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Development of Lobster Traps—Preliminary Experiments with Three New Designs of Rectangular, Australian Pot and Ink-well Traps

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Results of experimental lobster fishing with three new designs, namely rectangular, Australian pot and ink-well traps at Muttam, Kadiapatnam, Colachal, Enayam and Vizhinjam, south-west coast of India during 1979–80 are reported. Preliminary studies show that Australian pot and rectangular traps as more efficient to the ink-well type.

Trap is a versatile fishing gear used for small and large scale fishing of lobsters (Pease, 1965; Mohan Rajan *et al;* 1981). Traps are selective than lines and trawls. They can be left in the sea during unfavourable weather and can be collected conveniently when favourable weather sets in (Anon, 1980). The traditional Colachal trap used by fishermen of the south-west coast of India (Fig. 6) is described by Miyamoto & Shariff (1961). These traps fabricated out of indigenous bio-degradable material are not compact and not strong enough to withstand rough sea conditions. The life

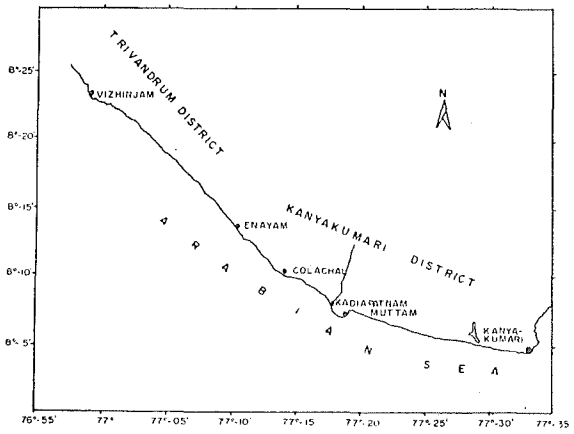

Fig. 1. Centres from where experimental lobster fishing conducted during 1979-80

of these traps seldom exceed three weeks. Being fragile and collapsible, the trap and the catch are often lost in the sea. They are not suitable for mechanisation of fishing. No work appears to have been done in India to improve the traditional lobster traps. The present paper reports the attempts of the authors to introduce new designs with improved materials for the judicious exploitation of the spiny lobster resources of the south-west coast of India.

Material and Methods

Three new designs of rectangular, Australian pot and ink-well type traps were made, considering the shape, size and easiness in handling and operation.

1. *Rectangular trap:* Measures 750 x 500 x 400 mm with a funnel attached to one side. The basal plate consists of four 750 mm long mild steel rods of 10 mm diameter welded to two 550 mm long rods breadth wise. To this, 4 ribs of 400 mm height and 550 mm breadth were attached equidistantly. (Fig. 2). All the traps were of single entry type provided with a 200 mm long funnel with an outside circular opening of 200 mm and internal opening of 120 mm diameters. The rectangular traps were numbered 01, 05, 07, 08, 10 and 11A to facilitate easy identification. WI and WII denotes Colachal traps woven with galvanised iron wire of 14 gauge. All the traps were ballasted to sink to the bottom.

2. *Australian pot:* This semi-cylindrical trap is similar in external appearance to the rock lobster pots used in the east coast of Australia, and hence the name (FAO/UN 1972). Metal traps in this design also measures 750 x 550 x 400 mm. Base of

the trap is similar to that of rectangular type, with 4 mild steel rods of 10 mm diameter and 750 mm length and two rods of 550 mm breadth at two ends. Four bent ribs of 6mm rod fashioned in a semi-circular manner were welded together to this basal plate at equal distance forming the superstructure with a height of 400 mm at the middle. Trap numbers 02, 06, 09, 12 and 17 were in this design (Fig. 3).

3. *Ink-well type:* This hemispherical design is similar in appearance to the Cornish ink-well traps of British coast described by Davis (1958) and Forsyth (1946) and bee-hive pots of Australia (Hughes, 1971). The frame is fabricated in mild steel rod (10 mm) with a circular base of 650 mm and with two strengthening rods inside. Four bent mild steel ribs of 6 mm are attached to the basal ring equidistantly which converge at the top forming the hemispherical superstructure in the form of a dome. Two circular rings of 570 mm and 430 mm diameters are attached parallel to the basal ring connecting the ribs horizontally. The maximum height from the base to the top is 550 mm. The 240 mm long funnel opens from top downwards with an external opening of 200 mm diameter and internal opening of 120 mm diameter, Trap numbers 04 and 15A were of this design (Fig. 4).

