



Marine Fishing Craft and Gear of Odisha

Aarthi Sridhar and M. Muralidharan

2013

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Photo: M. Muralidharan.

Back: *Ring jaal detail.* Photo: Arundhati Jagadish.

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INTRODUCTION

Marine fishing in Odisha has a relatively obscure history, although its other maritime traditions spanning several centuries are well recorded. The majority of fishers who contribute to its bustling marine fisheries are predominantly from Telugu and Bengali communities. It is believed that they made present-day coastal Odisha their home sometime between the nineteenth and twentieth century. Recently, even members of Odiya caste communities who were traditionally engaged only in inland fisheries and agriculture, have joined those making a living from marine fishing.

Few Indian coastal states have a diversity of coastal ecosystems and communities as Odisha. The mouth of the Mahanadi river cleaves a neat northern and southern zone along this coast, each with its distinct geomorphology, ecology and social life. The northern districts lie close to a gradual and wide continental shelf, with mudflats, mangroves and swampy vegetation, whereas the southern coast is marked by sandy beaches with a sharp and narrow continental shelf.

Odisha makes a fascinating study of the ways in which nature shapes human ingenuity, knowledge and survival strategies, giving us over the years a broad range of fishing craft and gear distinct to each oceanographic zone

and adapted to target specific species of fish. Extensive documentation of marine fishing technologies in Odisha was first undertaken in the 1980s as part of the Bay of Bengal Programme (BoBP)—an integrated fisheries development programme executed by the Food and Agricultural Organization¹. Their researchers recorded the near complete replacement of the cottage industry of net-making using cotton and hemp, by factory-made synthetic nets in the 1980s itself².

In the course of our research in this region, spanning a period of ten years (2003–2013), we have witnessed a technological transformation of fishing craft and gear. For instance, the *ring jaal*, a purse seine net, only made an appearance in Odisha in the mid–2000s, but by 2012 was visible in many prosperous fishing villages in southern Odisha.

Within fishing boats, there is a definite preference for the motorised *fibre teppa* in southern Odisha and the mechanised gill netter in northern Odisha, but higher capital and operational costs of these craft make the wooden *teppa* prevalent in many villages in Ganjam. Still, it is of significance that in a period of twenty years, many of the artisanal boats recorded in the BoBP publications of the '80s are no longer found in coastal Odisha today.

The book begins with a section that covers fishing craft, first from Ganjam and then from Kendrapara, followed by a section showing fishing gear used in both these districts. We have used contemporary colloquial names of boats and nets, which could differ from the descriptions in the earlier BoBP publications². The order of appearance of each item is based on their genre and size for easy identification on the ground. Each section contains a simple illustration to indicate the genre of craft or mode of operation of the fishing net. We have shown approximate measurements for each type of fishing net, and have presented both the median average as well as the range

(maximum and minimum sizes) of net length and height. Our measurements were collected based on interviews, and should be treated as approximate and not precise values. We have shown measurements for the main marine nets and not for trawl nets and estuarine nets, which do not vary greatly in dimension. Also, the current regulations on fishing gear largely pertain to nets (especially gill nets) which have greater diversity in length, height and mesh size.

The maps at the beginning of each section show the villages from where this information was collected.

SYMBOLS USED



Marine



Estuarine



Riverine



Motorised



Non-motorised



No. of people

GANJAM AND KENDRAPARA

In this book, we feature artisanal (non-motorised), motorised and mechanised boats that are used today in the districts of Ganjam and Kendrapara alone. These two districts encompass majority of the boats and nets used across the coast. While they represent distinct social-ecological regions, they are also important from another perspective. The Rushikulya river mouth (in Ganjam) and the beaches at Gahirmatha (in Kendrapara) are one of the largest and best known mass nesting sites of the olive ridley sea turtle, a protected species under Indian wildlife law.

In the year 2003, the Supreme Court of India issued an interim order banning the use of all gill nets in Odisha. This order was issued in response to a petition that sought to protect sea turtles from incidental catch in fishing operations³. Our photographs and research notes on the diversity of fishing boats and nets helped various fishworker organisations in arguing against the blanket ban on all gill nets. Instead, we suggested a more nuanced approach to regulation, which recognised the diversity of fishing technologies and their impacts on ecosystems and species. Maintaining a detailed record of fishing craft and gear is

invaluable to understanding their dynamic place in the social, cultural and economic life of fishers of Odisha. This book is a contribution in that direction.

Mass nesting of olive ridleys has been taking place regularly along the Kendrapara, Ganjam and even the Puri coast (Devi river mouth rookery). However, since the coastal geomorphology and fishing technologies seen in Puri are very similar to (and can be considered a subset of) that of Ganjam, we chose to showcase the craft and gear of Kendrapara and Ganjam as a representation of marine technological diversity in the state. However, we would like to underscore the importance of a more extensive effort covering the remaining districts.

Fishing operations are complex socio-technical processes. Fishing practices and the fishing technologies and materials (including craft, nets, hooks, bait, oars and sails) often evolve gradually and occupy an intimate place in the lives of fishers. We present in this book a simple collection of photographs and brief descriptions of craft and gear, which we hope will help arouse greater interest in the history and culture of fisheries in contemporary Odisha.

Map of Odisha showing the surveyed districts of Ganjam and Kendrapara





MARINE FISHING CRAFT OF GANJAM

Ganjam is Odisha's southern most coastal district. Neighbouring present-day Andhra Pradesh, the marine fishers of Ganjam are from Telugu communities called *Noliya*, belonging principally to the *Jalari* and *Vadabaliya* castes. Some historical records indicate that the *Nolias* were invited by the Gajapati kings of Odisha to assist in maritime operations on account of their sea faring skills.

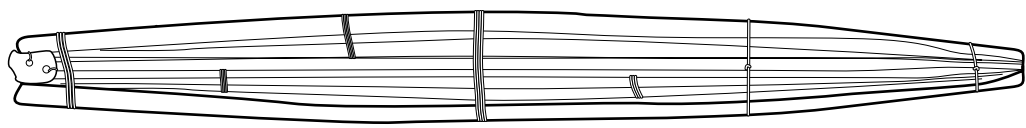
Craft and gear in Ganjam have transformed significantly in the past two decades. Artisanal fishing boats such as the *kattumaram* and the *padava* have nearly disappeared from most parts of the coast. A range of nets have appeared since the late 1980s. Cotton and hemp have been replaced by factory-made nylon and polyethylene nets. New nets such as the encircling *ring jaal* are now seen in many major fishing villages and are the cause of inequity in catches among fishers. There is a desire among fishers to adopt bigger and more efficient nets and boats, including trawl boats, but the absence of harbours in Ganjam have prevented the outright mechanisation of its fisheries.

