

**Comparative Evaluation of *Scylla* species from two fishery conservation areas of East coast of Andhra Pradesh, India.**

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**Abstract:** The documentation of crab landings especially commercially important *Scylla* species is needed for assessment of landings of crabs and their seasonal availability for better management. These crabs are serving either as live, fresh, boiled, steamed, chilled and smoked form at many popular restaurants. These species are commonly found in shallow coastal waters, lagoons, brackish water lakes, estuaries and mangrove areas. Crabs fishery study is essential to improve the population of crabs in respective areas. Hence the study was aimed to assess the crab's fishery resources of two species i.e., *S. serrata* and *S. olivacea* from two Coastal area of Andhra Pradesh i.e., Kakinada and Visakhapatnam District. The population structure of 2 *Scylla* species were investigated from January 2016 to December 2017. Maximum crabs were reported during the study period was caught from landing station Chollangi of Kakinada, East Godavari District and Bheemunipatnam from Visakhapatnam District. The crab landings were ranged as Chollangi > Tallarevu > Bhairavapalem > Mutlapalem in Kakinada whereas from Visakhapatnam district crab landings were ranged as Bheemunipatnam > Puddimadaka > Bangarammapalem > Visakhapatnam Harbour. The occurrence of wild seeds of these 2 species have been reported in these areas where they breed continuously at regular intervals. There is an indication of exploitation on the population due to over catching.

**Key words:** Mangrove, Population structure, Crab landings, assessment, *S. serrata*, *S. olivacea*.

**Introduction**

Portunid crabs (*Scylla* species) are found throughout the Indo-Pacific region. Mud crabs are highly desired in both the commercial and recreational sectors. The taxonomy of the *Scylla* species has long been controversial worldwide and has become a subject of great importance for carcinologists ever since the revision of the genus by (Estampador 1949) [4]. Adults crabs generally habitat within sheltered estuaries, Mangrove forests and Mud flats. Mud crabs are nocturnal feeders and usually remain in the protection of their burrow during the day time emerges out in the early evening. Mud crabs of genus *Scylla* de Haan, 1833 (Crustacea: Decapoda: Brachyura: Portunidae) are an important crustacean resource for commercial fisheries and aquaculture industries in coastal areas of the Asian countries, including Bangladesh [13]. Now-a-days *Scylla* species are commercially important in aquaculture and capture fisheries trade, it creates a huge interest in fishery resources in East coast of Andhra Pradesh, India. Several aspects of aquaculture of mud crab

species have been the basis of intensive research during the last two decades[15].

The data on the crab landings is essential to make out the contribution of crabs to Indian economy. Local evaluations across Southeast Asia were also conducted following Keenan *et al.*, (1998) taxonomic review to reveal the actual species occurring locally in India [11]. Economically, they are considered as cooking delicacy and are among the most valuable components of human diet. Fluctuations have been noticed in the marine fish landings from year to year and these are due to fishery independent factors such as salinity, temperature and anthropogenic pollution. To avoid exploration sustainable management measure to be taken to ensure replenish the stock in potential fishing grounds. Fisheries in India particularly marine fisheries sector have shown a tremendous progress in recent years. However, its abundance and catch are not scientifically documented since the marketing process involves

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typically from the fishermen to a dealer, then automatically either to the live market, then to a grocery store or a restaurant for consumers to purchase. Some may even engage in exporting with high price. Environmental and economic assets but largely neglected and are subjected to encroachments.

This paper views the resources potentials, marketing and economic aspects of 2 *Scylla* species i.e., *S. serrata* and *S. olivacea* in East Godavari district and Visakhapatnam district of Andhra Pradesh, India. The revision of Keenan *et al.*, (1998) on the taxonomy of the genus *Scylla* using as external morphology, genetic variations, and multivariate analysis of morphometric characters was less controversial.