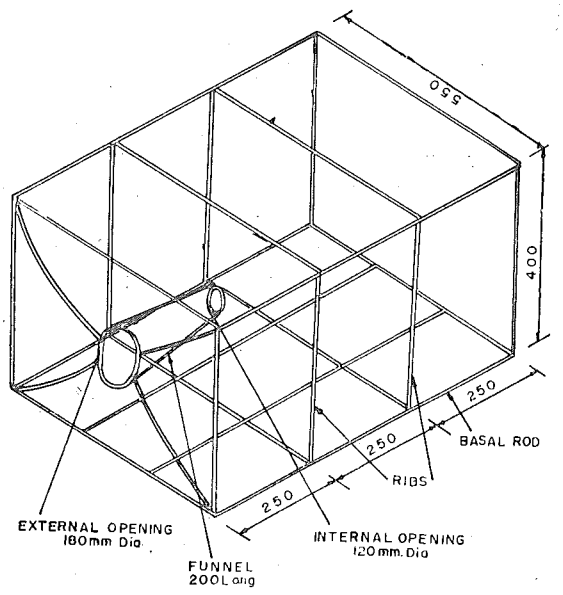

Fig. 2, Design of a rectangular trap (All measurements in mm)

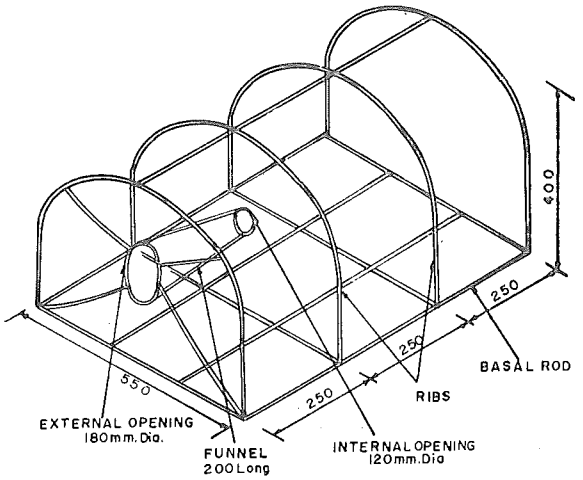

Fig. 3. Design of an Australian pot (All measurements in mm)

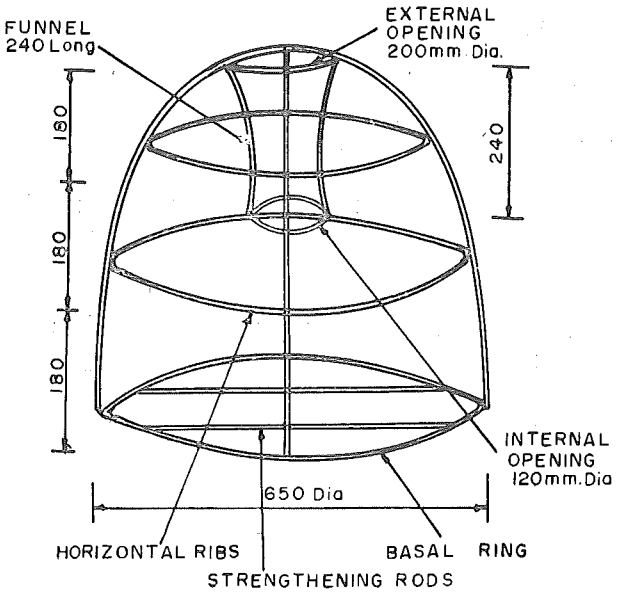

Fig. 4. Design of an ink-well trap (All measurements in mm)

Hemispherical traps with lateral funnel were also used. Such a trap in mild steel rod has a circular base of 600 mm diameter made of 10 mm thick rod. Two strengthening rods of 570 mm in length were welded together within this frame at a distance of 200 mm apart. The superstructure consists of 8 bent longitudinal ribs of (6 mm diameter) 620 mm length, attached to the basal ring equidistantly and welded together at the converging point at the top. The height from the base to the top of the dome is 500 mm. Two horizontal circular rings are attached to the longitudinal ribs, one

below the point of the opening of the funnel and the other above it (Fig. 5). Trap numbers 03 and 14A were of this type.

