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EXPLOITED FISHERY RESOURCES OF THE VEMBANAD LAKE PART - III. CLAM FISHERIES

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ABSTRACT

The molluscan fishery of the Vembanad lake is exclusively sustained by the black clam *Villorita cyprinoides* (Gray). The modal class of the clams exploited from the lake is represented by 15-19 mm & 20-24 mm. The exploited quantity of black clam from the lake during July 1988 to June 1989 is estimated as 7025.06 tonnes. The average annual catch per hectare of the lake is worked out at 333.72 kg whereas that of clam bed area as 4490 kg. The peak clam landing is registered during the months of May and October. 47.43% of the clam exploited from the lake is accounted from the southern sector (Thanneermukkom to Alleppey) and 52.57% from the northern sector (Cochin to Thanneermukkom). The annual catch/ha is 296.86 kg in the north and 386.99 kg in the south. The catch/clam bed area in the two sectors are of the order of 5392.45 kg/ha and 3786.39 kg/ha in the northern and southern regions respectively. 5.51% of the northern sector and 10.22% of the southern sector sustained perennial clam beds. The clams obtained from the southern region has a modal size class of 20-24 mm in contrast to 15-19 mm in the northern sector. The exploited clam resources of the lake showed a declining trend when compared to previous estimates.

Key-words: clam, fishery, Vembanad lake

INTRODUCTION

The Vembanad lake (Fig.1) situated in the state of Kerala (lat. 9°28′ and 10°10′ N and long. 76°13′ and 76°31′E) is the largest brackish water body in south India. It has a length of 60 km north to south from Cochin to Alleppey and an area of 21,053 ha. The completion of the Thanneermukkom barrier in the year 1976 has resulted in the separation of this lake into two entirely different ecosystems, retaining estuarine conditions in the northern sector or the downstream region (Cochin to Thanneermukkom = Cochin backwaters) and transforming the southern sector or the upstream region (Thanneermukkom to Alleppey) into a freshwater habitat. The molluscan fauna of this lake was studied by Preston (1916) and Cherian (1968). The available estimates of the clam resources of the Vembanad lake (Rasalam and Sebastian, 1976; Achary, 1987) are based on the data gathered from the co-operative societies. But there is virtually no literature available on the location and area of important clam beds, regional as well as seasonal variations in the catch and size group of the population constituting fisheries. An attempt was, therefore, made to gather data on these aspects especially with reference to the salt water barrier commissioned at Thanneermukkom across the lake. This work was undertaken as a part of an inves-

tigation envisaged under the Indo-Dutch Co- operation programme on the Kuttanad Water Balance Study Project (1987-90).

