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Assessment of Ring Seine Fishery Performance with a 25-HP OBM along the Mangaluru Coast

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ABSTRACT

To know the catch composition of the Ring seine operated at a depth of 15 m and 20 m along the Thanirbhavi coast off Mangaluru during the month of August-2023 to December-2024. Ring Seine was used to operate along the Mangaluru coast off Karnataka. The Experiment was started during the year 2023–2024 with Out Board Motor (OBM) Engine fitted with FRP canoe of Over All Length (OAL) of 13.8 m. The study was carried out at two depths Viz. 15 m and 20 m. The experiment was carried out once in fortnight for each months. The catch found was 1,648.40 kg in case of 15 m depth. At 20 m depth the catch was 16,786kg. The major species caught was Sardine and Mackerel. The fishes were segregated and sorted out species wise and size wise and later it was brought to the stored shore under the hatches with a chilled sea water to maintain the fresh quality until it goes for auctioning. This Ring seine fishing operation was carried at both the depths and the Predominant catch found at the depth of 20 m. This Ring seine operations was carried out to know the exact depth of operation for the 13.8m OBM engine and the commercially available species, which could help the fisher community to earn even in the fishing ban in the Karnataka coast. This Ring seine played a vital role in catching the pelagic fishes especially Sardine and Mackerel.

KEYWORDS: Ring seine, OBM, depth, fishing, operation, catch, efficiency, pelagic

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1. INTRODUCTION

The Indian Marine fishery was a classic example of a multi-species, multi-gear fishery operating under a heterogeneous management framework that includes Labour deployment and wage distribution in ring seine fishery of central Kerala (Das et al., 2012). India ranks as the world's second-largest fish producer after China, contributing approximately 8% to global fish production (Anonymous, 2022). During 2023–24 India achieved a record-high total fish production of 175.45 lakh mt, of which 131.13 lakh mt came from Inland fisheries and 44.32 lakh mt from the Marine sector. Karnataka ranked third among Indian states-after Andhra Pradesh and West Bengal-contributing 12.25 lakh mt to the national total (Anonymous, 2023). Among the fishing gears deployed along the Karnataka coast, seine nets are among the most efficient and commonly used. These are generally operated within 10 nautical miles from shore due to the increased effort and time required for fishing beyond this range (Jadhav et al., 2018). During the year 2022, outboard Ring seines contributed approximately 3.8%, while mechanized ring seines contributed 5% to India's total marine fish production (Natale et al., 2015) studied the mapping of fishing effort through AIS data. The Ring seine was originally developed by the ICAR–Central Institute of Fisheries Technology (ICAR-CIFT) for use by artisanal fishers, replacing the traditional *thanguvala* or boat seine (Pravi, 2012). Initially, 9.9-horsepower (hp) outboard motors (OBMs) were installed to provide propulsion, enabling fishers to reach distant fishing grounds with reduced manpower requirements. It was operated from wooden canoes measuring 11.7 to 17.5 m in length and powered by 15 to 25 hp OBMs. The net itself comprises four to six sections joined with No. 6 nylon rope. As per Russo et al., 2020. Studies have been conducted on the Temporal and spatial patterns of trawl fishing activities in the Adriatic Sea. (Central Mediterranean Sea, GSA17). Ocean. Overtime, the size and design of the ring seine gear have increased significantly, mirroring advancements in fishing craft size and engine horsepower. Historically, a typical cotton *thanguvala* used in the early 1960s measured just 42 m in length and 5.2 m in depth (Kuriyan et al., 1962). Modern ring seines, however, are considerably larger. Panicker et al. (1985) documented an early version of the ring seine measuring 250 m in length, with a depth of 33 meters at the bunt and 15 m at the wings. In the Chellanam region of South-central Kerala, Edwin and Hridayanathan (1996) recorded gear dimensions of 630 m in diameter and 100 meters in depth, with a mesh size of 18–20 mm. The introduction of ring seines also led to the deployment of more powerful engines. A 2013 ICAR-CIFT survey reported dissatisfaction among fishers with the power and reliability of existing engines, with many expressing a need for more efficient and powerful marine engines (Edwin et al., 2015). The availability of imported marine engines further accelerated the adoption of ring seines across the region. The ring seine method has since spread across central and northern Karnataka and into the Dakshina Kannada district, replacing most traditional gears used for pelagic fisheries. With this background, the present study was undertaken to Assess the performance of Ring seines operated at two different depths using a single 25-hp outboard motor along the Mangaluru coast. Prapti et al., 2025. Studied on the Impact of Ring Seiner equipped with AIS Transponder operated along the Ullal Coast off Mangaluru. Prapti et al., 2025. Studied the Optimization of Fishing Efficiency and Sustainability with AIS and Echo sounder Equipped Ring Seine operated along Ullal Coast off Mangaluru

