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HOOKS AND LINE FISHERY FOR 'KALAVA' AT COCHIN

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ABSTRACT

The present paper deals with the hooks and line fishery mainly for Kalava, from the comparatively deeper areas of 75 to 125 m depth on the outer continental shelf off Ponnani, Cochin and Alleppey where the substratum is of hard rock with rocky outcrops; which is the habitat for rock cods and other perches. The hooks and line fishery for Kalava starts from late November or early December and extends to the end of March, when the sea is fairly calm and the waters clear. This fishery made its appearance at Cochin in the early eighties i.e. in 1982 when the catch was only 49 tonnes and the effort 157 unit operations which made a tremendous increase to a total catch of 827.8 tonnes in the year 1987 with an effort of 2,656 fishing trips. Perches or the Kalava formed 80.8% of the total hooks and line fish catch, the rest being formed by elasmobranchs, tuna, *Coryphaena*, seer fish etc.

INTRODUCTION

Hooks and line as a tackle for fishing was in vogue both along the west and east coasts from very early times. As early as 1916, Hornell has mentioned the prospects of line fishing in the grounds off Travancore coast. On the south west coast, from Colachal to Alleppey, fishing for perches with hand lines from indigenous canoes and catamarans during December to March was a regular annual phenomenon. Based on this experimental fishing using handlines on the Dory fishing principles, fishing was conducted along the Travancore coast by Gopinath (1954). The hook and line fishing made its appearance off Cochin, only in the early nineteen eighties. This gear being mainly used for fishing in the deeper waters, only the more daring and adventurous traditional catamaran fishermen from the south who are experts in this type of fishing are engaged. The Colachal fishermen started the operation of hook and line using mechanised boats with base at Cochin in 1982. By the year 1987, the total number of units operating from this base was 90. The pablo boats, which were engaged in fishing using drift gill nets, switched over to hooks and line fishing for Kalava from December to March when the sea was calm. The only additional investment required for converting into a hooks and line unit was in providing hooks and lines and also an insulated wooden fish holding box with capacity of hold upto 1 tonne of fish, costing around Rs. 600-800.

Since 1956, the erstwhile Indo-Norwegian Project conducted several fishing trips for survey of the Kalava grounds along the rocky patches lying in 70-150 metre depth zone on the continental shelf from Trivandrum to Cannanore (Menon and Joseph, 1969). Silas (1969) andTholasilingam *et al.* (1973) also gave accounts of the Kalava resources and the Kalava grounds on the south west coast based on investigations of R.V. *Varuna*. Sudarsan *et al.* (1988) in their studies of the demersal stock, state that in the area between 8° and 13°N along the west coast at

depth beyond 40 m, the percentage of perches vary from 0.5 to 10.3. Premalatha (1989), based on trap fishing by IFP vessels gives an account of the fishery and biology of rock cods from south west coast of India.

Material and Methods

Observations were made twice a week at the Cochin Fisheries Harbour where the hooks and line units landed. They landed on three days a week i.e. every alternate day except sundays. Sampling was done on two observation days a week to estimate the daily and monthly catch and effort. To estimate the monthly species-wise catch, the average weight of catch of different species per unit on observation day was multiplied by the number of units in observation on that particular day, and the total for all observation days was raised to the total number of actual fishing days in that month. Particulars regarding operational details, expenditure, craft, gear etc. were collected by interviewing the fishermen who are actually engaged in hooks and line fishing.

Fishery

Area of operation

The area of operation of hooks and line units are the deeper areas of the outer continental shelf off Ponnani, Cochin and Alleppey, where the depth varies from 75 m to 125 m. Kalava grounds of this area have been reported earlier by Hornell (1916), Gopinath (1954) Menon and Joseph (1969) Silas, (1969), Tholasilingam *et al.* (1973) and Menon *et al.* (1977). The main area of operation of hooks and line units are shown in Fig. 1.

