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CURRENT AND FUTURE CONCERN OF GHOST FISHING GEAR TOWARDS THE SUSTAINABLE MARINE ECOSYSTEM

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Ghost fishing refers that derelict fishing gear (DFG), either lost or abandoned, remains their capture function in water and continue inducing mortality of aquatic organisms without human control. Commercial fishing nets that have been lost, abandoned, or dumped at sea are known as ghost fishing. Every year, they entangle or trap millions of marine species, including sharks, rays, bony fish, turtles, dolphins, whales, crustaceans, and birds, and kill them. Ghost nets entangle living coral, suffocate reefs, and introduce parasites and exotic species into reef habitats, causing more damage.

According to the United Nations (2009), approximately 650000 tonnes of fishing equipment are discarded in the ocean each year, including fishing nets, lines, cages, crayfish traps, and gill nets. At a rate of one tonne per minute, accounting for 10% of all plastic waste in the ocean and sea worldwide, according to UNEP. Ghost gear kills an estimated 5-30% of global harvestable fish stocks each year (depending on fishery/geography), making it a massive threat to global food security. In the oceans, ghost gear accounts for up to 58 percent of all macro-plastics (those greater than 5mm) and 70 percent of all floating macro-plastic pollution.

"Ghost fishing" is a form of marine detritus that impacts marine animals and the ecosystem. Derelict fishing gear (DFG) is lost or discarded fishing gear that is no longer under a fisherman's control and can continue to trap and kill fish, crabs, marine mammals, sea turtles, and seabirds. Gillnets and crab pots/traps are the most prevalent DFG to ghost fish, while longlines and trawls are less likely (Werner, *et al.*, 2016). Ghost fishing has several negative consequences, including the ability to kill both target and non-target creatures,

including endangered and protected species, damage to underwater environments like coral reefs and benthic fauna and contribution to marine pollution. It continues to kill for many years, even decades, and it has stopped capturing for human consumption. With the usage of synthetic materials, the extent and impact of ALDFG debris have expanded dramatically due to increases in the scope of fishing operations and technologies utilized in recent decades.

Causes of the fishing net becoming ghost fishing gear that might be poor weather conditions, gear conflicts with other vessels or bottom topography, gear abuse, and too much gear are all factors leading to gear becoming DFG. When misplaced gear continues to catch and destroy marine life, it is known as ghost fishing. The state of the equipment at the time of loss is crucial. For example, lost nets may operate at optimum efficiency, resulting in high ghost fishing catches (Macfadyen,2009). ALDFG is also a source of concern because it can become a navigational hazard in coastal and offshore locations, posing safety concerns.

Fishing Gear- More Prone To Become a Ghost Fishing Gear

There are many different types of fisheries, which are usually classified by the target species they are attempting to catch and the size of the operation. Industrial and commercial fisheries operate on a big scale, necessitating large vessels and a large amount of equipment. Small-scale fisheries, such as artisanal or recreational/sport fisheries, use smaller vessels and fewer gear. Whatever type of fishery you're in, you're at risk of having your gear become DFG. The most commonly stated types of DFG for ghost fishing are, in order of prevalence and amount of information available (Shomura and Godfrey, 1990). Since gillnets and pots have been the most well-documented ghost fishing gear types to far, this research focuses on their loss rates, species mortalities, and mitigation attempts.

Gillnets

Gillnet are antagonists of Ghost fishing's gears. The rate of loss is determined by where and how they are used. Those who contact the ground, for example, are more likely to be lost, as are those who are left unattended. Similarly, 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. In 1992, the United Nations (UN) banned huge drifting gillnets with a length of more than 2.5 kilometres from international waters. Deep-water fisheries in

the northeast Atlantic were responsible for more than 25,000 of the 33,038 gillnets reported lost in 2005 research (Brown et al., 2007).

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, but it also means that lost gear has a larger chance of ghost fishing for longer periods if not retrieved. 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. Lewis et al. (Lewis *et al.*, 2009).

Long line

In comparison to gillnets and trap gears, ghost fishing mortality and gear loss for derelict bottom trawl, longline, jigging, and fish weir gears are negligible. When trawl nets are used in regions with a rocky substrate or coral reefs, they become lost. Although this gear does not catch as many fish as other gear, it can nevertheless trap octopus and crabs.

Fish Aggregating Devices

Artificial drifting fish aggregating devices (FADs) are used by purse seine vessels targeting tropical tuna to attract fish. FADs are rafts built of natural and manmade materials that have long pieces of old fishing nets, ropes, and plastic ribbons suspended 40–100 meters beneath them to impede their progress across the water. This approach is mostly employed to catch skipjack tuna, but it also takes young yellowfin and bigeye tuna, as well as other marine life, resulting in 2.8 to 6.7 times more non-target species, including endangered sharks.

The reasons Why Fishing Gear Has Turned into a Ghost Net

There is a different reason why fishing gear is abandoned, lost, or discarded, but overcrowded fisheries, excess fishing capacity, and illicit, unreported, and unregulated fishing all contribute to the ghost gear problem (IUU).