## Materials and Methods

### Study Area:

The study was conducted at 4 landing stations which includes Chollangi (Coringa) Mutlapalem, Tallarevu and Bhairavapalem areas of Kakinada,

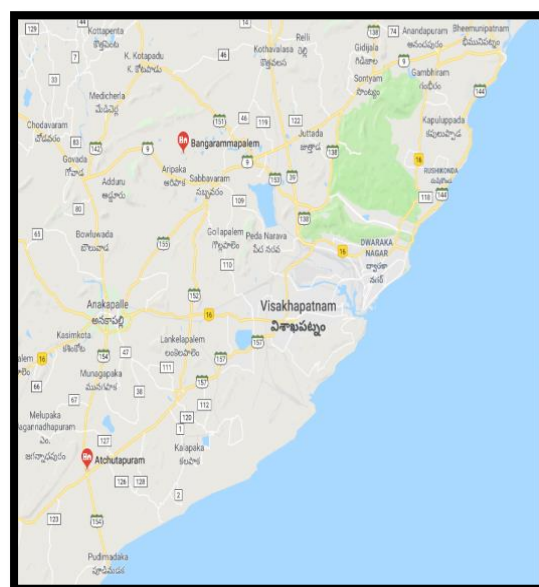
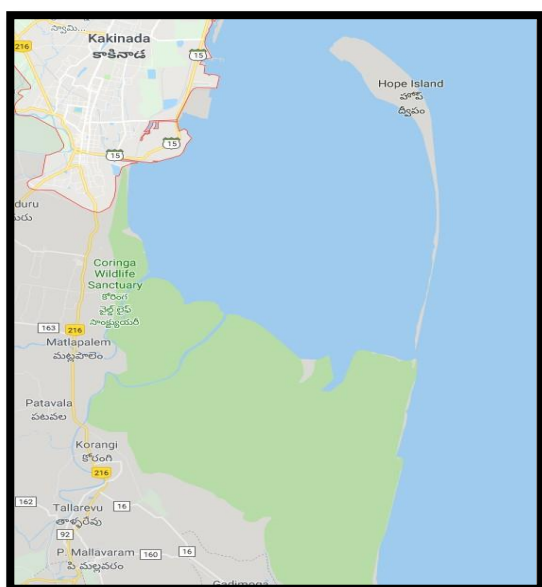
East Godavari district (Fig. 1) and Visakhapatnam Harbour, Bheemunipatnam, Bangarammapalem and Puddimadaka of Visakhapatnam district (Fig. 2) Andhra Pradesh, India. The latitude and longitude of following stations were given in Table 1 and Table 2.

**Table 1:** Landing Stations from Kakinada, East Godavari District

Landing Stations	Latitude	Longitude
Chollangi	16.8743°N	82.2339°E
Mutlapalem	16.8552°N	82.2325°E
Tallarevu	16.7819°N	82.2325°E
Bhairavapalem	16.7384°N	82.3116°E

**Table 2:** Landing Stations from Visakhapatnam District

Landing Stations	Latitude	Longitude
Visakhapatnam Harbour	17.6831°N	83.2399°E
Bheemunipatnam	17.8875°N	83.4456°E
Bangarammapalem	17.8128°N	83.0882°E
Puddimadaka	17.4927°N	82.0028°E



**Figure 1:** Landing Stations of East Godavari District **Figure 2:** Landing Stations of Visakhapatnam District  
Source of maps: Google maps

Crab fishing takes place in the channels and fringes of mangrove areas (Fig.3). Fishermen boats venture into mangrove during night to capture the live crabs. (Fig.4 and Fig.5).



**Figure 3:** Mangrove Forest at Tallarevu



**Figure 4:** Weighing the captured crab



**Figure 5:** Captured Crabs in live condition

#### Identification of Species:

Mud crabs are embodied with a lot of variation in coloration, size, spination and habitat etc. and this contribute to ambiguity surrounding their identification. Study clearly indicated that the green morph of India mud crab was *S. serrata*, while the brown one was *S. olivacea*. The species being identified as *S. serrata* is *S. olivacea* and that being identified as *S. tranquebarica* is *S. serrata*. It is possible that those specimens which had been identified as *S. tranquebarica* may be the juveniles of *S. olivacea* [12]. All the chelipeds, legs, and abdomen had no obvious polygonal pattern. Shape and height of the frontal lobe spines were rounded and low, respectively. Artisonal fishermen firstly identify crab burrow which were extended between the roots of mangrove trees. It is throughly disturbed by proding the burrows with the pole. It

will sometimes come out directly or pulled out using the pole as support. Care needs to be taken by fishermen's not to get any injury by the ferocious crabs.

