Contribution of tuna gillnet fisheries of Pakistan towards abandoned, lost or otherwise discarded fishing gears (ALDFG)

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ABSTRACT

Increased consumption of plastic in daily life has resulted in increased plastic pollution globally including manifold increase in the pollution resulted from disposal of plastic in marine environment Of the many sources. plastic pollution, is resulted from fishing and fishing related activities. Deliberate, inadvertent and accidental loss of fishing nets in the sea represents a significant threat to marine ecosystems. Abandoned, discarded and lost fishing gear (ALDFG), is estimated to account for 10 % of global marine plastic pollution and the quantities are ever increasing. Although tuna fishing vessels operates in the deep oceanic waters where chances of their entanglements in bottom rocks, reefs and ship wrecks are negligible but still tuna gillnetting is important source of ALDFG mainly because largest quantity of fishing gear carried by a single vessel i.e. on average 3,303 kg per tuna gillnetter whereas small gillnet vessels operating in coastal waters carry on average 96 kg only. Out of a total of 42.340 events of ALDFGs reported from Pakistan only 874 related to tuna gillnet operation was reported. Of the total amount of gears lost at sea i.e. 2,608,058 kg only 221,551 kg was contributed by tuna gillnetters. Major causes of loss or damage to fishing gears of tuna gillnet are accidental entanglement and loss due to environmental factors such currents and waves action as well as cyclone and high winds. Now with the marking of tuna gillnets with AIS (Automatic Identification System) beacon events of ALDFGs are practically diminished.

INTRODUCTION

With cumulative global plastic consumption at 8.3 billion metric tons in 2017 and a projected growth in plastic production expected to reach 34 billion metric tons by 2050, this issue is likely to be exacerbated without a significant change in behaviour. The issue is also keenly felt in the global oceans, with estimates of global plastic leakage into the marine environment to be in the order of 10 million m. tons per year. One of the key sea-based sources of marine plastic pollution, is that of fishing and fishing related activities.

Modern fishing gear is predominantly composed of man-made polymers such as nylon, polyvinylidene fluoride (PVDF), polypropylene (PP), polyethylene (PE), high-density polyethylene (HDPE) and ultra-high-molecular-weight polyethylene (UHMWPE). These plastic polymers have increased the durability and usability of the gear but also substantially extended their life. The ‘loss’ of such plastic gear to the oceans, therefore, represents a significant threat to marine ecosystems. Abandoned, discarded and lost fishing gear (ALDFG), including nets, lines, traps, pots and other items, is estimated to account for 10 % of global marine plastic pollution and has a significant impact on mobile aquatic organisms (e.g., fish, cetaceans, marine mammals and seabirds) with continued capture over extended periods of time. (FAO, 2016).

Known colloquially as 'ghost gear', the levels of mortality are estimated at being up to 15% that of ‘live’ fishing gear with an estimated 5-30% of global harvestable fish stocks, including Endangered, Threatened

and Protected (ETP) species and other species of ecological importance, being killed every year, making ALDFG a major threat to global food security as well as the health of the global ocean. Recognizing the challenge presented by ALDFG, Evolved Research and Consulting, UK and WWF-Pakistan initiated a study with a range of analytical work to improve understanding of the pathways for plastics pollution into the ocean. World Bank has provided funding for this study. Major part of this paper is based on the report of this study (Gallagher, 2021).

The specific objectives of the project are as follows:

a) To design and implement a robust methodology aimed at delivering national baseline assessments of ALDFG based on a representative sample of fisherfolk
b) To extrapolate the data and provide an estimation of spatial variation using 'hot spot analysis'
c) To gather and collate data on the importation and manufacture of fishing gear in the case study countries, analyzing the supply chain and resource ownership
d) To engage a network of stakeholders to focus on the problem and solutions to ALDFG within each case study country

This report provides primary data and quantifies the amount of plastics entering the marine environment in Pakistan as a result of abandoned, lost and discarded fishing gear. It also draws together secondary data on the supply chain for plastic fishing gear, both as a result of the import and distribution of gear in Pakistan. In doing so the report provides a baseline of ALDFG in Pakistan against which interventions aimed at addressing the issue can be assessed. Present papers restricted to the contribution of tuna fisheries of Pakistan to the Abandoned, discarded and lost fishing gear (ALDFG).