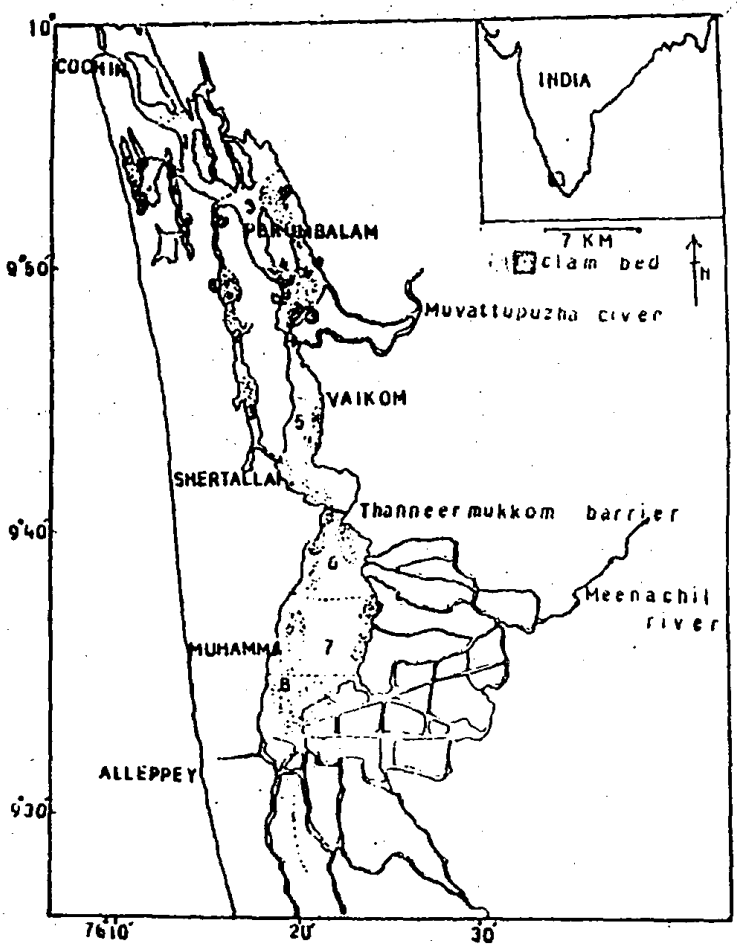

Fig. 1. Vembanad lake showing fishing zones and black clam beds.

MATERIAL AND METHODS

The estimation of the exploited clam resources of the lake was made on the basis of the data gathered from different types of clam fishing methods prevalent in the Vembanad lake. The catch data from the various clam fishing methods prevalent in clam bed (Fig.1), such as hand picking with the help of collection basket (Unda Vala or Kilungan), combing and heaping up of clam with tooth iron rake (Kolli or Varandi) and Kolli fitted with bag net were procured on a monthly basis during the regular survey cruises conducted from June 1988 to June 1989 using two boats, "Flying fish" and "Dutchman I" made available in the Indo-Dutch Co-operation programme on Kuttanad Water Balance Study Project. Based on the already available information on the physico-chemical conditions and fish fauna of the lake (Kurup and Samuel,

1987), the lake was apportioned into 10 zones, of which the presence of clam beds was noticed only from 8 zones (Fig.1). During the preliminary survey conducted in the month of June 1988, the clam beds of the lake extending from Cochin to Alleppey were identified and detailed information on various clam fishing methods prevalent in the lake were also gathered. This was followed by the regular monthly surveys when the clam beds of each zone were delineated and the area as well as depth were recorded. The total clam fishing units engaged in each end were observed for a continuous period of 24 hours (day and night). The total number of crafts and individuals engaged in the exploitation in each bed were enumerated and the catch from not less than 30% of the area as well as 500 assorted specimens of live clams were sampled from each unit for observation on bionomics. The period of fishing in respect of the observed catch and the total hours of fishing per day were also recorded. The daily landing of live clam from each bed was computed by applying the formula

$$w = (W/n) \times N$$

where W = total weight of clam,
w = total weight of clam recorded from the crafts sampled,
n = No. of crafts sampled and
N = total number of crafts enumerated from the bed.

The daily catch from all the beds of each zone were thus estimated and the monthly catch was computed by multiplying this with the total number of fishing days. With the help of a conductivity meter, salinity was recorded from fixed stations.

RESULTS AND DISCUSSION

Important beds of black clam: The presence of extensive clam beds (Fig.1) were noticed in regions where the lake bottom is sandy indicating that the species avoid areas where a high percentage of silt is prevalent. Important live clam beds of the different zones, their approximate area and depth are shown in Tables I & II. Among the zones of the downstream region, Zones IV and V have very good reserves of live clams where very hectic activity of clam collection was noticed on a regular basis. Zones VI and VII are in comparatively deeper areas of the lake and hence the collection of live clams, are confined to its peripheral portions.

Size group constituting fisheries : The size range of the exploited black clams varies from 9 to 59 mm (Fig. 2). Clams in the size groups above 35 - 39 mm and below 9 mm were very negligible in the catches. The modal size group constituting the fishery of the lake appears to be 15 - 19 mm. Next in the order of abundance is the size class 20-24 mm, followed by 10-14 mm. The size groups constituting the clam fishery over the different zones of the lake were analysed and the results are given in Fig.3. In Zone I where the clam beds exist in a semi enclosed part of the lake (Fig.1) with low saline conditions (Table I), the population mode has been noticed at 30 - 34 mm. In

