Advances in Agricultural, Animal and Fisheries Sciences (*Eds: Devi Dayal and Shamsudheen M*), 2022, ZNAN Publishers, Society for Technology, Environment, Science& People, Kozhikode, India, Pages: 30-35.
ISBN : 978-81-956227-2-6

Assessment of evidences of fishing gear losses from selected areas of Indian waters

Chapter 3

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ABSTRACT

Fishing gears may be lost into the seas because of rough climatic conditions, damages of the gear, entanglement with bottom obstructions or dragged away by other fishing vessels or ships etc. These lost gears designated as abandoned, lost or otherwise discarded fishing gears (ALDFG) contributes to species mortality by continuing to entangle and kill fishes and other endangered/threatened species such as turtles, birds and mammals, a phenomenon referred to as ghost fishing. Passive gears like traps, gillnets may catch fish for several months or even years after they are lost. Locating ALDFG will be helpful to understand the fate and transport of lost fishing gear and to remove them from marine waters, thus eliminating its harmful impacts to species and habitats. Present study was undertaken for evidences of fishing gear losses and ghost fishing from selected areas of Indian waters. Underwater investigation by scuba diving were conducted at Enayam, Tamil Nadu & Vizhinjam coast of Kerala. About 33kg lost gears were recovered by scanning an area of 700m^2 seabottom at Enayam. Six types of lost gears were retrieved in which Nylon monofilament gillnet panels (47.3%) were the predominant gear types followed by pieces of trawl codends , parts of long lines, ropes , traps , and squid jigs. Retrieved traps contained Molluscs, Arthropods, Echinoderms, Annelids and Cnidarians, Poriferans at various degrees of decomposition. From Vizhinjam coast of Kerala, gillnet webbings and ropes

were recovered. This baseline information will be useful to understand the scale and distribution of ALDFG and identification of the hotspot areas of gear losses.

Keywords: Fishing gear loss, Indian coast

Introduction

Fishing gears may be lost into the seas because of rough climatic conditions, damages of the gear, entanglement with bottom obstructions like wrecks and reefs or dragged away by other fishing vessels or ships etc. Sometimes fishermen intentionally leave the nets due to some gear conflicts or due to lack of disposal facilities for old/ damaged nets. Fishing gears that or lost in waters designated as (ALDFG) abandoned, lost or otherwise discarded fishing gears have the potential to continue fishing whereby ALDFG entangles or entraps animals (Gilman, 2015). The fishing gear loss and other fishing related debris adds to marine pollution to nearly 10 percent and its impact on marine organisms is very severe (Macfadyen *et al.*, 2009). The ecological impacts related to ALDFG are well known from marine systems and is getting worsen over the years due to the large-scale global fishing operations and introduction of highly durable fishing gears made of synthetic materials (Macfadyen *et al*, 2009; Gilman *et al*, 2016). Approximately, 100, 000 marine mammals die annually from entanglement or ingestion of fishing related marine debris (Laist, 1997). Moreover, these ALDFGs are hazardous to sensitive ecosystems like corals and leads to habitat degradation and interferes navigation and shipping activities.

Ghost fishing is another long-lasting effect of ALDFG defined as “the ability of fishing gear to continue fishing after all control of that gear is lost by the fisherman” and contributes to species mortality by continuing to entangle and kill target organisms and non-target species such as turtles, birds and mammals (Stelfox *et al*, 2016). Most common type of fishing gears causing ghost fishing are passive gears like gillnets and traps. Locating ALDFG will be helpful to understand the fate and transport of lost fishing gear and to remove them from marine waters, thus eliminating its harmful impacts to species and habitats. Worldwide nnumber of programs specifically aimed at the removal of ALDFG have successfully removed them from, onshore and at sea, thereby reducing the potential for ghost fishing (Bech, 1995; Humborstad *et al.*, 2003). Currently, the information about the geographical distribution of ALDFG from Indian waters are limited (FAO, 2017; Thomas *et al.*, 2020). Hence the present study was undertaken for evidences of ALDFG, gear types, their catch composition/condition through underwater investigations from selected areas of Indian waters.

Methodology

Fishing gear retrieval was carried out at selected locations in Enayam N 08^0 12.886' N, 77^0 10.701 E) in Tamil Nadu and Vizhinjam (8^0 21.259'N, 77^0 10.701'E) in Kerala during January to March 2019. The location was identified with the help of fishers in the particular location and area of reef/ rocky patch where the ALDFGs were usually present. Retrieval was carried out at a depth range of 20-30 m with the help of scuba divers. Different types of knives and shears were used for the retrieval of old fishing gear. Transects were set in the selected locations in each of the following diving locations and the details of retrieved gear also recorded. After photographic documentation, the details of retrieved gears were documented. Retrieved gear samples identified based on its mesh size, twine diameter, twist and construction. Organisms associated with retrieved gears were identified and quantified.