2. MATERIALS AND METHODS

The Experimental study was carried out during the month of August, 2023 to December, 2024 from the Department of Fisheries Engineering and Technology, College of Fisheries, Mangaluru, Karnataka, India along the Thanirbhavi coast off Mangaluru.

2.1. Rigging of the ring seine

The study was conducted using Single boat fitted with Outboard motor engine for the operation of Ring seine. The Ring Seine, also called as "Mini Purse Seine". This Ring seine was operated at a depth of 10 m and 15 m along the Mangaluru coast off Karnataka. The boat has a length of 45' fitted with 25 HP of the engine was used for the fishing operation. The Ring seine was joined together to make a larger one for conducting the experiments. Cochin developed and introduced ring seine in Kerala in the year 1982–83 (Panicker et al., 1985). This gear had an overall dimension of 250×33 m^2 and was fabricated of polyamide knotless netting of 18 mm mesh size. Ring seiners were constructed using steel, wood and FRP ranging LOA from 12 to 27 m. Edwin and Hridaynathan (1996).

2.2. Ring seine operation

The Ring seine operation was carried out with Repairing/ mending the net (Figure 1) during the experimental period. Later the steaming was done from shore to the fishing ground and released the net with all the necessary rigging arrangements (Figure 2). The Ring seine net was designed as per the specification of the Edwin, 1996 for fabricating the net (Figure 3) and after encircling the net, hauling was carried out and the fishes were taken on board the fishing vessel (Figure 4). And later the catches were segregated species wise and size wise. The mending of the Ring seine was carried before the fishing operation (Figure 1). The shooting of the Ring seine net was carried out by using out

Figure1: Mending the ring seine

Figure 2: Ring Seine operation with OBM

board motor engine boat (Figure 2)

2.3 Design and Hauling operation of the Ring Seine

The design of the Ring seine was as per the details mentioned below in the Figure 3. The Fishing Trip was carried out once in fortnight for a period of Ten months and the hauling operation was carried out during the study period was mentioned in the Figure 4. The catch obtained was segregated size wise and species wise. The small juveniles and other trash fishes were discarded back,

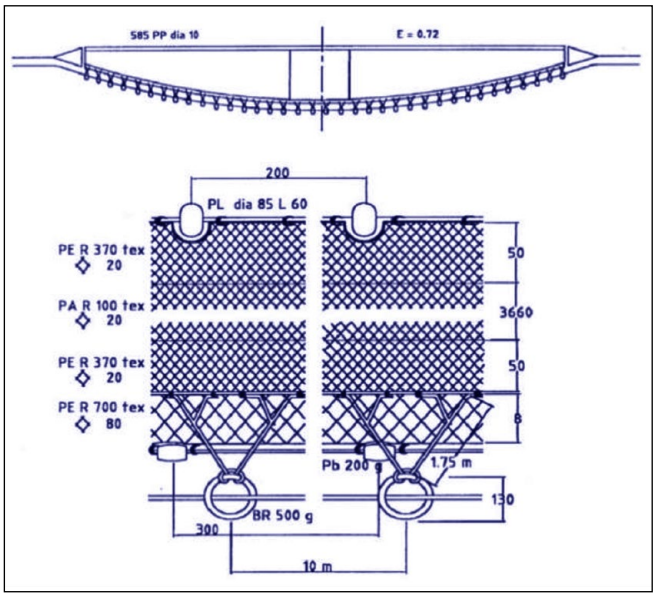

Figure 3: Design structure of ring seine

Figure 4: Ring seine fishing net in operation

and the medium size commercially high valued fishes were brought to the shore in iced condition for further processing and marketing.

