Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2582-2845.9054

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2024) *12*(1), 56-61

Indian Journal of Pure & Applied Biosciences

Peer-Reviewed, Refereed, Open Access Journal

Research Article

Fishing Crafts and Gears Operated in Junput Mangrove, Purba Medinipur for Sustaining the Livelihood of Local Fishermen

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Received: 8.12.2023 | Revised: 12.02.2024 | Accepted: 21.02.2024

ABSTRACT

Fishing practices are an old-age activity that has been carried out since time immemorial. Different primitive, low-cost, non-mechanized and motorized crafts and gears operated in different parts of the country. In our state of West Bengal, vast ranges of crafts and gears have been used to catch fish in different water bodies. Fishermen of our state evolved various fishing devices that enhance fish production and uplift local and national economies. Though emphasizing the above view, the present study was aimed to document different customary and mechanized fishing crafts and gears used in Junput coast, Purba Medinipur. Junput is a seaside resort city in the state of West Bengal, India. It lies at the northern end of the Bay of Bengal. It is the most popular sea resort in West Bengal, renowned for its beaches. In the Junput mangrove area, few canals were well connected with the Bay of Bengal. Thus, the diversity of ichthyofauna and shellfish was abundant. For harvesting them, local fishermen use different types of crafts and gears, which have been documented during the study period. Available crafts were Bamboo raft, Plank built boat (commonly known "Nauka"), Wooden framed boat (commonly known "Nauka or Dingi"), Thermocol raft, Rubber tube boat. Available gears used for capturing fishes were Gill net (commonly known as "Bindha jal, Phansa jal, Phanda jal"), Cast net (commonly known "Phenka jal, Khei jal"), Drag net (commonly known "Maha jal"), Scoop net without handle (commonly known "Chakni jal, Chha jal"), Hook and line (commonly known "Bardsi"), Trap.

Keywords: *Crafts, Gears, Junput, Ichthyofauna, Shell fish.*

INTRODUCTION

India is blessed with rich water resources in the form of rivers, ponds, lakes, reservoirs, flood plain wetlands and innumerable other small water bodies. The major resources include 29,000 km of rivers, 3,56,000 ha of mangroves, 3,00,000 ha of estuaries, 39,000 ha of estuarine wetlands (bheries), 1,90,500 ha of backwaters/lagoons, 31,53,366 ha of reservoirs, 2,02,213 ha of flood plain wetlands and 7,20,000 ha of upland lakes (Sugunan & Sinha, 2001).

Cite this article: Bhunia, T., Payra, P., & Saxena, S. (2024). Fishing Crafts and Gears Operated in Junput Mangrove, Purba Medinipur, for Sustaining the Livelihood of Local Fishermen, *Ind. J. Pure App. Biosci. 12*(1), 56-61. doi: http://dx.doi.org/10.18782/2582-2845.9054

India has a vast potential in the fisheries sector in inland, brackish water and marine sector. Among different inland water bodies, mangroves are a more sensitive ecosystem, which forms the nursery ground for various river and marine fishes. More than 80% of the mangrove forest in India is in Sundarban and the forest area is decreasing due to human activities. Several creeks in this ecosystem are utilized for large-scale prawn seed collection for aquaculture, which affects fish production in all the associated water bodies (Jhingran, 1991). Besides the Sundarban mangrove, in the district of Purba Medinipur, West Bengal has a few places of coastal areas like- Junput, Sankarpur, Tajpur, Mandarmoni, etc. Natural mangrove plants cover a significant amount of land mass, and in the Junput region, afforestation was done by mangrove plants to protect coastal areas and to prevent soil erosion.

The district of Purba Medinipur has diverse types of brackish water bodies. It has great potential for finfish and shellfish production. The fishermen inhabiting these water bodies' locality have gained wide experience in using particular types of crafts and gears for catching fishes (Payra et al., 2014). The pattern of fishing technique is based on the topography, ecology and fishes availability. There is a saying necessity is the mother of invention, which is well reflected in the use of fishing crafts and gears invented by the fishermen. The economic condition of the fishermen's community is reflected by the substances they use for making their crafts and gear. The small-scale fisheries sector uses traditional crafts and gears to play a significant role in Indian fisheries. Craft and gear employed in marine fishing in certain regions of the Indian coasts have been documented earlier by different scientists (Anon, 1982; CMFRI, 1981; Mahapatra, 1986; Tirumilu et al., 1991 & 1994 & Payra et al., 2014). Bose et al. (2019) found eight types of traditional fishing crafts and ten types of traditional fishing gear in Madhya Pradesh. Madhu et al. (2021) revealed five different kinds of crafts and twelve different kinds of gear in the Sundarban region. They also say that fishermen used different indigenous fishing gear in their locality, such as nets, traps, hooks and lines.