Results and discussion

From Enayam, about 33kg of lost gears were recovered by scanning an area of 700m^2 sea bottom. A total of 16 diving observations were carried out. Six types of ALDFG (Fig 1) were recovered with nylon monofilament gillnet panels (47.3%) as the predominant gear types (Fig 1 & 2). These panels were having eight mesh sizes 35, 45, 46, 50, 52, 60, 105 and 115mm. The recovered gears include monofilament netting panels (65.4 m^2), pieces of trawl codends (2.8 m^2), parts of long lines (17.1m), PP ropes (13.4m), traps (3nos), and squid jigs (3nos). From Vizhinjam coast of Kerala, gillnet webbings and ropes were recovered. Gajanur and Jaafar, 2022 while reviewing ALDFG studies worldwide, reported that monofilament fishing nets and lines accounted for the majority of ALDFGs.

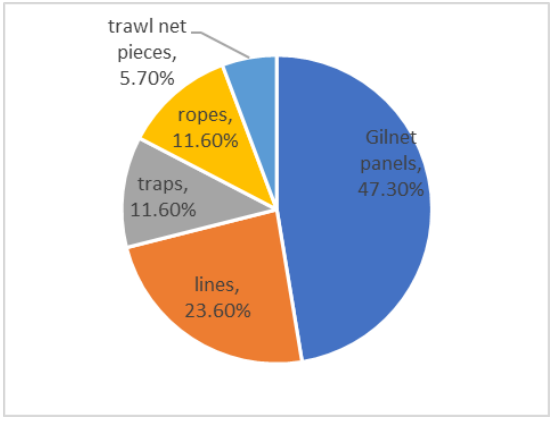

Fig. 1. Relative abundance (based on numbers) of retrieved fishing gears

Fig.2. Retrieved gillnet panel and trap

Retrieved traps contained Molluscs, Arthropods, Echinoderms, Annelids and Cnidarians and Poriferans at various degrees of decomposition. Of the total gears retrieved 49% contained organisms. Retrieved traps contained the largest number of animals followed by gillnets. Majority of the organisms were found in Mollusca followed by Echinodermata. The details of retrieved gears/gear parts are given in the table 1. One eighty individual organisms were recorded. Most abundant species recorded were bivalve *Perna indica* (47.2%). All the organisms were found dead on retrieval. Several researchers have reported the impacts due to lost fishing gear. Bilkovic *et al*, 2014 reported that 28-38 % of retrieved blue crab traps were actively ghost fishing in the Virginia waters of Chesapeake Bay.

Table 1. Organisms in retrieved gears

Phylum	**Class/species**	**number**
Mollusca	Bivalvia (*Perna indica*)	85
	Gastropoda (*Cyprea* sp)	38
Echinodermata	Asteroidea (*Stichastrella* sp)	15
	Other Echinoderms	15
Arthropoda	Malacostraca (*Atergatopsis* sp)	4
	Pycnogonida	15
Annelida	Polychaeta	5
Porifera	Demospongiae (*Callyspongia* sp)	Small fragments
Cnidaria	Anthozoa (*Gorgonia* sp)	Small fragments

Chances of entanglement and trapping of individuals in derelict nets are influenced by several factors. For example, the re-baiting phenomenon is one whereby initially trapped organism in derelict nets attract other predators and scavengers which in turn also get entangled in the net (Breen, 1990). Over the period, with the declining structural integrity of ALDFG, their impact on the environment may be at a declining rate (Erzini *et al*, 1997). Further, the declining impact of ALDFGs may also be as a result of organism's adaptability, by using ALDFGs for their shelter or refuge due to the structural integrity of ALDFGs (Angiolillo and Fortibuoni, 2020). However, systematic studies are needed over larger for determining the efficacy of ALDFGs as active trapping devices.

Conclusion

The findings from the present study provides a baseline information on the amount of ALDFG and data for identifying hot spot areas of gear losses in future retrieval studies. Dive cleanups and coastal cleanups programmes are also being carried around the globe with active participation of various stakeholders to protect marine areas. Such retrieval studies also reduce the impact of ALDFG on marine environment and further ghost fishing possibilities. Measures such as incorporation of biodegradable netting panel / twines in fishing gears, fishing gear marking, increasing the awareness among the stakeholders towards proper disposal of damaged gear will also help to lessen the impact of ALDFG.

Acknowledgement

The authors are thankful to the Director, ICAR-Central Institute of fisheries Technology, Kochi for permission to present this paper.

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