

Design and general features of Ray gillnets used in Kanyakumari coast

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Abstract

Gillnets are the most important indigenous fishing gear operates in inland and marine waters. This paper deals with design and general features of large mesh marine bottom set gillnets called *Thirandi Valai* or *Thirukku valai* targeting rays operated in Kanyakumari coast of Tamil Nadu. The gillnet is having a mesh size of 450 mm and is made of High Density Polyethylene (HDPE) of 2 mm dia. If not monitored properly the targeted fishing with this net may lead to overfishing of ray species.

Keywords: Large mesh bottom set gill net, HDPE, Kanyakumari, Tamil Nadu

I. Introduction

Gillnetting is a very simple, energy efficient and low cost fishing method employed mostly by artisanal fishers. Gillnets can be operated as surface, column and bottom to harvest fishes inhabiting different strata of the water column. Nets can be operated from a single man to many. Bottom set gillnets are used for catching elasmobranch like sharks and rays. A bottom set gillnet has heavy sinkers on the lead line to keep it on the base either by having anchors at both end or by tying one end of the net to something ashore (FAO,1980)¹. A sum of 20,257 gillnetters are reportedly operated in the Indian waters (CMFRI, 2012)². Bottom set gillnet is mainly seen in oceans, streams and lakes to catch species like shark, ray and other fishes. Rays are harvested for local utilization and to supply global markets for skin, cartilage and especially gill rakers (FAO, 2013)³. Wooden and fibreglass reinforced plastic canoes are used for operating the nets. Nets are fabricated by fishermen themselves using machine made webbings and locally made concrete sinkers.

Very few reports are available on the fishing of elasmobranch species. In the light of exploratory surveys, Sudarsan et al. (1989)⁴ and Ninan et al. (1992)⁵ gave quantitative evaluation of elasmobranchs along the outer continental shelf and

slope of the south-west coast of India. Successful introduction of large mesh pelagic gillnets in east coast of India was reported by Pajot (1993)⁶. Sharks and rays are caught using drift nets, set gill nets and long lines (Zhow, 1990)⁷. In Tamil Nadu, 69% of the rays was caught by trawlers (Raje et al., 2002)⁸. Status of elasmobranch fishery in Chennai, India is compiled by Mohanraj et al. (2009)⁹. Earlier, sharks and rays were considered as bycatch species but presently they are targeted along with other commercially important species (Roy, 2008)¹⁰. Polyamide (PA) multifilament is generally used for the fabrication of large mesh gillnets in India, which was consistently being replaced in Gujarat by HDPE in late 1990s (Pillai, 1989¹¹, Pravin et al., 1998¹², Rao et al., 2002¹³, and Thomas, 2010)¹⁴. Farias (2005)¹⁵ conducted gillnet selectivity studies for rays in Gulf of Mexico. Thomas (2005)¹⁶ reported HDPE as an alternate material for seer and tuna gillnets made of polyamide multifilament. Recently the material was found to be used for large mesh bottom set gillnets in Kadiyapattinam fishing village of Kanyakumari district, Tamil Nadu.

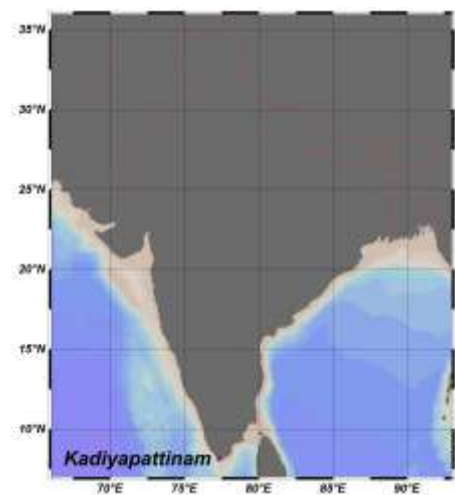


Fig.1 Map showing study area

Gill nets are widely used for marine fishing along the Tamil Nadu coast. There are 46,070 fishing crafts in Tamil Nadu of which 4028 are mechanized gillnetters, 24,942 motorized and 10,436 non-motorized (CMFRI, 2012)². These crafts operate, gillnets made of PA and HDPE. In few regions of Tamil Nadu, as in Kadiyapattinam fishing village of Kanyakumari, bottom set gillnets targeting sting ray is operated. In Kadiyapattinam fishing village, fishermen mostly do fishing with non-motorized and motorized fishing crafts. Only few reports on using bottom set gillnets targeting ray are available in the country. Presently, protection and management of elasmobranch population is becoming increasingly important on a global perspective. In this context, the design and structural details of large mesh bottom set ray gillnets made of HDPE operated in Kadiyapattinam are examined.

