



Ring Seines Operated off North Andhra Pradesh Coast

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Abstract

Ring seine is one of the most efficient and active fishing gears used for exploiting pelagic fish shoals along the east coast of India. Based on the target group and mesh size, the ring seines along the Andhra Pradesh coast are classified into three groups, viz., the large mesh ring seines targeting tuna and seer fish, medium mesh ring seines exploiting sardine, mackerel and carangid and small mesh ring seines targeting anchovies. The total length of the net ranges from 450-675 m and depth from 50-60 m having 20-30 rectangular webbing pieces. The design details and operational methods of ring seines operated along Andhra Pradesh coast are presented in this communication.

Keywords: Ring seines, artisanal sector, bunt, pelagic shoals

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Introduction

Andhra Pradesh, having a coastal line of 974 km and a continental shelf area of 33 227 sq.km distributed over nine districts supports a rich pelagic and demersal fishery. Along Andhra Pradesh coast, pelagic fishes contributed 56.7% of the total catch that comprised of sardines (15.4%), mackerel (8.4%), ribbonfish (7.0%), carangids (5.7%), seerfish (3.6%) and anchovies (3.1%) (Rao et al., 2008)

Introduction of motorized boats in the traditional sector in the late eighties made tremendous impact on marine and pelagic inshore resources and innovative gears such as ring seines gradually

replaced many of the traditional fishing gears. Motorization leads to the development of innovative high catching gears like ring seines in traditional sector (Balan et al., 1989). Ring seines or ring nets are a group of lightly constructed purse seines adapted for operation in the traditional motorized sector (Edwin & Hridayanathan, 1996). Panicker et al. (1985) introduced a mini-purse seine, which came to be known popularly as ring seine, for operation from traditional motorized craft, during 1982-83. D'cruz (1998) documented the design and traced the changes in ring seine designs in Kerala, while ring seines of south Kerala coast were reported by Edwin & Hridayanathan (1996).

Ring seine is one of the most efficient and active fishing gears used to exploit pelagic school of fish. In this method, the school of fish are surrounded and impounded by surrounding net (Brandt, 1972). Panicker et al. (1985) reported that ring seine had an overall length of 250 m and a depth of 30 m. Over the years, the length and depth of the gear increased upto 630 m and 100 m respectively (Edwin & Hridayanathan, 1996). Ring seines of 570 to 655 m length with pocket was reported by Jadav et al. (2011). Various aspects of ring seines were studied by Rajan (1993); Sathiadas et al. (1993); Edwin & Hridayanathan (1997a & 1997b, 1998a & 1998 b, 2003, 2006), Vijayakumaran & Chittibabu (2005) and Balan & Sathianandan (2007).

CMFRI estimated the number of ring seines operated along the coast off Andhra Pradesh to be 978, of which 624 are in north Andhra (CMFRI, 2010). These nets are operated mainly at Srikakulam district, Bhimili, Vasavanipalem, Chepala Uppada, Nagavayapalem, K. Nagaram, Annavaram and Thotapillepet of Visakhapatnam district and Uppada, Konapapapeta, Kotha Chodipilli Peta, Moola Peta and Danavayapeta of East Godavari district and other parts of Andhra Pradesh. Since the designs of ring seines of Andhra Pradesh are not documented, the present study was undertaken to document the

design details, technical and operational aspects of ring seines.

Materials and Methods

The study was undertaken during 2009-10 and the design details were collected by physical examination of the units operated along Andhra Pradesh coast. The data pertaining to the design, construction and operation of the ring seines were collected from the landing centres, net mending centres and by interacting with fishermen of the villages of Bhimili, Vasavanipalem, Chepala Uppada, Nagavayapalem, K. Nagaram, Annavaram and Thotapillepet of Visakhapatnam district and Uppada, Konapapapeta, Kotha Chodipilli Peta, Moola Peta and Danavayapeta of East Godavari district. The gear survey was conducted as per Nedelec (1975).

