

A STUDY ON THE PRAWNS OF ASHTAMUDI BACKWATERS IN KERALA WITH SPECIAL REFERENCE TO PENAEIDS

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ABSTRACT

Fifteen species of prawns were recorded from Ashtamudi backwater system which included one species of sergestid, five species of carideans and nine species of penaeids. The penaeid prawns were chiefly represented by juveniles of *Penaeus semisulcatus*, *P. indicus*, *P. latisulcatus*, *Metapenaeus dobsoni* and *M. monoceros*. While *M. dobsoni* and *P. indicus* were the dominant species in most parts of the backwaters, *P. semisulcatus* occurred more abundantly in some of the deeper areas having relatively higher salinities (9.42-32.11%). *P. latisulcatus* formed one of the common components of the catches taken during the post-monsoon period. *Parapenaopsis stylifera*, the most dominant species contributing to the marine fishery of this area, was encountered only in stray numbers.

Commercial exploitation and population characteristics of the juvenile penaeid prawns in these nursery areas are briefly discussed.

INTRODUCTION

While many of the marine forms utilise backwaters and estuaries as their nursery grounds some freshwater species migrate to this area for breeding purpose. For proper exploitation and management of the prawn resources, it is essential to have a clear understanding of the extent of their dependence on these ecosystems. The Ashtamudi backwater system in Kerala is the second largest of its kind in the state, next to Cochin backwaters. Although extensive studies have been carried out for the past two decades on the recruitment and biology of prawns of the latter environment, the Ashtamudi has virtually remained neglected all these years in spite of the fact that its adjacent coastal waters have emerged as the most productive grounds for prawns in the country (George et al 1980). A survey was therefore undertaken in November 1979 and April 1980 to study the prawns of these backwaters and the results are reported here with special emphasis on the penaeid prawns which support the lucrative marine fisheries of the area.

THE AREA AND METHOD OF SURVEY

The Ashtamudi is a palm-shaped brackishwater system, having 'eight branches' as the name implies, situated in Quilon District between Lat. 8.45'-

9.28°N and Long. 76.28°-77.17°E. With a total extent of about 32 Km² water area, it also forms an estuary of River Kallada and remains connected with the sea throughout the year.

The present survey was mainly based on experimental prawn fishing in different areas of the backwaters (Fig. 1) using a try-net measuring 4 metres of

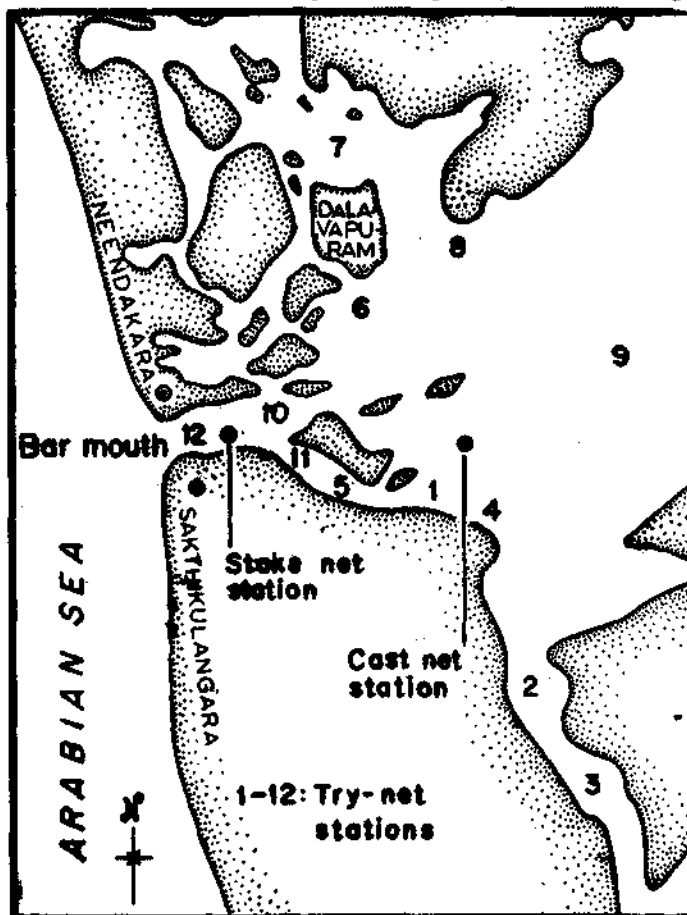


FIG. 1.A - Topography of Ashtamudi backwaters; B - Study area and sampling stations