3. RESULTS AND DISCUSSION

3.1. Fishing gear

Typical Ring seine of 13.8 m were operated for Sardine, Mackerel and other pelagic schooling fishes in the area of observation (Mangaluru, Karnataka State). The main parts of the net operated from Mangaluru were the Wing, Shoulder, Main body and Bunt, wing on either sides of the bunt and selvedge as per Jadhav et al., 2011. The Ring seine of Karnataka has three main parts viz., the central bunt portion, Main body and wing portions on either side of the bunt. The two types of Ring seines were presently operated

to catch different pelagic fish species in Mangaluru. Initially, the overall length of the Ring seines with pocket was 386–555m and depth of 26–35 m (Prapti et al., 2025 have also observed the similar results during their study period.

During the study period, observation were made on the overall length of the Ring seines and the same was noted as 225–365 m, formed by joining a total of 24 to 33 number of rectangular pieces, while depth varied from 20–40m. Edwin and Hridaynathan (2006) reported that the Ring seine (Ranibale) of Ernakulum and Alleppey region of Kerala had length of 300 to 500 m and a depth of 30 to 60 m. The webbing of the ring seines were made of polyamide (PA) multifilament twine of 210D/2/3 and 210D/5/3 for main webbing and bunt respectively, having mesh size of 17 to 25 mm. In ring seine with pocket, the stretched height of few sections of main webbing was higher than the other rectangular sections (Jadhav et al., 2011). Those sections having greater height were rigged in between the smaller sections of the main webbing. This type of rigging gave slackness to the webbing, thus forming pockets. These pockets were provided to avoid the fish from jumping over the float line and retain the fish in the net. The stretched height of all the sections of main webbing was same in the ring seine without pocket. Jadhav et al. (2011) has given a detailed description of the structure and fabrication of the ring seines operated off Ratnagiri.

3.2. Fishing craft

In the area of observation, ring seines were operated from FRP (fiberglass reinforced plastic) vessel. During the initial phase of introduction, ring seines were operated from single FRP vessel with carrier craft. Carrier crafts used for transportation of catch. The overall length (LOA) of these crafts were in the range of 10.9–13.0 m fitted with single 25 hp outboard motor (OBM), whereas a single cylinder auxiliary engine was fitted on the deck of the vessel for operation of horizontal warping heads used for quick hauling of the purse line (Jadhav et al., 2011). Prapti et al., 2025 have found the more time and energy was required to reach the fishing grounds and search for shoals in the Non acoustic Ring sine during their study period and they were back very quickly whereas, the bigger size single or two crafts with fish holds allowed them to stay at sea for 1–3 days. Vijaykumaran and Chittibabu, 2005 studied on the Adoption of New Fishing Techniques by Traditional Fishers along Andhra Pradesh-Orissa Coast and found the similar results.

3.3. Catch composition

Fishing operations were limited to a very less distance and only one day fishing trips was carried out at each fishing trips and the catches obtained were at 15 m and 20 m depth with 13.8m boat having a 25hp of the outboard motor engine was recorded in the (Table 1 and Table 2). The catch obtained for the Ring seine with a length of 10 m has found with.16, 484 kg (Table 1) with a 25hp of the OBM engine. The overall length of the crafts was presently increased to 12 m to 13.5 m with fish holds to store the catch on board and 2–3 holds were made available to store ice and fuel. The single 40hp OBM engines were presently replaced with 20hp OBM engines at a time, with combinations of 40hp and 12hp was studied by Mendon (2025) and observed that the propulsion of Ring seines of Kerala was usually by outboard engines of 25hp capacity. However, in certain cases, two engines were also used in a single unit by Edwin and Hridayanathan (1996) reported that the large Thanguvalloms in Kerala used two engines of 25hp each or a 25hp engine along with a 40hp engine. Whereas, Boopendranath and Hameed (2012) reported that the ring seine craft in Kerala was powered by two outboard motors of 22hp and the carrier was powered by OBM of similar design, generating 12hp. These recent changes helped to reach the fishing ground and come back very quickly whereas, the bigger size single or two crafts with fish holds allowed them to stay at sea for 1–3 days. Fishing operation of the Ring seine was operated using the basic principle of encircling the shoal.