Results and Discussion

Depending on the target group and mesh sizes, ring seines are classified into three categories along the coast of north Andhra Pradesh. The nets made with larger meshes are locally called *pedda ringula vala*, the nets with medium mesh size are called *nadipi ringula vala* and the net with small mesh called *chiraga ringula vala*. The net is fabricated by joining 20-30 pieces of webbing. The meshes in the bunt part were smaller than wing part and are fabricated

with thicker twines. The hanging ratio of the bunt part was 0.6-0.65. The meshes in the wing parts were larger in size and made with twine of thin diameter. The hanging ratio on either side of the bunt was 0.8-0.83. Both ends of the net were tapered by tying a set of four meshes as a bunch and all bunches were tied to one ring and was tied with 14 mm PP rope.

The design details of *pedda ringula vala* (large mesh ring seine) are given in Fig.1. *Pedda ringula vala* was made of 210Dx18x3 polyamide multifilament webbing with 100 mm mesh size in the bunt and 210Dx8x3 polyamide multifilament webbing of 120 mm on either side of the bunt section. The total length of the net was 466.6 m and depth was about 60 m. The head rope was made with 8 mm dia PP rope. Upper row of webbing was inserted in the head rope and thermocole floats tied in the nylon cloth were attached to the head rope. The depth of the net was slightly reduced at both ends of the net. Extreme ends of the net were tapered, with a set of four meshes of the netting tied as bunch and all bunches were tied to one ring and was tied with 14 mm PP rope. Lead sinkers of 600-675 kg (total weight) were attached to the 4 mm foot rope *viz.*, 3000 sinkers, each weighing 200-250 g. The foot rope was attached to the net by selvedge of 40 mm mesh size made of 1 mm dia HDPE webbing of 40 meshes depth. Below the foot rope, iron rings of 15 cm

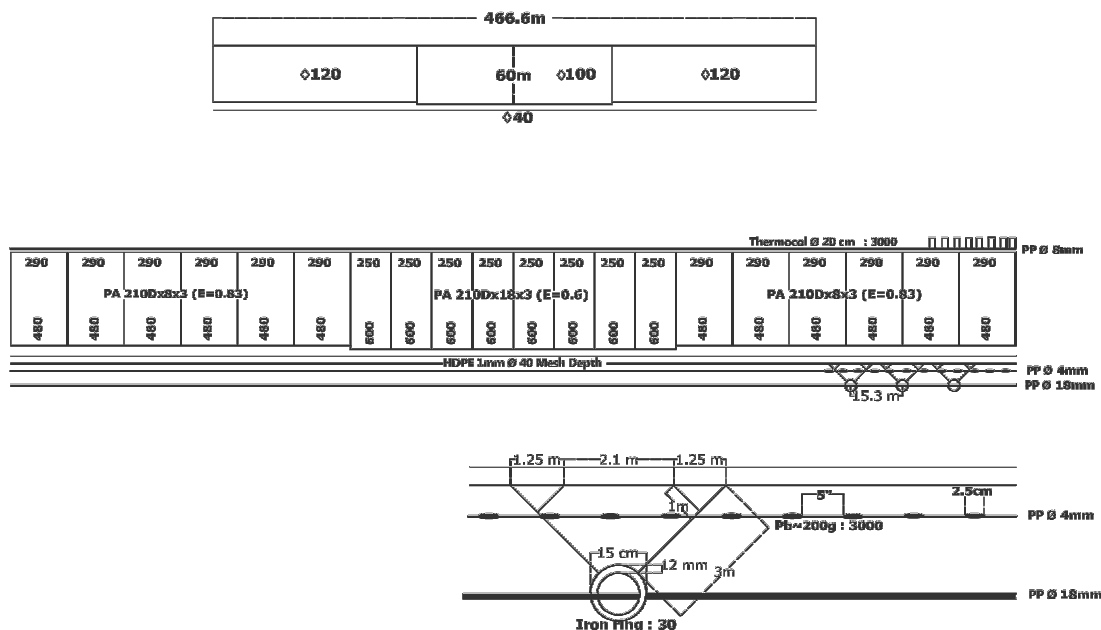


Fig. 1. Design of large mesh ring seine

diameter made with 12 mm dia iron rod was tied, to the foot rope. The rings were attached to the foot rope by two 10 mm dia ropes of three meters, supporting PP rope of 6 mm dia and 1 m in length tied to the foot rope in "V" shape and the distance inside the V was 4.6 m. The distance between the two ring ropes was 4.6 m. A purse line of 18 mm PP rope of 600 m length was passed through the rings and was used for closing the bottom of the net after surrounding the fish shoal.

