

Catch per Unit Effort of Ring Seines of South Kerala Coast

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Catch per unit effort (CPUE) of ring seines operated from the traditional plank built canoes was studied at two major centres, Ambalapuzha and Chellanam in Kerala. Parameters selected for assessing the productivity were catch per man hour and catch per fisherman per month. Statistical analysis shows that changes in CPUE are gear specific and location specific. Comparison between CPUE of large meshed (18-22 mm) *thanguvala* 800x90 m and small meshed (8-12 mm) *choodavala* 400x60 m shows that the latter performed better at both centres and performance of both nets at Ambalapuzha was better than that at Chellanam. CPUE decreased by more than half since the introduction of this gear. The causes and consequences of this decrease in productivity are also discussed.

Key words: Catch per unit effort, ring seines

Ring seine or the mini purse seine was designed and introduced as a new pelagic gear for the traditional craft (Panicker *et. al.*, 1985). Adoption and popularisation of this gear in the second half of the eighties was the single most significant development in the post motorisation phase of fisheries in Kerala. Ring seine is a modified version of the erstwhile *thanguvala* operated along the Kerala coast. Ring seines can broadly be classified into two major types, the large *thanguvala/ranivala* of size upto 800 x 90 m with 18-22 mm mesh and the small *choodavala/discovala/manduvava* of size upto 400 x 60 m with 8-12 mm mesh. Various aspects of ring seines have been studied (Anon, 1991; Rajan, 1993; Nayak, 1993; Achari, 1993; Sathiadas, *et. al.*, 1993; Alagaraja *et. al.*, 1994; Balan and Andrews, 1995; Edwin and Hridayanathan, 1996; Srinath, 1996). The objective of the present study was to assess and compare the catch per unit effort (CPUE) of two types of ring seines at two selected centres.

Materials and Methods

Chellanam in Ernakulam district and Ambalapuzha in Alleppey district, two major centres of ring seine operations in Kerala, were the centres selected. Data on the number of fishing days, time taken for reaching the ground, actual time taken for fishing, number of fishermen and other operational details were collected every week using questionnaire specially prepared for the purpose. The study was carried out during January 1995 to December 1996. Fishing units were selected on the basis of stratified random sampling and included ten units each of *thanguvala* and *choodavala* at Chellanam and, 13 *thanguvala* and 7 *choodavala* units at Ambalapuzha.

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The parameters studied were catch per man-hour (c/mh) and catch per fisherman per month (c/f/m). Weekly c/mh and c/f/m were grouped together for different periods and different units with respect to the two centres and the two gears and compared statistically using randomised block Analysis of Variance (ANOVA). The c/mh was calculated by considering the total time taken for fishing inclusive of the scouting time. Only productive trips were taken into consideration while calculating this parameter. The second parameter for comparison is the total catch inclusive of the non-productive trips per fisherman per month. *Thanguvala* of Chellanam were not operated during February, March and April.

Results and Discussion

With respect to c/mh *choodavala* units of Ambalapuzha performed best (Figs 1-4). The mean c/mh for two years were 0.64, 1.93, 0.86 and 2.54 kg for *thanguvala* of Chellanam, *thanguvala* of Ambalapuzha, *choodavala* of Chellanam and *choodavala* of Ambalapuzha respectively. The mean catch rates of the two sets at both centres for different months showed that there was significant difference in the catch rates ($p < 0.01$, $f = 34.25$, $df = 1, 11$). There was also significant difference between the catch rates in different months ($p < 0.01$, $f = 10.17$, $df = 11, 11$). Among the two gears, *choodavala* performed better at both centres with respect to c/mh.

