



Crafts and Gears operated in Brackish water fed canal for harvesting Fishes in different Seasons to maintain livelihood of the Fishermen communities

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Abstract

The crafts and gears operated in the coastal area of South West Bengal on traditional basis in different seasons for harvesting of table size fin fish and shell fishes are dealt in details in the paper. The brackish water fed canal namely Negua Diversion Canal runs across the Contai subdivision, Block of Egra-I, Egra-II, Ramnagar-I and Ramnagar-II in the District of Purba Medinipur, West Bengal, India. Moreover, it is evident that the canal has great potentiality for growth of fin fish and Shell fish resources of freshwater and brackish water. The canal has higher productivity due to the periodical tidal fluctuation of the Bay of Bengal. Because of the tidal inflow, the canal carries huge amount of brackish water which sustained the various life forms like-plankton, seedling of fin fish and shell fishes. The composition of fishes varies from season to season. The major fish species includes - *Ilophis brunneus* (Turd), *Gobiosoma hilebrandi* (Balkiri), *Scatophagus argus* (Vaja chauli), *Sillago sihama* (Sila), *Terapon jarbua* (Kunkuni), *Eubleekeria splendens* (Tekathi), *Mugil cephalus* (Parse), *Eleotris pisonis* (Balkiri), *Mystus sp* (Tangra), *Stolothrissa tanganicæ* (Kagja), *Lates calcarifer* (Vetki), *Synaptura panoides* (Pata), *Hemibagrus gracilis* (Kandhia), *Periophthalmus modestus* (Danphar), *Alosa pseudoharengus* (Khayera), *Pomadasyus hasta* (Khurunda), *Penaeus monodon* (Bagda), *Fenneropenaeus indicus* (Toni), *Metapenaeus dobsoni* (Pamra), *Metapenaeus monoceros* (Honye), *Scylla serrata* (Kaliya kankra), *Portunus pelagicus* (Jahajiya kankra), *Carcinoscorpius sp* (Rajkankra) etc. Different types of crafts and gears used for capturing fishes are Dinghi, Vala, Cast net, Scoop net without handle, Hook and line, Fixed net, Suti net, Been jal, Ber jal etc. The approximate production of shell fish is about 160 -165 kg/ha/year and fin fish 250-270 kg/ha/year. Therefore, the fishermen communities who are exclusively dependent on capture and marketing of fishes, for livelihood their socioeconomic status is considerably high as compared to the other people involved in agriculture.

Keywords: Craft and gears, fish capture, marketing, socioeconomic development, brackish water canal.

Introduction

India is blessed with almost all forms of rich natural resource of water and vast fish bio-diversity. In India aquaculture is the fastest growing sub-sector of agriculture. Though India is the second largest producer of fish from culture after the red giant China, the quantum of production is substantially low compared to the leader. India has a vast potential in the fisheries sector both in inland, brackish water and marine sector. India has the potential of very high fish production but, present fish production is 6.4 MT, in which inland sector contributes 3.4 MT and marine sector contributes 3.0 MT. Brackish water Resources of India includes Estuaries, Coast Line, Backwater, Mangroves, lagoons etc. Brackish water Aquaculture has been identified by the Government of India as one of the high potential area for increasing fish and shell fish production and also to achieve maximum economic and social benefits. The coastal area of West Bengal is the home of some of the poorest people, living in some of the least served and remote areas of the State. The total population is around 82 million in 3 coastal districts namely, South 24 Parganas, North 24 Parganas and Purba (East) Medinipur. These inhabited areas are densely populated. 2.47 million Fishermen population lives in these 3 districts. Majority of this population is classified as scheduled

castes and schedule tribes, meaning that the Government of India considers them to be disadvantaged groups deserving special attention because of their levels of poverty and neglect.

In the district of Purba Medinipur there are diverse types water bodies of brackishwater. It has great potentiality of the fin fish and also shell fish production. In this district the Negua Diversion Canal is located in between Shankarpur and Kudi (Egra block). The canal originated from Kudi and finally meets in to the Bay of Bengal at Sankarpur and in its way it shows characteristic water quality which supports numerous aquatic species including fishes. The fishermen inhabiting in the locality of this canal have gained wide experience in using particular type of crafts and gears for catching particular type of fish. The pattern of fishing technique is based on the topography, ecology and fishes available. There is a saying necessity is the mother of invention is well reflected in the use of fishing crafts and gears, invented by the fishermen. The economic condition of the fishermen community is reflected by the substances which they use for making their crafts and gears. The small scale fisheries sector using the traditional crafts and gears has significant role in Indian fisheries. Craft and gear employed in marine fishing in certain regions of the Indian coasts have been documented earlier by Chidambaram¹, Rao², Anon³, CMFRI⁴, Mahapatra⁵