This district also houses the secretarial office of the Orissa Traditional Fish Workers' Union (OTFWU), formed in 1995 as part of the larger fishworker movement across the country, campaigning for the rights of the small-scale sector in fisheries. Samudram, a women's federation of fishworkers, is also headquartered in Ganjam district and undertakes the direct marketing and value-addition of fish products in an effort to enhance women's livelihoods.

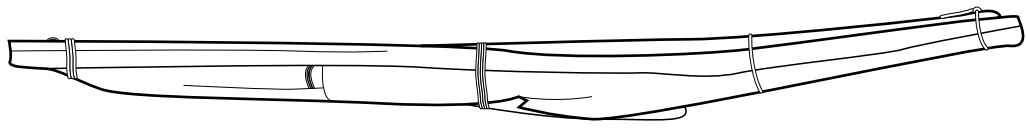
The mass nesting site of olive ridley sea turtles at Rushikulya was described in 1994⁴. The rookery is an important site and attracts a large number of tourists and researchers in the nesting season when hundreds of thousands of turtles come ashore to lay eggs.

The developmental map of the Ganjam coastline is gradually marked by incidents of sea erosion, groundwater depletion, water, air and solid waste pollution, unregulated tourism and industrialisation—all fairly recent occurrences in its history with significant implications for fisher communities.

Kattumaram



TOP



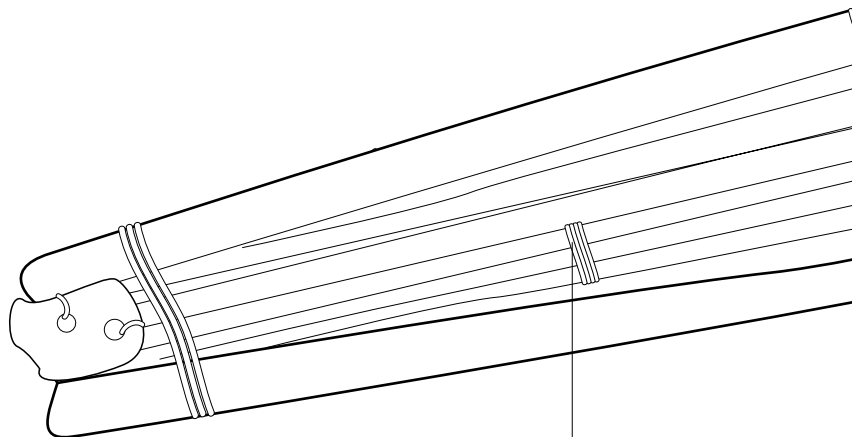
PROFILE

1 metre

Kattumaram, total length ~ 8.5 metres

KATTUMARAM

Other local names	<i>teppa, kathu teppa</i>
Area of operation	Marine and estuarine
Navigability	Up to 10 km offshore
Material	Wooden logs made commonly from <i>Erithryna indica</i>
Number of people	2–3
Gear	Previously used for deploying beach seines; now mainly for smaller gill nets, cast nets, lift nets and hooks
Motor type	Usually non-motorised; however, in some areas a 9 hp outboard motor is attached
Construction style	Log raft



Smaller pieces of wood are sometimes tied together to make a larger log; the kattumaram is made up of two to four such logs tied together

Kattumaram

The *kattumaram* is a craft found all along the east coast of the country. In Odisha, it is referred to simply as *teppa* and was once a common feature along the state's sandy beaches, from Paradip to Sonepur. Today in Ganjam district, it is only seen in Bada Nuagaon and Sana Nuagaon. We use the term *kattumaram* to distinguish it from the *chotta*, medium and *bada teppa*, which are distinctly different craft.

Once widely used throughout the Ganjam coast, its numbers have dramatically dropped in the last ten years. In the year 2011, our research team recorded only around 30 such boats along the entire Ganjam coast. At present, it is mainly used in the estuarine areas of the Rushikulya river and taken into the sea occasionally in good weather. Fishing using the *kattumaram* is

done up to 10 km from the shore almost all through the year, when the surf can be negotiated; the break in *kattumaram* fishing is mainly during the monsoons.

Tietze (1985)² recorded the length of the *kattumaram* as ranging between 4.2 to 8.5 metres. The *kattumaram* is made by tying between two and four logs together. Each log is sometimes made up of a number of smaller pieces pegged together. Three types of *kattumaram* can be distinguished according to the number of log pieces or sections they consist of. The two-logged *kattumaram* is the largest and is handled by about 1–2 fishermen, whereas the three- or four-logged *kattumaram* are operated by 3–4 fishermen. All *kattumaram* also have an option of attaching a bamboo mast for fastening triangular shaped sails.