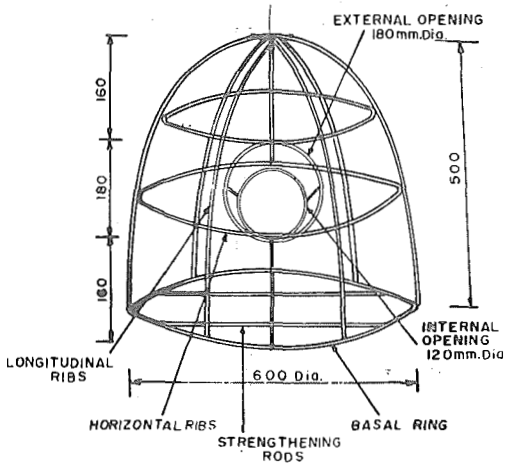

Fig. 5. Hemispherical trap with lateral opening (All measurements in mm)

All the traps were finally covered with secondary protective reinforcements such as chicken wire netting or synthetic net webbing or split bamboo strips. A total of 118 experimental fishing operations were carried out during 1979–80 at Muttam (77° 19′ 24″ E and 8 ° 7′ 24″ N), Kadiapatnam (77° 18′ 30″ E and 8 ° 8′ 12″ N), Enayam (77° 11′ E and 8 °13′ N), Colachal (77° 15′E and 8 ° 11′ N) and Vizhinjam (76 ° 59 ′ E and 8 ° 22′ N) in the south-west coast of India (Fig. 1) with a Colachal trap as control. The position of traps was rotated providing equal chances for all the traps to be tried from every point of setting. This was not strictly adhered to under adverse field conditions as well as in grounds where the lobster population was homogeneous.

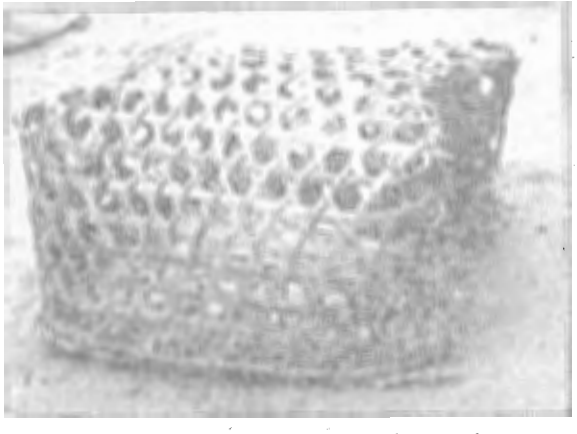

Fig. 6 Indigenous Colachal trap

The traps were laid and retrieved with the help of local fishermen by skin diving. The fishing grounds were located at 0.5 to 3 km from the shore at depths 8 to 15 m. Four-logged boat catamarans were used to reach the ground and back. On reaching the ground traps were baited with 50–100 green mussels *(Perna* sp*)*. Baited traps were thrown into water and by diving, the traps were set in position. Traps were hauled up after 24 h.

To select the better traps with which further experiments are to be carried out for confirmation of the findings, catch data was compared separately for each centre and also pooling all the centres. To reduce the difference in catches caused by difference in availability, the consecutive experimental days which gave better catches (Cochran & Cox, 1957) were taken for comparison. Within these days the simultaneously operated traps were compared on the basis of mean catch (Table 1).

Results and Discussions

In the design of traps, behaviour of the lobsters to the gear is of paramount importance. Spiny lobsters are sedentary, dull-witted, easily scared gregarious organisms and are lured into the traps by suitable baits. Bennet (1974) has pointed out that the catch of a baited trap is the result of a sequence of complex and variable events, the physical characteristics of the trap being decisive only at the end of the sequence. It begins with the initial awareness of the animal that attractive chemicals are present in the water (Mackie, 1973) and ends up with the entry, consumption of bait and attempt to escape, thereafter.

