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# Biodegradable Twines

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## Introduction

Fisheries is one of the leading food sectors in the world. Most of the people getting benefited trough fishing Worldwide. But now a days oceans are facing some dangerous treats like Ghost fishing, plastic pollution and others. The abandoned, lost and discarded [ALD] fishing gears in the oceans will continuously active and fish both targeted and non- targeted fish stocks for many years leads to ghost fishing through ghost gears.

The majority of the Fishing gears up to Early 1960s were constructed of natural fibres like Cotton, Jute, Manila, Hemp, Sisal etc. Later due to increase of awareness on fishing and also benefits of having fish. People found more sophisticated ways to increase fishing. That made the invention of synthetic fibres like Nylon [Poly amide], Poly ethylene, Poly ester etc. Having more catchability, duration, and, strength than that of natural fibres. Many types of gears were invented Gill nets, set gill nets, Trammel nets, Drift nets etc. by using these synthetic fibres Continuous fishing with these gears will cause the problem of Ghost fishing due to wear and tear or by any other unexpected loss of gears, it leads to damage of the marine environment along with marine species.

Use of Biodegradable synthetic twines instead of using synthetic twines. Which are also having equal catchability like synthetic twines. Mainly these twines will degrade by micro- organisms [bacteria fungi, algae] in the seas after 24 months it helps in the protection of fish stocks and other marine organisms from Ghost fishing(Lopez et al., 2019).

## Materials

Biodegradable polymers are newly emerging field in modern days, A vast number of polymers were invented and using in many fields not only in fishing gears because of their



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durability and long-lasting ability of the polymers.

Twines made up of biodegradable resins with 18 percent of PBAT [POLY BUTYLENE CO- ADIPATE CO- TERAPTHALATE] Mixed with a polymer which is also biodegradable in nature i.e., 80 percent of PBS [POLYBUTYLENE SUCCINATE], POLY BUTYLENE ADIPATE CO-TERAPTHALATE] and also some other materials like POLYCAPROLACTONE AND POLY [3-HYDROXY BUTYRATE CO-3 – HYDROXYVELERATE] will degrade by the micro- organisms in the oceans. These materials will degrade and redistributed in to their elemental cycles (Cerbule et al., 2023). Along with these twines natural fibres like cotton, jute is also used in fishing gears but they don't have high catchability, durability like biodegradable twines, but they have high rate of degradability. Cotton has 90 percent of cellulose with less lignin in it, and jute has high lignin and a natural phenolic materials present in the cell walls of fibres which contribute to their stiffness, when compared to cotton jute has higher tensile strength and more modulus of elasticity, and these are more expensive than the other polymers(Winger et al., 2015) .Twines ranging from 2.0to 6.0mm for jute, 2.5to 5.0mm for twisted cotton and 2.0 to 6.0mm for braided cotton (Winger et al., 2015). Their decay depends on the rate of decay, type of fibre, water temperature, water rotting power and immersion time. Of these 3- ply cotton 96 thread twine is best usable type of cotton twine, the breaking strength of these twines will measure over a period of 124 days at sea (Winger et al., 2015).

**Factors**

Some factors dictate the type of biodegradable twines used for the commercial fishing activity includes sufficient ply and thickness for ease of use, Resistance to ultraviolet light from sun, Resistance to abrasion, vulnerability to rot and Weathering. When dry these fibres exhibits more stiffness , nets with less flexible mono filaments has longer fishing efficiency than nylon nets(Cerbule et al., 2023) .

**Problems**

These are some major problems that are facing by the oceans and seas because of using Synthetic fibres for fishing and other types of synthetic materials used in oceans other than fishing.

**Ghost Fishing**

It is first scientifically observed in 1960 in both nets and traps and researches began to increase from 1970 in USA, Canada, Australia and other countries. This problem was first recognised by FAO committee on fisheries in April 1985 because of modern gears (Brown & Macfadyen, 2007). Very little research was undertaken on ghost fishing in mid 1990s.It occurs when animals trapped and died due to starvation, cannibalism, predation, disease or poor water



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quality (Sullivan et al., 2019). To reduce this problem many researches had been doing from USA more than 40 percentage and by others like Japan, Australia more than 10 percentage because the fish capture in these countries is more so they address the problem and trying to protect them by using biodegradable twines in fishing gears(Gilman et al., 2016). As it is very difficult to retrieve the derelict gears from the oceans but many countries are working on it to protect fish stocks. At global level 64000 tons of fishing gear is lost, abandoned or discarded each year (Cerbule et al., 2023).

**Reasons**

- Environmental factors such as adverse weather, cyclones, wave actions, currents sedimentation, ice cover(Brown & Macfadyen, 2007).
- Gear entanglement with other gears, vessels, or with bottom topography.
- Gear condition, it being broken, cut lose or aging.
- Intentional disposals at seas, through dumping, thefts, illegal unreported and unregulated fishing(Brown & Macfadyen, 2007).

**Plastic Pollution**

All these derelict gears leads to marine plastic pollution, recent studies showed that 78 percent of marine debris consisted of lost fishing gears in the north seas and in the EU basins 27 percent of marine litter from the lost fishing gears(Brown & Macfadyen, 2007). Every year around 12 million pieces of plastic were found in the oceans.

**Advantages / Disadvantages**

Utilizing the natural resources, inexpensive, easy decomposing, protecting the fish stocks from other predators, reducing ghost fishing. We found more advantages than the limitations from these twines. Expensive, low catchability, habitat destruction, other boat accidents etc.

**Indian Status**

In India researches on biodegradable twines is being taken place by CIFT Vizag, further more researches will be conducting in future years to address this ghost fishing.

**Conclusion**

Getting aware of this problem to fishermen so, that we can reduce the intentional gear disposal in to the oceans. And it leads to reduce ghost gear and ghost fishing, Which, increases the economic value and also marine wealth. Biodegradable gear is not a Silver Bullet solution for this problem, it is one solution to reduce (Brown & Macfadyen, 2007).

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