MATERIALS AND METHODS

In order to quantify ALDFG and address the majority of the related parameters, primary data was collected using a fisherfolk survey template. The national fishing sector was classified according to primary fishing activities with the sector being categorized into trawlers, gillnetters, surrounding nets and line gear. Present study confined to gillnetters that are operating in the offshore waters and targeting tuna and tuna like species. These gillnetters have large gillnets: gillnets with a dry weight > 1000 kg/

Using a sampling protocol of 95% confidence level with a 10% error margin, the sample size per grouping was then defined, though given the challenges and limitations associated with carrying out this work during the Covid 19 pandemic, these samples were not always achieved. The fisherfolk survey employed in Pakistan was carried out Karachi in Sindh Province and Gwadar in Balochistan, the two ports being used by tuna gillnet vessels

In addition to the fisher survey, a better understanding of the supply chain of plastic fishing gear was considered important to enable both the material flow to be mapped and for the ownership of the gear to be explored. National customs data was therefore gathered using the Harmonized Systems code (HS), to identify the quantity of fishing gear being imported into the country.

Given that no fishing gear is manufactured in Pakistan from raw material plastics, the quantity of legally imported gear should in theory balance the total quantity of gear used by fishers as derived from the survey. However, the situation is more complicated than this in that whilst there is no primary manufacture of fishing gear in Pakistan, there is a degree of secondary manufacture where the imported twine or panels of prefabricated meshes of various size are combined and manufactured into nets locally. A part of gillnets being used in tuna gillnet fisheries is weaved by women in coastal village of Gaddani in Balochistan.

Moreover, in addition to the legally imported gear, there is also a high degree of illegally imported nets and gear smuggled into the country from neighboring countries making any triangulation or balancing of imports versus annual use difficult. Whilst legally imported gear was therefore reflected in the customs data, the quantities involved in smuggled and illegal gear could only be estimated. A major fraction of net panels used in tuna gillnetting are smuggled in Pakistan from neighbouring country.

A number of calculations were carried out in the spreadsheets to determine the total amount of plastics entering the marine environment as a result of fishing activities especially tuna gillnetting.

The mapping of this was carried out using the GIS software QGIS v16.2. This not only included location specific attributes of latitude and longitude to identify specific incidence of ALDFG events but also mapped the size of events in terms of weight (kg) lost. To enable a heat map to be drawn, the symbology function within the QGIS was used to better present the attributes.

To enable greater confidence in the results, a triangulation of the data sources was attempted. Tracking both the importation (legal and illegal) of fishing gear and its flow through the supply chain should allow for an estimation of how much gear is turned over nationally per year. Triangulating this with the total fishing gear used over the year as derived from the fisherfolk survey should provide confidence in the results.

RESULTS

Tuna Gillnet Fishing in Pakistan

Tuna gillnet fishing is one of the oldest economic activity along the coast of Pakistan. There used to be large fisheries for salted-dried products that was exported mainly to Sri Lanka. Among the dry seafood, tuna species used to fetch highest prices, therefore, fishermen prefer to involve in catching of various tuna species along the coast of Pakistan. The processing trend started to change since early part of last decade when tuna was traded with fuel with Iran both at high seas and along the Iran-Pakistan border. Construction of coastal along the Balochistan coast (Mekran Coastal Road) has opened a new avenue and fish from even the distant places like Karachi could be easily transported to Iran with a few hours. This brought changes in fish handling on board fishing vessels and now all the catch is landed in chilled form.

Surface gillnetting using polyamide nets are used for catching tuna in Pakistan (Moazzam 2011, 2014). It has stretched mesh size ranging between 13 cm to 20 cm (average 15 cm) with a hanging ratio of 0.5. The trending was observed to be changing in last few years and larger nesh sizes (.20 cm) being used with the aim to target large tuna species (mainly yellowfin tuna). The length of the net varies from 7 and 20 km. (average 7.27 km). The breath of the net was reported to be 14 m.

Abandoned, Lost nd Discarded Fishing Gear (ALDFG)

Prior to this study, there was almost no information available on the quantities and nature of abandoned, lost and discard fishing gears (ALDFG) from marine capture fisheries in Pakistan except some very limited information relating to plastic pollution found on some beaches, of which some was ALDFG (Moazzam, 2012, 2016). The present study provides the first comprehensive set of data on ALDFG and a national baseline against which the effectiveness of future interventions can be judged.