overall length and 5.4 metres of head-rope and foot-rope lengths, with mesh size of 8 mm throughout. The net was operated against the tide with the help of a 30-foot motor boat (24 h.p.) and each haul was taken for 10 minutes duration. Information such as bottom conditions, depth and salinity of the water were also recorded from the area of sampling. A total of twelve hauls were taken, the first two hauls during November 1979 and the rest in April 1980 (Table 1). The prawn catches of commercial nets were also examined. The samples collected were sorted out into species-wise size composition. The size of the prawn refers to total length measured from the tip of rostrum to the tip of telson.

The salinity values recorded from the different sampling stations are shown in Table 1. Salinity varied from 8.12 ‰ to 32.43 ‰ during the sampling period. Mathew and Nair (1980) also observed similar range in salinity in this backwater system.

TABLE 1. Details of try-net fishing in Ashtamudi backwaters.

Serial number of hauls taken	Date	Time (hours)	Salinity ‰
1	22-11-1979	1400-1410	14.10
2	23-11-1979	1200-1210	9.42
3	28-4-1980	1220-1230	15.23
4	28-4-1980	1310-1320	17.10
5	28-4-1980	1350-1400	30.26
6	28-4-1980	1450-1500	14.36
7	28-4-1980	1525-1535	8.52
8	28-4-1980	1600-1610	8.55
9	28-4-1980	1640-1650	8.12
10	29-4-1980	0915-0925	32.50
11	29-4-1980	0945-0955	32.11
12	29-4-1980	1040-1046	32.43

Out of the twelve try-net hauls taken, the tenth haul did not yield any catch and the twelfth one damaged the net. In all the other hauls, prawns were present in varying degrees of abundance. Altogether fifteen species of prawns were recorded, including 1 species of sergestid, 5 species of carideans and the following 9 species of penaeids:

- Penaeus indicus* H. Milne-Edwards
- Penaeus monodon* Fabricius
- Penaeus semisulcatus* de Haan
- Penaeus latisulcatus* Kishinouye
- Penaeus canaliculatus* (Oliver)
- Metapenaeus dobsoni* (Miers)
- Metapenaeus monoceros* (Fabricius)
- Metapenaeus affinis* (H. Milne-Edwards) and
- Parapenaeopsis stylifera* (H. Milne-Edwards)

Except for the stray occurrence of the sergestid and caridean shrimps, the try-net samples were mostly composed of penaeid prawns. The haul-wise catch composition and overall size distribution of important species are shown in Tables 2 and 3, respectively. It can be seen that the penaeid prawn population was chiefly represented by *P. semisulcatus*, *P. indicus*, *P. latisulcatus*, *M. dobsoni* and *M. monoceros*. In general, species like *Penaeus semisulcatus* are noticed to prefer areas of slightly higher salinities in this backwater system. *Penaeus indicus* and *Metapenaeus dobsoni* occur in all the areas irrespective of salinity difference.

Penaeus semisulcatus: The green tiger prawn *P. semisulcatus* is considered to be a less common species in the west coast of India, although it has a flourishing

TABLE 2. Numerical abundance of penaeid prawns in the try-net hauls.*

Species	Serial number of hauls									
	1	2	3	4	5	6	7	8	9	11
<i>P. semisulcatus</i>	288	225	23	20	39	2	—	1	2	89
<i>P. indicus</i>	36	67	1	15	11	10	9	25	23	—
<i>P. latisulcatus</i>	36	6	—	—	—	—	—	—	—	—
<i>P. canaliculatus</i>	—	—	—	—	1	—	—	—	—	2
<i>P. monodon</i>	—	—	—	—	—	1	1	—	—	1
<i>M. dobsoni</i>	120	338	—	—	3	35	47	43	192	—
<i>M. monoceros</i>	—	3	—	1	—	2	5	2	8	—
<i>M. affinis</i>	1	—	—	—	—	—	—	—	—	—
<i>P. stylifera</i>	1	—	—	—	1	—	—	—	—	2
Total	481	639	24	58	55	50	62	71	225	94

* The 10th haul did not yield any catch and in the 12th the net was damaged

TABLE 3. Size distribution of important species of prawns in the try-net catches.