and Tirumilu et.al.^{6,7}. The present study is an attempt to present a concise 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. Along the Indian coast there are about one million active fishermen employing the indigenous crafts and gears following traditional method of fishing⁸. A survey on fish diversity of the Kushi River, a tributary of the Brahmaputra River was conducted by Islam M.R., Das B., Baruah D., Biswas S.P. and Gupta⁹. This small river is particularly important for its residential dolphin population as well as for its high quality of sand. A total of 57 numbers of fish species and five major types of gears have been recorded from the Kushi River. The Fishing methods in the rivers of Northeast India have been described by S D Gurumayum and M Choudhury¹⁰.

An investigation was made on the use of different types of fish trapping instruments in the Brahmaputra valley with an objective to study their respective dimensions, seasonal variation, abundance, catch, cost, variability of gears with species and their mode of operation. The identified fish traps can be classified into 28 different types of 5 major categories based on the principle of capture, design, and operational methods by Baruah D., Dutta A. and Pravin P¹¹. A Survey of Fishing Gear and Methods in the Lower Taylor Creek Area of Bayelsa State, Nigeria has been done by T. Kingdom and K. Kwen¹².

The important traditional gear of West Bengal include shore seines, gill nets, encircling nets, fixed bag nets, hook and lines etc. Besides, the scoop nets and traps are also in limited operation. Between the two types of traditional craft viz. plank built boats and dug-out canoes, the former dominates with 98% and majority of them are distributed in 24 Parganas district. Fishing craft in West Bengal have evolved over the years from riverine boats to more sea worthy versions¹³. Clinker boats called Patia or Pankhia without deck are used for operating shore seine and drift nets, where as carved built boats called Salte with deck made of bamboo splits are used in the operation of bag nets¹⁴. In case of Negua diversion Canal detail of the crafts and gears are well documented.

Material and Methods

The Negua Diversion Canal (NDC) is situated in the district of Purba Medinipur. On its way it shows characteristic freshwater from the origin up to siphon, Paniparul; and then shows characteristic brackish water after siphon and in Mohana or the end of the canal it shows characteristic marine water. The length of the canal is about 30.3 kms and from siphon up to Bay of Bengal approximately 16.5 kms and width varies from 110-140 meter depending upon the seasonal changes and tidal fluctuation of water of the Bay of Bengal. The length and wideness of the canal is very help full in multidimensional activities of the local

fishermen community. The operated crafts and gears recorded through physical verifications in every 15 days interval.

Results and Discussion

There so many crafts and gears are operated for harvesting different types of edible fishes and shell fishes. These crafts and gears are briefly described following:

Dinghi or Nauka: It is a small wooden made boat and most common fishing craft used in different stretches of the canal. These are non-mechanized boats operated in the canal. The length of the fishing boat varied in a range of 8-10 meter with 1-1.5 meter breadth. Comparatively rich fishermen use this small boat because the making cost is higher as compared to other crafts. The poor fishermen cannot afford this. It is operated by the fishermen during the setting of gill net and other types of nets and it also used in cast net operation.

Raft or Vala: In some stretch of the canal the fishermen were observed to rely on another kind of improvised materials. They showed considerable ingenuity in fabricating makeshift rafts out of discarded old tharmocol and sola. The floating platform made of plank and bamboo and fixed it over the tharmocol or sola packed bundles tied with rope. The poor fishermen used because of its low making cost. It is mainly operated in case of cast netting and gill net setting.

Cast net (Khei jal): A cast net is a net used for fishing of both fin fish and shell fish. It is a circular net with small weights distributed around its edge. The net is cast or thrown by hand in such a manner that it spreads out on the water and sinks. This technique is called net casting or net throwing. Fish are caught as the net is hauled back in. This simple device is particularly effective for catching small bait or forage fish, and has been in use, with various modifications, for thousands of years. In this canal, it is used especially to catch mullet, which will not bite a baited hook. Contemporary cast nets have a radius which ranges from 4 to 12 feet (1.2 to 3.6 meters). Only strong people can lift the larger nets once they are filled with fish. Standard nets for recreational fishing have a four foot hoop. Weights are usually distributed around the edge at about one pound per foot (1.5 kilograms per meter). Attached to the net is a landline, one end of which is held in the hand as the net is thrown. When the net is full, a retrieval clamp, which works like a wringer on a mop, closes the net around the fish. The net is then retrieved by pulling on the landline. The net is lifted into a bucket and the clamp is released, dumping the caught fish into the bucket. Cast nets work best in water no deeper than their radius. Casting is best done in waters free of obstructions.

