



Fishing Crafts and Gears Used Along Selected Stretch of River Mahanadi

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Abstract

Mahanadi is one of the major peninsular rivers of India which harbours rich ichthyofaunal diversity. The fisher folk employ various fishing methods to harvest fish for their livelihood and nutritional requirements. Information on fishing crafts and gears was collected from 11 stations from Seorinarayan (Chhattisgarh) to Paradeep (Odisha) along the river Mahanadi from December 2012 to February 2015. The most dominant type of craft is the plank-built boat of varying sizes, locally called 'donga'. Various types of gears were recorded along the river stretch among which gill nets are the most widely used. Polyamide monofilament and multifilament gill nets of 20-120 mm mesh size are popular. Cast nets are the next dominant fishing gear, operated from both the river bank and boat. Trap fishery, locally called 'benda'/'baja', is mainly used in the rocky areas of river stretch. Bag nets and seine nets were also employed towards the lower stretch of the river. Indigenous fishing gears specific for species and locale, made from locally available materials were also recorded. 'Khadi jal' is a type of drag net with a long wall of netting supported vertically by bamboo sticks. *Sola-kontai* fishing uses a hook and line in which multiple hooks are hidden inside baits made of dough containing rice flour, mud and plant extract as chemo-attractant and the depth of operation is maintained by plant fibre floats. 'Chhinajal' is a type of hand lift net, operated usually by women and children. A type of barrier net fishing was observed at open barrage shutters where nets are fixed to catch fish jumping against

the flow. Dynamite fishing, a destructive fishing practice is rampant in Mahanadi, particularly in Sonepur which has severe impacts on the ichthyofauna of the river. Though gillnets are extensively used, diverse traditional fishing gears continue to prevail along Mahanadi. Documentation of these gears and their mode of operation holds significance as it throws light on the traditional fishing knowledge of the community and provides an understanding of their cultural heritage.

Keywords: Fishing methods, Mahanadi river, crafts, gears

Introduction

Inland fisheries in India play a major role in alleviating poverty and providing nutritional and livelihood security for millions of rural households. Riverine fisheries are mostly small-scale and unsophisticated involving traditional fishing methods. Depending on the prevailing conditions of the river, fish stocks and the degree of development of the fishing community, various types of fishing methods have been developed to exploit the resources (Welcomme, 1985). Due to the complex nature of riverine fish assemblages as well as its seasonal distribution, size and ecology, a wide variety of fishing gears are necessary to harvest the fish. With modernization in the fisheries sector, the use of more durable synthetic fibres and the introduction of efficient gears have improved riverine fisheries.

Mahanadi, one of the largest rivers in Peninsular India is an abode to a rich diversity of ichthyofauna. Chauhan (1947) elaborated on the fish and fisheries of the then Patna state and had given a detailed account of the fishing nets and crafts used in the region. Job et al. (1955) described the various gears and crafts used in Mahanadi. George (1971) gave a

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comprehensive account of the inland fishing gears and methods followed in India. Many authors have surveyed the fishing gears and crafts used in the rivers of India – streams of Kumaon Himalayan region (Srivastava et al., 2002), North-eastern rivers (Gurumayum & Choudhury, 2009), rivers and streams of Mizoram (Lalthanzara & Lalthanpuui, 2009), Krishna river (Manna et al., 2011; Kokate et al., 2016), Kulsu river of Assam (Islam et al., 2013), rivers of Cooch Behar (Das & Barat, 2014), upper Ganges (Singh & Agarwal, 2014), rivers of Madhya Pradesh (Bose et al., 2019). Even with the advent of advanced fishing techniques, indigenous fishing methods are still being widely used which points out the experience and knowledge of fishers on fish resources and their habitat. The Mahanadi is one of the largest rivers in Peninsular India, traversing a length of 851 km from its origin in Dhamtari district of Chattisgarh and flows through Odisha before draining into the Bay of Bengal. The Seonath, the Jonk, the Hasdeo, the Mand, the Ib, the Tel and the Ong are the major tributaries. The longest earthen dam, Hirakud, is built across the Mahanadi. Documentation of gears and their mode of operation holds significance as it gives an insight into the

traditional fishing knowledge of the community and provides an understanding of their cultural heritage. The present study attempts to document the fishing crafts and gears currently being used along the river Mahanadi.

