

Seasonal and Spatial Variations in Fishing Intensity and Gearwise Landings of the Vembanad Lake

B.Madhusoodana Kurup, T.M. Sankaran,
P. Rabindranath and M.J. Sebastian

College of Fisheries, Kerala Agricultural University, Cochin-682506, India.

The variations noticed in the fishing intensity on an annual basis in the different regions of the Vembanad lake are discussed. Stake nets and dip nets accounted for 72.48% of the total landings, the former contributing to 53.14%. The contributions from gill nets, seines, cast nets, line fishing and other indigenous fishing methods are respectively 10.15, 9.68, 3.49, 2.54 and 1.66%. Stake and dip nets are almost confined to the northern sector (Cochin backwaters), contributing 57 and 20.7% respectively of the production. Seines and gill nets accounted for 8.5 and 8.3% respectively in this sector. In the southern sector (Thanneermukkom to Alleppey), the stationary gears are rarely noticed, the major part of the landings being obtained from gill nets (34.34%), seines (24.67%) and cast nets (19.04%).

Consequent to the commissioning of the Thanneermukkom salinity barrier in 1976, the Vembanad lake ecosystem became separated into an estuarine portion in its downstream regions or northern sector (Cochin backwaters) and a fresh water habitat in the upstream portions or southern sector (Thanneermukkom to Alleppey). The fishing methods employed for exploitation of finfishes and crustaceans of the lake were described by Gopinath (1953), Shetty (1965), Kurien & Sebastian (1982) and Kurup & Samuel (1985). However, no concerted attempt seems to have been made so far to study the seasonal and regional fishing intensity or to make an assessment of the gearwise landings.

Materials and Methods

From the data collected from the monthly fishery survey cruises conducted during 1988 and 1989 period (Kurup *et al.*, 1990) the fishing activity in each subzone of the 10 zones of the lake (Fig.1) was continuously monitored for a period of 24 h (day and night catches). The fishing methods of the lake were classified into 7 categories namely stake nets, dip nets, gill nets, seine nets, cast nets, lines and indigenous methods. The total number of units of similar gears operated in each sub-

zone were enumerated and the catches from not less than 30% units were examined. The period of fishing in respect of the observed catch and total hours fished per day, man power used per gear etc. were also recorded.

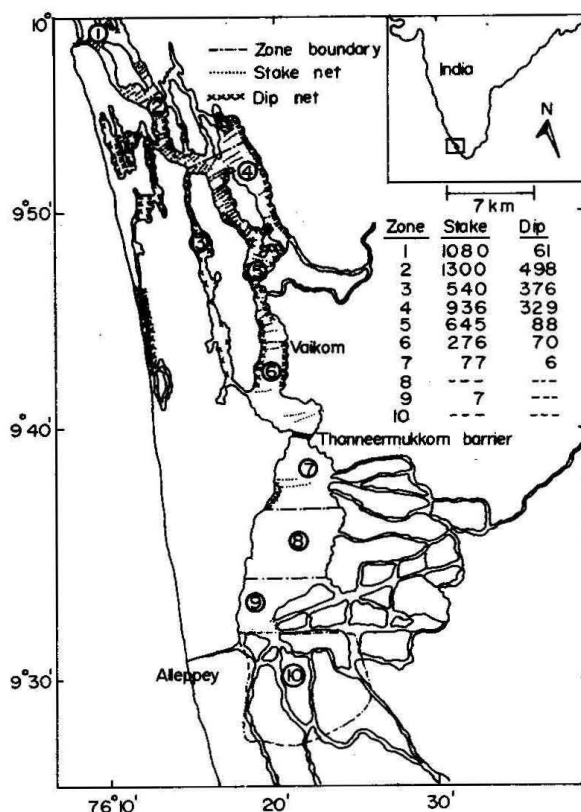


Fig. 1. Vembanad lake showing fishing zones and the location of stationary gears

In respect of stake nets, the total number of functional units in each subzone were ascertained and the number of hauls performed per day was also recorded. The daily landings from each category of gear was computed by applying the formula,

$W = (w/n) \times N$, where W = total weight of species, w = total weight of the species recorded from the sampled gears, n = number of gears sampled; N = total units of similar gears operated in the subzone.