Gill Net (Bindha Jal): Gillnetting is a common fishing method used by commercial and artisanal fishermen of all the oceans and in some freshwater and estuary areas. Gill nets are vertical panels of netting normally set in a straight line. Fish may be caught by gill nets in 3 ways: i. wedged – held by the mesh

around the body ii. gilled – held by mesh slipping behind the opercula, or iii. tangled – held by teeth, spines, maxillaries, or other protrusions without the body penetrating the mesh. Most often fish are gilled. A fish swims into a net and passes only part way through the mesh. When it struggles to free itself, the twine slips behind the gill cover and prevents escape.

Gillnets are so effective that their use is closely monitored and regulated by fisheries management and enforcement agencies. Mesh size, twine strength, as well as net length and depth are all closely regulated to reduce by catch of non-target species. Gillnets have a high degree of size selectivity. This is one type of fixed net. This net is also differs according to their mesh size and depending upon mesh size fish catch are varies.

Scoop net without handle (Chakni Jal): This net is circular bag net about 1.0 meter in diameter provided with a bamboo handle. This net varies according to their mesh size. A hand net, also called a scoop net, a net or mesh basket held open by a hoop. It may or may not be on the end of a handle. Hand nets have been used since antiquity and can be used for scooping fish near the surface of the water. When a hand net is used by an angler to help land a fish it is called a landing net. Because hand netting is not destructive to fish, hand nets are often used for tag and release, or to capture aquarium fish.