Teppa

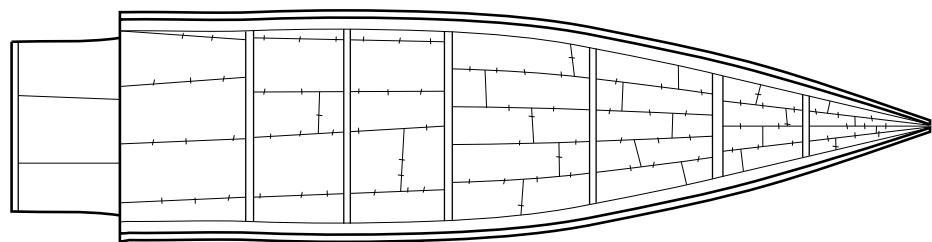
CHOTTA TEPPA



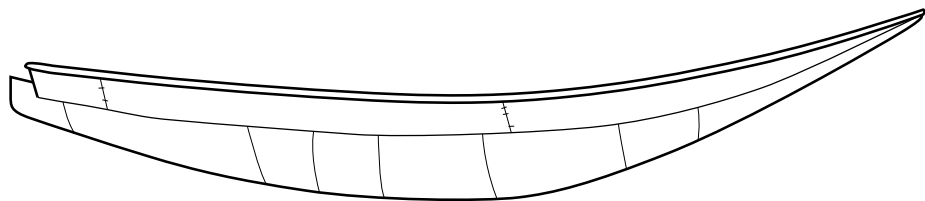
MEDIUM TEPPA



BADA TEPPA



TOP



PROFILE

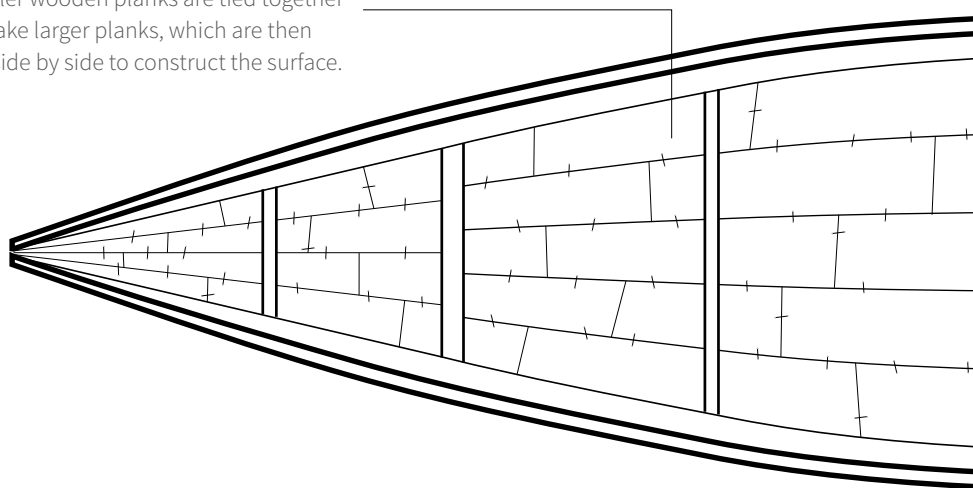
1 metre

Medium teppa, total length ~ 10 metres

TEPPA

	Chotta teppa	Medium teppa	Bada teppa
Area of operation	Estuarine/riverine	Marine	Marine
Navigability	1–2 km offshore	3–5 km offshore	5–10 km offshore
Material	Wood	Wood	Wood from <i>Albizzia</i> spp., <i>Acacia</i> spp., etc.
Number of people	1–2	3–5	10–12
Gear	<i>kabala</i> , <i>jaga</i> / <i>kanakurda</i> , <i>menjiram</i> , lift nets, hooks	All medium sized gill nets, trammel nets, hook and line	All gill nets, trammel nets, hook and line and ring nets
Motor type	None	9 hp outboard motor (OBM)	9 hp outboard motor (OBM)
Construction style	Carvel style raft	Carvel style raft	Carvel style raft

Smaller wooden planks are tied together to make larger planks, which are then laid side by side to construct the surface.



Chotta Teppa

The *chotta teppa* is seen these days only in Sana Nuagaon and Bada Nuagaon in Ganjam. During our survey, fishers indicated that the boat was introduced in these villages only a few years ago and has been used mainly in estuarine areas and is not taken

into the sea. This craft can carry two or three people at a time. It has a layer of polystyrene lined below the deck which gives it greater buoyancy. It is a non-motorised artisanal craft with a provision for the use of sails. Rowing is done with paddle-shaped oars.



Medium Teppa

The *medium teppa* is a motorised craft fitted with a 9 hp outboard motor. It is a wooden version of the chotta fibre with the characteristic use of polystyrene for buoyancy. It is used commonly in most coastal villages in this district. Wooden boats are used instead of fibre boats when seas are rough since these boats pose lesser risks of sinking upon damage. The outboard motor

provides the propulsion power; however, the medium teppa also has a provision for the use of sails when winds are favourable. A wooden rudder and additional oars provide navigational support. In smaller craft a motor is sometimes used to get past the breakers and into the fishing grounds, and the boat is then propelled using oars as well as sails.



Bada Teppa

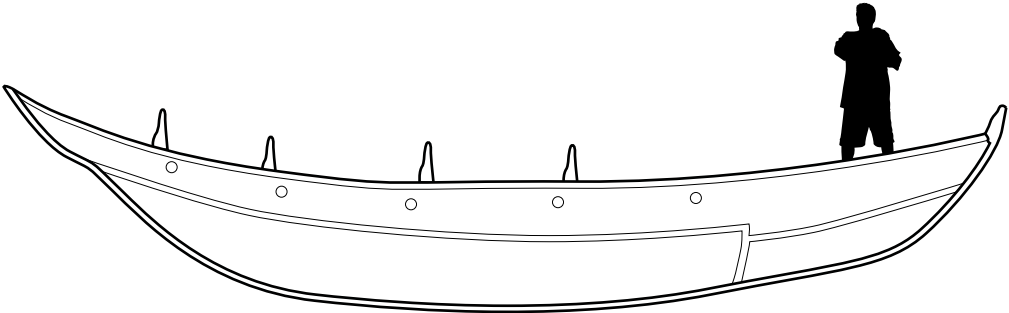
The *bada teppa* is a larger version of the medium teppa and is also fitted with a 9 hp outboard motor. This boat is found mostly in Sonepur village. It operates along the

same principles as the medium teppa and also has the support of sails. The body of the boat is reinforced with polystyrene, which is placed below the deck.