- Severe weather events
- Snagging on the seabed (rocks, corals, wrecks, and seamounts)
- Entanglement with other fishing gear is some of the specific variables that can occur, sometimes in combination (often conflict between towed and static gear types)
- Theft and vandalism
- Gear breakage and tracking malfunction
- Inadequately maintained or outdated gear
- Willful abandonment and discarding

The volume, distribution, and impacts of ghost gear have increased as fishing has spread to practically every corner of the globe, and the industry produced a wide range of synthetic, robust, and buoyant gears. Since the 1980s, abandoned, lost, and discarded fishing gear has been recognized as a major problem, and it's likely that the problem is worsening, though it's difficult to quantify given incomplete reporting of how much fishing gear is involved, the wide variety of gear types, and the difficulty in monitoring or retrieving ghost gear.

Impacts of Ghost Gear

Marine environments and biodiversity, particularly sensitive habitats and endangered species, are threatened by ghost fishing gear. Ghost gear is a major source of litter in marine environments, but it has a greater impact than other trash since it has the potential to entangle and trap marine creatures indefinitely.

1. Taking life from sea creatures

The negative impact of ghost fishing on fish species is difficult to quantify because it is dependent on several different factors, including the rate of gear loss, the catching efficiency of different types of gear, the materials used in construction and the rate at which the gear breaks down once abandoned, lost, or discarded, and the susceptibility of the animals in the area. Ghost gear, on the other hand, can catch both commercial and non-target species for months, years, or even decades after it has been lost or abandoned. Snared fish die of

starvation or are eaten by predators. Scavengers are drawn to dead animals, and some of them are caught, giving a steady supply of food.

2. Endangering habitats

Ghost gear poses a serious threat to maritime environments and biodiversity, particularly in sensitive areas and for endangered species. Ghost gear, like any other accumulation of marine litter, has the potential to affect and degrade marine environments by causing physical harm such as abrasion, shearing, or suffocation, as well as changing the physical and chemical composition of marine sediments. Physical degradation to marine ecosystems degrades the quality of the environment and can jeopardize vital feeding regions and breeding grounds (such as turtle and seabird nesting sites).

3. Economic and other consequences

Aside from environmental consequences, lost and abandoned fishing gear has substantial socioeconomic consequences for both fishermen and the general public. By tangles with other fishing gear, ghost gear can cause further damage and loss of fishing gear and catches. Replacing lost gear can be expensive, albeit it is occasionally abandoned when snagged to minimize the direct expenses of potential vessel damage or loss of other components of the gear, or when retrieving gear will limit fishing time and increase fuel expenditures, as is the case with FADs. The removal of entangled gear from propellers or engines, repairs, fuel, lost profits, and emergency services necessary when it causes breakdown are all substantial costs.

A Worldwide Solution for Ghost Fishing

Through collaborations between governments, fishers, NGOs, researchers, ports, and intergovernmental organizations, we must take tangible steps to limit the implications of ghost gear. Members' collaborative goals to solve the issue of ghost gear in a holistic and cyclical manner, with a focus on:

Reducing the amount of gear lost or abandoned in the oceans,

- Removing existing gear,
- Recycling recovered or end-of-life gear,
- Rescuing animals caught in the gear.

Good Practice for Avoidance of Ghost Fishing

To strengthen the management of fishing gear and reduce the risk of damage or loss, gear use limits, such as limited lengths of gillnet fleets, trap strings, and so on, are implemented.

For static gear like gillnets and traps, set soak time limits. Longer soak times increase the chance of losing gear, so anglers will strike a compromise between catching fish and retrieving gear fast.

Good connection with other anglers, especially between segments – for example, between static and mobile operators in common fishing grounds.

To decrease snagging and associated gear loss, data about the seabed and local currents should be shared.

Ghost Gear Management and Mitigation

Notify the appropriate fisheries department/authorities of any misplaced fishing gear.

- Retrieval of lost fishing equipment; fishermen should have well-trained crew members and retrieval equipment on board for safe retrieval.
- Engage with government representatives to obtain more information about ghost gear and learn the methodologies to mitigate it.
- Share expertise to prevent fishing gear loss; the authority can train new fishers to avoid fishing gear loss and raise awareness about ghost gear's environmental impacts.
- Interact with fishing equipment manufacturers and users to demonstrate the issue of ghost gear.
- Inventing and producing traceable and recyclable fishing gear.
- Design and fabricate gear made from biodegradable materials that will not affect the environment if lost.

Conclusion

Ghost gear has a negative impact on the marine environment and poses a threat to marine biodiversity. We need to determine the fundamental causes of gear loss so that we can build effective ways to prevent it. Local and global policies can play a critical role in avoiding and minimizing ghost fishing through voluntary measures. Preventive and

mitigation actions must be implemented, as well as the usage of biodegradable materials and raising awareness at the local, regional, and worldwide levels.

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