The design details of *nadipi ringula vala* (medium mesh ring seine) are given in Fig. 2. *Nadipi ringula vala* is fabricated with 210Dx4x3 polyamide multifilament with 25 mm mesh size in the bunt area and 210Dx2x3 polyamide multifilament of 35 and 40 mm mesh sizes on either side of the bunt section. The total length of the net was 471.4 m and depth was about 50 m. At both the ends of the net, the meshes were tied as bunches and large meshes of 100 mm mesh made of 3 mm rope were tied as bunch to give strength to the net. This was attached to 14 mm PP rope. The head rope was made with two 6 mm diameter HDPE rope. A selvedge of 2 meshes of 60 mm mesh size made of 3 mm dia twine was attached to the net. Upper row of selvedge was inserted in the lower 6 mm head rope and the polystyrene floats tied in the nylon cloths were attached to the upper head rope. Total of 3000

sinkers, each weighing 100 g, giving a total weight of 300-330 kg were attached to the foot rope. Below the foot rope, iron rings of 10 cm diameter made of 10 mm dia iron rod was tied to the foot rope. The rings were attached to the foot rope by two 10 mm dia ropes of three meters, and a 1 m large 4 mm dia rope was tied to the foot rope in V shape. A purse line of 18 mm PP rope of 500-600 m in length was passed through the rings and was used for closing the bottom of the net, after surrounding operation. These nets are used for harvesting mackerel, sardine and carangids.

The design and constructional details of *chiraga ringula vala* (small mesh ring seine) are given in Fig. 3. *Chiraga ringula vala* was fabricated with 210Dx2x3 polyamide multifilament of 10 mm mesh size in the bunt area and 210Dx1x2 polyamide multifilament of 15-20 mm on either side of the bunt section. The total hung length of the net was 379.2 m and depth was about 21 m. The extreme end of the net was fabricated with large mesh of thicker twine and both ends were tied as a bunch to the 14 mm PP rope. A selvedge of six meshes of 40 mm mesh size made of 1 mm dia HDPE twine was attached to the head rope and thermocole floats tied in nylon cloths were attached to the head rope continuously. Lead sinkers of 450-500 kg weight were attached to the 4 mm foot rope. The foot rope

