Exploited Fishery Resources of the Vembanad Lake: Fishery Based on Pokkali Fields and Polders

B. Madhusoodana Kurup, M.J. Sebastian, T.M. Sankaran and P. Rabindranath
College of Fisheries, Kerala Agricultural University, Panangad, Kochi-682506

About 2164 ha of Pokkali fields adjacent to Vembanad lake are utilized for the practice of prawn filtration. The total annual production is 1613.0 t. The seasonal production in these fields varied from 170-1800 kg/ha and the average yield is computed as 745.4 kg/ha. The catches from Pokkali fields comprised of penaeids such as *Metapenaeus dobsoni* (66.59%), *Penaeus indicus* (19.%), *M.monoceros* (5.23%) and fishes (8.28%).Six polders namely, Mathikayal, Marthandom, Ranimangalam, C.Block, H.Block and Chithira with an approximate area of 3875 ha are utilized for trapping and holding of fishes in the lower Kuttanad region. The total production is computed at 65.1 t. The catches from the polders comprised of freshwater fishes (93.5%) and palaemonid prawns (6.5%).

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. The low-lying fields adjacent to the Vembanad lake, often reclaimed from the lake for paddy growing are traditionally used for trapping and growing of the naturally available seeds of fishes and prawns, on a seasonal basis. In the downstream regions of the lake (Kochi to Tanneermukkom), these impoundments are traditionally known as 'Pokkali fields'and the type of fishing as 'Prawn filtration'. The extensive 'Padasekharams' or polders lying adjacent to the lake at the lower Kuttanad region (upstream regions of the lake) are also used for trapping and growing fishes and palaemonid prawns during the inter-monsoon periods.Even though prawn filtration prevalent in the Pokkali fields of Kerala have received much attention in the past (Menon, 1954; Gopinath, 1956; Panicker and Menon, 1956; George, 1974 & 1978) no concerted attempt has so far been made to survey the Pokkali fields lying adjacent to the Vembanad lake with a view to assess the total extent currently utilized for prawn filtration practices and also to ascertain the production status. Moreover hitherto no effort was made to quantify the fishery resources raised from the polders. Hence an attempt was made to quantify the fish production from these two types of environments since it is dependent on the natural fishery resources sustained by the lake. This work was undertaken as part of an investigation envisaged under the Indo-Dutch co-operation programme on the Kuttanad water Balance study Project (1987-89)

Materials and Methods

A survey on the prawn filtration practised in the Pokkali fields of the downstream area and fishing by dewatering in the polders of the upstream region was conducted simultaneously with the fishery surveys (Kurup, *et al* ., 1989) of the respective zones (Fig. 1). An assessment was made on the total area of paddy fields in the study area currently employed for the above practices. Not less than 25% of the fields of each zone (Fig. 1) were visited during the period of operation and the catches were examined giving due importance to diversity and quantity of speices caught and size group constituting the catch. Information on season of operation, number of days operated/month, month and days of maximum catch, catch particulars and details

of paddy cropping were also collected from the owner/lessee.

Results and Discussion

The fishing in the pokkali fields are restricted to the postmonsoon season. During the monsoon season, when most of the soil bound salts are washed away by heavy rainfall, one crop of a salt-resistant variety of paddy locally known as 'pokkali' is cultivated in these fields. This is harvested by the end of September and therafter, these fields are leased out to prawn farmers for a period of five months from 15th November to 15th April.

The catches from the pokkali fields comprised of penaeid prawns (91.72%) and fishes (8.28%). *Metapenaeus dobsoni* constituted 40-89% (Mean: 66.59%) of the prawn catch, the majority of them being in the size range of 40-59 mm. The contribution of *Penaeus indicus* varied from 2-60% (Mean:19.9%) comprising both smaller (40-100 mm) as well as bigger (100-160 mm) specimens, the former constituting 55%. *Metapenaeus monoceros* contributed 3.9-25% (Mean : 5.23%) of the total production, and they were in the size range of 40-89 mm. The fish species consisted mainly of

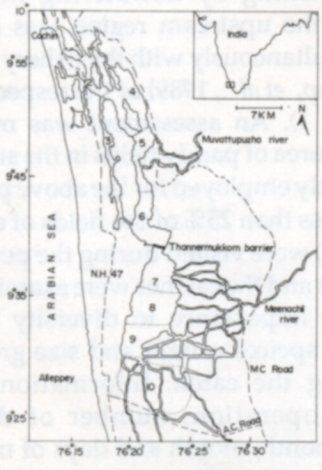

Fig. 1. Vembanad lake showing fishing zones

Sarotherodon mossambicus, Etroplus maculatus, E. suratensis, Ambassis gymnocephalus, Mystus gulio, Tachysurus subrostatus, Liza parsia and *Gerres filamentosus.* In general, the fishes were sparsely available in the regular catches from filtration during ebb tides. On the other hand, fishes showed a preponderance in the catches during the final harvest.