Fishing season

The major fishing season starts from December when the sea is calm, extending upto the end of March. The fishermen go back to Colachal in the last week of March. They return to Cochin again by the middle of April to start gill net and shark long line fishery.

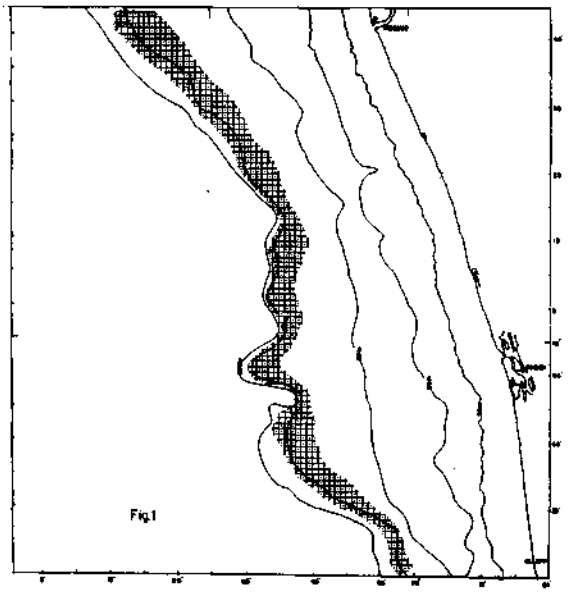

Fig. 1. Map showing the fishing area of hooks and line units for Kalava.

Craft and gear

The fishing crafts operating from Cochin area are mainly the pablo type, mechanised boats of length varying from 7.62 m to 9.4 m, OAL fitted with Ruston or Buck 2 or 3 cylinder engines of 30 to 52 Hp. Some of the Colachal fishermen own their own boat as well as gear, and a few others own only the gear. Each boat engaged in hooks and line fishery is equipped with an insultated wooden box of 1.5 m^3 for storing the fish.

For fishing Kalava, iron hooks of No. 7 and 8 are used. Hooks are attached to lines

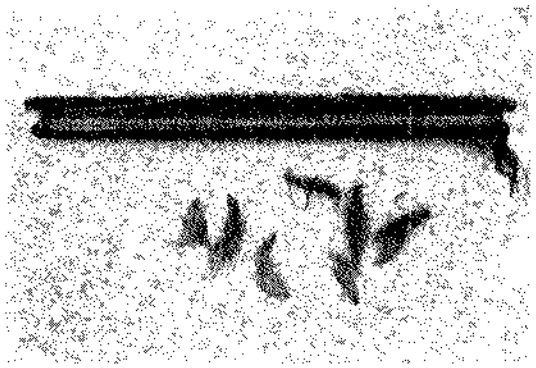

Fig. 2. Hooks with bait.

of synthetic monofilament of 2 mm diameter. Five to fifteen such hooks 6 to 8 feet apart are attached to one line (Figs. 2 and 3). Four to six such lines with hooks are operated from each boat. Each line has, attached to its end, sinkers weighing 1 to 2 kg.