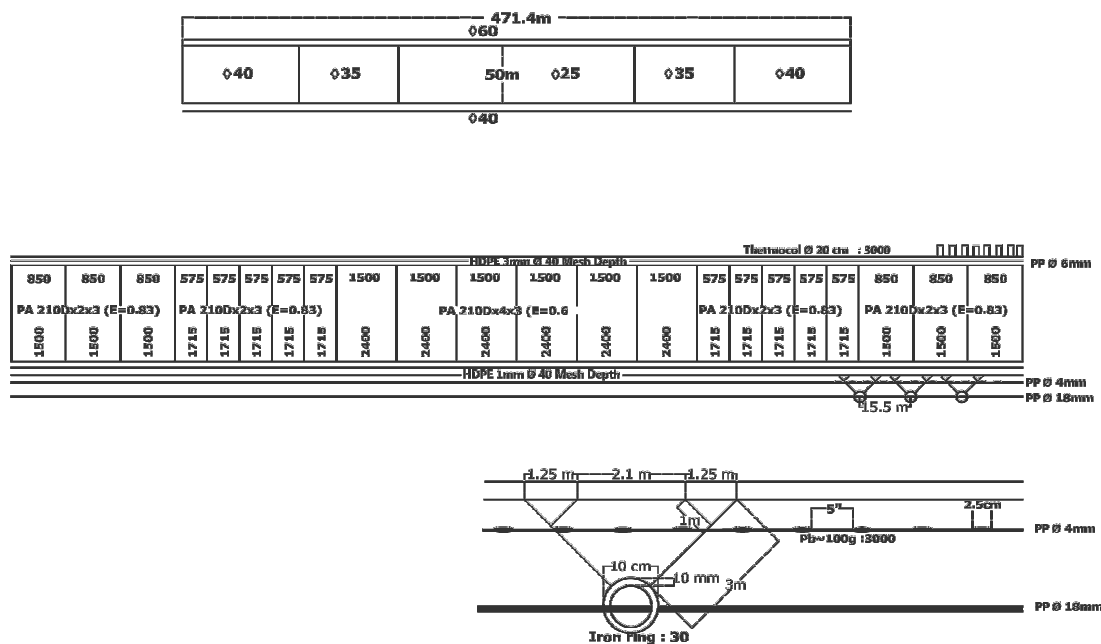


Fig. 2. Design of medium mesh ring seine

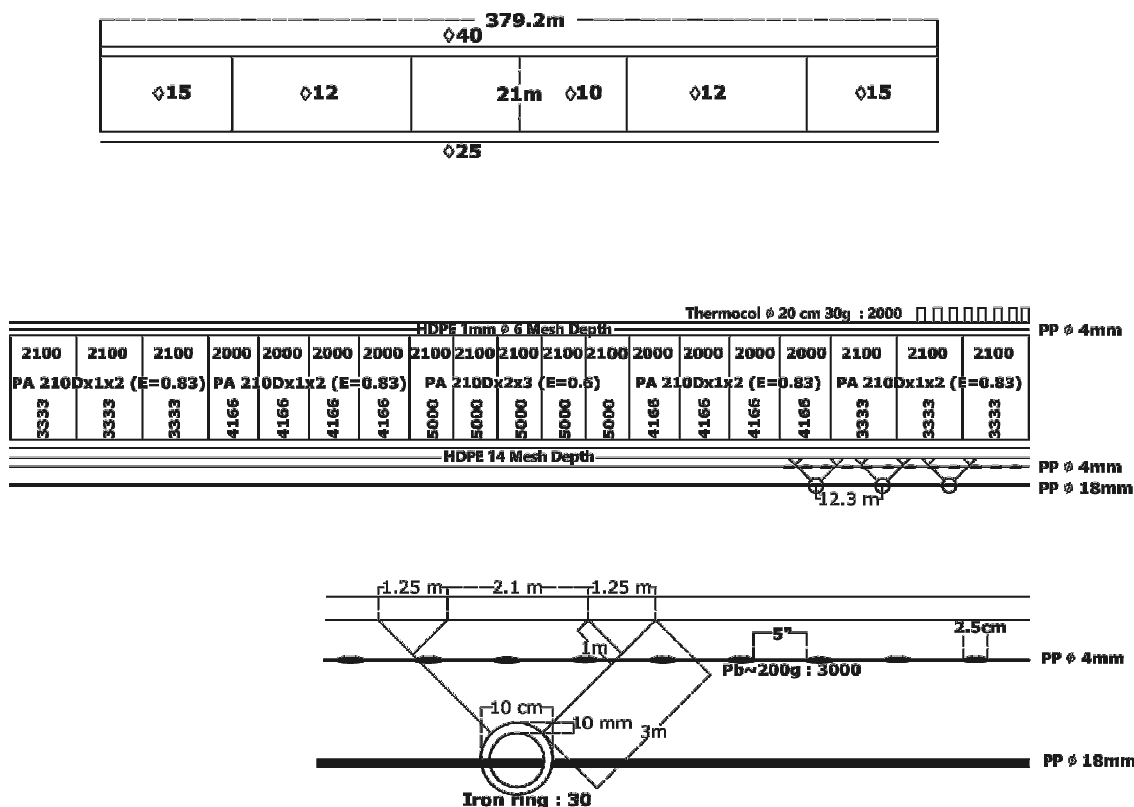


Fig. 3. Design of small mesh ring seine

was attached to the net by selvedge of 1 mm dia HDPE webbing of 25 mm mesh size 14. Iron rings of 10 cm diameter made with 10 mm dia iron rod was tied to the foot rope. The rings were attached to the foot rope by two 10 mm dia rope of two meters supporting 4 mm dia 0.8 m long PP rope tied to the foot rope in V shape. A purse line of 18 mm PP rope of 500-600 m length is passed through the rings and was used for closing the bottom of the net, after surrounding the shoal in operation. These nets are used for harvesting anchovies and sardines.

Catamarans, made of fiber glass reinforced plastic (FRP) and wood and plank built boats fitted with out board and inboard motors of 16 - 25 hp are used to operate the net. These boats fall into two size groups. Large catamaran (LOA 10 m) having dimensions of 10x2x1 m and smaller catamaran (LOA 8.5 m) with dimensions of 8.5x1.6x0.9 m are used. During ring seine operations, the two boats used, are either of the same size or of different size groups. The catch comprises of small pelagic fish like sardine, mackerel, anchovies and carangids and larger pelagic fish like seer fish and tuna.

The ring seine is operated by about 14-16 fishermen, employing two boats. After locating the shoal, one group of fishermen carry the ring net in one boat and encircle the entire shoal, and the other group with second boat holds the purse line and bridles on the other side. The two groups of fishermen pull the purse line and the bottom part of the net is closed. The entire shoal is completely surrounded and either side of the net is hauled to concentrate the fishes in the middle part (bunt). Catch of ring seines comprised mainly of a single targeted species like sardine, mackerel, anchovies and tunas which constituted to about 90% of the catch along with 10% of non targeted species like thryssa, lesser sardine, carangids and seer fish.

