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Appraisal of Trawl Designs Operated Along Kerala Coast

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Abstract

This study presents the design details of trawl nets being operated along Kerala coast. Trawls operated in Kerala can be grouped as fish trawl, shrimp trawl, cephalopod trawl and gastropod trawl based on target catch. The head rope length of different trawls ranged from 39.6 to 81.0 m. The mesh size of codends were in the range of 16-25 mm. Majority of the trawlers in Kerala use V-form steel otter boards and the smaller boats use wooden flat rectangular boards. A trend in increasing the mesh size of fish trawls at the wing to about 5000 mm was observed.

Key words: Trawl net, designs, mesh size, Kerala

Introduction

Trawl is one of the most popular fishing gears of Kerala and there are 29, 241 trawlers operated from different fishing harbours of the State (CMFRI, 2012). Since its introduction, changes have taken place in the size, design, type of material and operation (Thankappan, 2000). The race for fish has resulted in increasing the size of the trawlers, engine power and the size of trawl nets. Though there was a significant increase in size of trawl and mesh size in wing region, the codend mesh size remained below 30 mm (Edwin et al., 2014).

Periodic evaluation and bench marking of existing commercial trawl designs are required for assessing the energy requirements and to suggest improvements for gear based conservation measures. There are only limited studies on the commercial trawlnet designs operated along Kerala. Mukundan & Hameed (1993), Neethiselvan & Brucelee (2003), Gibinkumar et al. (2005) and Rajeswari et al. (2012) studied the design of trawls operated along different coats. Pravin et al. (2012) reported the large mesh demersal trawls in India and in 2013 compiled different trawl designs developed by Central Institute of Fisheries Technology (CIFT). In this paper, design, technical and operation details of trawl nets used along Kerala coast are presented.

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Materials and Methods

The study was undertaken along the fishing harbours/landing centres of nine maritime districts of Kerala during 2012-13. Design details of trawl nets were randomly collected from fishermen, net makers, boat owners, etc. using structured and pretested questionnaire. Measurement of trawl dimensions of different designs were measured randomly.

Results and Discussion

A total of 63 trawl designs were studied and documentation of gear designs were done according to FAO guidelines (FAO, 1975; 1978). Based on the target groups, trawl nets along Kerala coast were categorised into four types *viz.*, fish trawls, shrimp trawls, cephalopod trawls and gastropod trawls. Irrespective of the target catch and depth of operation, trawl nets in Kerala were predominantly two seam; four seam trawls were rarely used.

Head rope length of fish trawls along Kerala coast varied from 39.6 - 81.0 m. Polypropylene ropes with 12 - 16 mm diameter were used for head rope and foot rope. HDPE multi filament twisted twines of 0.5 to 4.0 mm diameter were used for the netting. Large mesh fish trawls with a wing end mesh size up to 5000 mm are now popular in the sector and the codend mesh size varied from 16 - 25 mm. Designs of most common fish trawls in the State are given in Fig.1 to Fig.7. Ribbonfish, pomfret, croakers, threadfins, horse mackerel, polynemids, catfish, barracuda, lizardfish, carangids, mackerel, anchovies, false trevally, and flatfish are the major finfish targeted by fish trawls (CMFRI, 2015).