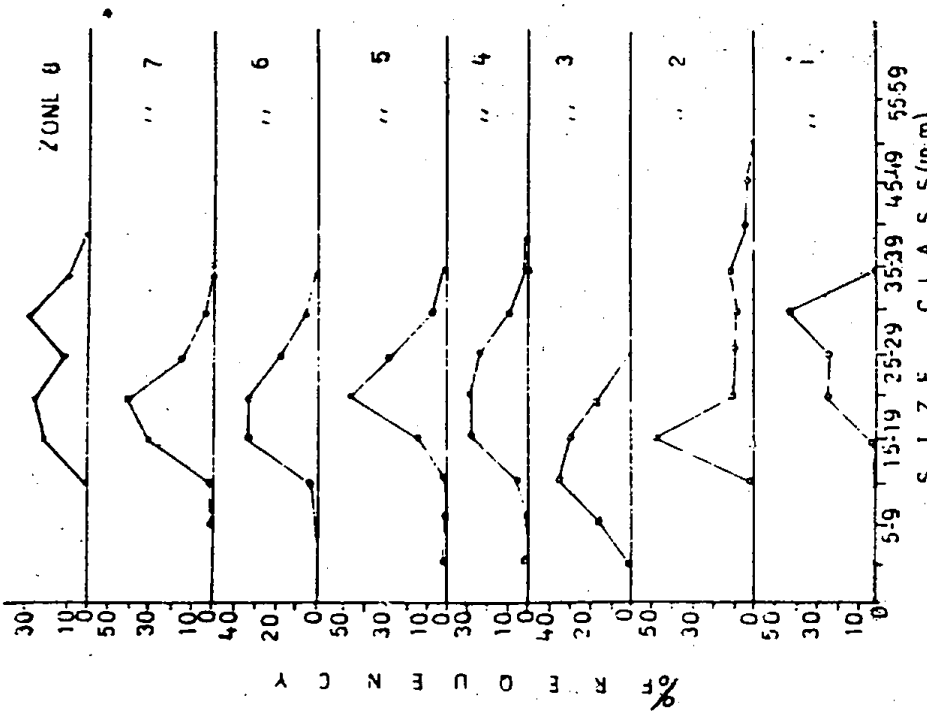

Fig. 3. Length frequency of black clams exploited from different zones.

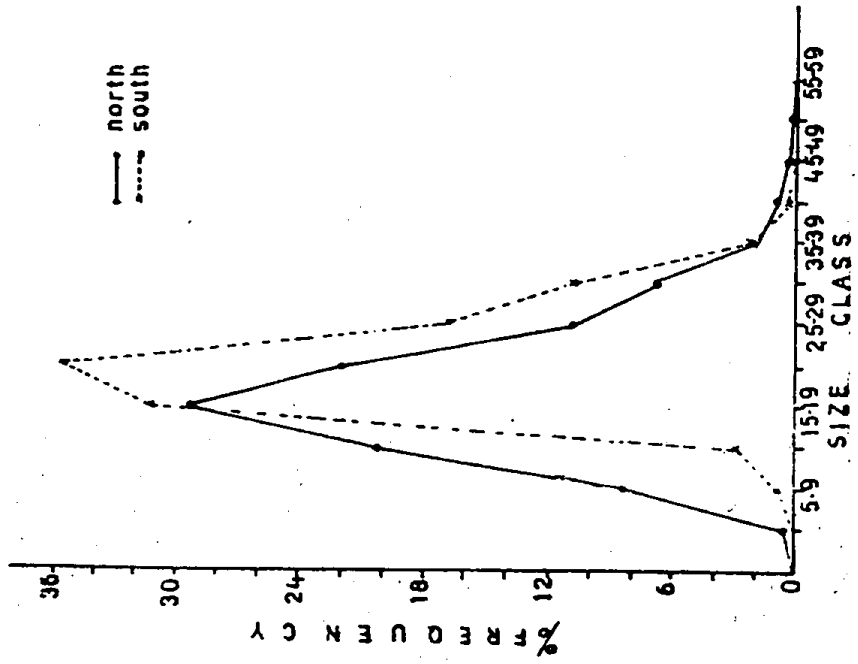

Fig. 2. Length frequency of black clams exploited from the downstream and upstream regions.

Table I – Important black clam beds of northern sector and zonewise clam production.

