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Ring Seines with Pockets Operated off Ratnagiri, Maharashtra

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Ring seine targeted at oil sardine and mackerel shoals moving in surface and column waters is a very recent introduction in Ratnagiri, Maharashtra. The design characteristics and operational aspects of the ring seine with pocket operated off Ratnagiri are presented in this communication. Twenty five to 32 vertical rectangular sections of polyamide knotted webbing of 14-20 mm mesh size were joined together to form a single net having a total length ranging from 486 to 655 m and depth ranging from 36 to 41 m. At both ends of the net, a triangular section referred to as choke with webbing of larger meshes and of thicker twines was rigged to give additional strength to the net. The ring seine was operated at a depth of less than 25 m from small fibre glass reinforced plastic (FRP) craft of 10.9-13.0 L_{OA} fitted with 9.9 hp out board motor (OBM) and assisted by a carrier vessel for transporting the catch to the shore. The depth of operation was always less than the depth of the net.

Key words: Ring seine with pocket, hanging coefficient, bunt, Ratnagiri

The ring seine comes under the class of encircling gears (Brandt, 1972). Two-boat ring seining enables small boats and even non-mechanized canoes to use relatively large nets. Ring seine is targeted at shoaling pelagic fishes like mackerel, sardines and anchovies. The main body of webbing is attached to selvages along the top and bottom edges and the top selvedge in turn attached to the float-line while the bottom selvedge to the sinker line with ring arrangement for pursing.

The Central Institute of Fisheries Technology (CIFT), Cochin developed and introduced a mini purse seine, popularly known as ring seine in Kerala during 1982-83 (Panicker *et al.*, 1985). Different aspects of ring seine fishery were studied by many (Klust, 1958; Panicker, *et al.*, 1985; Balan *et al.*, 1989; Anon, 1991; Rajan, 1993; Sathiadas *et al.*, 1993; Edwin & Hridaynathan, 1996, 1997 a&b, 1998 a&b, 2003, 2006; Kurup & Radhika, 2003 a&b; Vijaykumaran & Chittibabu, 2005; and Balan & Sathianandan, 2007).

Marine fisheries sector of Ratnagiri has witnessed many technological innovations during the past decades. Ring seine was introduced in Ratnagiri in the year 2008 by the local fishermen. At present a total of 15 units of ring seines are in operation out of which 10 are with pockets and 5 are without pockets (Jadhav *et al.*, 2010). Ring seines have been used by small-scale fishermen and were operated from fishing craft made of fibre glass reinforced plastic (FRP) fitted with out board motor (OBM). They are mainly operated to catch oil sardine and mackerel shoals. Data on landings of ring seiners have not been recorded separately.

The present study was undertaken with the objectives of making the first document of the design characteristics and rigging of the ring seine net with pockets as no record of the same was available. Variations in its design with respect to the ring seines operated along the Indian coastline are also presented in this communication.

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Materials and Methods

The present investigation was undertaken during the period August 2009 to May 2010. The detailed information regarding the design and construction of ring seine nets with pockets was collected by physically sampling the ten units presently in operation in Ratnagiri. The data were recorded according to Sadanandan *et al.* (1975) and Hellevang (1971) while the design of the gear was documented as per Nedelec (1975).

Results and Discussion

The design and technical specifications of the ring seine with pocket operated from Ratnagiri are presented in Fig. 1. The main parts of the gear were the bunt (*mand*), shoulder, main body, wing (*kan*) and selvedge (*palgi*). The main parts of the ring

seines of Kerala are the central bunt portion (*adi vala*) and two wing portions (*kaivaram*) on either side of the bunt (Edwin & Hridaynathan, 1996).

In ring seine with pocket operated from Ratnagiri, the total length was 570 ± 84 m. Bunt had a length of 30 ± 5 m (Fig. 1 section A), shoulder 31 ± 2 m (Fig. 1 section B), main webbing 26 ± 1 m (Fig. 1 section C), main webbing used as pocket 28 ± 2 m (Fig. 1 section D) and wing $16 \text{ m} \pm 0.39 \text{ m}$ (Fig. 1). The depth of various sections of the net was, bunt (35 ± 3 m), main webbing (37 ± 1 m), main webbing used as pocket (39 ± 1 m) and wing (32 ± 0.92 m). The stretched height of 17 to 25 rectangular sections of the main webbing was higher (Fig. 1 section D) than the other 6 to 8 rectangular sections (Fig. 1 section C). Those sections having