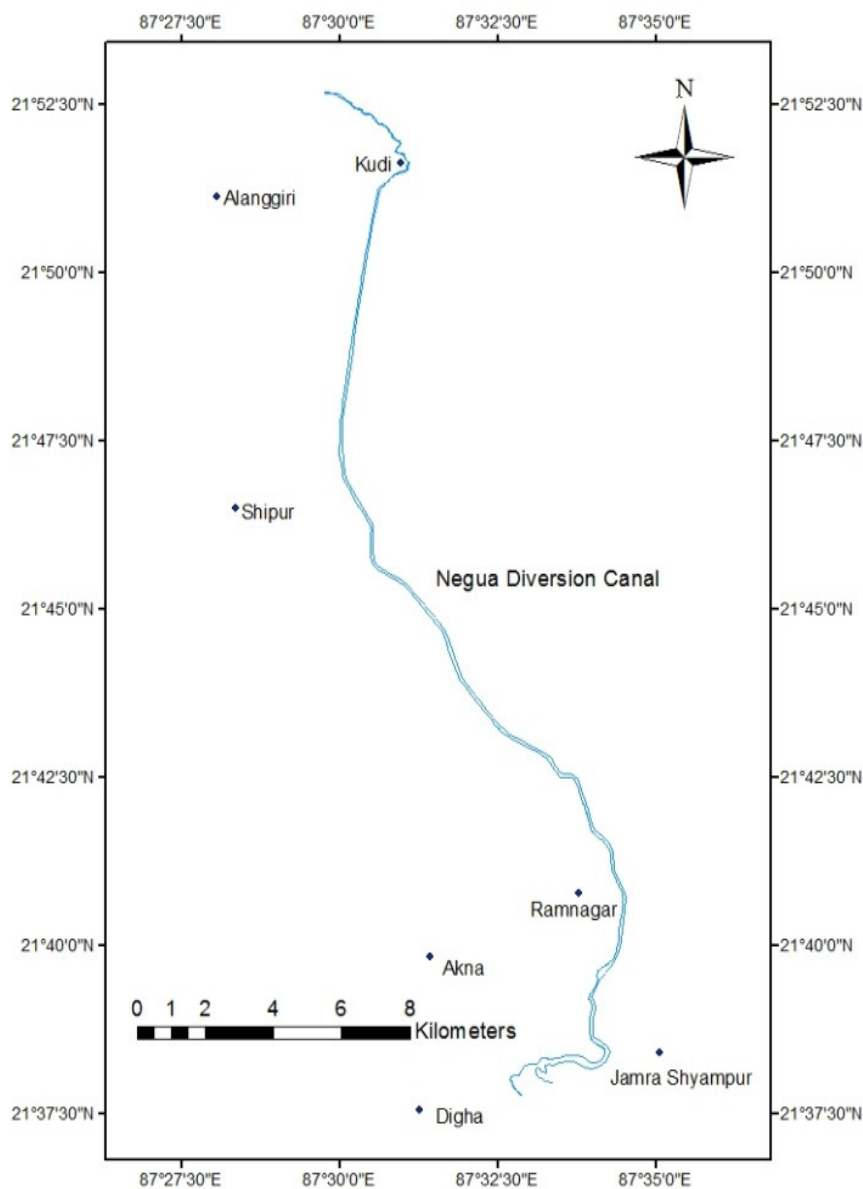


Figure-1
Blue line denote the canal (Negua Diversion Canal)

Hand nets have been widely used by traditional fishermen. Small fish are caught both in the shallow water of lagoons and in the open sea. These are made in different sizes ranging from small nets held in one hand to large scoop nets worked by several men.

Hook and line (Bardsi): This method of fishing by means of an "angle" (fish hook). The hook is usually attached to a fishing line and the line is often attached to a fishing rod or bamboo stick. Fishing rods or bamboo sticks are usually fitted with a fishing reel that functions as a mechanism for storing, retrieving and paying out the line. The hook itself can be dressed with lures or bait. A bite indicator such as a float, and a weight or sinker are sometimes used. Angling is the principal method of sport fishing, but commercial fisheries also use angling methods such as long lining or trolling. Catch and release fishing is increasingly practiced by recreational fishermen.

Fixed net (Mashari jal): This net is generally used in the time of capture of fishes those are hide in the bushes, which are kept by the fishermen in the canal for artificial resting place preparation. After few days when the fishes are hidden in the bushes the fishermen catch the fishes by this net, surrounding the bush. This net is frequently operated in the shallower portion of the canal.

Ber jal (Ber jal): It is one type of beach seine characterized by presence of a stout foot rope and absence of bag at the centre of the net. This net is used in the canal in the form of fixed net. This net is mainly used by the tidal fluctuation of the water of the canal because it is well channelized with the Bay of Bengal. The net is operated mainly after afternoon and the fishes are collected at the early morning.

Suti jal (Dhai jal): This is a stationary bag net which has a long tubular bag with along wing of wide meshed netting on both sides of the mouth. The wings are well supported by stalks. All types of fishes are captured by this net. This net is operated mainly during the low tide.

Been jal (Behundi jal): It is a stout net operated in the canal. It consists of a conical net with two short wings extending to small ropes which are fixed to the ground by anchor. The mouth of the net is kept open by wooden spreaders along with float and sinkers. The catch is collected at the end of each tide. This net is mainly used for catching of Prawns and all types of small fishes.

Cast net is used for capture of *Mugil sp*, *Lates sp*, *Gobiosoma hilebrandi*, *Eleotris pisonis* and Shell fishes. The gill net is used to capture *Mugil sp*, *Lates sp*, *Mystus sp*, *Sillago sihama* and Shell fishes like- *penaeus monodon* etc. Scoop net without handle is used for the wild collection of seed of *Penaeus monodon* and some other shell fishes. Hook and line are used for capture of all types of small fishes. Fixed net, Suti net, Been jal and Ber jal are used to harvest all kind of fin fish and shell fishes.

Discussion: During the present investigation two crafts and eight gears were observed in the entire length of the canal. One craft was a wooden, non-mechanized boat while other raft is plank and thermocol made. The operated gears are -Cast net, Gill net, Scoop net without handle, Hook and line, Fixed net, Ber jal, Suti jal and Been jal. The different fishing gears along with the fish species caught by them are listed in table-1 and capture image of crafts and gears are shown in the figure-2.

Table-1
Fishing gears used in Negua Diversion Canal (Purba Medinipur)