Zone	Name of the bed (Ref. Point)	Area (ha)	Depth (Mean) (m)	Salinity (ppt) Monsoon Jun-Sept	Post-mon. Oct-Jan	Pre-mon. Feb-May	exploited quantity of black clam (Tonnes)
I	1. Veluthully Kayal	20.00	3.0				
	2. Kumbalangi	17.5	2.70				
	3. Ezhupunna	8.00	3.0	0.5 - 4.0	3.0 - 7.0	6.0 - 17.0	
	4. Pandathu	7.5	3.60				
	Total	53.3					284.33
II	1. Thaikkattusserry	28.0	3.5				
	2. Eramelloor	12.0	4.0	0 - 7	0.5 - 18	9 - 23	
	3. Aroor	17.0	3.0				
	Total	57.0					739.05
III	1. Perumbalam north	30.0	2.0	0 - 8	6 - 18	12 - 18	475.74
IV	1. Perumbalamsouth	8.00	2.8				
	2. Nediathuruthu	32.00	3.5	Fresh	0.5 - 13	10 - 13	
	3. Chempu Kayal	110.00	2.75	water			
	4. Poochakkal	12.00	2.00				
	5. Manappuram	60.00	2.40				
	6. Anjuthuruthu	28.00	2.5				
	7. Murinjapuzha	40.00	3.75				
	Total	290.00					1560.86
V	1. Pallippuram-Thanneermukkom	120.00	2.20				
	2. Vaikom Jetty	80.00	3.45	Fresh	0 - 11	9 - 11	
	3. Vaikom electric tower	55.00	3.5	water			
	Total	255.00					633.85
	Total area of clam beds	685.00					3693.83

Table II – Important black clam beds of southern sector and zonewise clam production.

Zone	Name of the bed (Ref. Point)	Area (ha)	Depth (Mean) (m)	Salinity (ppt) Monsoon Jun-Sept	Post-mon. Oct-Jan	Pre-mon. Feb-May	exploited quantity of black clam (Tonnes)
VI	1. Vechoor	55.00	1.75				
	2. Pathiramanal north	42.00	2.25	Fresh	Fresh	0.5-4.0	
	3. Kayippuram-Kannankara	36.00	2.30	water	water		
	4. Thanneermukkom	4.00	4.0				
	5. Puthenkayal	28.00					
	Total	165.00					582.71
VII	1. Muhamma	210.00	2.15	Fresh	Fresh	0.5-2.5	
	2. Kumarakom	15.00	2.35	watre	water		
	3. Kavanattinkara	50.00	2.50				
	Total	275.00					977.68
VIII	1. Aryad	440.00	2.0	Fresh water	Fresh water	0.5-2.0	1771.63
	Total area of clam beds	880.00					3332.02

Zones II and III where higher salinities prevail (Table I) the modal value is exhibited by the size groups 15 - 19 and 10 - 14 mm respectively. Interestingly, in Zone IV, the size groups 15 - 19 mm, 20 - 24 mm and 25 - 29 mm were found almost equally abundant. In Zone V, however, a single mode is visible at 20 - 24 mm. The shifting of modal values to 20 - 24 mm is very evident in Zones IV to VII. Zone VIII stands apart from all other zones due to the presence of a population mode with highest size class at 30 - 34 mm and another minor mode at the size class 20 - 24 mm. The clam fishery of the southern sector is constituted by the modal class 20 - 24 mm in contrast to 15 - 19 mm of the northern sector (Fig. 2).

Estimates of live clam production : The annual catch of live clam from the lake from July 1988 to June 1989 is estimated at 7025.86 T and the corresponding catch/ha of the lake as computed at 333.72 kg. The total area of live clam beds of the lake is estimated as 1565 ha (Tables I & II) and the annual yield estimates show that maximum quantity is encountered in Zone VIII, followed by Zone IV; the lowest being in Zone I. The annual catch/ha over the different zones are depicted in Fig. 4 which shows that the highest annual catch/ha of the lake is recorded from Zone IV, followed by Zone VIII and the lowest from Zone I.