Key information derived from the ALDFG fisher survey includes data on the amount of fishing effort; the fishing gear employed over the period of a year; and what happens to that gear, of which options include being repaired, recycled, disposed of or most importantly, lost at sea as a result of being abandoned, lost or discarded. Each of these areas are extrapolated from the sampled data to the ‘true’

number of vessels estimated. This gives totals relating to tuna fishing and a total figure for all gears for estimating the impact of fisheries in Pakistan. In addition, data was also collected on why ALDFG events occurred, where they occurred.

The amount of fishing effort exerted per fishing category, and in total, is shown in Table I. The data shows of a total of 22,910 fishing vessels in Pakistan, that the greatest fishing intensity, as measured by the number of vessels and the amount of time fishing, is that carried out by the tuna gillnetters who number 709 vessels and carry out 138,797 days fishing in total. The total quantity of fishing gear used by the tuna vessels, as shown in Table II, totals 8,717.56 m. tons ; of which tuna gillnetters contribute 2,341,930 m. tons. The variation in the average dry weight figure per vessel highlights the quantities used by particularly large gillnetters (3303 kg per vessel) as opposed to other categories of fishers where the weight of gear carried on board is considerably lower. The total economic value of the gear is US$ 154,017,136, a significant proportion of which is spent on gillnets, and almost 50% of this on large tuna gillnets (US$ 74,514,675). A stand out figure highlighted in Table II is the lifespan of particular forms of gear with tuna gillnets having a particularly long life span of 40 months as compare short lifespan at 3 months on average for small gillnetter which employ monofilament nets.

Table I. Total Fishing effort and Fishing Efforts in Tuna Gillnetting

Gear Type	Totals	Tuna gillnets
Total number of vessels	22,910	709
Average fishing days per year per vessel	186	196
Total number of days fishing per year	4,210,124	138,797

TableI-II: Fishing gear on board

Gear Type	Total	Tuna gillnets
Total number of vessels	22,910	709
Total dry weight gear on all vessels (kg)	8,717,556	2,341,930
Average dry weight (kg) per vessel	381	3,303
Average lifespan due to wear and tear (months)	21	40
Total cost of fishing gear all vessels (USD)	USD 154,017,136 (cost gear all vessels)	74,514,675 (cost gear all tuna gillnetters)
Average cost of fishing gear per vessel (USD)	USD 6,723 (average cost gear per vessel)	USD 105,098 (average cost gear per tuna gillnetters)

The annual fishing gear life cycle and ALDFG

The life cycle of fishing gear for all categories of fishing activity used over the period of one year is shown in the summary Table III The results show that of the total fishing gear used, 2,608.058 tonnes annually (23% of the on board dry weight) is estimated to be lost to the sea as a result of either being abandoned, lost or discarded with 42,340 individual ALDFG events being calculated. In reviewing the different fishing categories, there is significant variation in this with small scale monofilament gillnet

being particularly susceptible to ALDFG losing an estimated 952,230 kg per year or 79.45 kg per vessel on average. They also incur 19,442 in total or 1.6 events per vessel per year. Tuna gillnetters o lose 221,551 kg in total or 312 kg per vessel per year. They also incur 874 events in total or 1 events per vessel.