Results and Discussion

4861 stake nets were found in the study area of which only 77 were located in the upstream regions (Fig.1). The number of hauls performed per month by the stake nets are given in Fig.2. Maximum number of stake nets were observed in zone II. 90% of the stake nets have a codend mesh size of less than 13 mm and 47% of these are below 8 mm. Stake nets are also illegally operated during the high tide periods by

planting temporary stake, locally known as "Tharachukettu" (Eattomkettal). The peak period of stake net operation in zones I - II occur during the pre-monsoon season while in zones IV - V its operation is partly suspended during this season (Fig.2). The closure of the barrier reduced the intensity of the tidal current in these regions and hence adversely affected the stake net fishery. Chinese dip nets are very abundant in the lower reaches of the estuary, which are operated round the year except during monsoon months. 1428 functional dip nets were observed in the study area, of which 6 are operated in the upstream regions (Fig.1). The number of dip nets operated/day in the different zones are depicted in Fig.2.

Among the 23 types of gill nets identified from the lake (Kurup *et al.*, 1989) "Ozhukku vala", "Neetu vala" and "Chemmeen vala" are extensively operated in the Cochin backwaters for penaeid prawns. More than 90% of *Etroplus suratensis* are caught from the upstream regions using "Karimeen vala" and "Idi vala". The number of gill nets operated per day in the different zones are given in Fig.3. Among the 8 types of seines identified (Kurup *et al.*, 1989) "Chemmeen koru vala" is extensively used during the pre-monsoon season in the Cochin backwaters for exploiting *Metapenaeus dobsoni*. Seine nets operated on a daily basis in the different zones are given in Fig.3.

In zones I - VI, a steep increase in the number of gill nets can be seen from February to May whereas no such distinct increase is noticed in the area beyond the barrier (zones VII - X). Among zones I - VI, the above trend is more pronounced in zones I - IV, which is due to the increased use of gill nets such as "Chemmeen vala" and "Ozhukku vala" and the seines - "Koru vala". In zones IV - VI, "Karimeen vala", "Koori vala" and "Meen vala" and "Ozhukku vala" are encountered only from February

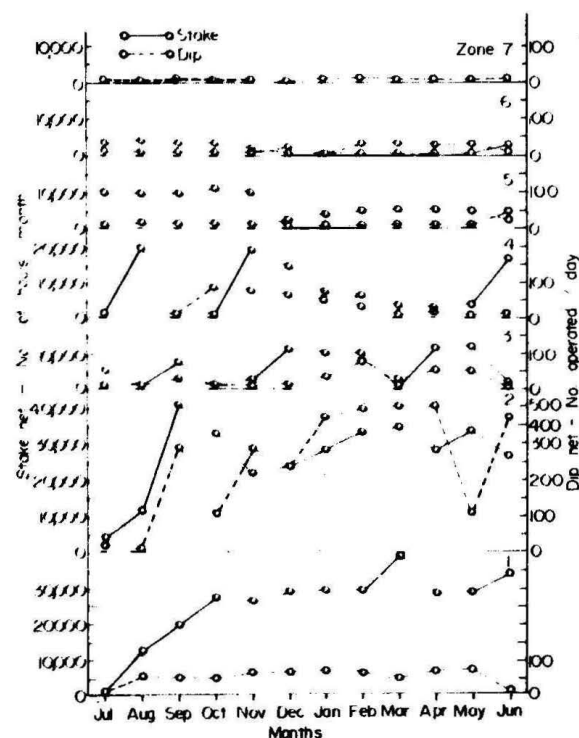


Fig. 2. Details of stationary gears operated in different zones of the Vembanad lake

