

Ghost Fishing in the Oceans: A Major Threat to Fisheries and Marine Conservation

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Summary

The abandoned, lost or discarded fishing gears in marine and coastal ecosystems cause a major threat in the oceans. It can contribute to declines in fish stocks causing losses not only to commercial fish stocks but also to nontarget species, and facilitates the spread of invasive alien species and harmful algae. Ghost nets can cause direct damage to marine biodiversity by capturing endangered species and indirectly by destroying their habitats, when they are degraded into microplastics and ingested by marine organisms. Additionally, Ghost fishing poses socio-economic challenges that can impact ocean and human health. Among the different types of ALDFG, Gillnets and pots plays a major role as ghost fishing gears. This article presents the causes of gear loss, impacts of ghost fishing, its effect on marine organisms and measures to mitigate the ghost fishing.

Introduction

Derelict fishing gears are lost, abandoned or discarded gears, often referred as “ghost nets”. Abandoned fishing gear is considered to be a source of plastic pollution (nylon, propylene etc) which presents a major problem for marine biodiversity. These plastics used to make fishing gear are very durable; some are expected to last in our seas for up to 600 years. It was esteemed that 14 million tons (Mt) of plastic end up in the oceans (IUCN, 2021) every year, part of these wastes consists of abandoned or discarded fishing gear (FAO, 2022). It is estimated that by 2040, there will be 23 – 37 million tons of plastic entering the oceans annually if appropriate interventions to prevent plastic pollution are not implemented soon (Pew 2020). The fishermen use fishing nets for fishing which upon being abandoned, lost or discarded in the ocean continues to fish the non-targeted species leading to ghost fishing and affecting the marine ecosystem. The consequences of ghost fishing and its impacts and mitigating measures are discussed below

Consequences and effect of ALDFG in oceans

Abandoned, lost, or otherwise discarded fishing gear (ALDFG) is a major source of

marine debris that has negative environmental and economic impacts. These derelict, invisible gears remain in the sea for a long time, harms the marine environment and continue to fish uncontrolled for a long time, keeping their fishing efficiency for years, above all, resulting in immeasurable loss in fish resources, as well as in populations of diving birds and marine mammals. It has become evident that lost fishing gears in marine and coastal ecosystems can contribute to declines in fish stocks cause losses not only to commercial fish stocks but also to nontarget species, and facilitates the spread of invasive alien species and harmful algae. Due to these reasons they ALDFG are also known as "ghost gears".

Causes for fishing gear loss

Several causes are the origin of fishing gear loss which can be either environmental or anthropogenic following the,

- Enforcement pressure on fishermen to abandon gear (e.g. Illegal fishing or illegal gear)
- Economic pressure resulting in discarding unwanted fishing gear at sea rather than disposal onshore
- Spatial pressures resulting in gear conflicts and consequent gear loss or damage.
- Operational pressure (e.g. Too much gear for time) and environmental conditions (e.g. Extreme weather) increasing the probability that gear will be abandoned or discarded
- Storms, currents and sedimentation
- Intentional rejection of the gear

Impacts of ALDFG

ALDFG has a number of negative environmental and socio-economic impacts including Some of them are listed below

- Smothering of the seabed and habitat disturbance
- Persistent toxic chemical pollution in the ocean – particularly from plastics
- Ghost fishing
- Gear conflict
- Loss of costly gear
- Damage of property such as boats
- Costs involved in clean-up efforts
- Reduced tourism value of coastal areas and
- Provides a habitat for, and assists in spreading, invasive species

- Entanglement of fishes, seabirds and birds

Effects of Ghost fishing on Marine organisms

When plastic fishing nets end up in the sea, over time, environmental conditions, such as abrasive actions or sunlight exposure, cause them to break up into progressively smaller fragments, leading to the formation of secondary microplastics which upon ingested by marine organisms, blocks digestion and damages the stomach. Moreover, they can affect several organisms as follows:

Sea lions and whales: Approximately across the world, 7.9 % of some sea lion populations, and 10.4 % of some humpback whale populations, are injured or killed by entanglement in ghost fishing gear and debris. Up to 1,500 sea lions are estimated to die annually in Australia from entanglement. They die due to the entrapment in monofilament gill nets from the shark fishery operating in the sea lion foraging area.

Whales, dolphins and porpoises of all sizes can become entangled in and killed by ghost fishing gear, though the problem is more widely reported for large whales. The large whales most commonly recorded as being entangled are the north Atlantic right whale and the humpback whale.

Sea turtles: Sea turtles die or get injuries due to entanglement in ghost fishing resulting in skin lesions with ulceration and necrotising myositis (death of local areas of muscle), nets (25%), ingestion of hooks and monofilament lines (19%), boat-strike injuries (24 %) and crude oil ingestion (2 %).

Birds: Birds upon entanglement in ghost fishing gear may not be able to dive, nest or fly and may suffer painful incisions into their limbs by rope or line. Gill nets present a clear danger to birds, with 514 dead marine birds found in 870 ghost gill nets recovered in the north-west United States.