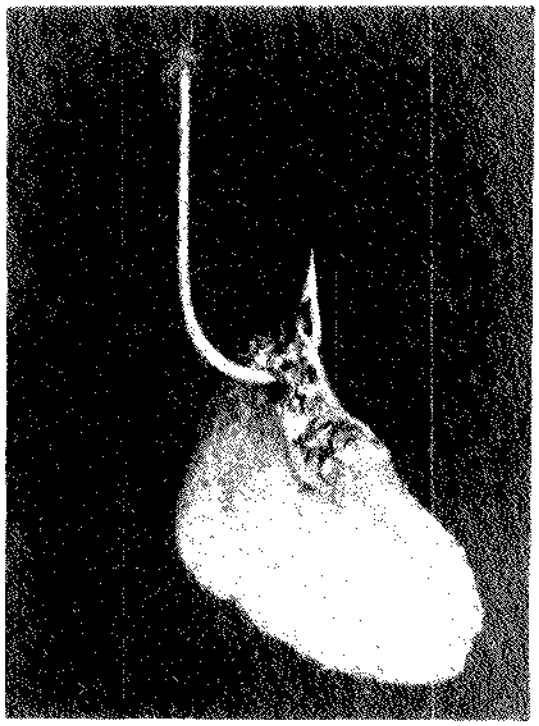

Fig. 3. Hook with bait

Operational details

Normally six to eight persons are engaged in one fishing trip in one boat. The fishermen start from the jetty between midnight and 0200 hrs; after storing sufficient quantities of fuel, drinking water, ice and provisions for two days and reach the fishing area by about 0800 to 1000 hrs. The fishermen go in groups of four to five units. They locate the grounds with the help of the stars and seldom do they fail in locating the ground. They also do some sounding by putting the ropes and confirm the ground by seeing the number of fishes getting hooked on the baited lines. Once the ground a located, a marker buoy is put, and the fishermen continuously do fishing during the day.

Small pieces of tuna like fishes, small fishes etc. which they collect on the way while proceeding to the fishing ground are used as baits. Some times even pieces of coloured waste cloth is sufficient to make the Kalava bait. A line is hauled up at the feel of the jerk of fish under the water. The catch in a single unit varies from 150 to 700 kg in the peak season. The fish caught during the day are stocked in the insulated box, well preserved in ice. After the day's fishing, they reach the fisheries harbour between 0300 and 0500 hrs, the next day. The catches are auctioned by commission agents and disposed to local and interior markets from here.

Effort and yeild

The commercial exploitation of Kalava using hooks and line started with Cochin as a base only in 1982, although a number of earlier reports based on survey using large

vessels, are present. The number of units in operation from here was only 8 in 1982 and by the year 1988 as much as 90 units were engaged in this fishery. The total estimated effort expended in 1982 was only 157 fishing trips. Till 1985, there was not much of increase in the effort, but in 1986, 1987 and 1988 the effort estimated were 1,345, 2,656 and 1,931 unit operations respectively. Maximum number of units operated during January to March. Of the total annual effort 85 - 90% was expended during November to March. Peak landings were during December and January in all the years.

The total estimated yield from hooks and line varied from 49 tonnes in 1982 to 735.3 tonnes in 1987 and 526 tonnes in 1988. Over a period of six years, the fishery registered an increase of about fifteen fold (Fig. 4). A comparison of the catch and catch per unit operation during this period indicates that though yeild has tremendously increased, the CPUE does not show the same trend. The maximum CPUE of 338.5 kg was recorded

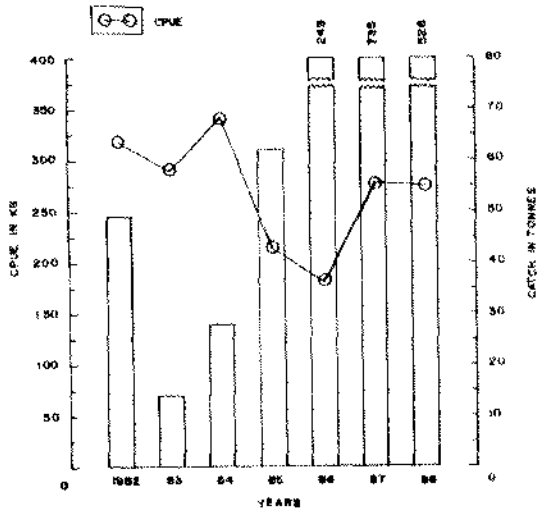

Fig. 4. Annual catch and effort of hooks and line during 1982-'88 period.