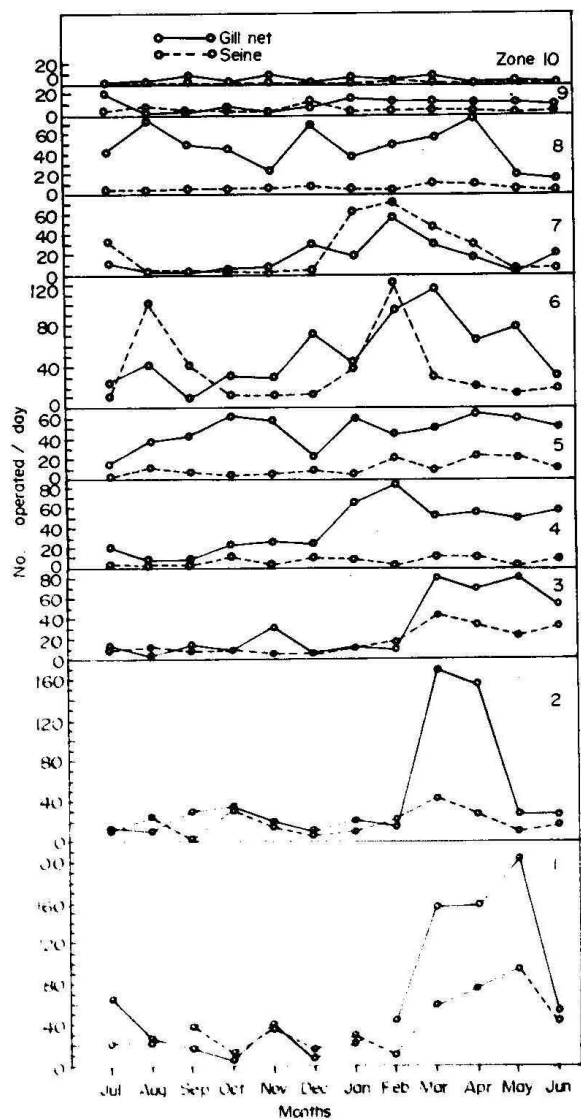


Fig. 3. Number of gill nets and seines operated per day in different zones of the Vembanad lake

to May. Very large number of "Kozhuva vala" are noticed in zones V & VI during January to April. Among the seines, the regular operation of "Pattukanni vala" and "Paithu vala" are observed in zones I - VI. The principal types of gears employed in the upstream region are "Karimeen vala", "Morasu vala", "Odakku vala" and seines such as "Peru vala" and "Koru vala". In zone VII, moderate numbers of "Vadi vala" (seine) could be seen during March - April.

5 types of cast nets are operated in the lake, which are specifically designed for

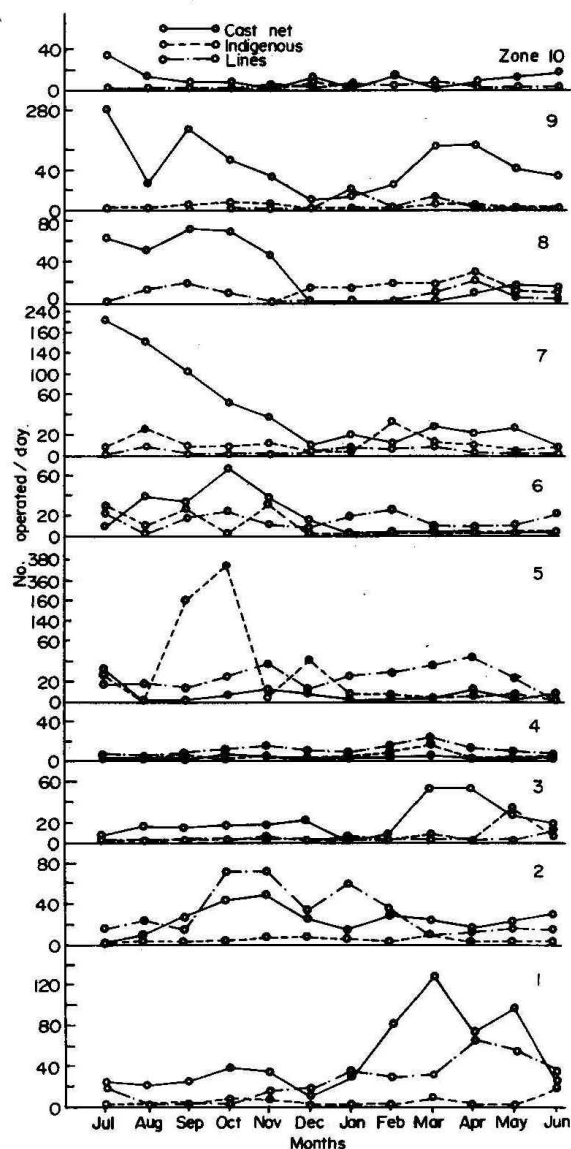


Fig. 4. Number of cast nets, lines and indigenous gears operated per day in different zones of the Vembanad lake

Penaeus indicus, palaemonids, pearlspot and other fishes. The variations in the intensity of cast net, line fishing and other indigenous fishing gears are depicted in Fig.4. The cast net fishing in zones VII - X commences by June, the activity gradually extending downwards to the other zones during succeeding months and lasts till November. 12 varieties of other indigenous fishing methods are employed in the lake, which are more pronounced in the upstream regions (Fig.4).