Table III: Quantifying the annual fishing gear life cycle

Gear type			Total	Tuna gillnets
Total number of vessels			22,910	709
Gear on Board	Total dry weight (kg)		8,717,556	2,341,930
	Dry weight per vessel		381	3,303
	cost dry weight all vessels (USD)		USD 154,017,136	USD 74,514,675
	cost dry weight per vessel (USD)		USD 6,723	USD 105,098
What happens to the gear	Amount repaired/ reused	Weight all vessels (kg)	3,036,674	1,430,900
		Cost all vessels (USD)	USD 63,002,884	USD 45,527,870
		Weight per vessel (kg)	133	2,018
		Cost per vessel (USD)	USD 2,750	USD 64,214
	Amount recycled / reprocessed	Weight all vessels (kg)	885,920	56,194
		Cost all vessels (USD)	USD 11,557,648	USD 1,787,955
		Weight per vessel (kg)	39	79
		Cost per vessel (USD)	USD 504	USD 2,522
	Amount disposed	Weight all vessels (kg)	3,890,440	116,988
		Cost all vessels (USD)	USD 46,883,917	USD 3,722,286
		Weight per vessel (kg)	170	165
		Cost per vessel (USD)	USD 2,046	USD 5,250
	Amount renewed (kg)	Weight all vessels (kg)	2,557,811	108,397
		Cost all vessels (USD)	USD 30,548,038	USD 3,448,928
		Weight per vessel (kg)	USD 112	153
		Cost per vessel (USD)	USD 1,333	USD 4,864
	Amount lost at Sea (kg)	Weight all vessels (kg)	2,608,058	221,551
		Cost all vessels (USD)	USD 35,956,739	USD 7,049,241
		Weight per vessel (kg)	USD 114	312
		Cost per vessel (USD)	USD 1,569	USD 9,943

	ALDFG events	All vessels	42,340	874
		Per vessel		1

The results show that of the total fishing gear used, 2,608.058 tonnes annually (23% of the on board dry weight) is estimated to be lost to the sea as a result of either being abandoned, lost or discarded with 42,340 individual ALDFG events being calculated. In reviewing the different fishing categories, there is significant variation in this with small scale monofilament gillnet being particularly susceptible to ALDFG losing an estimated 952,230 kg per year or 79.45 kg per vessel on average. They also incur 19,442 in total or 1.6 events per vessel per year. Tuna gillnetters o lose 221,551 kg in total or 312 kg per vessel per year. They also incur 874 events in total or 1 events per vessel.

In addition to ALDFG, Table III also shows the quantities, and values of fishing gear repaired, recycled and disposed. This doesn't disaggregate down to the type of repairs or recycling nor does it reveal the nature of the disposal but is indicative of the life cycle of fishing gear and reflects the possible outcomes for the gear used. The data shows that in terms of totals whilst 3,036,674 tonnes is repaired, and 3,890,440 tonnes is disposed of, in one form or another, only 885,920 tonnes is recycled. This represents only 8% of the total dry weight carried on board at any one time. In case of tuna gillnetters 1,430,900 tonnes is repaired, and 116,988 tonnes is disposed of, in one form or another, only 56194 tonnes is recycled.

There are economic consequences associated with each of the life cycle outcomes for plastic fishing gear. Table III reflects these, showing the total values per outcome as well as the vessel averages for each of the different forms of fishing activity. The total cost of ALDFG to fishers (or owners of the fishing resources) is estimated at $35,956,739 or US $1569.47 per vessel on average with considerable variation evident by category with small gillnetters having a cost value of US $9,631,490 in total gear on board or an average of US $804 per vessel. The total cost of ALDFG generated through tuna gillnetters to fishers (or owners of the fishing resources) is estimated at $ 7,049,241 or US $ 9,943 per tuna.

Whilst the ALDFG figures reflect the cost of 'lost' gear, the other outcomes reflect the cost of repairing, recycling or disposing of end of life gear. Interestingly both repair and disposal cost more on a per vessel basis than ALDFG at US$2,750 and US$2,046 respectively. Both repair and disposal cost in case of tuna gillnetters is more on a per vessel basis than ALDFG at US$ 64,214 and US$5,250 respectively However, recycling costs only US$504 per vessel cost and US$ 2,522 for tuna gillnetters is therefore considerably cheaper than ALDFG. This seems at odds with the total quantity of gear recycled though this may instead be a product of the lack of recycling options available.

Spatial distribution and mapping

The mapping of spatial data was carried out using the GIS software QGIS v16.2. This not only included location specific attributes of latitude and longitude to identify specific incidence of ALDFG events but also mapped the size of events in terms of weight (kg) lost. The GIS enables functionality so that a variety of maps could be drawn to aid analysis. Fig. 1 for example, is a simple mapping of ALDFG locations as an outcome of the survey.