Fig. 5. A catch of Kalava.

in the year 1984. The minimum CPUE of 180.4 kg was noticed in 1986. Though the catch has increased considerably, the effort also show a similar trend of increase. It has been stated that the number of fish per line would give a more reliable picture in hooks and line fishing. The average weight of fish per line varied from 31.08 to 74.5 kg. This was found to be the highest during January in all the years except in 1986. The fishermen attribute this high hooking rate to the clarity of water prevalent in the fishing grounds during this period. Table 3 gives the number of lines and the weight of fish per line during 1982 - '89 period.

Catch composition

Perches formed the most important component of hooks and line catch constituting 90.26% on an average during the years 1982 - '88. Elasmobranchs formed 4.42%, tunas 2.85%, *Coryphaena* 0.6%, seerfish 0.3%, catfish 0.29%, barracuda 0.62% etc. Percentage composition of the different groups in the catch during 1982 - '88 are presented in Table 2.

In 1982 the entire catch by this gear was exclusively of perches. In 1983 also 99.6% by weight of the fishes caught in the hooks were

Table 1. Month-wise catch and catch per unit operation in kg from hooks and line at Cochin

Year	Months	Perches	Tuna	Sailfish	Elasmobranch	Catfish	Barracuda	Carangid	Seerfish	*Coryphena*	Other fishes
1	2	3	4	5	6	7	8	9	10	11	12
1982	Jan.	22,707 (372.25)									
	Feb.	26,652 (277.63)									
1983	Feb.	13,680 (285)							48 (1)		
1984	Jan.	11,605 (351.66)			1,509 (45.73)						
	Feb.	4,550 (206.82)			1,194 (54.27)	4 (0.18)			6 (0.27)	306 (13.9)	
	Mar.	1,633 (204.13)							184 (23.00)		
	Dec.	5,162 (271.63)	114 (6)		1,486 (78.2)	3 (0.36)					
1985	Jan.	40,381 (234.77)	384 (2.23)			183 (1.86)				75 (0.44)	
	Feb.	5,889 (294.45)									
	Mar.	4,873 (147.67)		28 (0.85)	215 (6.52)						13 (0.39)
	Dec.	8,168 (123.76)	232 (3.52)		872 (13.21)		505 (7.65)		36 (0.54)		10 (0.15)
1986	Jan.	79,820 (149.48)	6,181 (11.57)		3,140 (5.88)	15 (0.03)		372 (0.70)	158 (0.30)		19 (0.04)
	Feb.	58,485 (133.28)	3,857 (8.78)		15,579 (35.49)	470 (1.07)				379 (0.86)	

1	2	3	4	5	6	7	8	9	10	11	12
	Mar.	17,779 (113.28)	5,890 (37.76)		2,034 (13.04)	901 (5.78)		609 (3.90)			3 (0.02)
	Apr.	440 (44.00)	143 (14.30)		2,440 (244)			9 (0.9)	10 (1)		
	Dec.	40,396 (180.34)	2,752 (12.29)		1,948 (8.70)		1,452 (6.48)	186 (0.83)	3 (0.01)		
1987	Jan.	2,35,591 (240.65)	3,447 (3.52)		43 (0.04)	293 (0.30)				425 (0.43)	38 (0.04)
	Feb.	1,19468 (202.83)	9,479 (16.09)		696 (1.18)		2,776 (4.71)	3,037 (5.16)			279 (0.47)
	Mar.	42,506 (154.01)	5,297 (19.19)		135 (0.49)		2,790 (10.11)	1,131 (4.10)			
	Nov.	51,315 (259.17)	7,547 (38.12)		6,646 (33.57)	185 (0.93)	22 (0.11)		354 (1.79)	9,981 (50.40)	
	Dec.	2,07,455 (337.87)	17,523 (28.55)		1,651 (2.69)	1,839 (2.99)			39 (0.06)	3,223 (5.25)	138 (0.23)
1988	Jan.	2,04,636 (274.31)	8,676 (11.63)		1052 (1.41)	452 (0.61)	503 (0.67)		125 (0.17)	9,400 (12.60)	236 (0.32)
	Feb.	48,464 (153.85)	11,809 (37.49)		4,859 (15.43)	126 (0.40)	4,363 (13.85)		12,269 (38.95)	5,493 (17.44)	125 (0.40)
	Mar.	44,624 (145.83)	1,415 (4.62)		11,239 (36.42)	33 (0.11)		7,219 (23.59)			30 (0.09)
	Dec.	1,44,902 (266.37)	1,785 (3.28)	121 (0.22)				14 (0.02)		1,705 (3.14)	