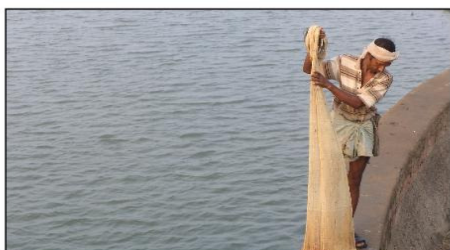
Name of the gear	Mesh size of the gear (cm.)	Fishes harvested by the gear	Average amount of fish catch
Cast net (Khei jal)	0.5-2.0	<i>Mugil sp</i> , <i>Lates sp</i> , <i>Gobiosoma hilebrandi</i> , <i>Eleotris pisonis</i> and Shell fishes are captured by this net	1.0-2.0 kg/day
Gill net (Bindha jal)	2.0-5.0	<i>Mugil sp</i> , <i>Lates sp</i> , <i>Mystus sp</i> , <i>Sillago sihama</i> and Shell fishes like- <i>Penaeus monodon</i> etc. are captured by this Net.	3.0-4.5 kg/day
Scoop net without handle (Chakni jal)	0.05-0.1	Seed of <i>P. monodon</i> and some other shell fishes.	50-150 piece/day (Juvenile of <i>P.monodon</i>)
Hook and line (Bardsi)	-	All types of small fishes are captured by this fishing method	0.5-1.5 kg/day
Fixed net (Mashari jal)	0.1-0.2	All types of fishes are captured by this Net	10.0-20.0kg/catch
Ber jal (Ber jal)	2.0-3.0	All types of fishes are captured by the Net	5.0-7.0kg /catch
Suti jal (Dhai jal)	2.0-5.5	All types of fishes are captured by this Net	4.0-7.0kg /day
Been jal (Behundi jal)	2.0-4.0	This net is mainly used for catching of Prawns and all types of small fishes	2.0-5.0kg /day



Dinghi or nauka



Raft or vala



Cast net or kheji jal



Gill net or bindha jal



Scoop net without handle or chakni jal



Line fishing or bardsi



Fixed net or mashari jal



Suti jal or dhai jal



Been jal or behundi jal



Ber jal

Figure-2
Details of the crafts and gears used in the Negua Diversion Canal

Negua Diversion Canal is one of the important sources of freshwater, brackish water and marine water for Purba Medinipur district. It is also a main water body for commercial fish production which is exploited by local fishermen community namely of Purba Medinipur district for management of their livelihood. It shows a variety of Ichthyofauna- *Ilophus brunneus* (Turd), *Gobiosoma hilebrandi* (Balkiri), *Scatophagus argus* (Vaja chauli), *Sillago sihama* (Sila), *Terapon jarbua* (Kunkuni), *Eubleekeria splendens* (Tekathi), *Mugil cephalus* (Parse), *Eleotris pisonis* (Balkiri), *Mystus sp* (Tangra), *Stolothrissa tanganicae* (Kagja), *Lates calcarifer* (Vetki), *Synaptura panoides* (Pata), *Hemibagrus gracilis* (Kandhia), *Periophthalmus modestus* (Danphar), *Alosa pseudoharengus* (Khayera), *Pomadasys hasta* (Khurunda), *Penaeus monodon* (Bagda), *Fenneropenaeus indicus* (Toni), *Metapenaeus dobsoni* (Pamra), *Metapenaeus monoceros* (Honye), *Scylla serrata* (Kaliya kankra), *Portunus pelagicus* (Jahajiya kankra), *Carcinoscorpius sp* (Rajkankra) etc. are the chief species found in the canal.

Negua Diversion Canal shows numerous indigenous freshwater, brackish water and marine water fish species and in terms of commercial fisheries it is one of the important water body of Purba Medinipur as well as soththern part of India. However, the canal having a lot of problems regarding fish harvesting. Most of the fishing methods adopted in the canal are traditional and unscientific.

A preliminary study on fishing crafts and gears in Dhaura reservoir in Uttarakhand was conducted by Varma, K. and Kamad, K. in 2013. Dhaura reservoir is one of the important sources of freshwater for plains of Uttarakhand. It is also a main water body for commercial fish production which is manages by fisheries department of Uttarakhand. It shows a variety of Ichthyofauna. *Labeo rohita*, *Catla catla*, *Cirrhinus mringla*, *Notopterus notopterus*, *Wallago attu*, *Channa gaucha*, *Clarius batrachus*, *Heteropneustes fossilis*, *Ompok pabo*, *Ompok bimaculatus*, *Mystus tengara* are the chief species found in the Dhaura reservoir.

Conclusion

To achieve higher production in reasonable period following measures should be implemented: i. The local fishermen would aware about the use of modern equipments of fishing. ii. Unauthorized poaching of fish species should be totally banned. iii. Boats should be regularly checked and repaired whenever required and over age boats should be rejected. iv. The mesh size less than 2.0 cm should be restricted durnig fishing operation. v. Proper training of modern fishing methods would be arranged for the fishermen's community by local panchyat or Government or NGO's.

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