Landings from the two stationary gears, namely, stake nets and dip nets accounts for 72.48% of the total catches from the lake. Of this, the stake nets alone contributed 53.14% (3827.48 t) and the dip nets accounted for 19.35% (1393.34 t). Gill nets contributed 10.15% (730 t), seines 9.68%

percentage contribution varying between 29.7% in July to 79.02% in May. In zones III and IV, November to February appears to be the ideal season for stake net operation, whereas in zones V and VI, its operation seems to be restricted during July to November. Share of dip net catches in the

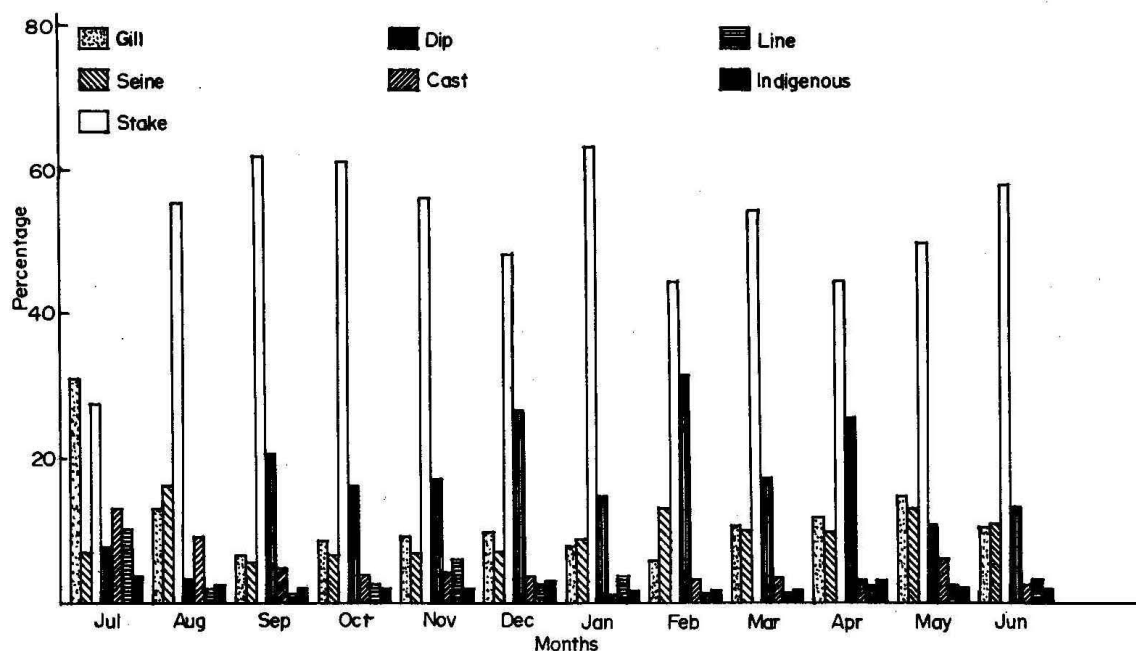


Fig. 5. Monthly variation in the landings from different types of gears and fishing methods

(697.05 t), cast nets 3.49% (251.18 t) and line fishing 2.54% (182.98 t). Other indigenous fishing methods accounted for 1.66% (119.36 t). The stake nets are operated during almost all the months contributing maximum share in the landings in January (63.56%), becoming greatly reduced during the monsoon months and recording the lowest in July (27.7%) (Fig.5). In zones I and II a major portion of the resources was obtained from the stake nets, 61.81% (1387 t) in the former and 59.48% (1581.98 t) in the latter (Fig.6). The contribution from this gear was found to diminish gradually in zones V to VII. A month-wise analysis of the data on the stake net landings in the different zones reveals that in zone I a maximum landing of 61.1% was obtained in January. In zone II, fishing by this gear was common throughout the year with the

lake varied from 3.33% (8.32 t) in August to 31.59% (322.52 t) in February (Fig.5). Bulk of the catches was obtained between January and April. In zone II it accounted for 28.41% (755.83 t) while in zone I the share was only 11.83% (265.78 t) (Fig.6). Sizeable quantities were obtained in zones III, IV and V where the catches recorded were 28.75% (155.83 t), 14.13% (95 t) and 24.56% (84 t) respectively. Dip net catches from zone VI were negligible. In zones I to II, heavy landings were reported during December to May, while in zones IV November to February showed the best landings by this gear. The dip net fishery of zones V and VI appeared restricted to periods between February to May.