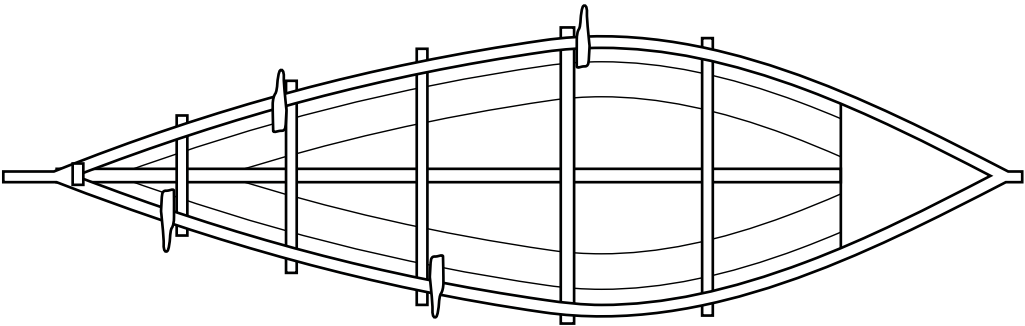




Padava



PROFILE



TOP

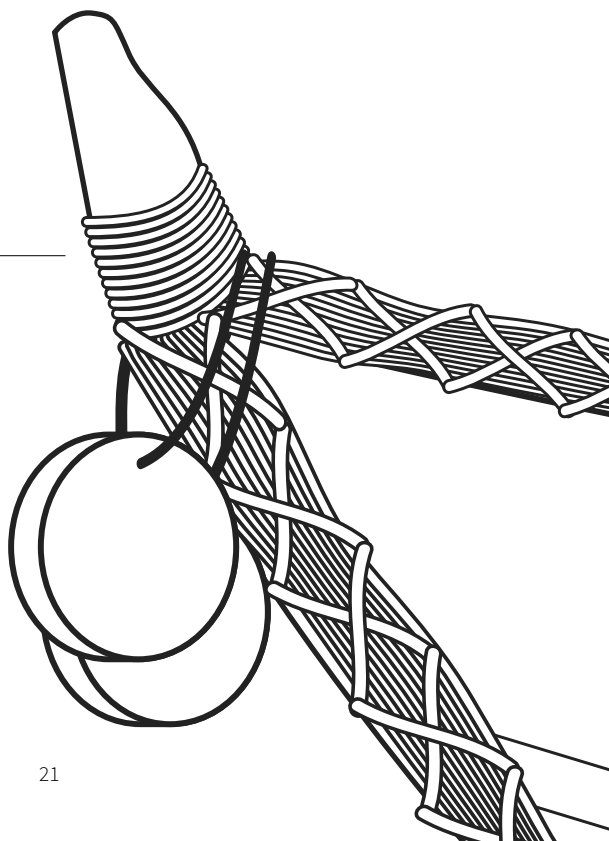
1 metre

Padava, total length ~8.5 metres

PADAVA

Other local names	<i>padhua</i>
Area of operation	Marine
Navigability	1–2 km offshore
Material	Wood, mainly from <i>Mangifera indica</i> (mango)
Number of people	20–25
Gear	<i>Bada jaal</i> only
Motor type	None
Construction style	Stitched plank type bar boat

The padava is held together by intricate ropework—the ropes used to sew the planks together are usually made of grass, straw or coir



Padava

Once a popular boat, the *padava* or *padhua* is now only occasionally used in Bada Arjipalli, Kantiagarh, Gopalpur, Golaband and Eksinghi. Only 12–15 *padava* were recorded in Ganjam.

The *padava* is a hollow wooden bar boat, which operates only one net—the *bada jaal*, a beach seine that requires a number of people to operate it (see page 56).

The *padava* is made by the fishers themselves, and sometimes with the assistance of boat

builders from Andhra Pradesh. It is a rowboat and is non-motorised.

The description of *padava* from Tietze's notes² does not differ much from its present day appearance. The boat does not have frames and the planks are sewn using natural materials such as grasses, straw and coir. The length of the boat is about 8 metres. It is designed to withstand the knocking of the surf. The *padava* is used for beach seining along the southern coastline from October to April.



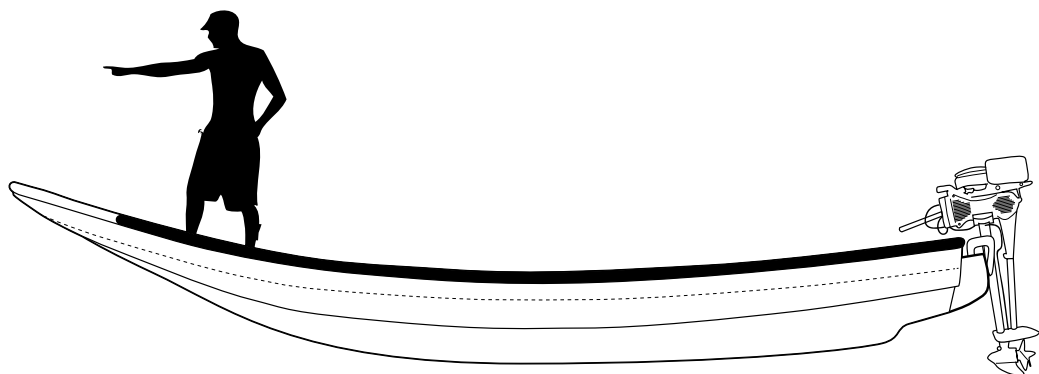


Fibre

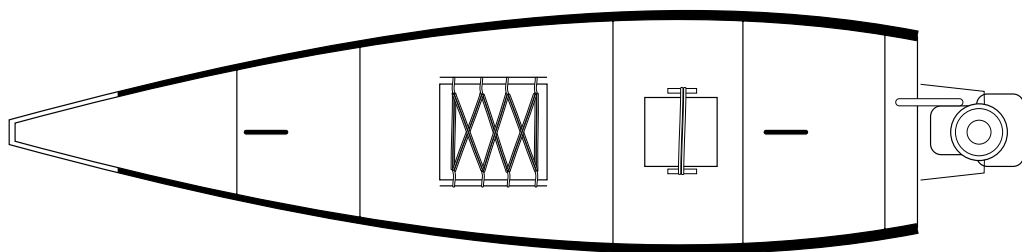
CHOTTA FIBRE



BADA FIBRE



PROFILE



TOP

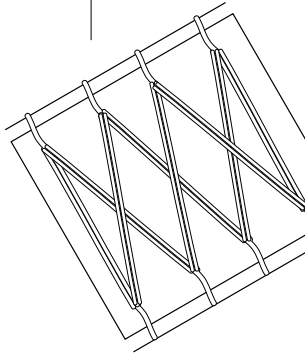
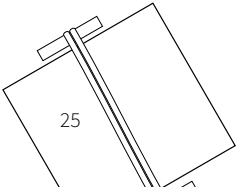
1 metre

Chotta fibre, total length ~ 10 metres

FIBRE

	Chotta fibre	Bada fibre
Other local names	<i>chotta FRP</i> (fibre-reinforced plastic), <i>BLC</i> (beach landing craft)	-
Area of operation	Marine	Marine
Navigability	2-10 km offshore	Up to 50 km offshore
Material	Fibre-reinforced plastic (FRP) and wood, usually from <i>Acacia</i> spp., <i>Albizzia</i> spp.	Fibre-reinforced plastic (FRP) and wood, usually from <i>Acacia</i> spp., <i>Albizzia</i> spp.
Number of people	5–7	10–12
Gear	Gill nets, trammel nets, hooks	Gill nets, trammel nets, encircling nets and hooks
Motor type	9 hp outboard motor (OBM)	9 hp and 13 hp OBM, and 21 hp inboard motor
Construction style	Assembled prefabricated mould	Hollow boat assembled with a prefabricated mould

The fibre teppa contains an in-built hold for storing fish or ice, a feature which is absent in the wooden teppa



Chotta Fibre

The *chotta fibre* is the most widely used craft for marine fishing along the Ganjam coast nowadays and is found on the shores of almost every marine fishing village. The fibre-reinforced plastic (FRP) boat design was introduced by the Bay of Bengal Programme in the 1980s. Since then, this craft has been used widely across this coast.