Fig. 2 on the other hand provides the same data but using a heat map functionality. This expands the mapping points to reflect the number of incidents within specific locations as very often there were very similar latitude and longitude coordinates identified. Both Fig. 1 and 2 demonstrate strongly the clustering of ALDFG events in coastal waters within the 12 nm limit. These hotspots (Karachi, Churna Island, Ormara, Pasni Bay, Gwadar and Jiwani area) are

known to be highly productive fishing grounds but also have a number of reef and ship wrecks both of which cause snagging and net entanglement. The Indus Delta and to a lesser extent Miani Hor are also important fishing grounds with a high use of monofilament nets. The creeks in both areas have mangroves and are likely therefore to have a high degree of snagging.

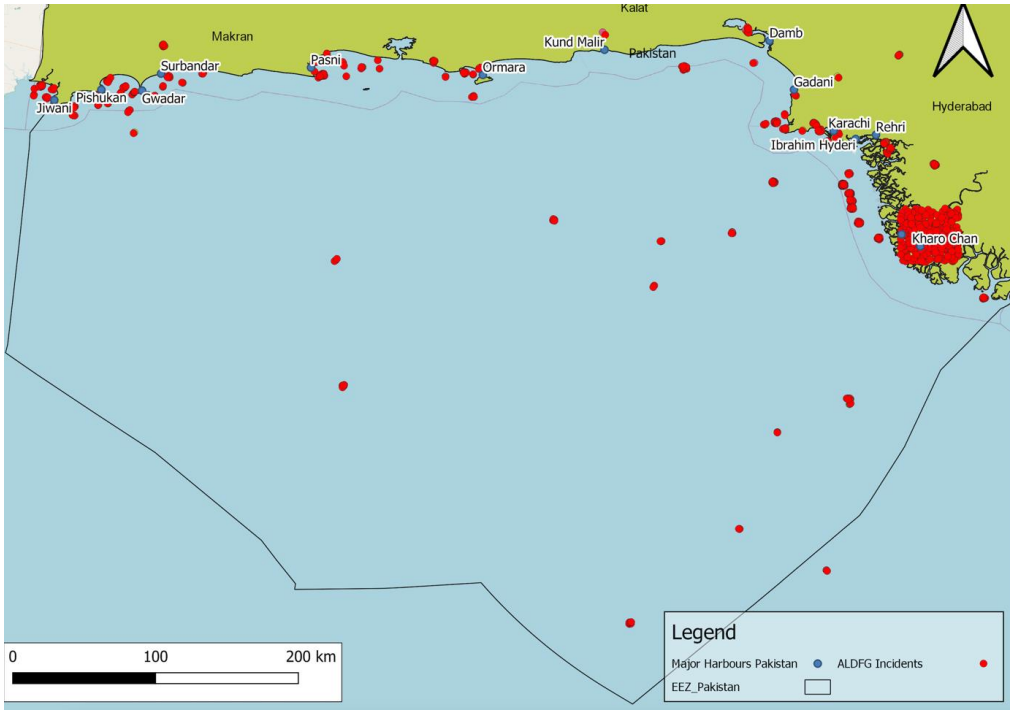

Fig. 1: ALDFG incidence distribution along the coast of Pakistan

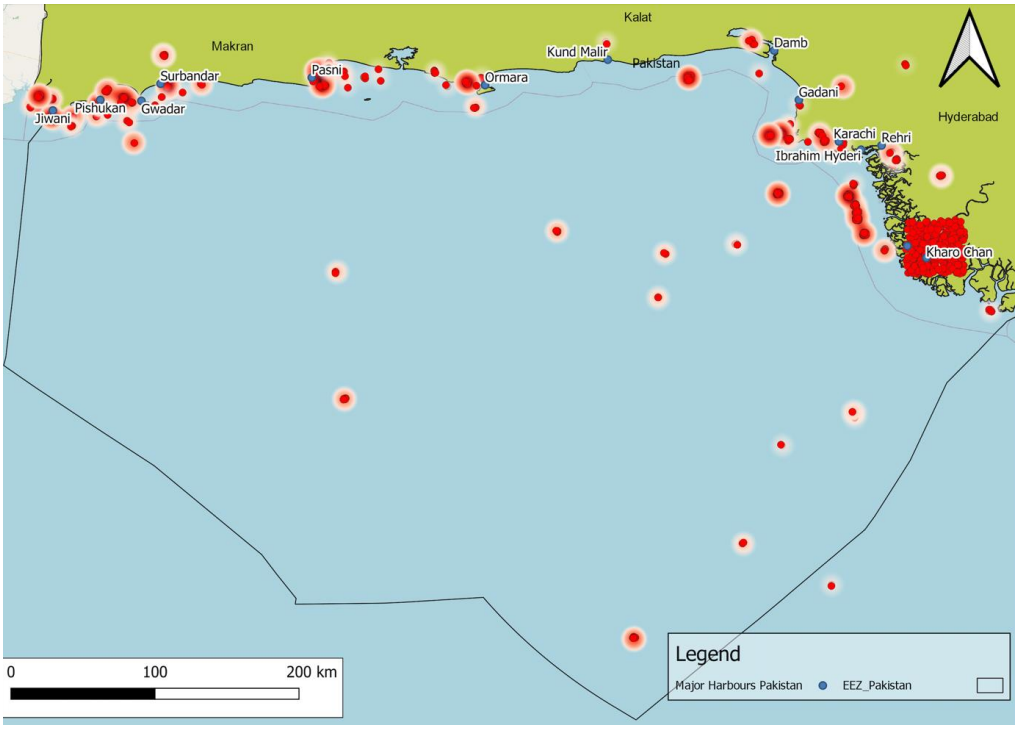

Fig.2: Pakistan heat map for ALDFG incidences

What these maps don't do is reflect the actual quantities of gear lost in each of these incident maps or break the incidents down into fishing group categories. Doing so will provide for greater analytical scope. In terms of presentation, the scale and number of maps for the coastal area will also enable further granularity. The GIS itself will also enable data to be explored further going forward and will be provided as a complementary resource to go alongside this report.