Material and Methods

The present study was carried out along a 650 km stretch of the Mahanadi river from December 2012 to February 2015. Data on fisheries, crafts and gears were collected from 11 sampling stations, from Seorinarayan in Chattisgarh to Paradip in Odisha (Fig. 1). Around 10 fishers from each sampling station were interviewed for information on the fishing methods practised in the river.

Results and Discussion

The fisheries of river Mahanadi is mostly small-scale and carried out by the local fishermen communities. Fishers sell their catch in the local market for their daily income and also utilize it for direct consumption within their households. They use various types of traditional crafts and gears, incorporating simple technology and low level of mechanisation. Some

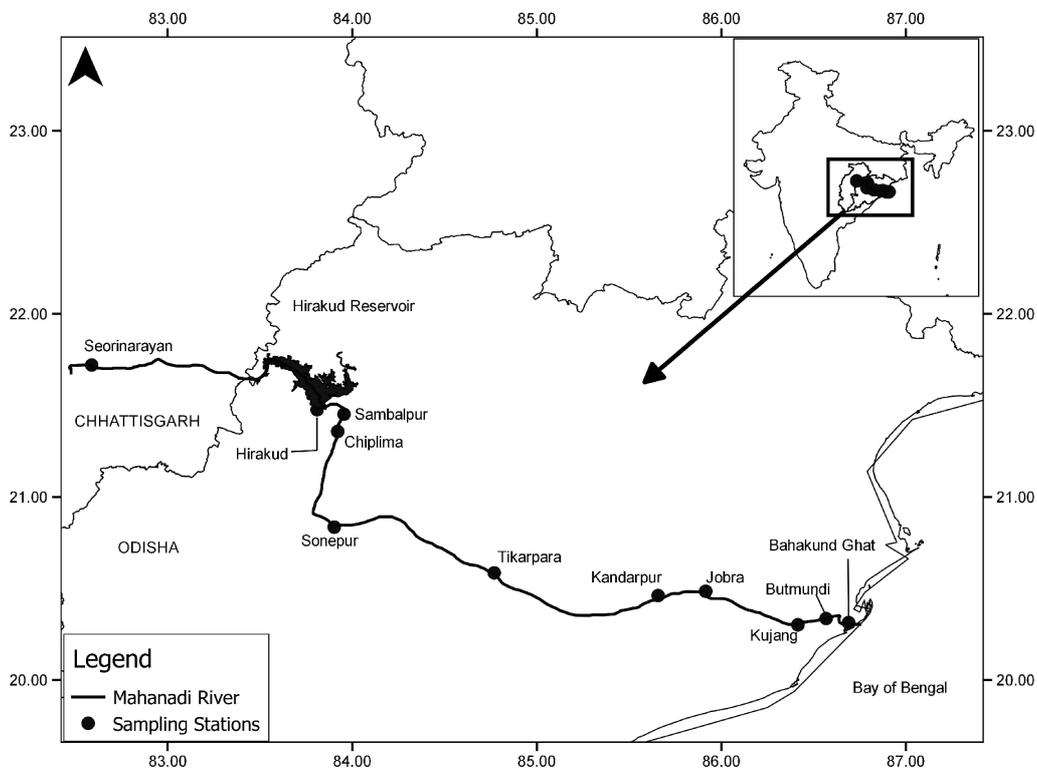


Fig. 1. Data collection points of fisheries, crafts and gears from Mahanadi river

gears are used throughout the year while others are seasonal. The gears are used to harvest multiple fish stocks and the catches consist of diverse fish species.