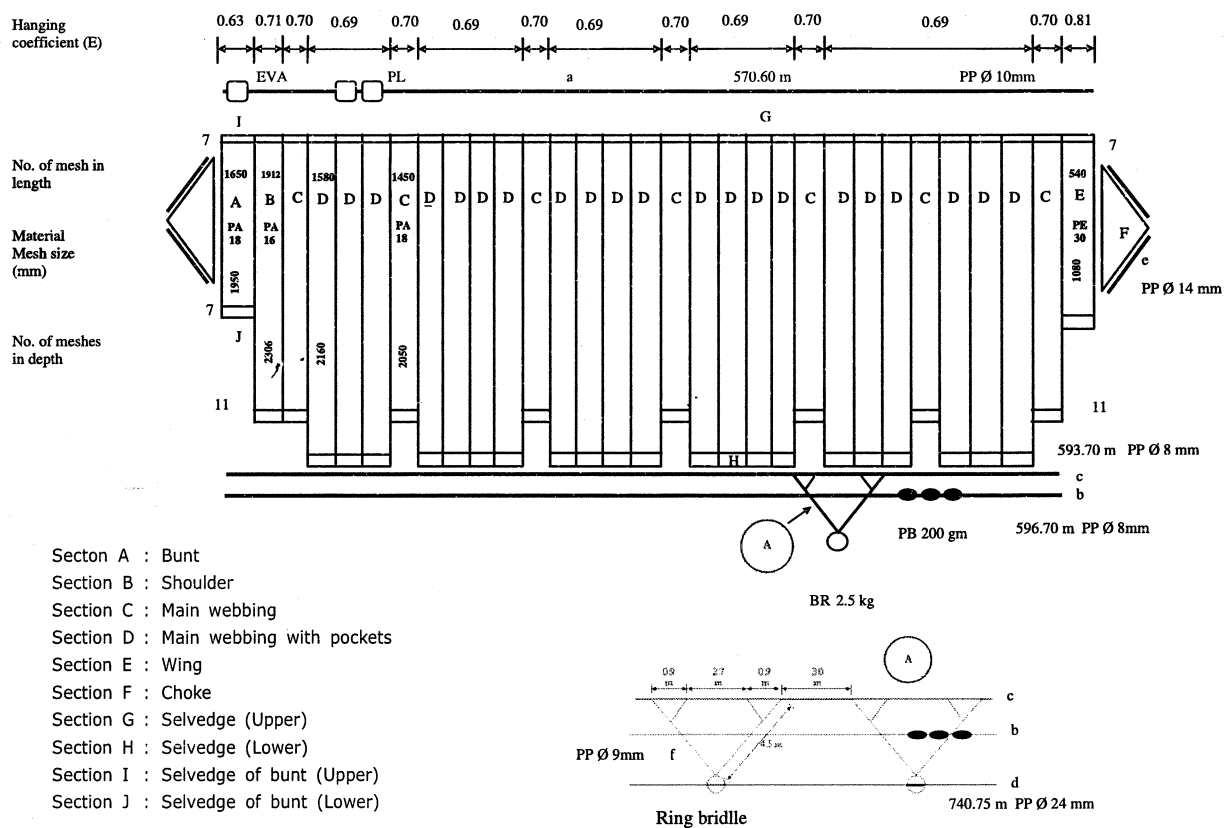


Fig. 1. Design of ring seine net with pocket operated from Ratnagiri

higher height (Fig. 1 section D) were rigged in between the smaller sections (Fig. 1 section C) of the main webbing. This type of rigging gave slackness to the main webbing, thus forming pockets. The pockets thus formed enabled in avoiding the escape of the encircled fish by jumping over the floatline after the pursing operation. The thanguvala of Ernakulum and Alleppey region of Kerala had length of 300 to 500 m and a depth of 30 to 60 m (Edwin & Hridaynathan, 2006), which were almost equal to the ring seines of Ratnagiri. The biggest ring seine (thanguvala) observed at Alleppey, Kerala had a length of 630 m and depth of 100 m (Edwin & Hridaynathan, 1996) while the biggest ring seine observed in Ratnagiri during the period of study had 655 m length and 40 m depth indicating that the depth of the net in Allappey was more than double that of the net in Ratnagiri.

The stretched length of the main webbing was formed by joining 25 to 32 rectangular pieces (Fig. 1). The selvedge pieces with rigged floats and sinkers were laced to the respective sides of each section of the main webbing separately by polyamide (PA) twine of size 210dx4x3 (R tex 304). The bunt part was located at one end of the net.

At both ends of the net, a triangular section referred to as choke was rigged (Fig. 1). The choke had large meshes of 140 to 180 mm, made of thicker twines of polypropylene (PP) of 3 mm diameter. The choke was provided with bridle of 1 to 1.2 m length and consisted of PP rope of 14 mm in diameter. The main purpose of the choke was to give additional strength to the net.

The main webbing was of PA knotted webbing while the selvedge was of polyethylene (PE) and of diameter 1.5 to 4 mm. In

the Alleppey region of Kerala, PA knotless webbing was used as the main webbing in the traditional thanguvala (Edwin & Hridaynathan, 1996).