Gill nets contributed between 5.76% and 31.26% of the lake's total catches. The highest landings were recorded in April

(102.44 t), followed by March (91.04 t) and the lowest in August (33.23 t) (Fig.5). Zone I recorded the highest share (178.75 t) followed by Zone III (135.1 t). In the former the gill net fishery is intended for penaeid prawns whereas in the latter it is used for the pearlspot. On an average 7.96% of the

seine net fishery in the different zones of the lake shows that in all the zones, except in IX and X, catches were high between January to May. In zone IX, it accounted for 33 to 45% on regular basis, with the maximum contribution during August (80.27%).

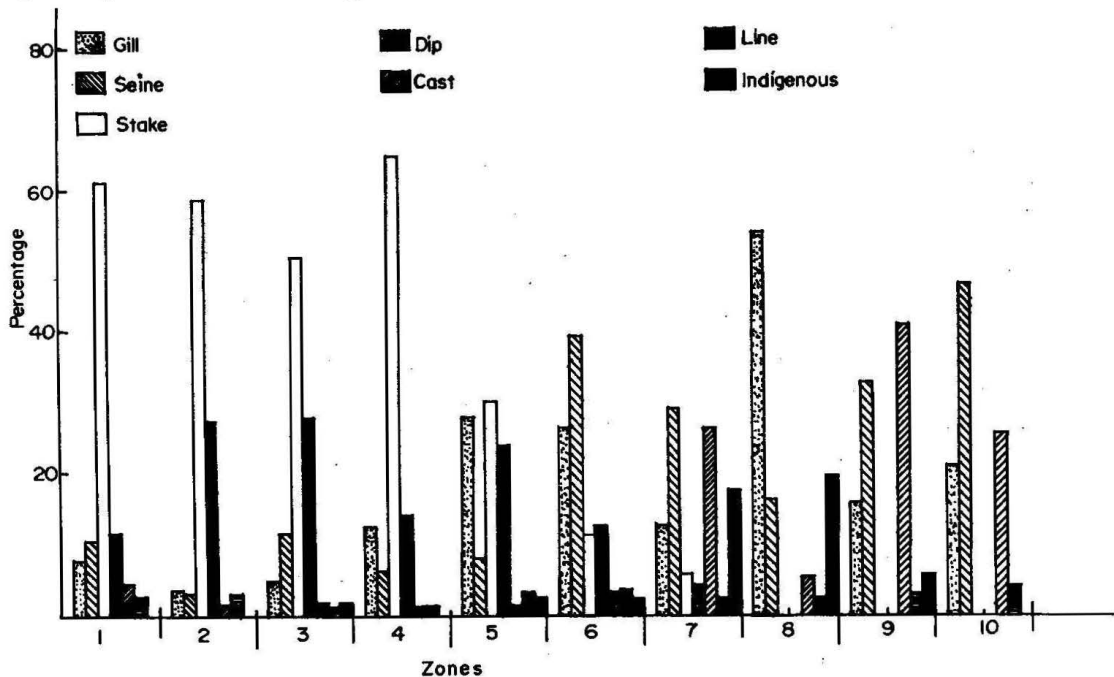


Fig. 6. Zone-wise variation in the landings from different types of gears and fishing methods

total catches in zone I was from gill nets, where hectic gill net fishing takes place from January to May. In zone II, highest landings were recorded during March and April but in zones III and IV gill net fishing increased gradually from December onwards and reached its peak during February and March. In zones VII and VIII gill net fishery exists during all the months, but it gets accelerated during December to February in the former and July to August in the latter. Seines accounted for 5.85 to 15.87% of the total catches of the lake. Highest landings were obtained in February (132.71 t) and the lowest in July (15.97 t) (Fig.5). Zone I accounted for the maximum landings (242.32 t), followed by zone II (98.37 t) and the lowest figure (92.73 t) was from zone VI (Fig.6). The seasonal variation in the