II. Materials and method

Data on technical details of the net was collected during January 2015 from Kadiyapattinam (Fig.1), fishing village of Kanyakumari district using structured questionnaire covering details of fishing craft and gear. The details were recorded as per Sree

Krishna & Shenoy (2001)¹⁷ and Thomas & Hridayanathan (2002)¹⁸. Design details were depicted as per Nedelec (1975)¹⁹.

III. Results and Discussion

Fishing Gear

Technical specification of gillnetter and the ray gillnet are given in Table 1. Design of a typical ray gill net is given in Fig. 2. Nets were made up of HDPE multifilament of 2 mm diameter with 450 mm mesh size. The total fleet length of the gillnet was 2000 m. Similar sized ray gillnets were used by fishers at Central Java (Dharmad and Fahmi, 2014)²⁰ and Malabar region of Kerala coast (Manojkumar et al., 2012)²¹. The depth of the gillnet was 20 meshes and each piece of net contained 650 meshes in length. The nets were hung to head rope of 4 mm diameter and square shaped concrete sinkers (120x90x25 mm) were attached to the foot rope. As indicated by Chaidee et al. (2007)²² sinkers in the large mesh gillnet help the net expand fully while in operation. The hanging coefficient of the net was 0.51. To enable bottom setting, nets were rigged without floats. On either side of the net thermocol pieces (300x220 mm) were used as buoys.

Table. 1 Technical specification of ray gillnet systems

Webbing material	HDPE
Mesh size (mm)	450
Twine type	Twisted monofilament
Twine specifications/Diameter (mm)	2 mm (10x3)
Colour of the webbing	Dark blue
Horizontal hanging coefficient (El)	0.51
Hung length (m)/ Panel	150
Hung depth (m)	2.52
Head rope material and diameter (mm)	Polypropylene, 4
Foot rope material and diameter (mm)	Polypropylene, 4
Sinker material and size (mm)	Cement, 120x90x25
Sinker weight (g)	~ 500

Total fleet length (m)	2000-3000
Depth of operation (m)	20-30
Fishing craft	Wooden / FRP
Fishing craft LOA (m)	12
Mode of propulsion	Motorized (10 Hp) and non motorized

Fishing Craft

The nets were operated from motorized wooden/FRP gillnetter (Fig.3) of 12-18 m L_{OA} fitted with 10 hp engine. Previously the net was operated from catamarans till the introduction of outboard engine fitted country craft along Kanyakumari district in 1981(Pillai and Menon, 2000)²³.The depth of operation ranged from 20-30 m. Electronic instrument like Global Positioning System (GPS) was used to locate the fishing site. Nets were set at the

bottom using anchor and were soaked for 4-6 h. For finding the net's position during the night, indicator flag lights were attached to both ends of the net. Setting and hauling of the net was done manually without any mechanical hauling devices. Sardine oil is applied to the fishing craft twice a year as a preservative treatment and marine grade paint is used for FRP craft.