Out of three *Scylla* species occurring in Indian coastal waters validated by the taxonomic identification of Keenan *et al.*, (1998). Initially, identification was done by their color with the help of local fishermen's in the landing sites (Fig 6-16). The presence of sharp and blunt spines on the Elbow and claws were considered as the major identification key to differentiate both the species for the present research study. Both the male and female crabs were differentiated by their abdominal flaps. The local name for the species in the study area for *Scylla serrata* was "Pasupupeta" and *Scylla olivacea* as "Pachapeta". They call the male crab as "Pothupeta"





**Figure 6:** *S. serrata* female frontal view



**Figure 7:** *S. serrata* female dorsal view



**Figure 8:** *S. serrata* male dorsal view



**Figure 9:** *S. serrata* male frontal view



**Figure 10:** *S. olivacea* female dorsal view



**Figure 11:** *S. olivacea* female frontal view



**Figure 12:** *S. olivacea* male frontal view

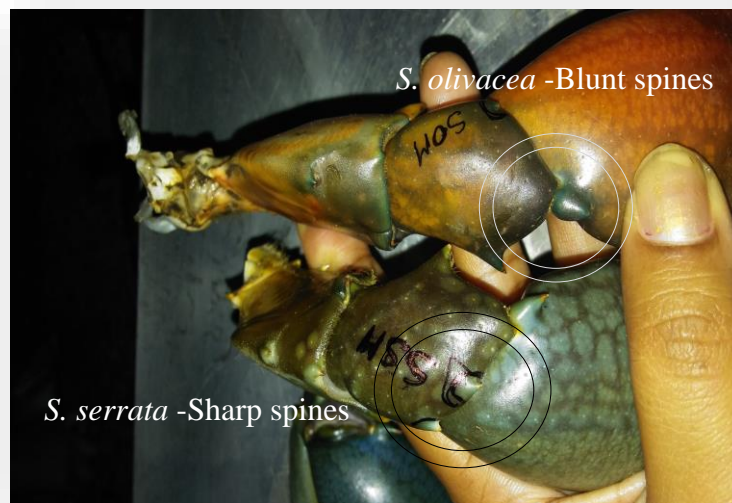


**Figure 13:** *S. olivacea* male dorsal view

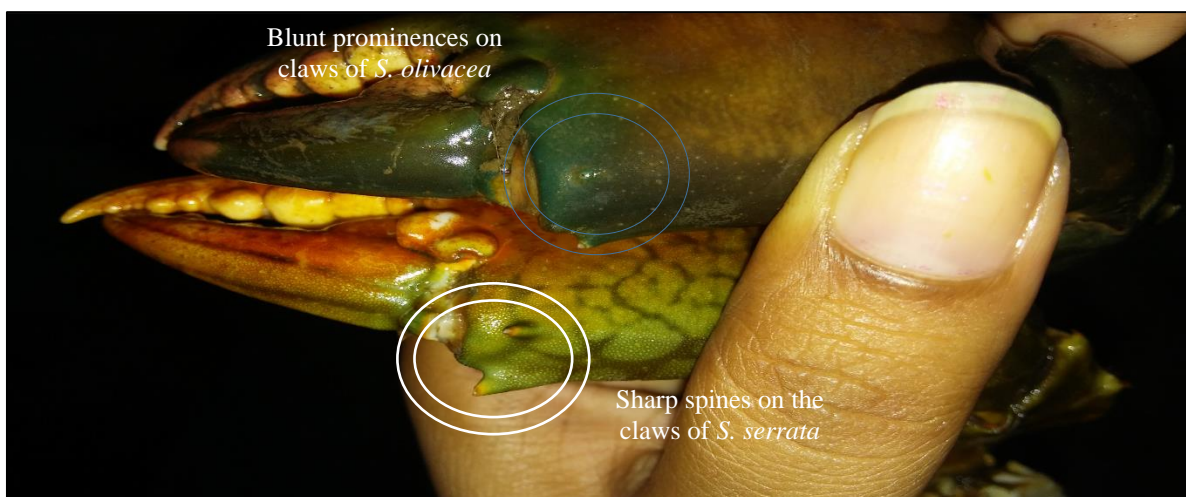
**Difference between *S. serrata* and *S. olivacea* (Fig. 14, Fig. 15 & Fig. 16)**



