

codends would negate the short-term loss caused due to the release of juveniles. The experiments were the first of its kind that have reported BRDs rigged trawls in the region and would be a baseline for future studies related to implementation of gear based technical measures in trawling sector.

The study was experimental in and for a short duration. Any gear modification would require several trials, for the gear to get stabilized and for the fishers to get used to the new technology. Hence the results may not be the same as in commercial operations, however the overall profile of the species catches observed in this study shows the positive benefits of using these BRDs in Palk Bay. Technical modifications to the gear are a complex process, since it involves many operational parameters that work in tandem and includes the non-technical factor of operational profit. Therefore, more trials would be required in different seasons and at different harbours to further substantiate the results of this preliminary fishing experiments along Palk Bay.

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Jellyfish menace in estuarine Stake nets operated off Kochi, Kerala

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Jellyfish are distributed around the world oceans and estuaries, living from surface to greatest depths. These gelatinous zooplankton, belonging to Phylum Cnidaria, an ancient phylum of organisms having about 10,000 species include jellyfish, corals and sea anemones. Jellyfish

swarms are widespread and frequent in coastal areas worldwide and considered as menace due to their ecological and socio economic consequences (Stabili *et al.*, 2020). Several studies have reported increased influx in recent years with massive blooms appearing in estuaries

and backwaters and adversely affecting inland fishing. Invasion of jellyfish are often seen in coastal areas of India. Stake nets locally called as *Oonnivala* are extensively operated in all coastal districts of Kerala as the most important gear for backwater prawn fishing (Thomas *et al.*, 2007). The stake net fishery has already been impacted by accumulation of large quantities of plastic wastes in the nets (Kripa *et al.*, 2012). The problem is further aggravated by jellyfish invasion especially near the estuarine areas during summer months. Out of the 17724 stake nets operated in the state, maximum concentration is in Ernakulam 51.6% (Vijayan *et al.*, 2000).

Survey conducted among twenty fishermen in estuarine areas of stake net operation near Aroor and Arookutty, off Kochi have shown these stake nets choked with large scale influx of jellyfish during the months of March to May 2019. The weight of individual jellyfish varied from 250g to 6kg which was constituted mainly by species such as *Lychnorhiza malayensis* and *Acromitus flagellatus* sp. The weight of the whole biomass

of jellyfish varied from 50-100 kg per net per day as reported by the fishers. These jellyfish are a great menace to fishers as their nets get clogged which in turn reduces the filtering capacity of nets. Usually the duration of operation of stake nets varies from 5-7hrs, because of jellyfish clogging, fishers have to lift up the nets intermittently (1-2hrs) to remove them whereby the soaking time of nets was also considerably reduced. For stake nets the highest catches were usually obtained during January-May, with catch rates ranging from 11-13kg per stake net per day (Ramesan, 2017) whereas due to jellyfish menace catches have even declined to 4-6kg per stake net per day. In addition, more efforts also required in sorting the catch which consumes much time and labour of fishermen. Some of these jellyfish cause skin irritation. Fishers have to sometimes discard the catches especially small shrimps like *Metapenaeus dobsoni* due to difficulty in sorting them from jellyfish and also due to skin irritation. Nets get damaged due to the weights of jellyfish which comes along with waterflow which necessitates repair of the nets and also loss of fishing days of fishers.



Stake net catches with jellyfish



Acromitus flagellatus

Global warming, decline in the population of predatory fish species due to overfishing and eutrophication are said to be the factors causing the proliferation of jellyfishes. During premonsoon months, increase in temperature along with salinity rise, causes influx of jellyfish from the seas into in the estuarine and backwaters areas. These jellyfish choke the stake nets and even causes damages to other nets like Chinese dipnets and seine nets. The possible interventions may be excluder devices at the mouth or cod end of stake nets to segregate jellyfish (Manojkumar *et al.*, 2015) or converting the jellyfish to some valuable products which will be an additional income to the stake net fishers.

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Crab Ring Trap: A commercial fishing activity and a source of livelihood in Mahul, Maharashtra

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Traps are passive fishing gears designed in such a way that the fish enters freely into the trap, and get trapped. Traps are selective, low energy and environment friendly fishing gear. Different types of indigenous fish traps and pots are operated along the coastal waters of India. Most of the traditional traps are made of bamboo and related materials with short life. Currently many modified traps with different shape, size and

design are available in the local markets. Most of the fishermen in India consider trap fishing as an option for secondary livelihood, besides the major fishing operations.

Mahul fishing jetty in Mahul village is one of the major fishing centres in Mumbai, which is densely covered with mangroves. It is an intertidal undulated area, where crab fishing using ring