The chotta fibre uses gill nets and long lines. The boat measures about 10 metres

in length and nearly 2 metres in depth. The length of the motor rod in water is around 1.5 m and the length of a blade of the fan is around 14 cm.

All fibre teppa are motorised, and in the villages surveyed, these boats were fitted with a 9 hp engine. The chotta fibre can travel a maximum distance of 30–40 km and it operates nets like the kabala jaal, chungdi jaal, illish and chandi jaal, besides a variety of hooks and lines.





Bada Fibre

Our data from 2012 onwards shows the *bada fibre* in use in the villages of Bada Arjipalli, Sana Arjipalli, Gopalpur, Old Golaband, New Golabanda, Markandi, Pat Sonepur and Ramayapatna.

This boat is designed to accommodate larger gill nets, ring jaal, and for longer durations

of fishing, which can sometimes last nearly twelve hours.

The kind of motor attached to these larger fibre boats depends on the intensity of fishing. It has been observed that the more powerful 21 hp inboard motor is used mainly at sites where the ring jaal is used.







MARINE FISHING CRAFT OF KENDRAPARA

The district of Kendrapara was carved out of Cuttack district in 1993; Mahakalpara and Rajnagar are its coastal administrative blocks. These blocks contain a labyrinth of rivers and streams and a rich biodiversity of littoral mangrove vegetation. The Bhitarkanika National Park in Rajnagar block was declared in 1986, while the offshore waters of this district (extending up to 20 km away from the shore) were declared as the Gahirmatha Marine Sanctuary in 1997. The communities presently fishing and residing in the coastal villages of these blocks are believed to have come during two prominent periods—once after partition in 1947, and later around the time of the Indo-Pakistan war of 1971.

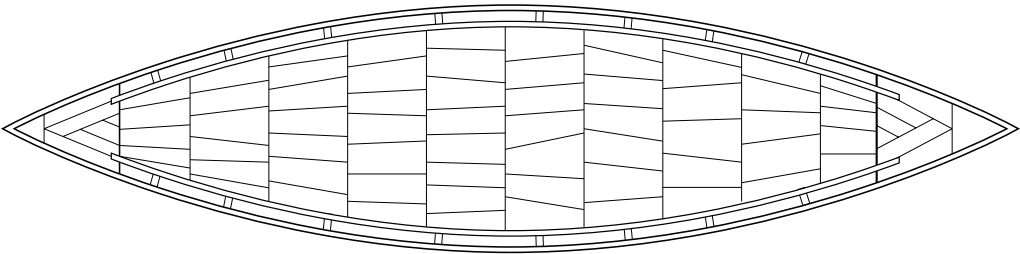
The range of fishing operations within this entire district are truly diverse. In this section, we only highlight marine fishing practices and a few estuarine fishing practices in villages close to the seashore. Many of the boats mentioned in Tietze's book², such as the *patia*, *chhoat*, *sabado* and *salti* which were used for transportation or fishing, are no longer found on this coast. However, there are a large number of fishing techniques which involve the use of traps and other forms of passive fishing which are

still in use in this district. In comparison to Ganjam, sea faring craft are locally classified mainly based on the engine capacity rather than the construction style of the craft.

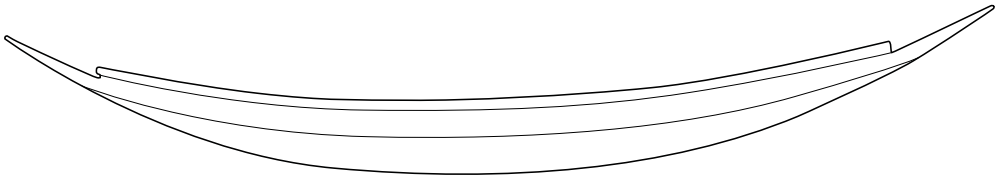
Kendrapara has a fascinating although inadequately explored history of the relationships between its different fishing communities and its rulers, elites and governments, particularly over problems of natural resource use. This region was significant for commercial maritime operations, and False Point on Hukitola Island was an important port during the colonial period.

The region has an intricate network of markets and merchants and a few important landing centres where godowns and ice facilities are located. Many of the boats of the southern villages of Kendrapara land their catch at the landing centres at Khar Nasj, Jamboo and Attara Banki in Paradip. Fishers living in the north land their catches at the Dhamra harbour and Tantiapal. There are several small non-motorised boats in the district of Kendrapara, which operate in areas close to the river mouths. They almost exclusively fish in rivers and sometimes in the sheltered bay close to Hukitola Island.

Oula donga



TOP



PROFILE

1 metre



Oula donga, total length ~ 7.6 metres

OULA DONGA

Other local names	<i>donga, dingy</i>
Area of operation	Estuarine and restricted offshore only within the bay area of Hukitola Island
Navigability	Up to 1–2 km offshore
Material	Wood
Number of people	1–2
Gear	Gill nets and tidal nets
Motor type	None
Construction style	Carvel type boat

Planks on the deck of the boat are simply placed and not affixed with adhesives or nails

The sides of the boat are double layered

Oula Donga

The *oula donga* is a artisanal craft and is used extensively in the estuarine system of this region. The bow and stern of this boat are identical. A common decorative feature of these boats is the use of colourful cloth and an image of the goddess Tarini.