The reasons for ALDFG events

The fisher survey addressed this issue directly with the results highlighted in Fig. 3. Of the 1,973 events cited where reasons were given, 62.24% of the responses referred to snagging on the seabed. This was by far and away the largest factor cited though other significant reasons were the interaction with other ships, particularly trawlers (9.1%) and oceanic and meteorological conditions (12.4%).

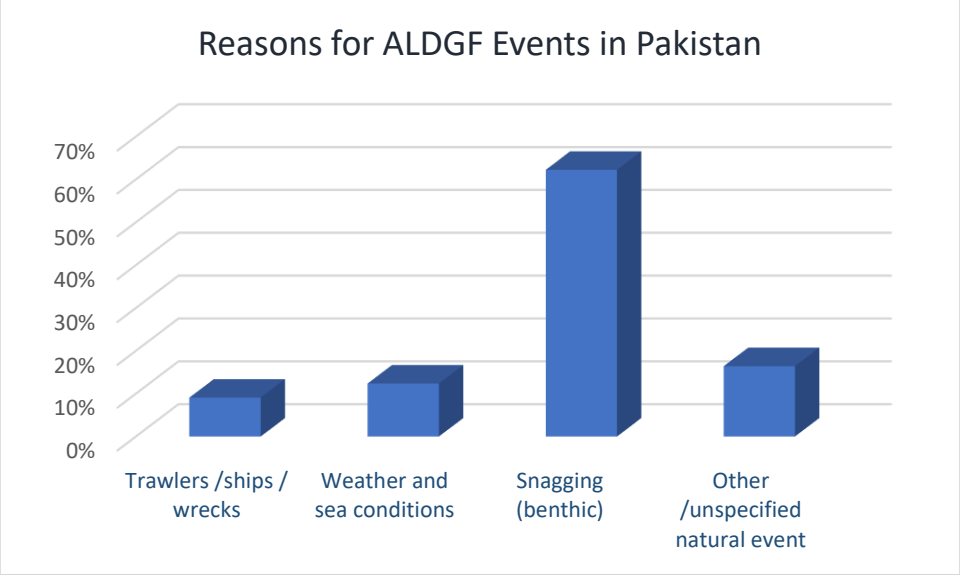

Fig. 3 The Reasons of ALDFG in Pakistan

Although a relatively rare occurrence, fishing vessels may capsize due to either adverse conditions or accidents. Over recent years there have been two such events documented in which fishing boats have been lost. In one instance, in October 2017, a large tuna boat with a gillnet weight of approximately 4,800 kg was sunk off Churna Island (24.616871; 66.278933) due to a malfunction of the engine and damage to hull. In another instance, a small boat with monofilament gillnet of about 170 kg capsized in January 2016 near Ghora Bari (24.412390; 66.914922) due to collision with another fishing boat. There may be other such events as well but no other information is available and statistics are limited.