Cast nets contributed 0.63 to 12.87% of the total catches, showing high values in May (29.12 t), July (28.88 t) and a low figure in January (5.99 t). Catches were highest in zone I (95.76 t) and lowest in zone IV (0.82 t). Monthwise catches were invariably high during February to May in zones I to IV but no such clear trend could be seen in zone V. While in zones VI and VIII it was very active between July to November, in zones IX and X it existed on an year round basis. The share from line fishing varied from 0.37 to 10.54%, highest values being recorded in January (34.41 t) and November (30.76 t). Catches were very low in September (2.18 t). Highest catches from lines were obtained in zone II (75.8 t), followed by zone I (67.15 t). In zone X its contribution was very low (0.6 t). Fish-

ing with other indigenous gears and practices are common throughout the year with a high intensity during April (20.50 t), moderate in March (13.30) and low in August (4.4 t).

Fishing in Vembanad lake employ an incredibly complex array of fishing gears. The differences noticed in the fishing activity of the various zones have a direct bearing on the dissimilarity observed in the resource (Kurup & Samuel, 1985). Among the various categories of gears employed, about three-fourth of the landings are from stationary gears. Between the two types of fixed gears, stake nets accounted for more than 50% of the landings, which is comparable to the fixed bag net fishery of the Hooghly - Matlah estuarine system (Datta *et al.*, 1971). The stationary gears are almost entirely confined to the downstream regions of the lake, with maximum distribution in zones I and II. It is felt that blocking of the regions proximal to the sea with stationary gears, is inimical to the lake fishery, because they either indiscriminately filter out the incoming prawns and fishes irrespective of their size, or destroy outwardly migrating fishes such as *Mugil cephalus*, *Liza parsia*, *Chanos chanos*, etc.

In the down stream regions of the lake, the fishing methods and gears used are much diversified and they show both seasonal as well as regional variations. Very hectic fishing activity commences by January and reaches its peak by April - May. During the month of April, 205 units of gill nets and 107 units of seines were seen in operation on a daily basis in the main stream of zones I and II having a total area of 3000 ha. During the pre-monsoon season, the fishermen belonging to the upstream regions of the lake and from far off places like Quilon and Kayamkulam, migrate to the lower zones. They stay in these areas for a period of about 3-4 months and exploit the penaeid resources available in the

region. This type of fishing is comparable to the migratory fishery (Jhingran, 1985) of the Hooghly-Matlah estuarine system.

The authors gratefully acknowledge the assistance rendered by the following persons and agencies in carrying out this programme: Mr. S.N.Vipond, Project Director, Kuttanad Water Balance Study Project for providing the financial support; Mr.K.C.Churian, Computer Operator, K.W.B.S.P. for processing the data and to the Kerala Agricultural University for making available all the required facilities at the College of Fisheries, Panangad, Cochin.

References

- Datta, P., Laha, G.C. & Mitra, P.M. (1971) in *Symposium on Indian Ocean and Adjacent Seas*. 1971, MBAI, Cochin, 12-18 January (Abstract)
- Gopinath, K. (1953) *J.Bombay Nat.Hist. Soc.* 51, 446
- Jhingran, V.G.(1985) *Fish and Fisheries of India*. Hindustan Publishing Corporation (India) Delhi.
- Kurup, B.M. & Samuel, C.T. (1985) in *Proc.Symp. Harvest and Post-harvest Technology of Fish*, p.232, Society of Fisheries Technologists (India)Cochin.
- Kurup, B.M., Sebastian, M.J., Sankaran, T.M. & Rabindranath, P. (1989) *Exploited Fishery Resources of the Vembanad Lake*. Final Report Presented to Kuttanad Water Balance Study Project pp.142
- Kurup, B.M., Sebastian, M.J., Sankaran, T.M. & Rabindranath, P. (1990) *Mahasagar*, 23, 127
- Kurien, C.V. & Sebastian, V.O. (1982) *Prawn and Prawn Fisheries of India*. Hindustan Publishing Corporation (India).
- Shetty, H.P.C. (1965) *Proc. Natn. Acad. Sci. India*, 35, 115