The important traditional gear of West Bengal includes shore seines, gill nets, encircling nets, fixed bag nets, hooks and lines, etc. Besides, scoop nets and traps are also in limited operation. Of the two types of traditional craft, plank-built boats and dug-out canoes, the former dominates with 98%, and the majority of them are distributed in 24 Parganas district. Fishing craft in West Bengal have evolved over the years from riverine boats to more seaworthy versions (BOBP, 1990).

Moreover, as hunting was the way of life for most of the tribes, including catching fish from wild water, more and more devices were developed.

The availability of abundant forest products like timber, cane, bamboo, etc., the basic materials for constructing such devices, might have provided an added advantage in designing and constructing various categories of crafts and gears. The present study is an attempt to present brief information by listing the various types of crafts and gears employed in different maritime states of India, along with a brief note on the contribution made by the gears of both traditional and mechanized sectors in the respective states.

MATERIALS AND METHODS

The present study was conducted in the Junput mangrove area in about 8-10 km experimental area from May 2022 to April 2023. In the Junput mangrove area, few canals run across, most of which are well connected with the Bay of Bengal. In these canals, natural tidal fluctuation occurs; thus, marine and brackish water fin fish and shellfish were available in ample amounts. Available crafts and gears were recorded through physical verification every 15-day interval during the study period.

RESULTS AND DISCUSSION

A wide diversity of traditional fishing crafts and gears have been recorded from Junput mangrove area. The most frequently used crafts were Bamboo rafts, Thermocol rafts,

Rubber tube rafts, Plank built boats (commonly known as "Nauka"), and Wooden framed boats (commonly known as "Dingi"). Gears used for capturing fishes were Gill net (commonly known "Bindha jal, Phansa jal, Phanda jal"), Cast net (commonly known as "Phenka jal, Khei jal"), Drag net (commonly known "Maha jal"), Scoop net without handle (commonly known "Chakni jal, Chha jal"), Rod and line with hook (commonly known "Bardsi"), Traps etc.

1. **Fishing Crafts:** Fishing crafts are floating and movable platforms on which the fisherman operates the fishing gears. In different open-water systems, fishermen extensively use fishing crafts. The variation and nature of inland fishing crafts depend on the geographical and hydrological features of the region. The fishing crafts recorded in the Junput mangrove area were Bamboo rafts, plank-built boats, Wooden framed boats, Thermocol rafts and Rubber tube boats (Table 1).

1.1. Bamboo raft: This is the most primitive type of craft used for fishing and transportation purpose. Fishermen make these crafts with low investment as bamboo is abundantly available in this region. Light bamboo are cut horizontally in the same size of 25-30 pieces and are tied together (keeping all the bigger ends of the trunk towards the stern side) with coir rope/synthetic rope for constructing this raft. The length and size of these crafts greatly vary depending on the water current and the number of bamboo used. They are normally used in cast net operation and gill net setting.

1.2. Thermocol raft: The fishermen were observed to rely on another kind of improvised material known as the thermocol raft. It is another easily made craft used mainly by poor fishermen; it is also a single man operated craft. A thermocol box (length 2.5 to 3 ft. and width 1.5 to 2 ft.) is tied with rope under another larger thermocol box. They showed considerable creativity in fabricating makeshift rafts out of discarded old thermocol and sola. The floating platform made of plank & bamboo and fixed it over the tharmocol or sola packed bundles with rope. Such bundles are tied with rope on which fishermen used to sit and go for fishing. The poor fishermen use this one due to its low making cost. It is mainly operated in the case of cast netting and gill net setting.

1.3. Rubber tube raft: This is the cheapest craft among all the crafts discussed so far. It is used mainly by poor fishermen and is single-man operated. Old rubber tubes are used for this purpose. A wooden / nylon mat platform is placed over the rubber tube, tied tightly with rope. It is used for setting and hauling small mesh-sized gill nets in both stagnant and running waters.