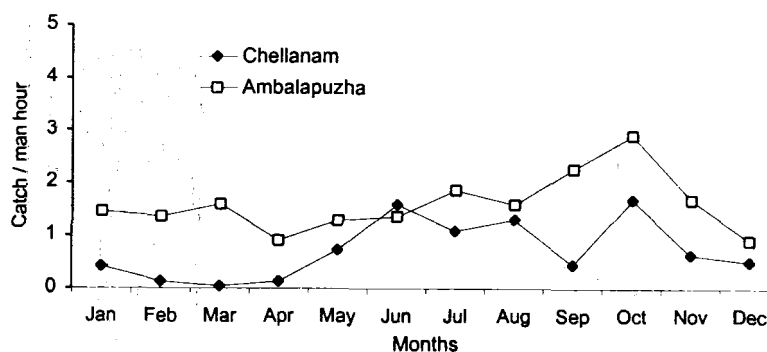


Fig. 1. Catch per man hour of *Thanguvala* during 1995

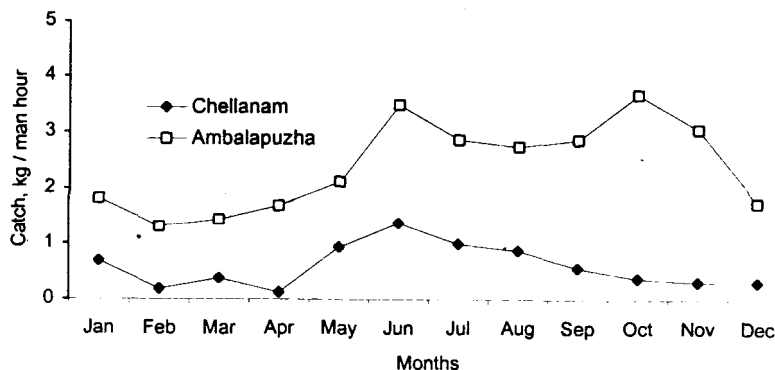


Fig. 2. Catch per man hour of *Thanguvala* during 1996

When ANOVA was applied to the mean catch rates of all sets of gear at both centres it was found that there was significant difference between *thanguvala* units of Chellanam and Ambalapuzha ($p < 0.001$, $f = 89.296$, $df = 1, 11$). Significant difference was observed between the catch rates in different months ($p < 0.01$, $f = 4.129$, $df = 11, 11$). In the case of *choodavala* units there was significant difference between the c/mh at both centres ($p < 0.01$, $f = 122.888$, $df = 1, 11$); however, the difference in catch rates were not significant between months. There was significant difference also in the mean catch rate of *thanguvala* and *choodavala*.