The Supply Chain of Plastic Fishing Gear and Customs Data

The fishing gear supply chain includes a number of key stages from design, manufacturing and production; to packaging, distribution and transportation through suppliers, wholesalers and retailers to the end users, the fishers. Examining this will enable a better understanding of resource ownership, which is relevant when considering fisher behaviour with respect to end-

of-life gear and how the perceived value of fishing gear determines the effectiveness of waste management, as well as the use of unsustainable fishing practices.

Notable participants in the value chain are the 'kabari' or trash buyers who purchase end of life gear (nets, ropes, floats, lead weight, chains, and otter boards) and waste for any number of potential outcomes including reuse, resale, repair and recycling. In most large town such as Ibrahim Hayderi, Rehri, Keti Bundar, Ormara, Pasni, Gwadar and Jiwani, there is at least one such Kabari operating though Karachi Fish Harbour also has four large Kabari shops and four small Kabari units which procure gear.

In addition to understanding the supply or value chain of fishing gear in Pakistan, it is also useful to understand the quantities of plastics flowing through it. A starting point for this is the national customs data which should in theory reflect all fishing gear, whether finished product or component materials entering the country. If this data could be obtained with the HS codes it would enable comparison between different countries and identify the exact nature of the gear being imported. Having accurate data on the importation of gear, as well as its manufacture would also provide the starting point for the material flow of plastics through the value supply chain.

Accessing the customs data for Pakistan however proved difficult with the only data collected being that shown in Table IV.

Table-IV. Pakistan Customs import data 2020

	2018-2019		**2019-2020**		**2020-2021 (July 2020 - 27 May 2021)**	
HS Code	Weight (kg)	Import Value (USD)	Weight (kg)	Import Value (USD)	Weight (kg)	Import Value (USD)
5608.1100*	2,161,427	USD 13,833	2,097,094	USD 13,421	2,267,153	USD 14,510
5608.1900	452,150	USD 2,894	291,320	USD 1,864	987,912	USD 6,323
5608.9000	72,111	USD 462	87,333	USD 559	128,680	USD 824
Total	**2,685,688**	**USD 17,188**	**2,475,747**	**USD 15,845**	**3,383,745**	**USD 21,656**

*5608 Knotted netting of twine, cordage or rope; made up

This shows that during 2020/21, 3,383,745 kg of gear was imported in total to the cost of US$ 21,656. This is likely to represent only the quantity of gear legally imported and reflects only a certain type of gear as classified by the HS code, with 5608 defined as 'knotted netting of twine, cordage or rope; made up'. However, Pakistan is almost entirely dependent on these pre-fabricated net panels and nylon twine which it imports in a variety of sizes, materials and mesh sizes, largely from South Korea, Thailand, China and UAE. Since there are no primary net manufacturing facilities in Pakistan, the panels and twine are joined together in a secondary manufacturing process in country to form various types of fishing nets designed for local use. In addition twine is also used for weaving of net for large pelagic fisheries.

The importation of fishing gear was duty free in the past but fishing gear classified under HS Code 5608.11—00 (made up fishing nets) and HS Code 5607-50-10 (nylon fish net twine), as well as floats, now carries import duties that have to be paid for by large fishing gear shops and wholesalers. It is estimated that approximately 67% of fishing gears are imported legally into Pakistan.

A considerable amount of fishing gears however, particularly gillnet panels and ropes, are known to be smuggled into the country from other countries. The land border with Iran for example is porous with both fishing gear and boats brought into the country illegally. Previously it was estimated that 60 % of the fishing gears used in gillnet fisheries were smuggled in from Iran though due to changes in currency, this trade is declining rapidly. It is now estimated that about 26 % of gillnet panels are smuggled in this way from Iran with a significant quantity now imported from Oman and UAE instead.

In addition, small quantities of fishing nets are brought into Pakistan through the "Afghan Transit Trade". The panels of nets are imported from Afghanistan and smuggled back to Karachi through Afghan border by trucks along with other general commodities. According to fishing gear shop owners, this is not a regular phenomenon but occasionally net panels (about 7 %) are imported through this system.