Size groups in mm	<i>P. semi-sulcatus</i>	<i>P. indicus</i>	<i>P. latisulcatus</i>	<i>M. dobsoni</i>	<i>M. monoceros</i>
11-15	3	1	—	1	—
16-20	20	9	—	8	—
21-25	41	8	—	39	—
26-30	31	19	—	51	—
31-35	26	21	—	55	3
36-40	16	23	6	19	1
41-45	18	18	14	5	1
46-50	24	12	13	7	4
51-55	28	14	6	4	—
56-60	27	6	2	2	3
61-65	19	5	—	—	1
66-70	10	2	—	—	2
71-75	6	5	—	—	—
76-80	2	2	—	—	—
81-85	1	6	—	—	—
86-90	—	1	—	—	—
91-95	—	2	—	—	1
Total numbers measured	272	154	41	191	16

fishery in some parts of the east coast. Surprisingly enough it was noticed that in the try-net collections this species formed nearly 40% by number and ranked first in terms of weight during the months of sampling. Its occurrence was also found to be more in the southern deeper areas (2-3 m depth) where the bottom was muddy, mixed with plenty of fine black sediments. The salinity of the water was also relatively high (9.42-32.11 ‰) in this part of the backwaters when compared to the interior shallow areas. As could be seen from Table 2, the yield per try-net haul was remarkably high during November, while the catch dwindled off by April. The size ranged from 11 mm to 85 mm, but the bulk of the catch was constituted by the size group 16-70 mm. Smaller juveniles measuring 21-30 mm predominated during November, thereby indicating that active recruitment of the species into this habitat might have taken place during the beginning of the North East monsoon.

Penaeus indicus: This species was recorded from all the areas sampled and formed about 11% of the total collection. Its size ranged from 12 mm to 95 mm with majority of the prawns belonging to the size group 26-55 mm. According to Rao (1980) early juveniles of this species occur in large quantities in the nearshore areas of these backwaters and predominates in the population occupying within 2 metres depth.

Penaeus latisulcatus: Fairly good number of the juveniles of this species (36-60 mm) were recorded during November. In the subsequent survey, however, it was totally absent from the catch. This is one of the very rare species of penaeid prawns reported from Indian waters (George 1969, 1979; Mohamed and Rao 1971) and does not support any commercial fishery either in the marine or estuarine regions of the country.

Metapenaeus dobsoni: Juveniles of *M. dobsoni* popularly known as 'thelli chemmeen,' are the most abundant in the neighbouring backwaters and estuaries. In Ashtamudi backwaters, over 45% of the try-net catch was contributed by this species and ranked first among the penaeid prawns in terms of number. Like *P. indicus*, this was encountered at all salinity realms of the ecosystem. Its overall size range was 11-58 mm, but the bulk of the catch was contributed by the size group 21-35 mm. In November the samples were almost exclusively made up of smaller size groups indicating active recruitment of the species around this period. While studying the seasonal distribution of prawn seeds of Cochin backwaters, Suseelan and Kathirvel (1980) noticed that early juveniles of this species, below 35 mm size, occur in maximum abundance during August-January.

Metapenaeus monoceros: Present in the samples in poor numbers, this was represented by the size group 31-70 mm.

Other species such as *P. canaliculatus*, *P. monodon*, *M. affinis* and *P. stylifera* were extremely rare in the try-net collections.

Commercial exploitation

Prawns were exploited commercially from all over the backwaters using stake nets (Fig. 2), cast nets and dip nets, of which the former two were important. There were about 585 stake nets and 200 cast nets under operation at



FIG. 2. Stake nets in Ashtamudi backwaters

TABLE 4. Details of prawn catch by commercial nets.