**Figure 14:** *S. serrata*



**Figure 15:** *S. serrata* and *S. olivacea*



**Figure 16:** Spination on Claws of both the species



**Crab Fishery Data:**

Crabs are fished throughout the year in the study areas. The capture fishery data was surveyed in the above said landing stations of coastal Andhra Pradesh. For this purpose, crab catch estimation and the observation of crab landing areas have been done. Counting of baskets was taken into consideration of the availability of male and female crabs of both the species. The abundance of crabs was also recorded from the total crabs landed during the study period.

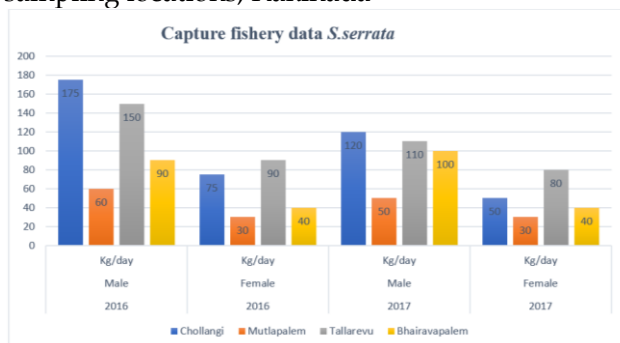
**Results and Discussion****Crab fishery:**

Mud crabs are fished throughout the year in Kakinada, East Godavari district. The capture fishery data of *S. serrata* and *S. olivacea* were recorded for every fortnight during the study period 2016-2017. The data was clearly mentioned in Table 3 and Table 4.

**Table 3:** Capture fishery data of *S. serrata* from Kakinada, East Godavari district

Landing Station	2016	2016	2017	2017
	Male Kg/day	Female Kg/day	Male Kg/day	Female Kg/day
Chollangi	175	75	120	50
Mutlapalem	60	30	50	30
Tallarevu	150	90	110	80
Bhairavapalem	90	40	100	40

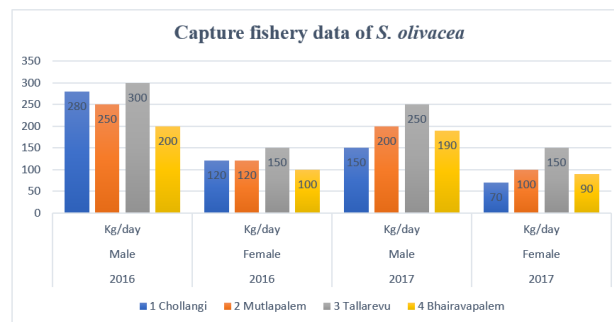
In the present study, there is maximum catch of *S. serrata* was reported at Chollangi (Fig.17) and minimum at Matlapalem during the months of June to September.

**Figure 17:** Comparision of capture of *S. serrata* at 4 sampling locations, Kakinada

In the present study, there is maximum catch of crab was reported at Tallarevu (Fig.18) minimum at Bhairavapalem during the month of during the month of June to September.