Imported or smuggled gear are sold in the market in Khadda, Karachi as well as shops in Karachi Fish Harbour and Ibrahim Hayderi though most large fishing settlements and towns have one or more shops where gear is sold with most shops in Balochistan selling smuggled gear.

Triangulation

Based on the information collected from Customs Authorities and adding the rough estimate of fishing gears smuggled in through Iran and Afghan Transit Trade the total annual available fishing gear being imported into Pakistan amounts to about 3,255 tonnes (2,175+850+230 kg).

The ALDFG survey of fisherfolk reveals that about 11,169.161 tonnes of fishing gear are used and held on board vessels across the various fisheries at any one time. This does not refer to the total gear used by all fisheries over the period of one year but it does reflect the demand at any one point in time.

The results also show that 2,608.058 tonnes is estimated to be lost to the sea as a result of either being abandoned, lost or discarded over the period of one year, whilst 3,036.674 tonnes is repaired, 3,890.44 tonnes is disposed of, in one form or another, and 885,920 tonnes recycled. The quantity and proportion of annual dry weight ending up as ALDFG is therefore significant, representing a serious threat to marine life and also a significant cost, being estimated at US $35,956,739 in total.

DISCUSSION

Increased consumption of plastic in daily life has resulted in increased plastic pollution globally including manifold increase in the pollution resulted from disposal of plastic in marine environment It is estimated that annually 10 million m. tons plastic is added to the oceanic environment. Of the many sources. plastic pollution, is resulted from fishing and fishing related activities. Now that durable plastic material is being used for manufacturing of the fishing nets which extended their life in the sea. Deliberate, inadvertent and accidental loss

of fishing nets in the sea represents a significant threat to marine ecosystems. Abandoned, discarded and lost fishing gear (ALDFG), is estimated to account for 10 % of global marine plastic pollution and the quantities are ever increasing. These ALDFGs have a serious impact on marine animals including fish, cetaceans, marine mammals, seabirds and even invertebrates with continued capture over extended periods of time because of these "Ghost Gear". Almost all category of fishing gears including nets, traps, hooks & line contribute to "ghost fishing".

There was almost no information available on the ALDFG in Pakistan, therefore, a study was initiated under the aegis of the World bank which revealed that that almost all fishing gears contribute to ALDFG including tuna gillnetting. Although tuna fishing vessels operates in the deep oceanic waters where chances of their entanglements in bottom rocks, reefs and ship wrecks are negligible but still tuna gillnetting is important source of ALDFG mainly because largest quantity of fishing gear carried by a single vessel i.e. on average 3,303 kg per tuna gillnetter whereas small gillnet vessels operating in coastal waters carry on average 96 kg only.

Major causes of loss or damage to fishing gears of tuna gillnet are accidental entanglement and loss due to currents and waves action which lead to fouling of fishing gears which is difficult to disentangle and usually discarded in the sea, as there is no system of collection of discarded fishing nets. At times, tuna gillnets are accidentally or deliberately trampled by other fishing vessels (mainly trawlers) and cargo vessels. Fishermen try to locate the lost nets and try to recover it but it is defunct and cumbersome process and at times, recovery cannot be made. While operating in comparatively shallower waters some cases of benthic snagging are reported but such events are extremely rare. Another major cause of loss of tuna gillnets is weather related especially during cyclones and high winds, the possibility of net loss are comparatively high.

Previously, fishing gears were not adequately marked except for some unspecified flags which could not provide adequate tracing and recovery of lost fishing gears, however, now all tuna gillnets are provided by one AIS (Automatic Identification System) beacon which is placed at the first end of the gillnet being laid in the sea. With AIS, fishermen can identify the approaching fishing boats or cargo ship well in advance and take evasive action including diversion of approaching vessel for safe passage. Additionally fishermen can track the lost and drifted fishing gears and safely retrieve them. According to tuna gillnet fishermen the event of ALDFGs are practically diminished since installation of AIS beacons on fishing gears.

In addition to these, now discarded and damaged fishing gears are being procured by middlemen (Kabaris) which is mainly exported to China, Vietnam and Slavonia as raw material for recycling, therefore, incidences of ALDFGs are substantially reduced.

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