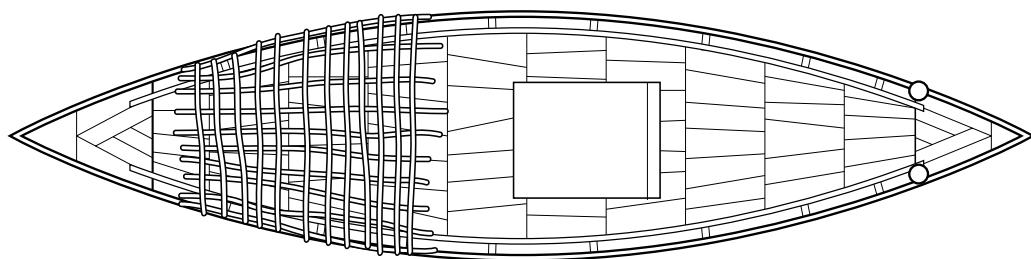
These boats are found mostly in the villages near Jamboo. Their lengths vary from 7 to 8 m.

These boats are mostly used for fishing within the river using both gill nets and tidal nets such as the *behundi jaal*.

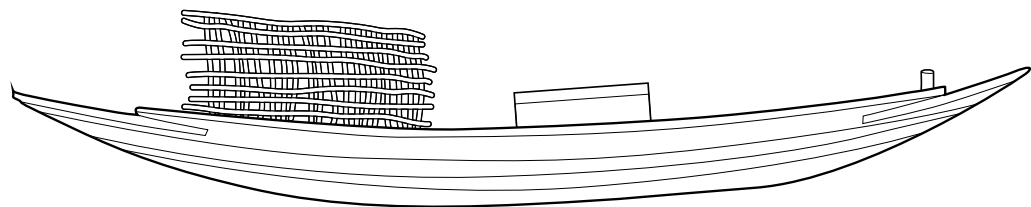




Bhut-bhuti / 1-Cylinder Gill Netter



TOP



PROFILE

1 metre

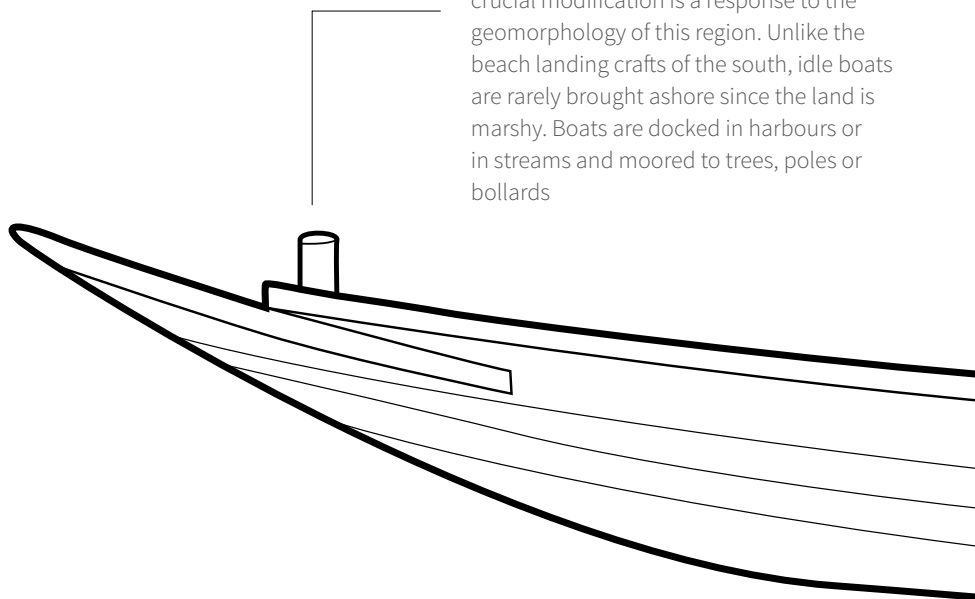


Bhut-bhuti, total length ~ 12 metres

BHUT-BHUTI / 1-CYLINDER GILL NETTER

Area of operation	Estuarine and marine
Navigability	Up to 3-5 km offshore
Material	Wood, mainly of <i>Albizzia</i> spp. or sometimes sal, and sometimes with a fibreglass coated hull
Number of people	4–6
Gear	Gill nets such as <i>bahal</i> , <i>koni</i> and <i>ilish</i>
Motor type	Inboard 10 hp motor; Motors are either 'hand-fitted' (assembled using locally available engine components) or are pre-assembled branded motors (e.g., Kirloskar)
Construction style	Carvel type displacement boat

Typical of gill netters of Kendrapara, these projecting stumps on the front of the boat are used to moor the boat to land while it remains in the water. This small but crucial modification is a response to the geomorphology of this region. Unlike the beach landing crafts of the south, idle boats are rarely brought ashore since the land is marshy. Boats are docked in harbours or in streams and moored to trees, poles or bollards



Bhut-Bhuti / 1-Cylinder Gill Netter

The *bhut-bhuti* is a modified version of the *oula donga* which is fitted with an inboard engine. On some boats, a protective arched shell made out of a frame of bamboo strips is fitted onto the deck of the boat towards the stern. A plastic sheet is tied over this frame forming a canopy, which provides

shelter from the sun and rain. Shelter is also provided to the inboard motor in this manner. Some of the bigger *bhut-bhuti* measure about 10 m in length and are around 2.5 m wide with a depth of 1 m. The rudder of the *bhut-bhuti* is fitted inside the boat.





Gill Netters

GILL NETTER		
	1-Cylinder gill netter	2-Cylinder gill netter
Area of operation	Marine	Marine
Navigability	5–10 km offshore	Beyond 10 km offshore
Material	Wood, mainly of <i>Albizia</i> spp. or sal	Wood, mainly of <i>Albizia</i> spp. or sal
Number of people	6	6–8
Gear	Gill nets such as <i>bahal</i> , <i>koni</i> , <i>bhetki</i> and <i>ilish</i>	Gill nets such as <i>bahal</i> , <i>koni</i> , <i>bhetki</i> and <i>ilish</i>
Motor type	Inboard 10 hp motor; Motors are either hand-fitted or of Kirloskar brand	Inboard 20 hp motor; Motors are either hand-fitted or of Kirloskar brand
Construction style	Carvel type displacement boat	Carvel type displacement boat

2-CYLINDER GILL NETTER (OULA DONGA VARIETY)	
Area of operation	Marine
Navigability	Beyond 10 km offshore
Material	Wood, mainly of <i>Albizia</i> spp. or sal with fibreglass coated hull
Number of people	6–8
Gear	Gill nets such as <i>bahal</i> , <i>koni</i> , <i>bhetki</i> and <i>ilish</i>
Motor type	Inboard 20 hp motor; Motors are either hand-fitted or are pre-assembled branded motors (e.g., Kirloskar)
Construction style	Carvel style, but with fibreglass body