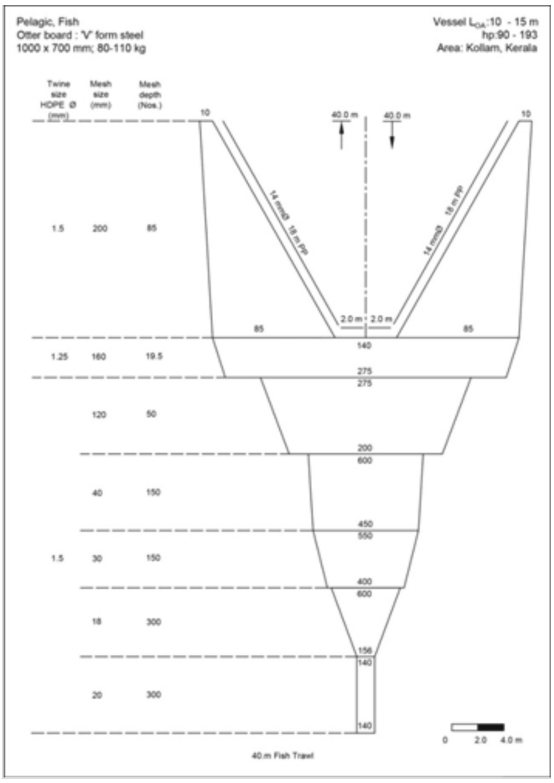

Fig. 1. 40.0 m Fish trawl

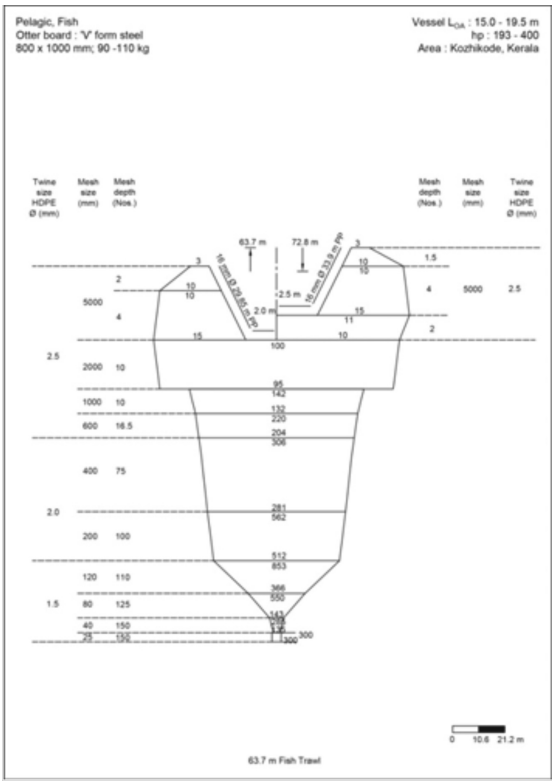

Fig. 2. 63.7 m Fish trawl

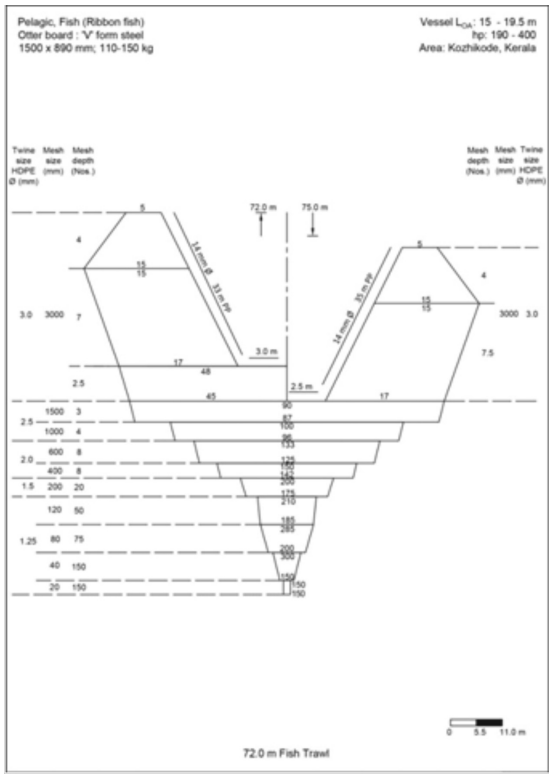

Fig. 3. 72.0 m fish trawl

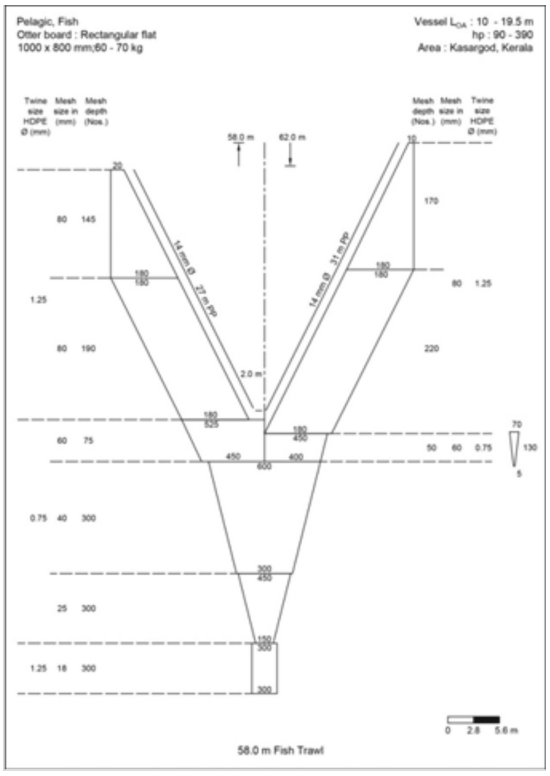

Fig. 4. 39.6 m fish trawl

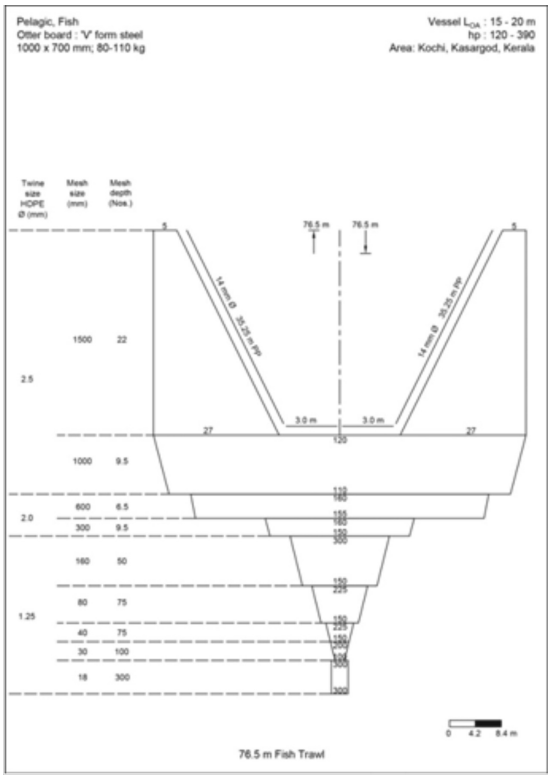

Fig. 5. 76.5 m fish trawl

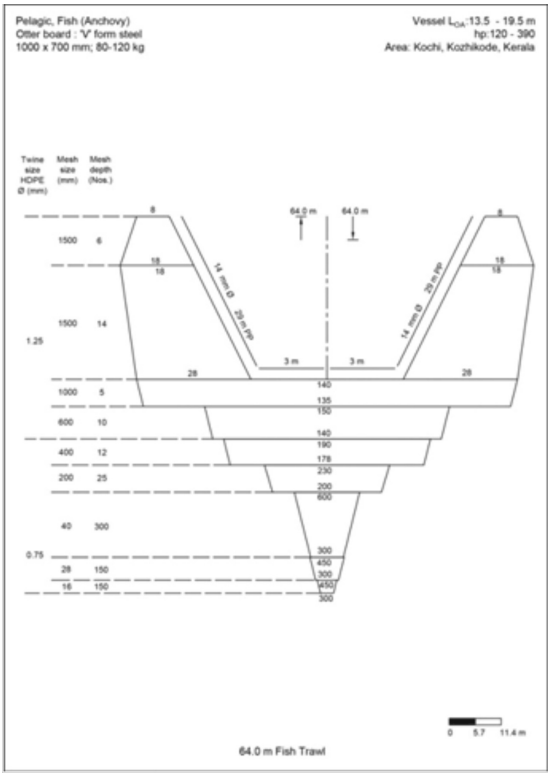

Fig. 6. 64.0 m fish trawl

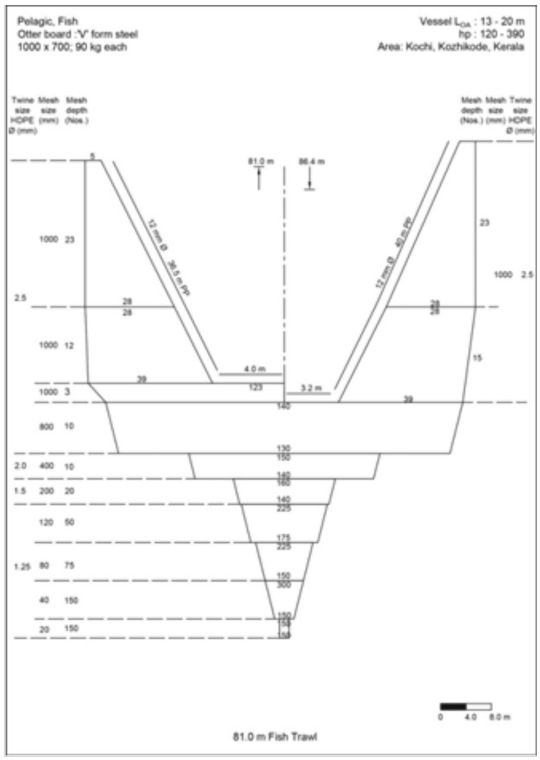

Fig. 7. 81.0 m fish trawl

Though not as diverse as fish trawls, shrimp trawls with different designs were recorded. The head rope length of shrimp trawls along Kerala coast ranged from 34.2 – 58.0 m. Polypropylene rope with 10 - 12 mm diameter were used as head rope and foot rope. HDPE twines with 0.5 - 2.5 mm diameter were used for fabrication of the trawl. Mesh size of the shrimp trawl at the wing end varied from 40 - 300 mm and 18 - 25 mm for codend and HDPE twines with 0.5 – 2.5 mm diameter were extensively used. Typical shrimp trawl designs in Kerala are given in Fig. 8 to Fig. 11. *Metapenaeus dobsoni* and *Parapenaeopsis stylifera* are the major shrimp catch from Kerala coast.

The use of squid and cuttlefish trawls is seasonal and was recorded from all the fishing harbours of the State. The head rope length of these trawls ranged from 54.0-57.6m and are fabricated with HDPE webbing of diameter between 1.25-2.5 mm. The mesh size of 1000-1200 mm in the wing region scales down to 18-20 mm in the codend. PP rope of diameter between 12-14 mm were used for the head and foot ropes. Typical designs of cephalopod trawls operated along Kerala coast are given in Fig. 12 and 13 respectively. *Loligo duvauceli, Sepiella inermis* and *S. pharaonis* are the major cephalopod species targeted by these trawls.