TABLE 2. *Yearly catch composition in % from hooks and line*

Year	1982	1983	1984	1985	1986	1987	1988
Total catch (kg)	49,359	13,728	27,756	61,864	2,45,470	7,35,349	5,25,675
Species :							
Perches	100.00	99.65	82.68	95.87	80.22	89.25	84.20
Tuna			0.41	1.00	7.67	5.89	4.51
Sailfish				0.05			0.02
Elasmobranchs			15.09	1.76	10.24	1.25	3.26
Catfish			0.03	0.30	0.56	0.34	0.12
Barracuda				0.82	0.59	0.76	0.93
Carangids					0.48	0.57	1.37
Seerfish		0.35	0.68	0.05	0.07	0.05	2.36
Coryphaena			1.11	0.12	0.15	1.84	3.16
Other fishes				0.03	0.02	0.05	0.07

perches. During 1984, the percentage of perches was 82.68. In 1985, 95.87% of fishes in this gear were perches, very few numbers of barracudas, sharks, *coryphaena* and tuna were also caught on the hooks. In 1986, 1987 and 1988, the percentages of perches were 80.22, 89.25 and 84.20% respectively. Small quantities of sharks, tuna, barracuda, catfish, carangids etc. were also caught along with the perches.

In all the years, December and January were the maximum productive months. The catch per unit effort of perches in 1982 was 324.83 kg. In 1983, this was only 285 kg. During 1984 CPUE was 280 kg whereas in 1985, this was only 203.8 kg. Though total perch catch from hooks and line has increased tremendously, in 1986 the CPUE was only 144.47 Kg. In 1987 and 1988 the CPUE in the case of perches was 247.1 and 231.6 kg. respectively.

The most predominant species of perches fished by this gear in this area belong to families Serranidae and Lutjanidae. The most abundant species are *Epinephelus diacanthus, Pristipomoides typus, E. chlorostigama, E. tauvina, E. bleekeri* etc. Of the total perch catch, on an average 34.6% was constituted

TABLE 3. *Month-wise catch (in kg) of fish/line from hooks & lines*

Years	1982			1983			1984			1985			1986			1987			1988		
Months	Total catch (kg)	No. of lines	Catch per line (kg)	Total catch (kg)	No. of lines	Catch per line (kg)	Total catch (kg)	No. of lines	Catch per line (kg)	Total catch (kg)	No. of lines	Catch per line (kg)	Total catch (kg)	No. of lines	Catch per line (kg)	Total catch (kg)	No. of lines	Catch per line (kg)	Total catch (kg)	No. of lines	Catch per line (kg)
Jan.	22,707	305	74.50				13,114	198	66.23	41,023	860	47.70	89,705	2,670	33.60	2,39,837	4,895	49.00	2,25,080	3,730	60.34
Feb.	26,652	480	55.33	13,728	288	47.66	6,060	132	45.91	5,889	100	58.90	78,770	2,195	35.89	1,35,735	2,945	46.09	87,508	1,575	55.56
Mar.							1,817	48	37.85	5,129	165	31.08	27,216	780	34.90	51,859	1,380	37.57	64,560	1,530	42.20
Apr.													3,042	50	60.84						
										No operation from May to October											
Nov.																76,050	990	76.81			
Dec.							6,765	114	59.34	9,823	330	29.77	46,737	1,120	41.73	2,31,868	3,070	75.52	1,48,527	2,720	54.60