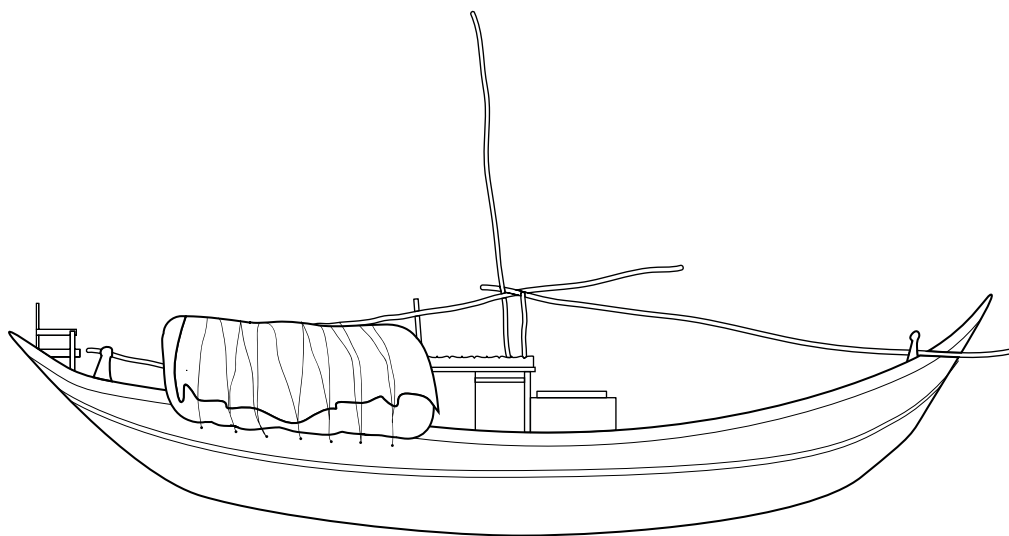
1-CYLINDER GILL NETTER



2-CYLINDER GILL NETTER



2-CYLINDER GILL NETTER
(OULA DONGA VARIETY)



PROFILE

1 metre

2-Cylinder gill netter, total length ~ 12 metres

1-Cylinder Gill Netter

The 1-Cylinder gill netter is distinctly different from the bhut-bhuti in that it belongs to a different tradition of boat building altogether. These boats often have a flattened bottom, a high square stern and a raised bow. The body of the boat is made completely with wood and the stem of the bow is tied with a sacred cloth.

This boat can be distinguished from the

bhut-bhuti from the square shape and slightly overhanging incline of the stern. A wooden cabin that protects the engine is usually constructed over the deck. The rudder is built into the aft side and the boat has a built-in canopy made of bamboo and plastic sheets, similar to that in the bhut-bhuti. A broad deck ensures adequate space for water cans, floats, nets and other equipment. This boat is found mostly in the villages of the Mahakalpara block.





2-Cylinder Gill Netter

The 2-Cylinder gill netter is a larger and more powerful version of the 1-Cylinder Khar Nasi boats mentioned earlier (see page 42).

The stern sometimes has a small bench for the crew or *tandel* (driver) to sit on and the deck and hold is spacious enough to carry

food, water, ice boxes and fishing equipment on board. These boats tend to stay offshore over a period of 4–5 days during each fishing operation. This is done in order to maximise fish catch to make up for the high costs of individual operations, which can be as high as Rs. 2–2.5 lakh per trip.





2-Cylinder Gill Netter (Oula Donga variety)

The 2-Cylinder gill netter (of the oula donga variety) contains two cylinders and has a high bow and stern. The entire hull of the boat is reinforced with a fibreglass coating and paint. These boats are more commonly found in Barkholikola than in Khar Nasi.

The boat has a distinct shape: the bow and stern are both pointed, unlike the square, overhanging stern of the Khar Nasi

2-Cylinder boats. The deck has a broad beam which accommodates larger nets, ice boxes and other equipment necessary for a larger crew and more intensive fishing. These boats are also used for ferrying people and for transporting sand.

Some of these boats are fitted with a hand pump and also with a small seat at the stern for the tandel (driver).





6-Cylinder Gill Netter

The 6-Cylinder gill netter is seen in only some parts of Kendrapara such as Kajalpatia and in the Talchua area, and is not very common.

It is suited for longer duration fishing operations and for carrying on board more nets, larger ice boxes and other material.





6-CYLINDER GILL NETTER

Area of operation	Marine
Navigability	Beyond 20 km offshore
Material	Wood, mainly of <i>Albizia</i> spp. or sal
Number of people	8–10
Gear	Gill nets such as <i>bahal</i> , <i>koni</i> , <i>bhetki</i> and <i>ilish</i>
Motor type	Inboard 21 hp motor (Kirloskar model)
Construction style	Carvel style displacement boat



Trawler

Trawlers were introduced in Odisha in the 1960s. There are two kinds of trawlers in operation in Odisha. One is known as the day trawler and is a smaller vessel using a 6-cylinder engine with a 60 hp capacity. These boats are largely found in the Devi river mouth area.

The second kind of trawler in operation in Odisha is known as the *sona* trawler. These

operate largely from the northern harbours of Balaramgadi, Dhamra and Nehru Bangla at Paradip.

Depending on the size of the boat, one or two nets are carried on board, and adequate amount of ice, fuel, water and other items can be accommodated. The crew of these vessels belong to both Bengali and Odiya castes, although owners are predominantly Odiyas.