Regional variations were also encountered in the abundance and availability of the two predominant penaeid prawn species. The predominance of *M.dobsoni* was quite conspicuous in the fields at Kumbalam, Veluthully, Kannamali, Arookutty, Valanthakad, Perumbalam, Ulaveypu, Eramalloor and Kakathuruthu. In these regions the contribution of *P. indicus* was below 20%. In contrast, *P. indicus* contributed to more than 50% of the catch in a few fields located at Cheppanam, Maradu, Nettoor South (Kithankara) and Nettoor North.

It is estimated that about 2164 ha of Pokkali fields in the study area are currently utilised for prawn filtration. The average seasonal production is computed as 745.4 kg/ha (174-1800 kg/ha). The total production from the prawn filtration practices is worked out as 1613 t. The area currently used for prawn filtration under the different cruise zones and the respective production figures are summarised in Table 1. Virtually no pokkali field is seen in Zone 1,while zone II is endowed with very extensive prawn filtration units, situated either on the bank itself or somewhat in the interior, but well connected with the lake through intrinsic channels. The seasonal production varied from 173-1800 kg/ha. Those located at the Nettoor-Panangad region showed the maximum production among all the fields of the study area. In Zone III, the fields of the northern region of the Shertallai canal are more productive (225-1050 kg/ha) than

Table 1. *Pokkali fields surveyed and the estimated production*

Cruise Zone	Sub Zone	Region	Total area, ha	Area surveyed, ha	Mean production/ season/ha & range, kg	Total production, t
II	IIA	Thevara-Maradu Valanthakad	396	99.98	774.0 (406.0-1800.0)	306.5
	II B	Madavana-Panangad Aroor	158	77.53	859.1 (333.0-1463.0)	135.7
	II C	Thevara-Edacochin	210	12.00	792.0 (310.0-1410.0)	166.3
	II D	Edacochin-Kumbalangi Veluthully	900	205.19	805.0 (173.0-1350.0)	724.5
III	III A	Arookutty-Kakkathuruthu	168	67.22	739.0 (225.0-1050.0)	124.2
	III B	Kakkathuruthu-Sherthalai	260	95.28	407.8 (170.0-877.0)	105.8
IV	IV A	Panangad-South Parur	72	12.00	694.0 (420.0-900.0)	50.0
		Total	2164	569.20	745.4 (170.0-1800.0)	1613.0

those located farther from the barmouth (170-877 kg/ha). Even though zone IV is also endowed with extensive fields, prawn filtration is practised only in those fields situated at Panangad-Perumbalam-South Parur belt. From the data collected it is seen that the activity has become greatly diminished in these regions due to poor tidal influx. The seasonal production varied from 420-900 kg/ha. In zones V to X no prawn filtration was encountered during the course of the present investigation.

The Kayal lands which were reclaimed as Padasekharams or polders, located along the south-eastern boundary of the Vembanad Lake in the lower Kuttanad region are presently utilised for trapping and retaining fishes and prawns during the inter-monsoon season. These polders become flooded during the south-west monsoon months and consequently remain fallow till November. Alongwith the heavy flooding, the freshwater fishes of the rivers of the central Travancore migrate downwards and part of this stock gets trapped in these fields. When the floods subside to manageable levels the trapped fishes are prevented from escaping by repairing the outer bunds of the polders. They are then allowed to grow for a couple of months, till the end of September when the water level in the polders gets substantially lowered and extensive dewatering from the fields begin. In each polder 4-10 pumps are operated simultaneously and the pumped out water will be allowed to pass through a conical net. The dewatering is

continued over a period of 30-35 days. The fishes caught in the nets are removed daily. The final harvesting of fishes is done with the help of "ottal" or hand net.

The catches from the polders comprised of freshwater fishes (93.5%) and palaemonid prawns (6.5%). Among the fishes, a substantial portion is constituted by catfish species, such as *Heteropnuestes fossilis, Clarias batrachus, Ompok bimaculatus, Mystus malabaricus* and *Wallago attu.* The predominance of these species are noticed especially at the time of the final harvest. The daily catches mainly consist of *Puntius sarana, P.filamentosus, P. amphibius, Nandus mormoratus, Xenentodon cancilla* and *Hyporhamphus xanthopterus. Etroplus suratensis* and *E. maculatus,* are common components during both occasions. The palaemonid species are represented by *Macrobrachium rosenbergii* and *M. idella.*

Six polders, namely, Mathikayal Marthandom, Ranimangalam, C- Block, H-Block and Chithira (Table 2) are being utilised for trapping purposes, their approximate area being estimated at 3875 ha. The total production is computed at 65.10 t (Table 2). Highest production is recorded from 'Mathikayal'(24,000 kg) followed by 'H' Block and the lowest is from ' Chithira'.

