Twine to the Rescue

Kenya has a problem of 'ghost nets' or abandoned polyethylene fishing lines that pollute the aquatic ecology. An alternative design project finds a solution in biodegradable twine

Fishing gear is a major contributor to marine litter. 'Ghost nets' is the informal term for what is formally called Abandoned, Lost or Otherwise Discarded Fishing Gear (ALDFG). These continue to catch both target and non-target species. They pose risk to boat operations; damage coral reefs and the seabed; and present a safety hazard for ocean users and resources. They comprise a serious threat to food security, long-term economic growth, the viability of marine ecosystems, and the development of a vibrant and productive Blue Economy.

As fishing gear wears and tears, it releases toxins and microplastics into the marine environment. Larger fragments of plastics are ingested by marine organisms; these are carriers for adsorbed contaminants that affect the food web through 'biomagnification'. Old and discarded fishing nets further contribute to the stockpiling of plastics on land, where they take up to 1,000 years to decompose, leaching potentially toxic substances into the soil and water. Their impacts are of particular concern on the African continent, given that more than 200 million people in Africa rely on fish for high-quality, low-cost protein. About 12 million are employed in the fishing sector.

It is in this backdrop that a Catch green project aimed to provide a viable solution to tackling ocean plastics pollution. It began with pilots in biodegradable fishing gear that can help cut down incidents and duration of ghost fishing. The density of this biodegradable fishing gear is higher than polyethylene; if lost or dumped, it sinks to the bottom of the sea, where it breaks down through biodegradation with help from rich colonies of micro-organisms. The nets turn into biomass, water and carbon dioxide without leaving behind any harmful toxins or microplastics. This reduces the amount of microplastics on land and in the ocean. When it falls into disuse on land, it can be turned into beneficial agricultural mulch and compost at any biodigestion facility.

The project was a result of a partnership with Swedish-based GAIA Biomaterials; financial support came from the Sustainable Manufacturing and Environmental Pollution Program (SMEP) and the Foreign, Commonwealth and Development Office (FCDO). Catchgreen is working with fishing gear manufacturers, research organizations and fishing industries in South Africa and Kenya to develop an innovative compound, called BiodolomerOcean, designed specifically for marine applications. The Kenyan Marine and Fisheries Research Institute (KMFRI) is a partner to pilot the viability of biodegradable fishing gear for the small-scale fisheries (SSF) sector along Kenya's coast. These will evaluate whether the nets are effective and usable, advancing research in this field and developing more market-competitive products. The project has found no prior studies that tested the viability of biodegradable fishing nets within the African context.

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The matter of gill-nets

KMFRI is testing if Biodolomer Ocean can replace the polyethylene twine in a modified design of gill-nets. Gill-nets are controversial because of the great damage they inflict. In response,

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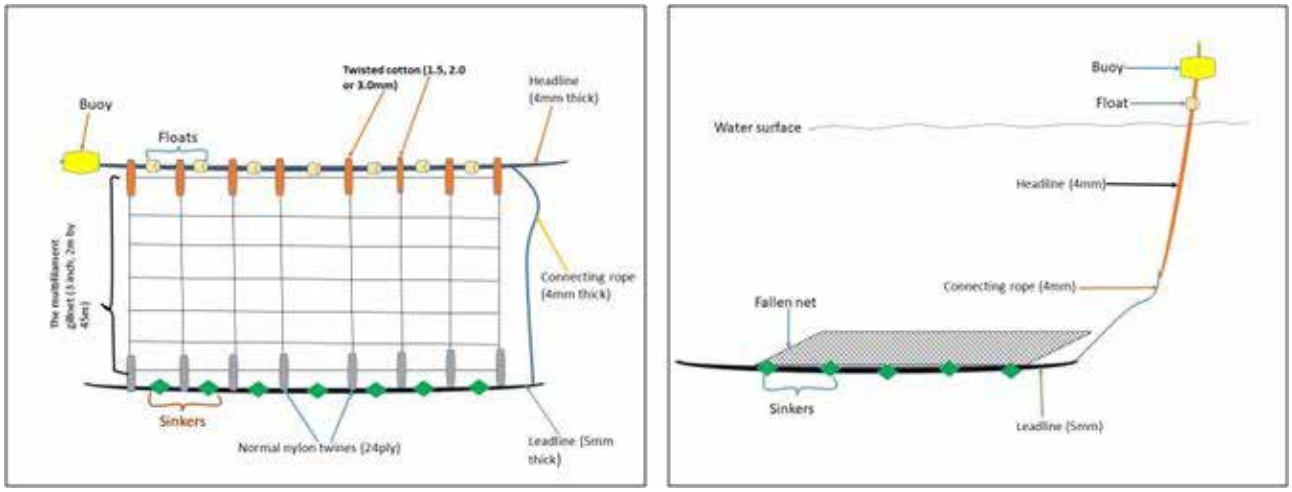

Illustration of the modified multifilament gillnet vs modified net collapsing in the event of loss

Kenya has implemented regulations to curb this. In 2021 it prohibited the use of monofilament gill-nets. Also prohibited is any gill-net with a mesh size smaller than 45 mm in stretched diagonal length. These nets are more efficient than nylon gill-nets and are preferred by fishers. They are particularly destructive because they capture juvenile fish in large numbers, also damaging corals. Gill-nets made of monofilament take long to break down if lost; they are major contributors to ghost fishing along the Kenyan coast. Despite regulations prohibiting decreasing net mesh size, some fishers still modify their gear to improve catch rates. The absence of proper systems for the collection of old and discarded gill-nets exacerbates the problem. Fishers often discard old nets in the ocean or burn them, leaving them at the beach or in mangrove forests. The result is significant damage to mangrove forests and the gradual decline of fishery resources.

Kenya's marine fisheries hold significant strategic value; they play a crucial role in supporting livelihoods and contributing to food security. In Kenya, the sector employs approximately 27,000 artisanal fishers. It also provides employment to a diverse range of individuals in varied aspects of the value chain, including traders, processors, input suppliers, merchants of fishing accessories, and providers of related services. Artisanal fishers in this region utilize varied gear, depending on the species and size of fish available.

Due to limited access to suitable fishing vessels or equipment for deep-water fishing, they often rely on cost-effective options such as gill-nets. Kenya's fishing sector has been predominantly male-dominated, with men being more actively involved in the direct harvesting phase. Women often play a significant role in complementary activities like trading, processing and intermediary functions, constituting nearly half of the overall workforce.

There is no ideal replacement for monofilament gill-nets as yet. These are inexpensive; their import is difficult to regulate because they are also used to make anti-mosquito nets. KMFRI designed a modified version of the commonly used gill-net in 2021 in collaboration with the Department of Fisheries and the Blue Economy project in Kenya, and with financial support from the Food and Agriculture Organization of the United Nations (FAO).

This innovative design replaces the usual synthetic twine used to hang the multifilament nylon netting to the headline of the gill-net with cotton twine. This alternative design allows for the cotton to break down and the nets to collapse should the nets be lost, thus preventing ghost fishing. Catchgreen is building on the alternative design by substituting the traditional polyethylene head and lead lines with twine made of BiodolomerOcean, which biodegrades in two years.

For more

Catchgreen
https://www.catchgreen.net/

Kenyan Marine and Fisheries Research Institute (KMFRI)
https://www.kmfri.go.ke/

Compostable fishing nets: An end to Ghost Nets in the oceans?
https://www.gaiabiomaterials.com/news-media/press-release/compostable-fishing-nets%3A-an-end-to-ghost-nets-in-the-oceans%3F