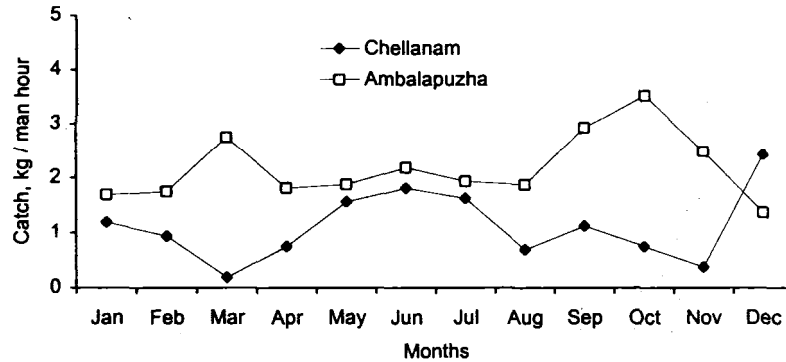


Fig. 3. Catch per man hour of *Choodavala* during 1995

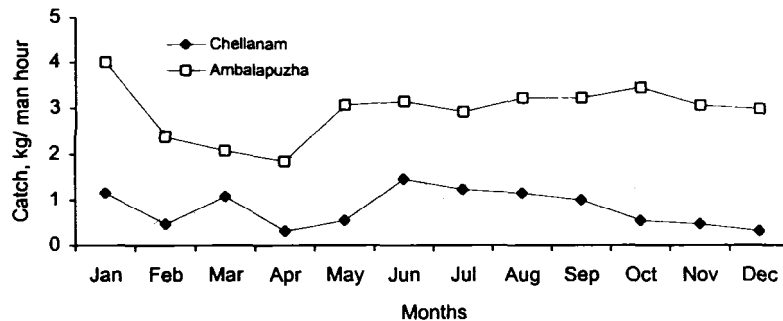


Fig. 4. Catch per man hour of *Choodavala* during 1996

The $c/f/m$ ranged from 90 (December 1995) to 529 kg (September 1996) in the case of *thanguvala* units and 10 (April 1996) to 560 kg (August 1996) in the case of *choodavala* units (Table 1). However, the mean $c/f/m$ for ring seine units was 218 kg. When ANOVA was applied significant difference could be seen between $c/f/m$ of *thanguvala* at the two centres ($p < 0.01$, $f = 36.128$, $df = 1, 8$). Similarly comparison of *choodavala* units at Chellanam and Ambalapuzha showed that there was significant difference at two centres. Significant difference was observed between the mean with respect to the gear and with respect to the centres ($p < 0.01$, $f = 8.839$, $df = 1, 8$). The *choodavala* units performed better with regard to $c/f/m$ with an aggregate mean of 236 kg whereas for *thanguvala* units it was only 200 kg.

Table 1. Month mode catch (kg) per fisherman per month during 1995-96

Month	<i>Thanguvala</i>		<i>Choodavala</i>	
	Chellanam	Ambalapuzha	Chellanam	Ambalapuzha
January	42.5	188.5	123.0	229.5
February	—	156.5	32.0	191.0
March	—	213.5	48.0	260.0
April	—	184.5	5.0	208.5
May	64.0	217.0	80.5	255.0
June	182.0	377.5	198.0	325.5
July	123.0	340.5	200.5	284.5
August	139.5	349.0	318.0	383.0
September	60.0	438.0	84.5	390.5
October	39.0	487.0	45.0	506.0
November	63.0	426.0	69.5	358.0
December	116.5	93.5	54.0	149.0

No fishing during February, March & April at Chellanam by *thanguvala* units

It was observed that the variation in performance of ring seine was with respect to the type of gear and location. *Choodavala* units performed better at both centres. Small fishing units need only less crew. The small mesh size of the gear prevented the escape of fish. The higher catch rates in both units at Ambalapuzha were the direct outcome of the lower number of crew onboard both types of vessels compared to those at Chellanam. The time taken for each fishing trip at both centres was almost the same. An advantage of fishing in Ambalapuzha centre is the low wave action. The *choodavala* units here operate in shallower waters (Anon, 1992). The efficiency of *thanguvala* is centre specific and unit specific depending on the development phase, pressure of fishing and performance levels of units (Rajan, 1993). The average catch per man-hour has decreased to 1.49 kg. The catch and effort analysis of ring seine has shown a downward trend in the catch per unit evidenced by a decrease from 1031 kg in 1990 to 581 kg in 1993 (Balan and Andrews, 1995). The pioneering work of Kurian and Willmann (1982) involving 22 craft gear combinations (mechanised and traditional) showed that c/mh for encircling nets was 5.4 kg. During the introductory stages of the ring seine, a study conducted by South Indian Federation of Fishermen's Societies (SIFFS) in 1988 estimated the c/f/m as 496 kg. Later studies by SIFFS from four selected centres along Kerala coast showed an average catch rate of 4.58 kg/mh (Anon, 1992). Sathiadas *et. al.* (1993) estimated the catch per trip of ring seine as 800 kg during 1990-92. Considering the crew size of 27 and 13 trips per month, c/f/m works out to 386 kg. Thus a sharp decline of c/f/m is observed from 496 kg in 1988 to 218 kg in the present study.

The reason for this decline in CPUE is attributed to the excess effort expended in the ring seine sector. At the time of its introduction 300 ring seines of size 250 x 30 m were recommended for operation along the Kerala coast (Panicker, 1985). But in course of time, the size of gear increased three times and number of units increased to 2259 in 1991 (Anon, 1992). To accommodate the huge gear the size

of the plank craft was also increased. Other consequences of these developments are the increase in the number of crew, number of outboard motors used for propulsion and use of more powerful engines. The total horsepower of the ring seine units using upto four engines has been estimated to be 85. This large scale proliferation of ring seines has caused two major gear 'koruvala' and 'kollivala' to become obsolete (Alagaraja *et. al.*, 1994) and the contribution of ring seines rose to 21.4% of the total marine fish landings of the state in 1995 (Balan and Andrews, 1995)

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