The pokkali fields of the study area showed difference in the levels of production irrespective of their proximity to the barmouth. The fields which are located nearer to the barmouth are generally expected to show higher values of production than those situated away from it but surprisingly highest productions are encountered from fields located along Nettoor-Panangad- regions, about 7-8 km away from the barmouth. In these fields, the traditionally evolved method of growing paddy and prawns alternately is still practised. The stumps of the paddy crop help to increase the organic production of the fields apart from providing a substrate for settling down of the post larval prawns and thus

Table 2. *Total area and production of Polders used for trapping and retaining of fishes*

Cruise zone	Name of Polder	Area, ha	Mean production/ day & ranges, kg	Total production (30 days), kg
IX	Mathikayal	900	800.00 (400-1200)	24,000
IX	Marthandam	300	212.50 (70-400)	6,375
IX	Manimangalam	300	287.50 (160-680)	8,625
IX	'C' Block	500	220.00 (90-360)	6,600
IX	Chithira	375	175.00 (60-270)	5,250
IX	'H' Block	1500	475.00 (140-700)	14,250
	Total	3875	Total Production	65,100

offer a better biological environment for the growth of prawns.

The total extent of paddy fields used for prawn filtration in Ernakulam and Alapuzha districts of Kerala is estimated as 5500 ha (Anon, 1987). About 5117 ha of pokkali fields and low lying areas adjoining the Vembanad backwaters are used for prawn filtration (George, 1978). The annual production from these fields varied from 3000-5400 t (Gopinath, 1956). The production from pokkali fields showed significant variation from year to year. Menon (1954) estimated an average annual production of 1074 kg/ha during 1951-'53 in the seasonal fields of Vypeen island while Gopinath (1956) observed a slightly higher production rate of 1184 kg/ha during 1952-'55 from the same area. George *et al.* (1968) have estimated the production at 754 kg/ha from the seasonal fields of Mulavukad. The production from the fields of Vypeen island during 1969-'72 and 1977-'78 were estimated as 903 and 735 kg/ha respectively (George, 1974; 1978). During the present investigation the seasonal average production is computed at 745.4 kg/ha. It is to be inferred, therfore, that the production from pokkali lands has some what stablised around 700- 800 kg/ha during recent years. The availability and abundance of prawn larvae in the brackish water environment is related to the prevailing salinity conditions. In those years with prolonged monsoon showers, their availability may become delayed due to very low saline conditions, thus adversely affecting the prawn production. Further, most of the pokkali fields in the study area are getting transformed into prawn filtration grounds because of labour problems connected with pokkali cultivation, and lack of paddy cultivation results in reduction of organic production, which in turn affects the prawn production. It is pointed out that if filtration is done during every ebb tide it provides only very little time for the prawns to grow. Muthu (1983) is of the view that the postlarvae which enter the pokkali fields grow rapidly feeding on the rich food available there and these early juveniles do not show any inclination to escape from the pond during low tides. The urge for migration is shown by the prawns only when they are fully grown. According to Mammen (1984) this habit of staying back in the brackish water environment till attaining adult size shown by *P. indicus* can be profitably made use of for artificially stocking them in the pokkali fields even when prawn filtration is adopted.

Because of the predominance of juveniles and subadults in the catches, the bulk of the catch is often found unacceptable to the processing industries. Further, the small cod end mesh size of the prawn filtration net which varies from 9-11 mm, results in the destruction of fry and juveniles of these species to a great extent. 75.86% of *P.indicus* and 100% of *M.dobsoni* and *M.monoceros* caught by paddy field filter nets are below 100 mm in size (George *et al.*, 1974). The above authors are of the view that if the cod end mesh size is increased to 20-25 mm, about 75% of *P. indicus* caught will be above 100 mm.

Hitherto no attempt has been made to quantify the fishery resources obtained from the Padasekharams of the Lower Kuttanad region and hence a comparison is not possible. In most of these fields, paddy cultivation is carried out only once in an year and the fields remain virtually fallow after the harvest. During the post-harvest season there is a luxurient growth of floating aquatic weeds. The fish production of the Padasekharams can be substantially increased by adopting selective stocking of Indian major carp seed and growing them as a follow-up crop during the post-harvest season. This will also help in the eradication

of the aquatic floating weeds to a great extent. Experiments conducted on carp culture in the punja fields of the Kuttanad have shown encouraging results (Anon, 1981). It is found possible to raise a crop of fishes either as an alternative crop after the paddy harvest or simultaneously with the cultivation of water-tolerant varieties of paddy. The former practice is found to be easier and more profitable. Similar experiment conducted in the farming of *Macrobrachium rosenbergii* in the punja fields of the Kuttanad yielded a net profit of over Rs. 15,000/ha/$5^1/_2$ months (Anon, 1981).

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