by *E. diacanthus;* an almost equal quantity of *Pristipomoides typus* also landed every year. *E. chlorostigma* formed 12.3%, *E. bleekeri* constituted 11.8%, *E. tauvina* formed 6.7%, other species like *E. areolatus, E. epistictus, Lutjanus* spp. etc. together constituted the remaining 2.1%. Generally fishes of size 20 cm and above in total length, belonging to the one and two year old groups are only caught in this gear. *Epinephelus diacanthus* ranges in length from 19.5 to 59 cm and weigh 150 to 2,400 g. Fishes of size 32 to 45 cm predominate in the fishery. *P. typus* varies in total length from 19 to 68.5 cm; ranging in weight from 100 to 3,350 g the dominant size group in the catch being 28 to 46 cm. *E. chlorostigma* ranges in size from 24 to 62 cm; the largest fish weighing 2,450 g. *E. tauvina* ranged in length from 42 to 85 cm. *E. bleekeri* also ranged from 21.5 to 64 cm with the maximum weight of 2,500 g.

Marketing and economics

The Kalava brought to the fisheries harbour are auctioned by commission agents. The auctioned fish well preserved in ice are mostly transported in trucks and lorries, to interior markets.

The average initial investment of each hook and line unit work out to Rs. 1.2 lakhs. These units operate both hooks and line and drift nets in an year depending on season. The annual average fishing days worked out at 200. Number of actual fishing days for hooks and line alone worked out to 65. Hence for working out the economics of hooks and line operations, the component of fixed cost has been worked out proportionate to the fishing days by this gear. The revenue is the value of the catch realised. The net profit is shared among the boat owner and the crew on 3:2 basis, all operational expenses being taken care of by the boat owner.

TABLE 4. *Income and expenditure statement of hooks and lines for the year1987 - '88 (per boat)*

I. Fixed cost (Rs.)	
Depreciation on cost of vessel	3, 900/-
Interest	5,850/-
II. Operational cost (Rs.)	
1. Labour	51,740/-
2. Fuel	65,000/-
3. Repairing and maintenance	4,225/-
4. Port dues	390/-
5. Auction charges	8,998/-
6. Other expenses	1,625/-
Total	1,31,978/
III. Revenue (Rs.)	
Average catch (kg)	17,996/-
Gross revenue (Rs.)	1,79,960/
IV. Net operating income (Rs.)	47,981/-
V. Share of the boat owner (Rs.)	22,939/-
Share of the crew	15,292/-

DISCUSSION

Joseph (1986) and Sulochanan and John (1986) stated that high concentration of perches exists in the southwest coast and emphasize the scope of exploitation of this resources. Joesph (1986) has estimated the standing stock of the demersal components from the 70 - 200 m depth zone as 60,000 tonnes. Sudarsan *et al.* (1989) recorded the highest density of demersal stocks along the Kerala coast as 6.4 tonne per km^2 in the 100- 200 m depth zone and 5.0 tonne per km^2 in 50 - 100 m depth zone. The level of exploitation of demersal stocks from the nearshore area within 50 m depth in the southwest coast is 1.75 lakh tonnes. This exceeds the potential yield estimates for this area and necessitates a reduction in fishing pressure in this area (Sudarsan *et al.*, 1989). Premalatha (1989) while studying the perch trap fishery by the Integrated Fisheries Project has estimated the MSY for perches at the commercial fishing grounds of Ponnani and Alleppey to be 2,000 tonnes; which is much higher than the present level of exploitation.

Hooks and line fishing for perches, if carried out on an intensified way could be as lucrative as the shrimp trawling, with good prospects of exporting the Kalava as frozen fillets to foreign markets. If the fishermen could be enlightened to use gadgets like pulley reels which would save time and increase the fishing efficiency; if the Government takes initiative in establishing some indication or marking or provide modern equipments that would help in locating the grounds easier and thereby save time and energy which could other wise be utilized for actual fishing, this would become more profitable and intensive.

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