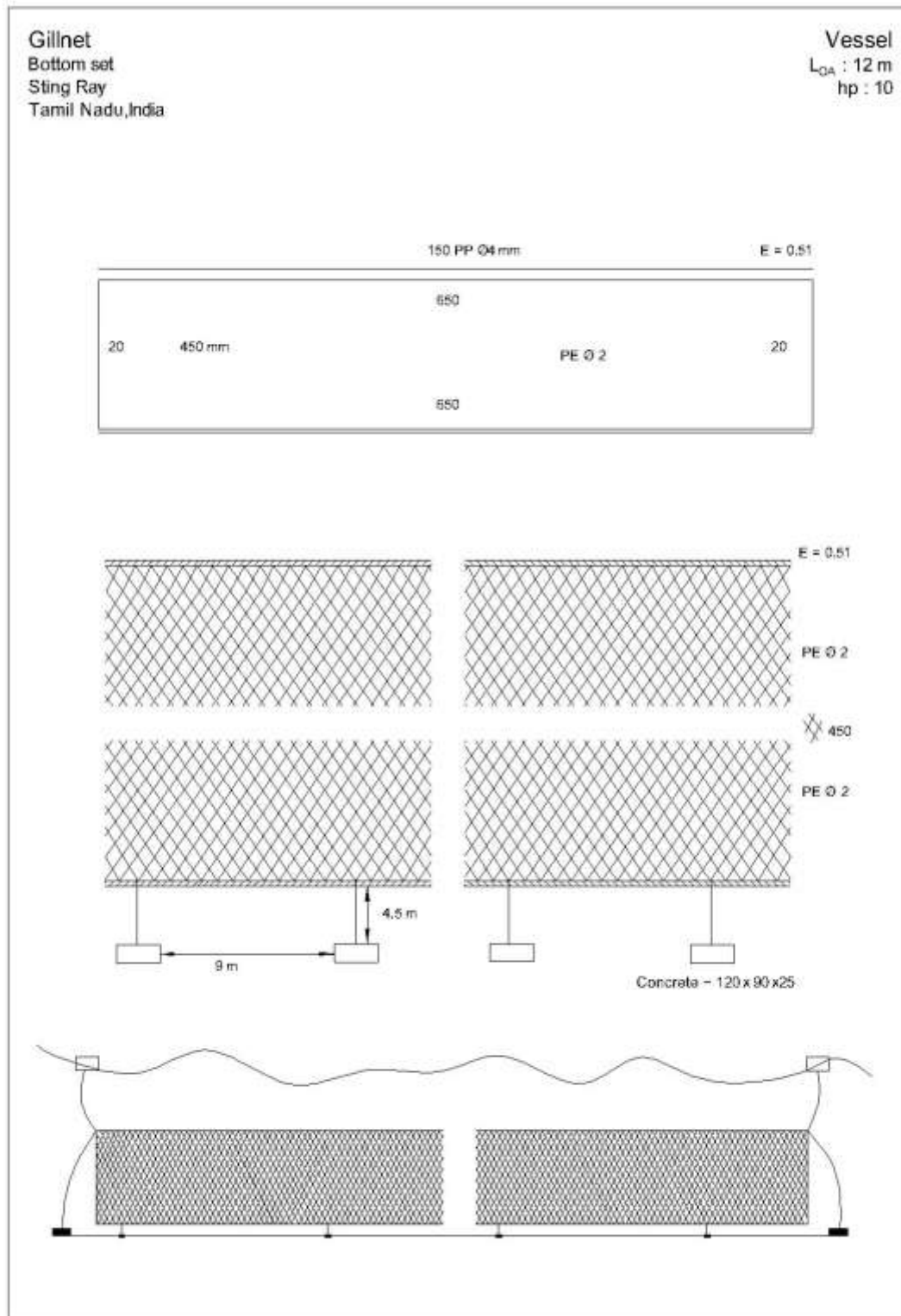


Fig.2 Design of a typical botom set ray gillnet operated in Kanyakumari



Fig.3 Gillnetters



Fig.4 Stacked in bundles



Fig.5 Gillnets kept ashore after fishing



Fig.6 Temporary sheds for storing gillnets

Operational Details

The nets are operated through the whole year and the peak fishing season was June – September (MSSRF, 1997)²⁴ starting from the southwest monsoon. In November, on account of unfavorable climate conditions, the mechanized gillnet operation gets suspended and fisherman operate ray gillnets from non motorized and motorized boats. Normally, fishing is carried out from Monday to Saturday in a week. After every fishing operation, fishers keep the net onboard. Every Saturday after completion of a week's operation the net is cleaned, made in to bundles (Fig.4 &) and kept small temporary sheds constructed near shore (Fig.5

Species composition

Various sizes of sting rays and eagle rays are caught by the ray gillnet. The ray species caught are *Gymnura macrura*, *G. poecilura*, *Dasyatis uarnak*, *D. bleekeri*, *D. sephen*, *Aetobatus narinari* and *Mobula sp* . The caudal spine of the sting rays gets entangled in the net and while the fish struggle to escape the

whole fish gets entangled in the net. Based on the reports from the fishermen, rays each weighing 10-50 kg is caught. Besides, marine turtles that swim close to the ocean floor and the group of endangered species e.g. sharks, dolphins, dugong, etc., were occasionally caught as incidental catch in these nets.

IV. Conclusion

A study on the attitude of the fishing communities around Kanyakumari coast towards sea turtle conservation ought to be taken up with a specific goal as to perceive the viewpoints of the fishers. Presently no regulation concerning the elasmobranch fisheries exists under the Department of Fisheries or Forest Act. So, for proper management of those species which are under threat or are critically endangered like sharks and rays under the IUCN Red List (2000), clear guidelines are to be formulated.

The study shall then be related to the collection of basic Information aiming for the awareness building of fisheries researchers on fishing gear technology.

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