Particulars	Canoes observed				
	Cast nets		Stake nets		
	1	2	1	2	3
Date of observation	22-11-1979	23-11-1979	29-4-1980	29-4-1980	29-4-1980
Prawn catch (Kg)	4.5	5.0	8.0	3.0	3.5
Number of nets	1	1	7	8	5
Average catch of prawns/net (Kg)	4.50	5.00	1.14	0.38	0.70
Species composition in percentage by weight:					
<i>P. semisulcatus</i>	60.5	40.0	6.2	5.0	4.0
<i>P. indicus</i>	38.0	57.0	62.6	45.2	40.0
<i>M. dohsoni</i>	*	*	25.0	47.6	40.0
<i>M. monoceros</i>	*	*	5.0	2.1	5.0
Other penaeids	2.5	3.0	1.2	1.0	1.0

* Included in 'Other penaeids'

the time of this investigation. Table 4 shows the catch details and species composition of prawns obtained by these nets. The areas of fishing from where observations were taken are indicated in Fig. 1. The castnet catch, which amounted to 4.5-5.0 kg/unit for an effort of about 4 hours fishing in the forenoon was mainly constituted by *P. semisulcatus* and *P. indicus*. The stake nets were operated in the night during low tide period and the catch per unit of effort for prawns ranged from 0.38 kg to 1.14 kg/net. The catch consisted of more number of species than in the castnets, the dominant being *P. indicus*, *M. dobsoni*, *P. semisulcatus* and *M. monoceros* in the order of their abundance. The size range of *P. indicus* in the commercial catch was 68-133 mm, the major size group being 86-120 mm for castnets, and 81-96 mm for stake nets. In the case of *P. semisulcatus* the size ranged from 65 to 128 mm, with relatively smaller prawns (71-90 mm) dominating the castnet catches during November. *M. dobsoni* was chiefly represented by the size group 41-55 mm while the size range was 38-57 mm in the stakenet fishery.

REMARKS

The study reveals certain interesting facts. *P. semisulcatus* has not been so far recorded as a major constituent of the prawn catch from any of the brackishwater environments. According to Yasuda (1956) juveniles of the species measuring 3.2 to 17.0 mm in carapace length live in areas of the sea where *Zostera marina* are growing. However, in the present study no such correlation was evident. The large concentration of juveniles of this species and the occurrence of the King prawn *P. latisulcatus* in appreciable numbers in this backwater system would suggest that it is an ideal nursery ground for these species. Abundant resource of the young ones of *P. semisulcatus* also shows the possibility of the existence of a good breeding stock in the adjoining sea where the adult prawns have recently started appearing in the commercial catches in minor quantities. It is however strange that in comparison with the abundance of juveniles of the species in the lake, the occurrence outside is limited. *P. stylifera*, the most dominant species contributing to the marine fishery of this area, was encountered only in stray numbers in the backwaters, in confirmation with the habit of the species. However, year-round sampling of these waters is necessary to determine whether this ecosystem is the major source of replenishment for the exploited prawn stock of the adjacent inshore areas.

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REFERENCES

- GEORGE, M. J. 1969. Prawn fisheries of India, II. Systematics-taxonomic considerations and general distribution. *Bull. Centr. Mar. Fish. Res. Inst.*, 14: 5-48.

- GEORGE, M. J. 1979. Taxonomy of Indian prawns (Penaeidae, Crustacea, Decapoda). In 'Contributions to Marine Sciences', dedicated to Dr. C. V. Kurien, 21-59.
- GEORGE, M. J., C. SUSEELAN, M. M. THOMAS AND N. S. KURUP. 1980. A case of over-fishing: Depletion of shrimp resources along Neendakara coast, Kerala. *Mar. Fish. Infor. Serv. T & E Ser.*, 18: 1-8
- MATHEW, THRESIAMMA AND N. BALAKRISHNAN NAIR. 1980. Phytoplankton of the Ashtamudi Estuary, Kerala. *Indian J. Mar. Sci.* 9: 253-257.
- MOHAMED, K. H. AND P. VEDAVYASA RAO. 1971. Estuarine phase in the life of history of commercial prawns of the west coast of India. *J. mar. biol. Ass. India.* 13 (2): 149-161.
- RAO, P. VEDAVYASA. 1980. Penaeid prawn seed resource in the estuaries and backwaters of Karnataka and Kerala. *Mar. Fish. Infor. Serv. T & E Serv.* 20: 9-11.
- SUSEELAN, C. AND M. KATHIRVEL. 1980. Prawn seed calendars of Cochin backwater. *Proc. Symp. Coastal Aquaculture; Mar. biol. Ass. India, Cochin* (in press).
- Y.SUDA, J. 1956. Shrimps of Seto Inland Sea of Japan. *Proc. India-Pacif Fish Counc.*, 6th Session, Section II & III: 378-386.