**Table 4:** Capture fishery data of *S. olivacea* from Kakinada, East Godavari District

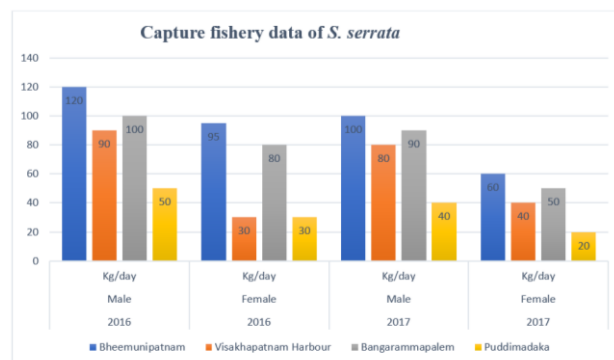
Landing Station	2016	2016	2017	2017
	Male Kg/day	Female Kg/day	Male Kg/day	Female Kg/day
Chollangi	280	120	150	70
Mutlapalem	250	120	200	100
Tallarevu	300	150	250	150
Bhairavapalem	200	100	190	90

**Figure 18:** Comparision of capture of *S. olivacea* at 4 sampling locations, Kakinada.

Mud crabs are fished throughout the year in Visakhapatnam district. The capture fishery data of *S. serrata* and *S. olivacea* were recorded for every fortnight during the study period 2016-2017. The data was clearly mentioned in Table 5 and Table 6

**Table 5:** Capture fishery data of *S. serrata* from Visakhapatnam District (Kg/day)

Landing Station	2016	2016	2017	2017
	Male Kg/day	Female Kg/day	Male Kg/day	Female Kg/day
Bheemunipatnam	120	95	100	60
Visakhapatnam Harbour	90	30	80	40
Bangarammapalem	100	80	90	50
Puddimadaka	50	30	40	20

**Figure 19:** Comparision of capture of *S. serrata* at 4 sampling locations, Visakhapatnam.

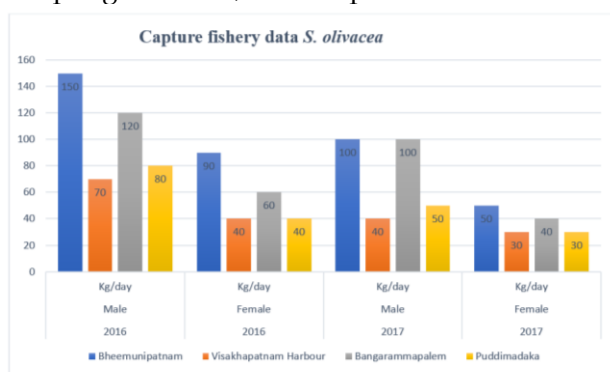
In the present study, there is maximum catch of crab was reported at Bheemunipatnam (Fig.19)

minimum at Visakhapatnam Harbour during the month of June to September.

**Table 6:** Capture fishery data of *S. olivacea* from Visakhapatnam District

Landing Station	2016	2016	2017	2017
	Male Kg/day	Female Kg/day	Male Kg/day	Female Kg/day
Bheemunipatnam	150	90	100	50
Visakhapatnam Harbour	70	40	40	30
Bangarammapalem	120	60	100	40
Puddimadaka	80	40	50	30

**Figure 20:** Comparison of capture of *S. olivacea* at 4 sampling locations, Visakhapatnam.



In the present study, there is maximum catch of crab was reported at Bheemunipatnam (Fig. 20) minimum at Visakhapatnam Harbour during the month of June to September.

## Discussion

The current study of crab landings especially commercially important crabs is need of the hour to get clear picture about the landings of *Scylla* species and also their seasonal availability for better management and national development. In India, the crab fishery is small scale and is based mainly on capture fishery. Surface currents change seasonally depending on the northeast monsoon (December–February) and the southwest monsoon (June–September) [3,14]. The male crabs were more in number when compared to female crabs in both the species during the study period. Crab fishery in India is yet to be recognized as a major fishery despite the abundant occurrence of edible crab all along the Indian coast. It has wide distribution, occurring abundantly along both east and west coast of India [9]. In India, mud crabs are reported from the estuaries of the rivers of Ganga, Mahanadi, Krishna and Cauvery and the brackish water lakes viz., Chilaka and Pulicat on the east coast, the estuaries of Narmada and Tapi and the brackish waters of Kerala on west coast. They are