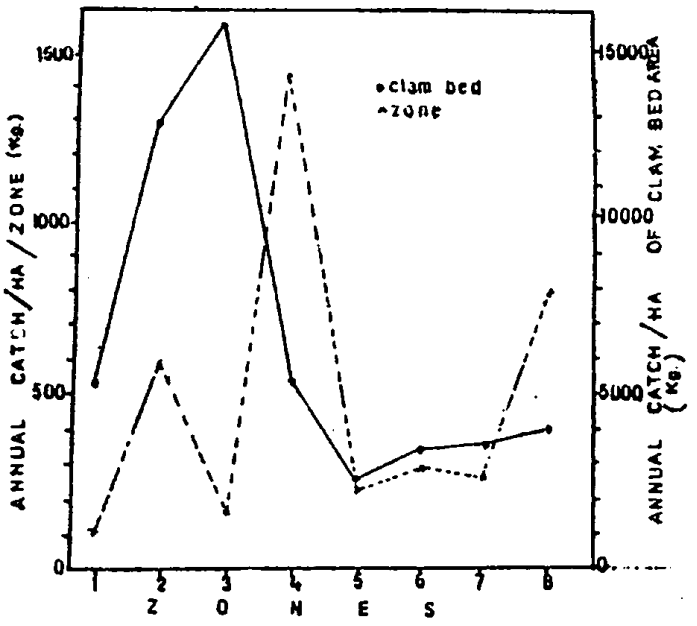

Fig. 4. Annual catch/ha of black clam from different zones.

The monthly variation of the clam catch over different zones of the lake is depicted in Fig. 5 and the corresponding catch/ha values are shown in Fig. 6. In zones I and II, the highest landings were encountered in September and January respective-

ly, whereas in Zone III, it was during the month of November. In Zone IV, a distinct peak can be noticed in May, while in Zone V, the catch was very high during March, May and October. In zones VI to VIII, there was a gradual increase in catch from June onwards, attaining highest values during November - December months. The monthly variations of catch/ha values over different zones were almost in conformity with the above observations (Fig. 6).

Hornell (1921) indicated that the black clam (*Villorita* sp.) is not nearly so abundant in the lake as the backwater clam, its habitat being restricted to regions usually more distant from the sea than that of the latter. However, over the years it appears that a drastic change has occurred in the distribution and abundance of these species. Even though extensive beds of *Meretrix meretrix* (Linn.) and *M. casta* (Hanley) have been recorded from the northern parts of the lake in addition to *Villorita cyprinoides* (Gray) (Rasalam and Sebastian, 1976), their distribution is now confined to very narrow stretches along the high saline bar mouth area. Their niche in the lake seems to have been taken up by the black clam and the fishery of the lake is at present almost exclusively supported by this species.

The presence of black clam beds in the lake were noticed from those regions where the bottom salinity varied from 0 to 23‰. Although *V. cyprinoides* is reported to tolerate extreme salinity variations from 0.8 to 29.55‰ (Nair and Shynamma, 1975), the results of the present study revealed that the perennial abundance of this species was encountered only from those areas where bottom salinity values varied from 0 to 13‰. Similarly more than 80% of the clam beds were found to be situated in such regions of the lake where the prevailing bottom salinity was less than 13‰. Furthermore, during the present investigation, populations of *V. cyprinoides* in the highest size groups are found to be flourishing in very low saline (0-2‰) regions of Lower Kuttanad. The above findings may probably support the view expressed by Hornell (1921) that *V. cyprinoides* is purely a fresh water species and its presence in brackish water conditions, indicates a marked change in its habits and a reacquired tolerance for saline conditions. Nair (1975) reported faster growth in populations of *V. cyprinoides* inhabiting higher salinity regimes of the lake, showing its preference to high saline environments. This inference is, however, at variance with the present findings.

5.51% of the total area of the northern sector supports a regular live clam fishery in contrast to 10.22% of the southern sector. The catch per clam bed area in the two sectors is of the order of 5392.45 kg/ha and 3786.39 kg/ha in the northern and southern regions respectively. The marginally high values recorded from the down stream regions is due to the higher values obtained in Zone IV which in turn seems to attract more and more people from far off places to come to this zone for black clam collection. The commissioning of the Idukki hydropower project provided perennial flow of fresh water in the Muvattupuzha river which discharges into this region of