Designs of ring seines are varying depending on the target group. Ring seine of 15-20 mm mesh sizes reported by Vijayakumaran & Chittibabu (2005) was nearer to the mesh size of *chiraga ringula vala* of present study. Edwin & Hridayanathan (1996) reported a large ring seine having mesh size of 18-22 mm used for sardines and mackerel from Kerala coast, which is similar to *nadipi ringula vala* of

Andhra Pradesh. The vertical pieces of the net decreased from bunt side towards wing side in Kerala (Edwin & Hridayanathan, 1996). But in the present study, the depth of the wing is slightly decreased in *pedda ringula vala*. The maximum length of the net recorded is 675 m which is larger than the 630 m recorded in the west coast. The maximum depth recorded is 60 m in Andhra Pradesh coast which is less than the maximum depth of 100 m in the west coast reported by Edwin & Hridayanathan (1996). The extreme ends of the net only reduced, leaving 90% of the net with uniform depth as reported by Panicker et al. (1985). The webbing used to construct nets in all the designs in the present study were PA knotted webbing unlike the knotless webbing in the thanguvala reported by Edwin & Hridayanathan (1996). The mesh size of the bunt is 67% of the optimum mesh size used in gill nets and the rest of the net could be larger by a factor of 1.2-5 depending on the herding effect of targeted fish (Hameed & Boopendranath, 2000). The mesh size of the bunt is smaller than the wing in all designs presented in this communication and the hanging ratio of the wing part is more than the bunt.

Ring seine is an efficient gear for bulk harvesting of shoaling pelagic species such as sardines, mackerel, carangids and tunas. However, the total fishing capacity has to be matched with maximum sustainable yield of resources in the area of distribution of the harvested resources. Sardine and mackerel landings along the east coast show a significant increase and it would be appropriate to introduce a limited number of ring seines, following precautionary principles after scientific assessment, with strict regulations on the mesh size and dimensions of the gear.