The gears and crafts of Mahanadi were described by Job et al. (1955). Shetty et al. (1965) reported on the fisheries of Mahanadi estuarine system with an inventory of the fishing crafts and gears used in the area. Pathak et al. (2007) have given a detailed account of the gears and crafts used in the upper, middle and lower stretches of Mahanadi river. Earlier, natural fibres were used to make net but it has been replaced by synthetic fibres owing to their longer lifespan. There are gears used seasonally targeting specific species or size classes, while gears like gill nets are used throughout the year.

Fishing crafts were made of locally available wood and materials. The type of craft used along the river depends on the water flow, current velocity, substrate and type of fisheries.

Plank-built boat is the most common boat used along the stretch of Mahanadi River (Fig.2 b, c, d). It is locally called the 'donga'. The size of the boats varies depending on the location and usually the size is 25X3.5 feet (Fig. 2). Depending on the size of the boat, it can accommodate 2-3 persons. The plank-built boat used in the estuarine part of the river is known as 'nauka'.

Rubber tubes are used by fishers in near-shore waters of the reservoir (Fig. 2). They use it to cast small fishing gears. Use of rubber tubes as make

Table 1. Information on gears used in Mahanadi river

Sl. No.	Gear used	Vernacular name	Average catch kg/haul	Period of operation	Species caught
1.	Hook and line	<i>Sola kontai</i>	5-13	December to June	Catfishes; <i>Sperata seenghala</i> , <i>S. aor</i> , <i>Wallago attu</i>
2.	Traps	<i>Bendha</i>	9.5	Throughout the year	Prawns, <i>S. seenghala</i> , <i>M. armatus</i> , <i>Mystus cavasius</i> , <i>R. chrysea</i>
3.	Gill net	<i>Current jaal</i> , <i>Phasa jaal</i>	2-10	Throughout the year	<i>Catla catla</i> , <i>Labeo calbasu</i> , <i>L. fimbriatus</i> , <i>Sperata seenghala</i> , <i>S. aor</i> , <i>Cirrhinus mrigala</i> , <i>C. reba</i> , <i>Chitala</i> , <i>chitala</i> , <i>Rita chrysea</i> , <i>Eutropiichthys vacha</i> , <i>Ompok sp.</i> , <i>Mystus sp.</i> , <i>C. reba</i> , <i>Osteobrama cotio</i> , <i>Labeo goniuis</i> , <i>Puntius sp.</i> , <i>Chanda nama</i> , <i>Notopterus notopterus</i> , <i>Channa sp.</i> , <i>L. dyocheilus</i> , <i>Tor mussullah</i> , <i>W. attu</i> , <i>M. armatus</i> , <i>G. giuris</i> , <i>Awaous sp.</i> , <i>Johnius coitor</i> , <i>N. notopterus</i> , <i>L. calbasu</i> , <i>L. bata</i> , <i>O. cotio</i>
4.	Cast net	<i>Sanki jaal</i>	1.5-2	Throughout the year	<i>C. mrigala</i> , <i>L. calbasu</i> , <i>L. rohita</i> , <i>Puntius sp.</i> , <i>R. chrysea</i> , <i>Chanda nama</i> , <i>Aspidoparia morar</i> , <i>C. reba</i> , <i>Salmophasia bacaila</i> , <i>Garra gotyla</i> , <i>Mystus sp.</i> , <i>Nandus nandus</i> , <i>Mastacembelus armatus</i> , <i>Glossogobius giuris</i> , <i>Xenentodon cancila</i> , <i>T. cutcutia</i> , <i>O. cotio</i> , <i>Securicola gorai</i> , <i>N. notopterus</i> , <i>L. goniuis</i>
5.	Bag net	<i>Binthi jaal</i>	5	Throughout the year	Multi species
6.	Lift net	<i>Chhina jaal</i>	3	June	<i>Gonialosa manmina</i> and juveniles of other fish species
7.	Drag net	<i>Khadi jaal</i>	6-8	June	<i>G. manmina</i> and juveniles of other fish species



Fig. 2. (a), (b), (c) Different types of plank-built boats used along the Mahanadi river, (d) Tyre tube

shift rafts by fishermen in Krishna river was reported by Manna et al. (2011).