also found to inhabit the mangrove regions of Andaman and Nicobar Islands, Andhra Pradesh, Tamil Nadu and Kerala [1]. *S. serrata* is characterized with pointed frontal lobes, two spines on the outer margin of the Elbow and claws of crabs. These morphological characters of mud crab were identical with that of *S. olivacea* and displayed distinct differences from that of *S. serrata* described by Keenan [8]. The capture fishery was more abundant in East Godavari District due to conversation area of Coringa Mangroves. The approximate extent of mangroves habitat is 55ha which cover the area extended from Visakhapatnam port to Visakhapatnam Airport [18]. Urbanization and improper conservation of Mud swamps was one of the reasons for minimal crab fishery resource at Visakhapatnam District. In Visakhapatnam urbanization and industrialization damaging the natural mangrove fields. Lately, the airport expansion, port-based industries leading to destruction of mangrove swamps [10]. Existing crab fishery of India is not commercially developed as in the other countries from a comparison of present exploitation and evaluation of the potential crab resources of different regions. It would appear that there is a scope for developing the fishery into a major resource for nation. The mud crab plays an important role in the national economy by earning from export [5]. *Scylla* species have greater demand and fetch a higher price because of their delicacy, larger size and amphibious nature (live commodity). From the scientific point of view, it is essential that intensive investigations on improved fishing technique on the farming of suitable varieties of crabs and on various biological aspects.

The ecology ties between mangroves and adjacent environments can serve as a key for sustainable management. Fishing communities should be involved in the use of environment friendly technologies to enhance crab production. Taxonomic identification *S. serrata* and *S. olivacea* are the most common species occurring in India, based on the of Keenan *et al.*, [17]. *S. olivacea* and *S. paramamosain* are characterized by single spine on the outer margin of the carpus of the cheliped [7]. Fishery landing reports are important contributors in countries economy in terms of household income employment and exports. About 2.5 - 3.00 lakh people are directly involved in crab value chain [6]. The natural crab seed (crab lets) which are captured naturally from mangrove mud swamps were maintained by man-power providing trash

fish meat as food source at artificial lagoons at Visakhapatnam District. The Mangrove swamps and salt marshes are located at North- Eastern part of Visakhapatnam is characterized by swamps and wetlands are of inter tidal in origin, have embodied Eastern Ghats ridges, which are abutting the Sea (Bay of Bengal) in the eastern side [16]. Conversion of mangrove forests and waterways for pond aquaculture will continue in some countries as depletion of natural stocks drives the need to increase dependence on farmed seafood [2]. Aquaculture is another major threat, being interlinked with both deforestation and overexploitation of fisheries resources. Possible conservation measure to be taken to increase the crab landings and to make it availability throughout the year by large scale destruction of young crabs would obviously have adverse effect on the crab resources [19]. The wetlands and mangroves of Puddimadaka were associated with back waters of intertidal zone.

## Conclusion

The present study confirms that the crab landings were more at Kakinada, East Godavari district than Visakhapatnam district due to proper conservation of mangrove forest (Coringa). Even though availability of Mud crabs were throughout the year there was a peak range from June to September. More need to be done to educate people aware of management plans to conserve natural marine resources to avoid exploitation of the crab landings.