1.4. Plank-built boat: It is commonly known as 'Nauka'. It is constructed by joining good-quality wooden planks with iron nails. It is spindle-shaped in size. To prevent fouling and boring organisms, fishermen frequently used coaltar and kerosene oil. Small and moderate-sized boats are used to operate different gears in this mangrove area. Small boats are manually operated, and moderate-sized boats are motorized and used for coastal inshore fishing.

1.5. Wooden boat: A wooden-framed boat locally called 'Dingi' varies in shape and size depending on its use and the types of fishing to be carried out. Fishermen use these boats during cast netting and gill net operation. They are manually operated by the fishermen.

2. **Fishing gears:** The term 'fishing gear' refers to all those devices that are used for fishing. Different types of gears employed all around the world with different efficiency. Basically two types (active and passive) of gears are used in fishing operation. Gears are varies greatly in shape, size, fabricating materials, mode of operation, zone of operation and species of fish to be caught. The fishing gears

recorded from the Junput mangrove area are described below (Table 2).

2.1. Gill net: These nets are locally called as 'Bindha Jal', 'Phansa Jal' or 'Phanda Jal'. These are passive fishing gear with an approximate length of 50ft, width of 5.3 ft and mesh size size 30 35 mm. The vertical panels of gill nets are settled in water column with the help of floats at the head rope and sinkers at the foot rope. Fish may be caught by gill nets in 3 ways: (1) wedged – held by the mesh around the body (2) gilled – held by mesh slipping behind the opercula, or (3) tangled – held by teeth, spines, maxillaries, or other protrusions without the body penetrating the mesh. A fish swims into a net and passes only partway through the mesh. When it struggles to free itself, the twine slips behind the gill cover and prevents escape. It is operated in all depths, ranging from shallow to deep water.

2.2. Cast net: Cast net is locally known as 'Phenka Jal' or 'Khei Jal'. It is conical in shape with a strong rope attached to the apex, forming a circle when spread out. Number of lead or iron weights attached along the margin to sink it during the fishing operation. Cast nets were most common type of active fishing gear most frequently operated in this mangrove area. The length of the net is usually 9.41 ft and mesh size varies in between 17-37mm. Single fisherman operates it. It can be operated anywhere either using a craft in shallow or even from shore line area. About 1 kg fishes are being harvested after 2 hours of fishing efforts.

2.3. Drag net: Drag net is locally known as 'Mahajal'. This type of net is towed through the water in small or large sheets of water bodies. It is very large, heavy and fine meshed net (mesh size varies); requiring the efforts of a small or large team of fishermen. The drag net can be used manually or by using a boat to set in water and draw. This net is operated at place where the river bed, lake or wetland is more or less stagnant water bodies. In this mangrove area these nets are being used during low tide when water recedes.

2.4. Scoop net without handled: Scoop net is locally known as 'Chakni jal' or 'Chha jal'. This net is circular bag net about 1.0 m in diameter provided with a bamboo or metal handle. Hand net have been used for scooping when fishes are near the water's surface. They also used after cast netting, to prevent the escape of the fishes.

2.5. Rod and line with hook: Rod and line with hook is locally known as 'Bardsi'. Various kinds of hooks and lines are used for angling various fishes. Rods are generally made up of Bamboo stick or metal components. The line can be anchored or left drifting or they can be fixed in any position from the surface to the bottom. Hook and line is used to catch a single fish at a time, but in the case of a long line, several fish can be harvested. Traditionally, various forms of baits are being used, such as earthworms as living bait, shrimp or snail flesh as dead bait, a mixture of wheat or other flours, eggs of ants, etc., for catching fish. Fishing is usually done by putting the bait along with hooks at the end of the line. These types of gears can further be divided into 'Hand line' (small series of hooks) and 'Long line' (larger series of hooks).

2.6. Traps: Trap fishing is a passive fishing method of ancient origin with great variations in the design, materials, fabrication and operation so as to match the local conditions and behaviour of the target organism. This gear can be referred to as indigenous or traditional fishing gear, outcome of ITK (Indigenous Traditional Knowledge). In traps fishes enter voluntarily and are being trapped inside. A trap may have one or more chambers, which get closed after the fish enters the inside of the trap. Except for the entrance, small traps are completely closed like cages, unlike the larger traps which remain open above the water surface. Traps are made up of bamboo splits, stem of coconut leaf etc. Rectangular and v-shaped traps are mainly used in this study area.