Entanglement of Sea turtle and sea lions in ghost fishing nets

Common type of ALDFG

On a global scale, entangling nets and traps are considered to be the most common type of derelict fishing gears that contribute to marine debris. According to a recent estimation of Richardson et al. (2022), most likely nearly 2% of all fishing gears are lost to the ocean annually, which means that at least tens of thousands of commercial and recreational fishing gears are lost year by year worldwide. Lost fishing gear consists primarily of gillnets, trawls, longlines, pots, traps, buoys and other types of gear used by the commercial and recreational fishing industries. ALDFG are classified majorly into two types depending upon their material used as

- Plastic items, as classified by the International Standard Statistical Classification of Fishing Gear (ISSCFG) includes items like nets, pots, traps, ropes, fishing lines, floats, buoys and lures and
- Non-plastic items may include hooks, sinkers and anchors



Figure.1. Various Abandoned, lost and discarded fishing gears (a) buoy ;(b) plastic jigs; (c) a bundle of monofilament line (d) traps (e) Lost fishing net (f) mixture of ropes

Among all the ALDFG, gillnets and pots have been the most well-documented ghost fishing gear types.

(I) Gillnets

Gill nets (and drift nets) have been described as ‘the deadliest’ due to the low visibility of the monofilament line which makes up these nets underwater. Gillnets used in shallow coastal waters under 200 meters have a lower loss rate and are easier to recover, whereas gillnets used in deep sea over 500 meters are the most problematic due to enormous net lengths,

longer soak durations, and gear stress. Due to its detrimental effects, the United Nations (UN) banned huge drifting gillnets with a length of more than 2.5 kms in 1992 from the international waters.



(a)

(b)

Figure.2. Derelict fishing gears (a) Gill net (b) Traps

(II) Pots /Traps

Pots and traps are examples of passive gear. Trap gear frames used to be constructed of wood, so that if it became derelict, the string would rot and allow the door to open, releasing any trapped animals. but nowadays they are usually made of metal or covered with a plastic resin. This makes the trap gear considerably more durable and long-lasting, which is good for the fishers, Traps for lobsters and crabs, for example, become dislodged from their ropes and/or buoys during a storm, or are cut off by boat propellers, or are lost owing to poor trap maintenance. Trapped animals starve and die, or are devoured by other predators or scavengers, while ghost traps continue to catch them until they degrade significantly. Fishers in Florida have recorded annual trap losses of 10–20 percent of their total traps, equating to 50,000–100,000 lost traps in recent years.

Mitigation Measures

Minimizing the effects of ghost nets requires the following actions like

- (i) reporting and locating the lost fishing gear,
- (ii) retrieval of lost fishing gear and through
- (iii) recycling or remedial actions for lost fishing gear.

Reporting and locating the lost fishing gear:

The reporting programmes include the maintenance of a register for recording the fishing gear as found, abandoned, lost or otherwise discarded. Reporting should be made not only to

the relevant fisheries authority (flag State), but reports should be forwarded to the state in which the gear was lost (coastal State) – especially if the lost gear poses a risk to navigation. Reports should include basic information including gear ownership; type of gear and depth of operation, date, time and position of gear loss; reason for loss, the status of the gear (retrieved/not retrieved, disposed)

Retrieval of the lost fishing gear:

The retrieval of lost gear is the only way to eliminate its negative impacts. For fishing gear such as gillnets, shellfish traps and pots, retrieval is most effective if done as soon as possible after the gear is lost. Waiting to retrieve these gear after weeks may prove ineffective in reducing its negative impacts. There are several ways to retrieve the lost fishing gears they are use of remotely operated vehicles, grappling with hooks, use of divers and trawl nets etc.

Recycling of the lost fishing gear:

The final process to minimize the impact of ghost fishing, is to transform the lost fishing gears into recycled products. Several companies are producing recycled PA, HDPE, and PP from fishing net materials, via mechanical recycling. Sorting and separation step is essential to improve the properties of the recycled products. To improve their properties blending with raw resins at different percentages could guarantee the quality of products.

Conclusion

Ghost fishing serves as a threat to marine biodiversity, fisheries, and ecosystems. However, through proactive measures such as improved gear design, stricter regulations, active gear retrieval, and public engagement, its impacts can be significantly reduced. Collaborative efforts among governments, the fishing industry, and environmental organizations are crucial in ensuring a sustainable future for marine life. The cooperation between the organisations and fishermen should be in a proper manner thus creating awareness programmes about the detrimental effects of ghost fishing. Moreover, government initiatives have to be implemented to fishermen to retrieve the lost fishing gears from the sea thus encouraging fishermen to mitigate the proportion of lost fishing gear retaining in the ocean. Addressing ghost fishing is not only an environmental necessity but also a step toward more responsible and sustainable fishing practices worldwide.

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