In the case of the rectangular and Australian pots it was noticed that the effects of storm buffetings and underwater currents are considerably reduced as the centre of equilibrium is lower than in the hemispherical one. Rectangular traps are considered to stack better. Newman & Pollock (1969), considers rectangular traps much superior to hoop nets because they continue to catch lobsters inspite of inclement weather. In

Table 1. *The average number, average weight and average length of lobsters caught in traps operated simultaneously at various centres*

	Enayam							Kadiapatnam						Colachal				
Trap nos.	02	04	05	08	WI	14A	C	05	08	09	WI	WII	C	02	06	11A	17	C
Average number of lobsters estimated for 100 days of operation	38	—	35	58	54	—	46	3	46	—	29	36	46	29	38	—	—	9
Average wt. of lobsters caught per day g	93	—	93	189	148	—	141	10	111	—	100	102	119	65	98	—	—	34
Average length of lobsters caught for the entire season mm	134	—	145.6	161.3	157.2	—	155.8	170	146.2	—	187.5	160	162.5	136.7	153.8	—	—	180

	Muttam												Vizhinjam				
Trap nos.	01	02	03	04	05	07	08	09	10	11A	14A	15A	C	01	03	06	WII	C
Average number of lobsters estimated for 100 days of operation	15	20	—	—	—	15	10	—	—	—	—	—	40	11	—	28	44	61
Average wt. of lobsters caught per day g	31	47	—	—	—	43	31	—	—	—	—	—	134	21	—	63	118	221
Average length of lobsters caught for the entire season mm	143.3	150	—	—	—	190	175	—	—	—	—	—	202.9	130	—	134	147.5	170

ink-well traps, as the funnel is located at the top middle portion, it makes the opening equidistant from any direction of entry. The broad circular base inparts greater bottom stability. In Australian pots, the streamlined design makes it more rugged and easy to repair. With minimum welding and limited projecting corners, this trap is convenient to handle. In addition, being elongated and with the centre of equilibrium lower, storm buffeting under the sea was found less. Catchwise also Australian pots were better compared to ink-well types. One drawback noticed in the newly designed traps was the shape and the position of mouth opening. As both the openings were in the same plane situated close to the floor of the trap, they did not function as valves at all in preventing the escape of lobsters. Majority of the lobsters escaped after feeding, as evidenced by the empty shells of the bait left in the trap.

The estimated average number of lobsters caught per 100 operations, average weight of lobsters caught per operation and the average length of lobsters are presented in Table 1. The average number of lobsters is estimated for 100 operations only to avoid fractions in the number of lobsters. On the basis of the average number of lobsters caught, traps 06 at Vizhijam, 02, 05, 08 at Enayam, 02, 06 at Colachal, 05, 08 at Kadiapatnam (Table 1) and 02 at Muttom gave better catches (Table 1). For the catch obtained in the same part of the season, the number of days operated, average number, average weight and average length of lobsters caught in traps 02, 05, 06 and 08 are presented in Table 2. The average catch shows that traps 02, 05 and 08 as promising. Thus for the traps 02, 05, 06 and 08, the combined analysis and the centrewise analysis are in good agreement (Tables 1 and 2). For establishing the comparative efficiency of these traps, further experiments are necessary. To ascertain whether there is any wide difference in the size of lobsters, the average weight of lobsters was calculated (Tables 1 & 2). The average weight was found to increase with average numbers and it appears that there is no wide difference in the size of lobsters from trap to trap. Tables 1 & 2 show that the average length of lobsters caught in trap 02 is relatively smaller than that caught in other traps.

Table 2. *The average number, average weight and average length of lobsters caught in the same part of the season in the promising traps*

Traps nos.	02	05	06	08
No. of days operated	33	35	20	37
Average no. of lobsters caught per 100 days operation	48	17	40	68
Average wt. of lobsters caught per day g	115	45	103	193
Average length of lobsters caught for the entire season mm	138	148	146.2	155.7

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