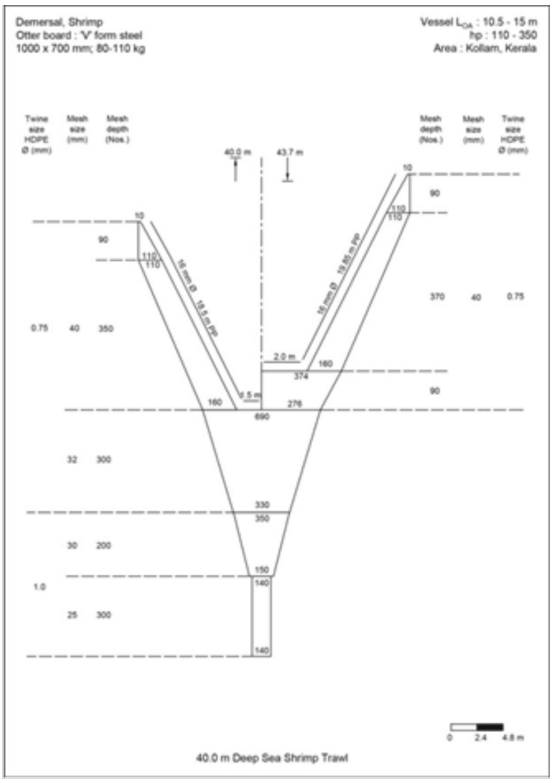

Fig. 8. 40.0 m shrimp trawl

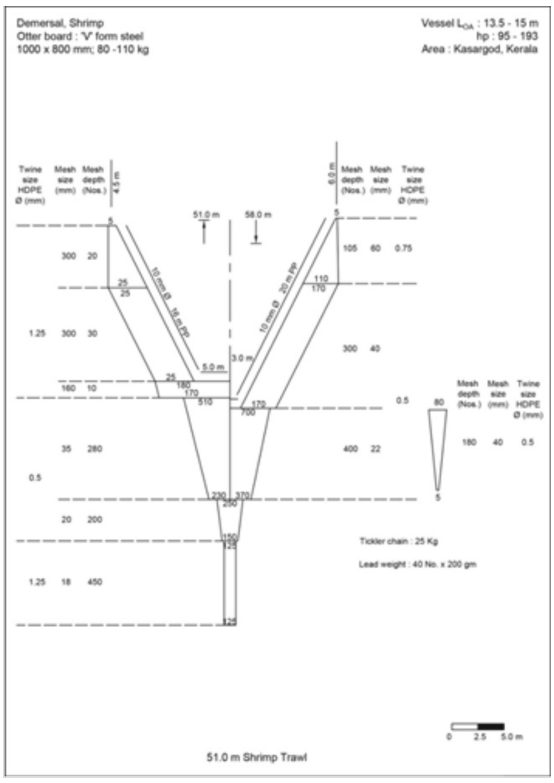

Fig. 10. 51.0 m shrimp trawl

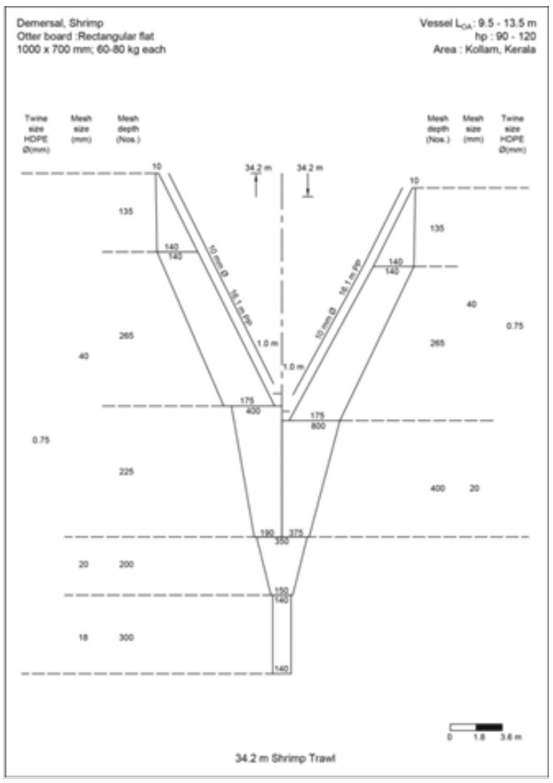

Fig. 9. 34.2 m shrimp trawl

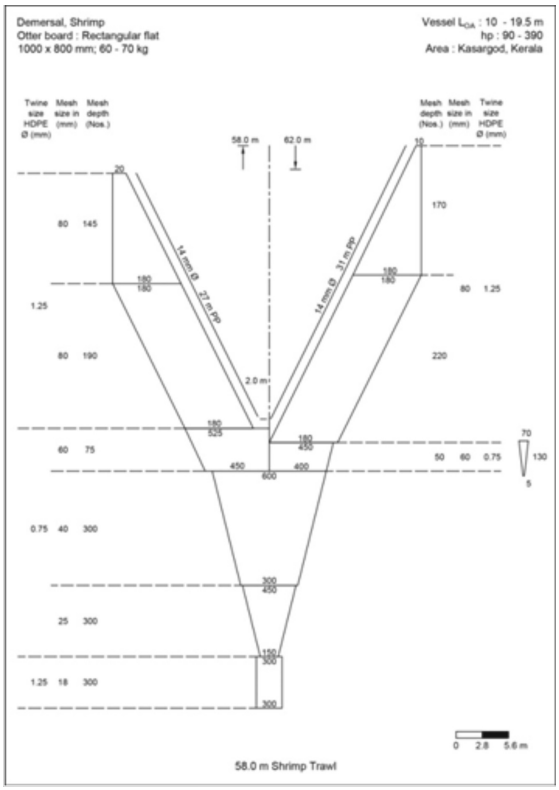

Fig. 11. 58.0 m shrimp trawl

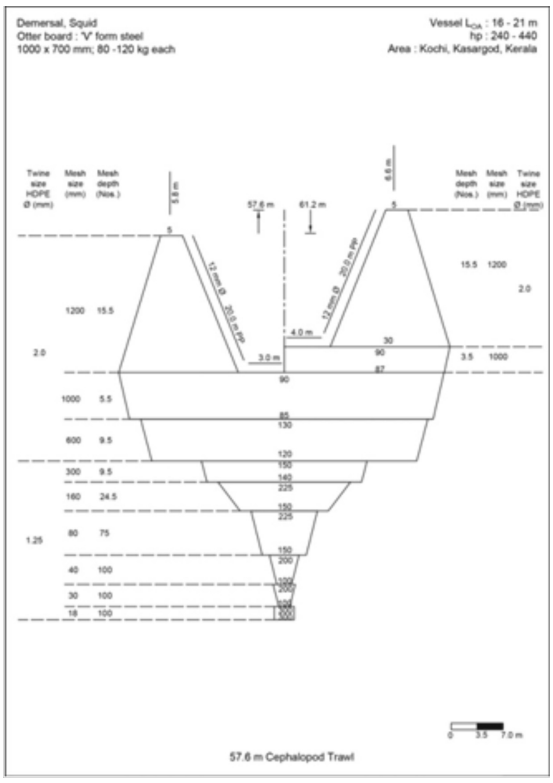

Fig. 12. 57.6 m Cephalopod trawl

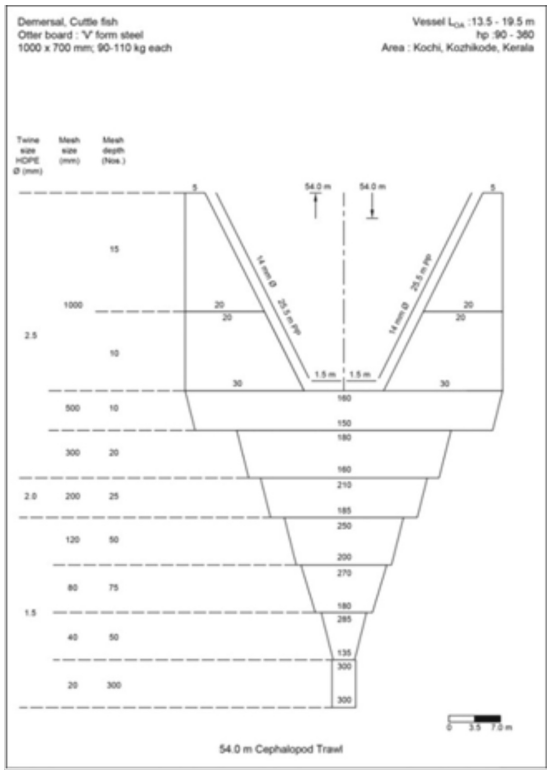

Fig. 13. 54.0 m Cephalopod trawl

Design and operational details of Gastropod trawls are almost similar to shrimp trawls. These trawls are operated along Kollam coast only. The wing end mesh size ranged from 40-80 mm and the codend mesh size was 20 mm. The targeted species are *Babylonia zeylanica* and *B. spirata.* The typical design of gastropod trawl being operated off Kollam coast is given in Fig. 14.