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References

- Balan, K., Panikkar, K.K.P., Jacob, T., Andrews, J. and Rajendran, V. (1989) Motorisation of the country craft in Kerala – an impact study, CMFRI Special Bull. 45: 47 p, CMFRI Cochin, India
- Balan, K. and Sathianandan, T.V. (2007) An assessment of ring seine fishery in Kerala through surplus production model, Indian J. Fish. 54 (2): 135-140
- Brandt, A.V. (1972) Fish Catching Methods of the World, 523 p, Fishing News (Books) Ltd. London, UK
- CMFRI (2010) Marine Fisheries census Andhra Pradesh Govt of India, Ministry of Agriculture, Dept. Of Animal Husbandry, Dairying & Fisheries, New Delhi and CMFRI
- D’Cruz, S. Titto (1998). The Ring Seine: Evolution and Design Specifications. SIFFS: Trivandrum
- Edwin, L. and Hridayanathan, C. (1996) Ring seines of south Kerala coast, Fish. Technol. 33 (1): 1-5
- Edwin, L. and Hridayanathan, C. (1997a) Energy efficiency in the ring seine fishery of south Kerala coast, Indian J Fish. 44 (4): 387-392
- Edwin, L. and Hridayanathan, C. (1997b) Operational efficiency of two major artisanal fishing gear of Kerala, Indian J. Fish. 44 (4): 400-412
- Edwin, L. and Hridayanathan, C. (1998a) Changing pattern of the species composition of ring seine landings, Fish. Technol. 35: 40-45
- Edwin, L. and Hridayanathan, C. (1998b) Catch per unit effort of ring seines of south Kerala coast, In: Advances and priorities in fisheries technology, (Balachandran, K.K., Iyer, T.S.G., Madhavan, P., Joseph, J., Perigreen, P. A., Raghunath, M.R and Varghese, M.D., Eds) pp 181-184, Society of Fisheries Technologist (India). Cochin, India
- Edwin, L. and Hridayanathan, C. (2003) Selective effect of ring seines, Fish. Technol. 40: 55-56
- Edwin, L. and Hridayanathan, C. (2006) Optimization of ring seine using large mesh sections – a theoretical approach, Indian J. Fish. 53 (3): 291-296
- Hameed, M.S. and Boopendranath, M.R. (2000) Modern Fishing Gear Technology, 186 p, Daya Publishing House, Delhi
- Jadav, R.R., Mohite, A.S. and Kazi, T.G. (2011) Ring seines with pockets operated off Ratnagiri, Maharashtra, Fish. Technol. 48 (2): 119-124
- Klust, G. (1958) Ring nets made of synthetic fibres, studies and Reviews, No.4, 16 p, GFCM, FAO, United Nations, Rome
- Nedelec, C. (1975) FAO Catalog of small scale fishing gear, Fishing News (Books) Ltd., 191 p, Farnham, Surrey, England
- Panicker, P.A., Sivan, T.M. and George, N.A. (1985) A new fishing gear for traditional craft, In: Harvest and post harvest technology of fish, (Ravindran, K., Unnikrishnan Nair, N., Perigreen, P.A., Madhavan, P., Gopalakrishna Pillai, A.G., Panicker, P.A. and Mary Thomas, Eds), pp 223-226, SOFT (I), Cochin, India

- Sathiadhas, R., Panikkar, K.K.P. and Salini, K.P. (1993) An economic evaluation of ring seine fishery along Kerala coast, *Seafood Export J.* 25 (6): 19-41
- Syda Rao, G. Rohit, P., Maheswarudu, G. and Rajkumar, U. (2008). Marine Fisheries of Andhra Pradesh-An appraisal. Marine Fisheries information Service T&E Ser., No. 196:1-15
- Rajan, J.B. (1993) A techno-socio-economic study on ring seine fishery of Kerala, fisheries research cell, PCO centre, Trivandram, India, 55 p techniques by traditional fishers along Andhra Pradesh - Orissa coast, *Mar. Fish. Infor. Ser. T & E Ser.* 184: 12-14
- Vijayakumaran, K. and Chittibabu, K. (2005) A note on the adoption of new fishing techniques by traditional fishers along Andhra Pradesh-Orissa coast, *Mar. Fish. Infor. Ser. T & E Ser.* 184: 12-14