The fishing gears recorded during the study (Table 1) are as follows

The '*sola kontai*', a type of hook and line, consists of a float made of plant pith or thermocol to which a multifilament long line with 3 hooks are attached (Fig. 3). The hooks are covered inside the dough (bait) prepared by mixing rice, mud and aromatic ingredients from plants. It is operated by a single person. Similar type of line fishing using cotton line and twisted pith float was described by Job et al. (1955). Another type of hook and line consists of a single main line to which several branch lines, each with a single hook, are attached. The baits used are earthworms. Catfish are mainly caught by this method. This method is usually used in deep pools.

The most common trap is the cylindrical type (Fig. 4a). It is locally known as '*Bendha*'. It is made of bamboo strips, with two funnel structures one for the fish to enter and the other to prevent its escape. Traps are usually operated for 6 hours. Around 3-5 kg of fish per trap is caught during each operation. Fishes like *Mystus* spp., *Sperata* spp., *Mastacembelus*

spp., *Glossogobius giuris*, etc. and prawns form the catch. Various types of traps used along the stretches of Mahanadi river were reported by Job et al. (1955), Jayaram & Majumder (1976) and Pathak et al. (2007). Trapping fish using nets fixed against the open sluice gate of the barrage is a common fishing method observed in Cuttack (Fig. 4b). Species like *Labeo rohita*, *Cirrihnus mrigala*, etc. are usually caught by this method. Jayaram & Majumder (1976) reported fishing using trap netting fixed across the rushing water at the sluice gates of anicut on Mahanadi in Cuttack.

Gills nets, locally known as '*current jaal/phasa jaal*', are the most commonly used gear throughout the river stretch and around the year (Fig. 5a,b). The netting is made of polyamide and both multifilament and monofilament gill nets are used. The net is usually 25-50 m long and 2-3 m wide. Wood or thermocol is used as floats and lead or clay is used as sinkers. Gill nets of various mesh sizes ranging from 5 mm to 85 mm are used for fishing, depending upon the targeted species. The nets are usually operated for 4-12 hrs during the night. Catch of 2-10 kg of fish per haul is reported. Cyprinids such as *Osteobrama cotio*, *Cirrhinus reba*, *Labeo* sp.,



Fig. 3. Hook and line (Sola kontai) (a) hooks being placed inside bait (b) with thermocol float (c) with plant pith float

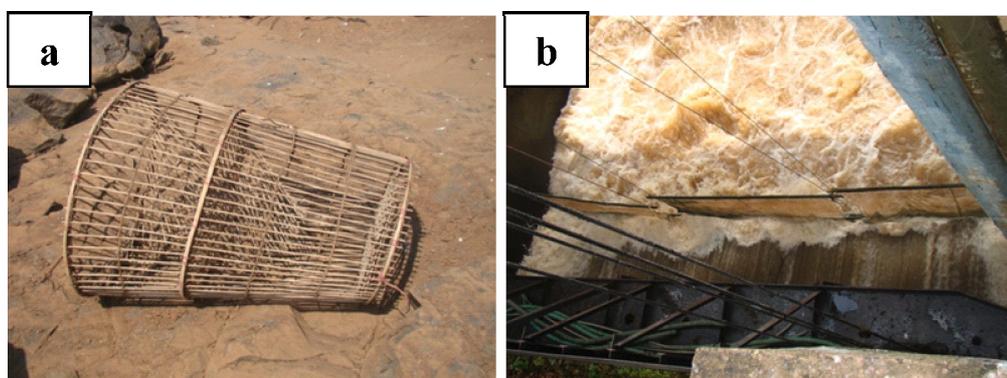


Fig. 4. (a) cylindrical trap (b) fishing in barrages

Puntius sp., catfishes such as *Rita chrysea*, *Eutropichthys vacha*, *Ompok* sp., *Mystus* sp., *Sperata* sp., murrels, full beaks and perchlets are the major contributors to the catch.