In Ratnagiri, variation was observed in mesh size of each section of ring seine. The mesh size of bunt was 18 mm, shoulder 14-18 mm, main body 18 mm, pocket sections of main webbing 18-20 mm and wing 30 mm. Similar mesh size of 15-20 mm for ring seine was observed by Vijaykumaran & Chittibabu (2005) in Orissa. On the contrary, in Kerala, Edwin & Hridaynathan (1996) reported that smaller ring seines (*choodavala* or *discovala*) for anchovies had a mesh size of 8-10 mm while the larger ring seine (*thanguvala*) targeted for sardine and mackerel had a mesh size of 18-22 mm.

The hanging coefficient varied at different sections along the length of the floatline and leadline. The hanging coefficient at floatline was in the range of 0.52 to 0.81 while along the lead line it was 0.55 to 0.87. The hanging coefficient of ring seine of Chellanam, Kerala was more on the foot rope (0.65) than on the head rope (0.60) (Panicker *et al.*, 1985).

The average depth of the ring seine was 6.78% of the average length of the net while depth of the bunt portion was only 6.15% of the total length of the net. On the contrary, Edwin & Hridaynathan (1996) reported that the depth of the bunt portion of ring seine used in Alleppey and Cochin was about 10% of the total length of the net. According to Donald (1930), the stretched depth of ring nets of California was about 15% of the length. Prado (1990) stated that the minimum depth of the seine was 10% of the length.

The net was rigged to a single floatline made of PP rope of 10 mm dia and to a

single leadline of PP rope of 8 mm dia. The spindle shaped ethylene vinyl acetate (EVA) floats numbering about 680-842 (761 ± 81) and circular shaped plastic floats (dimensions: 78x55 mm) numbering about 3916-5900 (4758 ± 848) were rigged to the net. Spindle shaped lead sinkers (200 g) numbering about 3005-3899 (3452 ± 447) were used in a single net. The purseline was of PP rope of 24 mm diameter. The separate line for ring and bridle attachment was of 8 mm to 10 mm diameter fixed on the bottom selvedges of the net on the fifth or sixth mesh from the leadline. Ring bridles were attached to this line. Galvanized iron or brass rings weighing 0.8 to 2.5 kg each were used. In the ring seines of Kerala, the double head rope and foot rope of PP rope of 10 mm diameter with the aeroplast floats and lead sinkers of 120 g and purse line of PP of 12 mm diameter and rings of mild steel of 225 g each were reported by Panicker *et al.* (1985).

The deck equipments used were purse winch, purse line reel, guiding blocks and purse davit. Mobile phones were used to contact with the carrier vessel and also for arranging marketing of the catch. The gear was operated using the basic principle of encircling the shoal. In Ratnagiri, the operation of the ring seine net was accomplished by using one vessel with 8 to 12 crew. Skiff was not used for the operation as master float was used for holding one end of the net during encircling. On locating the shoal, the vessel quickly encircled the shoal by dropping the net. The bottom was pursed immediately by hauling the purse line with the help of an auxiliary engine. The catch was emptied and transferred to the carrier vessel for disposal. The operation was carried out at depth always less than the depth of the net.

The ring seine operation was carried out by single vessel assisted by a carrier

vessel for transporting the catch to the shore. FRP vessels of size ranging from 10.9 to 13 m L_{OA} and carrier vessel with 8.5 m L_{OA} and depth of 1.8 m were commonly used. The ring seines in northern Kerala were operated from one or more large plank built canoes (L_{OA} 12-24 m) as reported by Edwin & Hridayanathan (1997).

The vessels were fitted with 9.9 hp OBM for propulsion while a single cylinder auxiliary engine of 5 hp was fitted on the deck of the vessel for operation of horizontal warping heads for quick hauling of the purse line. The propulsion of ring seines of Kerala was carried out usually by outboard engines of 25 hp capacity and in certain cases, two 25 hp engines were also used in a single unit (Sathiadas *et al.*, 1993). Edwin & Hridayanathan (1996) reported that the large *thanguvalloms* in Kerala used two engines of 25 hp each or a 25 hp engine along with a 40 hp engine. Vijayan *et al.* (2000) recommended outboard engine with less than 50 hp for effective operation of ring seines. They suggested that the use of excess horsepower for propulsion, resulting high fuel consumption without commensurate increase in production must be discouraged.

According to Edwin & Hridayanathan (1996) in ring seiners of south Kerala coast the crew comprised of 30 to 35, which is more than double that observed during the present study in Ratnagiri.

In Ratnagiri, the nets were operated generally at depths less than 25 m while the nets along the Kerala coast were operated up to a depth of 45 m (Sathiadas *et al.*, 1993). The use of powerful engines and absence of substantial catch from the inshore waters, urged fishermen of Cochin and Alleppey to venture into depths up to 45 m during the daytime and up to 55 m at night (Edwin & Hridayanathan, 1996).

The basic information on the design characteristics, rigging and modalities of operation of the ring seine net with pockets, in Ratnagiri would help in technological innovations the net may go through in the coming decades.

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