Table 1: Ring Seine (10 m), operation at a depth of 15 m for the 25 hp of the OBM Engine

Fishing trips (Days)	Horse power of OBM	Depth of operation	Types of fishing net (10.0 m)	Catch (kg)
0	25hp	15 m	Ring seine	2500.00
15	25hp	15 m	Ring seine	1800.00
30	25hp	15 m	Ring seine	1875.00
45	25hp	15 m	Ring seine	1578.00
60	25hp	15 m	Ring seine	987.00
75	25hp	15 m	Ring seine	1002.00
90	25hp	15 m	Ring seine	1360.00
105	25hp	15 m	Ring seine	2004.00
120	25hp	15 m	Ring seine	1400.00
135	25hp	15 m	Ring seine	1978.00
			Total catch (kg)	16,484.00

The gear was adapted to the tendency of pelagic fishes to concentrate into dense shoals. Once a school of appropriate size and desirable species was detected, the craft was taken sufficiently close to the school and was encircled quickly by dropping the net. The catch obtained for the Ring seine with a length of 15 m has found with.16,786 kg (Table 2) with a 25hp of the OBM engine. In Ratnagiri, the gear was operated mainly to catch Mackerel and Oil Sardine

Table 2: Ring seine (15.0 m) operation at a depth of 20 m for the 25hp of the OBM Engine

Fishing trips (Days)	Horse power of OBM	Depth of operation	Types of fishing net (15.0 m)	Catch (kg)
0	25hp	20 m	Ring seine	2000.00
15	25hp	20 m	Ring seine	1300.00
30	25hp	20 m	Ring seine	1375.00
45	25hp	20 m	Ring seine	1278.00
60	25hp	20 m	Ring seine	1987.00
75	25hp	20 m	Ring seine	1020.00
90	25hp	20 m	Ring seine	1986.00
105	25hp	20 m	Ring seine	2040.00
120	25hp	20 m	Ring seine	1800.00
135	25hp	20 m	Ring seine	2000.00
			Total catch (kg)	16,786.00

shoals moving in the surface and column waters. Initially, the operation of the Ring seine net was accomplished by use of one vessel with 8 to 12 crew members. Skiff was not used for the operation, as master float was used for holding one end of the net during encircling. The gear were mostly operated near to the coast. 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 unpowered carrier vessel for disposal. The carrier vessel was used only for catch disposal (Jadhav et al., 2011). In recent years, 10–12 hp auxiliary diesel engine were used to assist the pursing operations and to facilitate multiple setting operations quickly. The Ring seine operation was accomplished by single or double motorized vessels with 13 to 15 crew members on each vessel. Edwin and Das, 2015, Prapti et al. (2025) described the operation of Ring seines operations along the Ullal coast off Mangaluru; the manpower used being more than double that observed during the present study in Ratnagiri. The carrier craft is no longer used as present day ring seiners are equipped with 4–5 fish holds with storage capacity of 1–1.5 ton catch in each hold. The technological trends in Ring seine fishing method of Karnataka have been changing drastically since its introduction with respect to their structure, length and depth of net, size and catch carrying capacity of the craft, multiple and higher power engines and mode of fishing operation. The observed emerging trends in the mechanization of Ring seine would help in more technological innovations.

4. CONCLUSION

The Ring seine operated at 15 m and 20 m, the catch obtained for the depth of 20 m depth (16,786 kg) followed by 15 m (16,484 kg). The reason was the length of the Ring seine operated were suited for the depth of 20 m, rather than 15 m during the study period.

5. ACKNOWLEDGEMENT

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