Cast nets are used along the whole river stretch throughout the year (Fig. 5). It is locally known as 'sankijal'. The netting is made of polyamide multifilament having 2-3 m length, 3-4 m diameter and lead or clay as sinkers. The mesh size varies between 10-15 mm. These are operated from both boat and river bank. In summer, cast nets are used during the night whereas in the rainy season when the water is turbid, the net is used both day and night. Fishes like *Puntius* spp., *Salmophasia* spp., *C. reba*, etc. are normally caught by cast nets.

Bag nets are locally known as *Binthi jaal* (Fig. 5d). These are non-selective gears operated at the lower stretches of the river with tidal influence. The net is made of multifilament polyamide and has a codend mesh size of 5 mm. The gear mouth is tied to fixed structures and kept open by the water current and the catch gets collected at the codend

of the net. The net is operated by 2-3 persons. Fishes like perchlets, *Liza* sp., *Valamugil* sp., *Scatophagus argus*, *Glossogobius giuris*, *Puntius* spp., pipe fishes, etc. form the catch. Three types of bag nets operated in Mahandi estuary were described by Shetty et al. (1965).

Lift net is locally known as *Chhina jaal/Hariya jaal* (Fig. 6). It is a hand lift net in which the netting is attached to a bamboo frame. It is operated seasonally during the monsoon season in shallow waters. The average catch is around 3 kg per gear for 2 hours operation. Small fishes like *Gonialosa manmina* and juveniles of several species are usually caught using this gear. Due to the simplicity of the gear, it is also operated by women and children. Detailed descriptions of the gears are in Sajina et al. (2014). Similar gears from other regions of the country are reported by Remesan (2012).

Drag nets are locally known as *Khadi jaal* (Fig. 7). This gear was observed in Hirakud reservoir and usually operated in June-July during the onset of monsoon, when the water level in the reservoir is



Fig. 5. (a) & (b) Gill net (c) Cast net (d) Bag net (e) Fishing using mosquito net



Fig. 6. Types of lift nets

very low. It is a long wall of netting supported by around 20-30 sticks of 1 m height that are arranged vertically at intervals of 0.5 m along the length of the net. It is operated during the morning for 2-3 hrs. An average catch of 6-8 kg is obtained. More than 95 % of the catch was *Gonialosa manmina* along

with juveniles of other fish species. The details of the gear and the fishery associated with this drag net is given by Sajina et al. (2014) and was earlier described by Chauhan (1947), Job et al. (1955), Pathak et al. (2007) from the Mahanadi river.



Fig. 7. Drag nets

Fishing using rectangular small meshed nets, was observed along the shallow areas of the river (Fig. 5e). Two persons are involved in operating this net. Small-sized fish are caught in this net. Prasad et al. (2013) described cloth netting operated in Uttar Pradesh where small mesh size cloth or mosquito net is held by two or more persons. Similarly, the *Tana jal*, a fine meshed mosquito net was reported by Das & Barat (2014) from Cooch Behar district of West Bengal.

The practice of destructive fishing methods in several stretches of the river was observed, which is one of the reason for the decline of fish stocks (Tyagi et al., 2020). Fishing using dynamites is prevalent in the Sonepur river stretch. Fine meshed are also in rampant use. Kumar et al. (2002) have mentioned the reduction in mesh size and the use of mosquito nets as one of the reasons for low productivity in Hirakud reservoir. Indiscriminate fishing practices in various rivers of the country were reported by Manna et al. (2011) and Das & Barat (2014). Documentation of crafts and gears along with fishers' knowledge about traditional fishing methods is vital for fisheries management as it encompasses information on resources, habitat, fish behaviour and seasonality. The need for livelihood and food security drives the fishermen to resort to such measures without much concern about the consequences. It is important to make the fishers aware of the deleterious effects of such practices and encourage them to follow sustainable fishing practices.

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