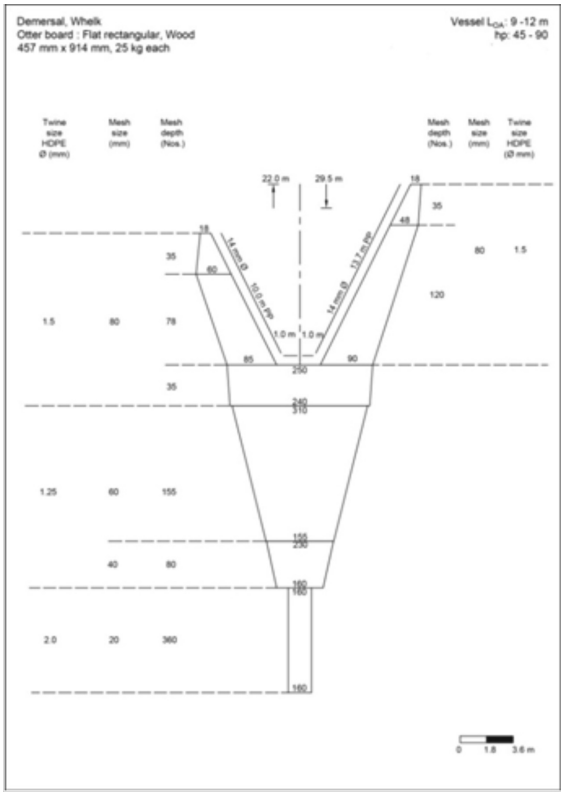

Fig. 14. 22.0 m Gastropod trawl

HDPE or Acrylonitrile Butadiene Styrene (ABS) floats are commonly used with one master float with diameter of 200-350 mm used at the centre and 10-17 floats with diameter of 75-100 mm used on either sides of the master float. Recently only 3-4 large floats of 800 mm diameter are attached to the head rope with a small rope. Along Kerala coast for a trawl net having 11.0 m head rope length used seven plastic floats of 100 mm diameter (Boopendranath & Hameed, 2013). According to Rajeswari et al., 2012, in Andhra coast fish trawls used 15 – 305 mm Ø spherical plastic floats of which the number varied from five to seventeen.

Lead or iron chain used as sinkers are spherical or spindle shaped with weight ranging from 100-250 g

Table 1. Specifications of trawl nets from Kerala

Item and Specification	Fish trawl	Shrimp trawl	Cephalopod trawl	Gastropod trawl
Head rope length (m)	39.6.0 – 81.0	34.0 – 58.0	50-65	22
Webbing material		High Density Polyethylene (HDPE)		
Twine size (mm)	0.5 – 3.0	0.5 – 2.5	1.5 – 2.5	1.25 – 2
Wing end mesh size (mm)	40 – 5000	40 – 300	1000 – 1200	80
Codend mesh size (mm)	16 – 25	18 – 25	18 – 20	20
Rope material		Poly Propylene (PP)		
Rope diameter (mm)		12 – 16		14

each. A total of 30-80 kg of sinkers are used, depending on the size of the gear. According to Boopendranath & Hameed (2013), seven kg of iron link chain was used as sinker for 11.0 m trawl. Two polypropylene ropes of 20 - 40 m length and 18 - 22 mm diameter were used as bridles. According to Mohan et al. (1990), 30 m bridle for 25 m high opening trawl and 20 m bridle for 32 m large mesh trawl was found to be effective based on comparative catch rates obtained.

V- form steel otterboards were the most common, but smaller trawlers continue to use wooden flat rectangular boards. According to Gibinkumar et al. (2005) 'V' form steel otter boards of 50 - 85 kg each were used in 80% of the trawlers in Kerala. Large trawlers use steel otterboards each weighing 80 -150 kg and the weight of wooden boards ranged from 25 kg to 40 kg each.

Irrespective of the designs of trawls operated, bycatch was identified as the most important problem. Pramod (2010) estimated the bycatch and discards from Indian EEZ as 1.2 million t. The bycatch from Kerala coast comprised of juveniles of commercially important species, stomatopods, crabs, echinoderms and jellyfishes (Kurup et al., 2003). According to Gibinkumar et al. (2005) juveniles of more than 200 species of commercially important finfish and shellfish are landed as bycatch along south-west coast of India. None of the trawl designs studied adopted the Kerala Marine Fisheries Regulation Act stipulated codend mesh size of 35 mm. A five time increase in wing end mesh size and three times increase in head rope length was observed in the trawl designs when compared to the study by Sabu et al. (2005). Adoption of responsible fishing systems like semi-pelagic trawl system (CIFT, 2011) for selective harvesting of fish needs to be popularized for minimizing the impacts of trawling on ecosystem and the resources.

The findings of the study will help as a benchmark for determining the changes in the fishing power and also to introduce gear based technical measures for conservation of trawl resources.

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