Table-1: Fishing Crafts used in Junput Mangrove for sustaining the livelihood of the local people

Name of the Craft	Made with	Length & width	Making cost (Rs)	Durability	Gear Operation
Bamboo raft	Bamboo materials	3-11m in length and 2-5m in width	500-1000	6 months to 2 years	Drag net, gill net and cast net operation
Thermocol raft	Thermocol sheets	1.0 – 1.2m in length with a diameter of 0.5-0.7m	500-1000	2-3 years	Drag net, gill net and cast net operation
Rubber tube platform	Rubber and Wood	1 to 1.5 sq. m in diameter	1000-1500	4-6 years	Setting and hauling of gill net and cats net
Plank built boat	Planks of different woods like- *Albizia*, *Azadirachta*, *Eucalyptus* etc.	8-11ft. in length and 1.5-2ft. in width	20000-40000	Nearly 10 years	Drag net, Cast net and gill net
Wooden boat	Wood of *Tectona grandis or Terminalia arjuna* and coveredwith FRP	12-14ft. in length and 6-9 feet in width	50000-80000	12-15 years	Drag net and gill net

Table-2: Fishing gears used in Junput Mangrove for sustaining livelihood of the local people

Name of the gear	Mesh size of the gear (cm.)	Harvested Fishes by the gear	Average quantity of fish catch	Durability in years	Making cost (Rs.)	Fishermen involved in each operation
Gill net	30-35mm	*Lates calcarifer, Mugil cephalus, Mugil Persia, Mugil tade, Mystus vittatus, Scatophagus argus, Terapon jarbua, Fenneropenaeus indicus, Metapenaeus dobsoni, Metapenaeus monoceros, Penaeus monodon, Scylla serrata, Scylla olivacea* etc.	4-5 kg/day	4-5	4000 - 14000	2-4
Cast net	17-37mm	*Escaulosa thoracata, Eubleekeria splendens, Glossogobius giuris, Periophthalmus novemradiatus, Mugil cephalus, Mugil Persia, Mugil tade, Mystus vittatus, Scatophagus argus, Terapon jarbua, Fenneropenaeus indicus, Metapenaeus dobsoni, Metapenaeus monoceros, Penaeus monodon*	1-2 kg/day	3-4	2500 – 6000	1-2
Drag net	1.0 mm	Spawn and fry of mullets and shrimp larvae	200 – 300 seeds/day	3-4	3000 – 7000	3-4
Scoop net without handled	9.0mm	Spawn and fry of mullets and shrimp larvae	150-200 seeds/day	3-4	100-300	1
Rod and line with hook	Rod length 6ft and line 7 ft	*Glossogobius giuris, Mugil cephalus, Mugil Persia, Mugil tade, Mystus vittatus, Scatophagus argus, Terapon jarbua* etc	0.5-1.0kg/day	1-2	50-100	1
Traps		This net captures all types of fishes.	0.5-1.0kg/day	3-4	50-500	1

CONCLUSION

The ichthyofaunal diversity of the Junput Coastal mangrove ecosystem is relatively high, although the catch abundance was low. The low catch abundance is partly attributed to sampling efficiency, and with increased efforts (sampling time), the species record might be increased by about 10%. As pointed out earlier, the ichthyofauna are more vulnerable and less tolerant to extreme conditions; thus, although the mangrove plants have displayed luxuriant growth in the area, the ichthyofaunal community seem to have only partially recovered from the destruction of their estuarine habitat, and from continued fishing pressure (observed during this study). Nevertheless, the presence of large juvenile fish assemblages is a good indicator that the rehabilitated mangrove ecosystem is in the process of restoring to a high level of habitability. To achieve greater production in reasonable time frame to sustain livelihood of the local people the flowing measures should be implemented:

- The local fishermen should be aware of the use of modern fishing equipment

- Mesh size less than 2.0 cm should be restricted during fishing operation
- Unauthorized poaching should be banned
- Fishing boats and other crafts should be regularly monitored and over age boats should be rejected.
- Local panchayats, the Government, or NGO's should arrange different training programmes for fishermen to educate them on how to use modern fishing gear, the ill effects of indiscriminate fishing on ecosystems, etc.

Acknowledgement:
The authors are very much thankful to the local fishermen and villagers for sharing their knowledge about fishing crafts and gear during the study period.

Funding:
There is no funding source for this research work.

Conflict of Interest:
The authors disclose no conflicts of interest related to the publication of this paper.

Authors Contribution:
The First author conducted the overall research work and prepared the manuscript.
The Second author supervised the research work and checked plagiarism.
The Third author helped in writing the manuscript and guided during the data collection.

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