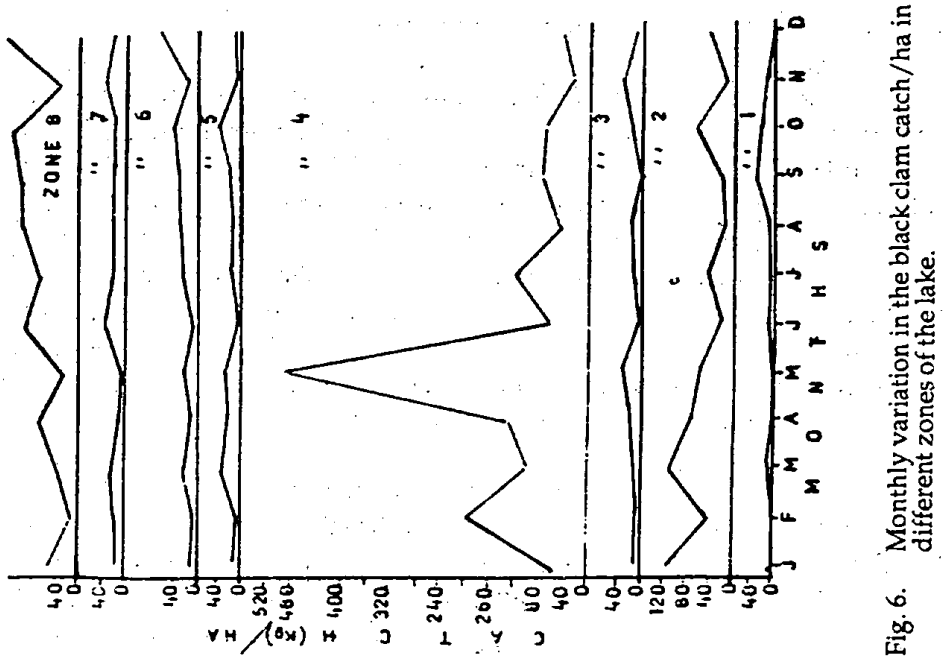

Fig. 5. Monthly variation in the catch of black clam in different zones of the lake.

Fig. 6. Monthly variation in the black clam catch/ha in different zones of the lake.

the lake. This has resulted in optimising the salinity requirements (0.5 - 13‰) of *Villorita cyprinoides*, thus providing a conducive environment (Hornell, 1921), for its growth and reproduction even during the pre-monsoon season.

The difference in catch of black clams during the premonsoon season between the two sectors may be due to the operation of the Thanneermukkom barrier. During the period from January to May, the shutters of the barrier are closed and hence the water level in the upstream areas of the lake gets increased. This makes clam picking, a difficult proposition. In comparison, in the downstream region the water level will be substantially lower, thus facilitating easy clam collection. Yet another factor which could also be responsible for the diference in production in monsoon season is that during this season the dredging operations south of the barrier ceases, enabling the fishermen to fish actively for the black clams. On the other hand, during the pre-monsoon period the dredgers will be in active operation.

A comparison with earlier reports show that the live clam resources of the lake exhibit a diminishing trend over the years. Rasalam and Sebastian (1976) reported that about 26,858 tonnes of live clams were fished from the Vembanad lake in 1968. Achary (1987) observed that the average annual clam production from the lake during the period from 1979 to 1984 was 21,490 tonnes. An analysis of the data furnished by him, shows a steady decline in production from 1983 onwards, reaching a value of 13,804.48 tonnes in 1984. During the present survey, the production has reached a very low value of 7202.86 tonnes. The present estimate from the northern region is 3693.83 tonnes, which forms only 35.86% of the quantity estimated in 1984 (Achary, 1987). However, in the southern region, the difference is very negligible showing a more or less stable replenishment rate. It is to be inferred, therefore, that the commissioning of the Thanneermukkom barrier has brought about no marked adverse effect on the black clam resources in the southern portion (Thanneermukkam - Alleppey) of the lake, unlike in the case of fishes and crustaceans as reported by Kurup, Sebastian, Sankaran and Rabindranath (1989). The low value obtained for the northern sector illustrates the declining trend in catch from the lake over the years. The increased fishing pressures and the resultant massive removal of the under-sized clams in the size group 10-14 mm may have contributed to the decline noticed. Further, the indiscriminate fishing practices using toothed iron rakes for combing the clam beds and disturbing spat settlement, pollution hazards from coconut husk retting grounds and industries, etc. might also have created adverse conditions resulting in the gradual depletion of this resource in the northern region.

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