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## References


1. Anil, M. K. 1997. Studies on the fisheries and culture prospects of mudcrab (genus *Scylla* de Haan) along the Kerala coast. Ph. D. Thesis. Cochin University of Science and Technology, 213 pp
2. Alongi, D.M. (2002) Present State and Future of the World's Mangrove Forests. *Environmental Conservation*, 29, 331-349. <http://dx.doi.org/10.1017/S0376892902000231>
3. Chatterjee, A., Shankar, D., McCreary, J. P., Vinayachandran, P. N., & Mukherjee, A. (2017). Dynamics of Andaman Sea circulation and its role in connecting the equatorial Indian Ocean to the Bay of Bengal. *Journal of Geophysical Research: Oceans*, 122, 3200–3218. <https://doi.org/10.1002/2016JC012300>
4. Estampador, E. P., Studies on *Scylla* (Crustacea: Portunidae), 'T'. Revision of the genus, *Philippine J. Sci.*, 78 (1949) 95-108.
5. JAHAN. H. and ISLAM, M.S. 2016. Socio Economic performance of live crab (*Scylla serrata*) business in the southwest coastal region of Bangladesh, *International Journal of Fisheries and Aquatic Studies* 4(1): 453-457.
6. Keenan CP, Davie PJF, Mann DL. 1998. A revision of the genus *Scylla* de Haan, 1833 (Crustacea: Decapoda: Brachyura: Portunidae). *Raffles Bulletin of Zoology*, 46(1):217-245.
7. K. Swain, P & Rama Rao, N & Pattanaik, Chiranjibi. (2009). Mangrove forest cover of Visakhapatnam coast is under threat. *Current science*. 97. 1112-1113.
8. MPEDA 2011. Breakthrough in mudcrab (*Scylla serrata*) seed production by Rajiv Gandhi Centre for Aquaculture (RGCA), MPEDA, Tamil Nadu, Newsletter, p. 13-14.
9. Mandal, A., Varkey, M., Sobha, S. P., Anjali, K. A., Gopalakrishnan, A., Kumaran, G., Sethuramalingam, A., Srinivasan, P. and Thampi-Samraj, Y. C. 2014a. Molecular markers reveal only two mudcrab species of Genus *Scylla* (Brachyura: Portunidae) in Indian coastal waters. *Biochem Genetics*, 52: 338-354.
10. Overton, J. L., Macintosh, D. J. & Thorpe, R. S., Multivariate analysis of the mud crab *Scylla serrata* (Brachyura: Portunidae) from four locations in South-east Asia, *Mar. Biol.*, 128 (1997) 55-62.
11. P. Lakshmi Devi, Aneykutty Joseph, Anup Mandal, Alphy Korath. On the systematics of genus *Scylla* De



- Haan, 1833 of cochin backwaters, a South Indian estuary. J. Bio. Env. Sci. 10(2), 1-15, February 2017.  
<https://innspub.net/ijbes/on-the-systematics-of-genus-scylla-de-haan1833-of-cochin-backwaters-a-south-indian-estuary/>
12. Rizal S, Damm P, Wahid MA, Suñdermann J, Ilhamsyah Y, Iskandar T, *et al.*, General circulation in the Malacca Strait and Andaman Sea: A numerical model study. Am J Environ Sci. 2012; 8(5):479-88.
  13. Subhashini, K., Hareesh Chandra, P., Govinda Rao, N., Radha Krishna, J., Solomon Raju, A.J. and Purnachandra Rao, S. "An observational Study on the Status of Mangrove Cover at Visakhapatnam" in Advances in Pollen Spore Research Vol. XXXI (2013): 113-134.
  14. Suseelan, C., R. Marichamy, M. K. Anil and R. Salhladhas 1995. Mud crab culture. Technology transfer series 3.
  15. Sattar Abdul S. (1998): Status of Wildlife in the Saline Marsh and Swampy Habitats of Visakhapatnam Coastal Environment. Dissertation submitted to Andhra University, pp 10, 21.
  16. Shaji, M., Quinitio, E. T., Samraj, T., Kandan, S., Ganesh, K., Kumar, D., Arulraj, S., Pandiarajan, S., Ismail, S. and Dhandapani, K. 2006. Seed production of mud crab *Scylla serrata* at the Rajiv Gandhi Centre for Aquaculture, Tamil Nadu, India. *Aquacult. Asia*, 11 (1): 17-21.
  17. Sangthong, P. and A. Jondeung, 2006. Classification of three crab morphs in genus *Scylla* using morphometric analysis. Kasetsart J. National Sci., 40: 958- 970.
  18. Varadharajan D, Soundarapandian P (2012) Commercially Important Crab Fishery Resources from Arukkattuthurai to Pasipattinam, South East Coast of India. J Marine Sci Res Dev 2:110. doi:10.4172/2155-9910.1000110
  19. Wan Roslina Wan Yusof, Fasihuddin Badruddin Ahmad, and Mummedy Swamy, "A Brief Review on the Antioxidants and Antimicrobial Peptides Revealed in Mud Crabs from the Genus of *Scylla*," Journal of Marine Biology, vol. 2017, Article ID 1850928, 7 pages, 2017. <https://doi.org/10.1155/2017/1850928>.

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