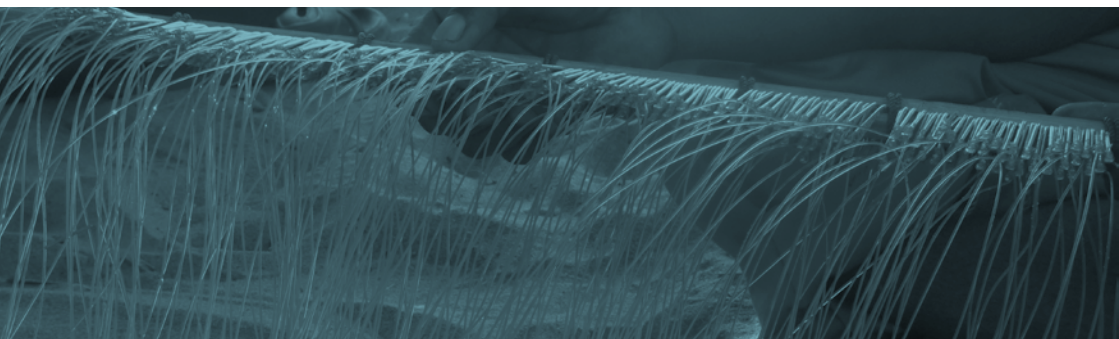


TRAWLER

Other local names	<i>sona</i> trawler (for bigger vessels)
Area of operation	Marine
Navigability	Small trawlers: Up to 20 km offshore; Large trawlers: Can travel well beyond 20 km offshore and for longer durations
Material	Wood
Number of people	10
Gear	Bottom trawl net
Motor type	Inboard 6-cylinder engine



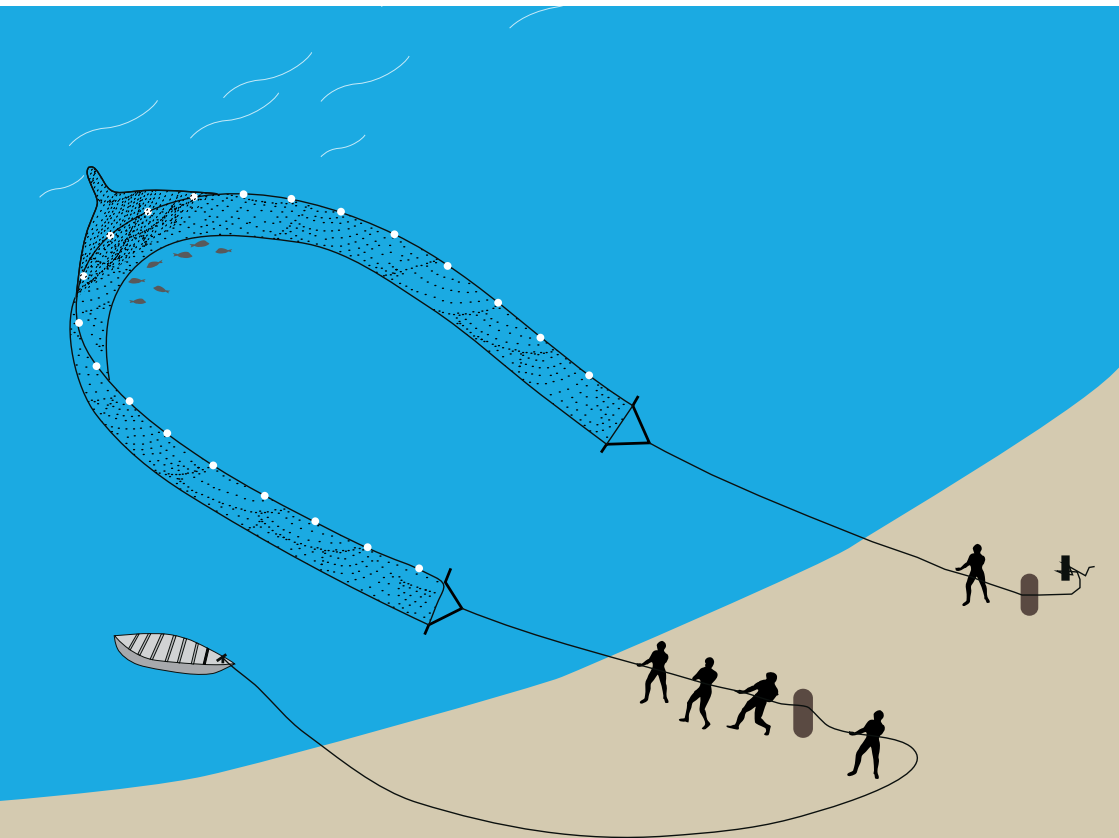
FISHING GEAR



SHORE SEINES

A beach (or shore) seine is a seine net operated from the shore. The gear is composed of a bunt (bag or loose netting) and long wings often lengthened with long ropes for towing the seine to the beach.

The head rope with floats is on the surface, the foot rope is in permanent contact with the river/sea bed and the seine is therefore a barrier which prevents the fish from escaping from the area enclosed by the net.¹



Bada jaal

Length: 1,800 m

Height: 35 m

Mesh type and material: multifilament, cotton and nylon

Species targeted: *kokili*, *soringa* and other inshore fishes

The *bada jaal* is commonly found only in southern Odisha and is used extensively in winter. Fishing with this net is very different compared to the other nets used by fishermen of southern Odisha. This net is made up of four different nets with varying mesh sizes; during fishing, the smallest net is thrown in first followed by nets with increasing mesh sizes. The *bada jaal* is operated from the *padava* (see page 22), which is exclusively meant for this net. It is a multifilament net with a length of ~1 km and depth of ~18 m. It has plastic floats and sinkers made of lead pellets and cement stones.

The smallest net is made of cotton or *fisery* (a local term for nylon), the next two are made of nylon, and the largest is made of rope and provides support to the entire combination of nets. Before the onset of winter, this net is dyed and left covered; it is only uncovered when it is bright and sunny to prevent the colour from getting ruined. According to the fishermen, a net without the proper colour renders it a lower capacity to catch fish. The fishermen are exceptionally careful with this

net as the cost of a single net is around Rs. 35,000. This net is usually used in the winter months beginning around November. It requires tremendous effort to fish with this net. Ten fishermen are needed to operate the net from the *padava* while around 40 people onshore (typically also including women) draw the net in. The fishermen on the *padava* spread the net in the water and after about five hours of fishing, the people onshore pull it in. It takes four hours to draw it in completely, but the hard work pays off. During winter, fishers can earn as much in three or four months with this net as compared to a whole year with any other net.

The *bada jaal* is a very important net for fishermen in winter as it catches all sizes of fish like the *kokili* (anchovy) in the small mesh and the *soringa* (silver sillago) in the larger mesh sized nets. Fishing with the *bada jaal* takes place only 1 or 2 km from the shore, which is the limit of the length of rope holding the net to the shore. There are an equal number of *padava* as there are *bada jaal* nets, as a single *padava* operates a single net.



Gado jaal

Length: 225 m

Height: 4.5 m

Species targeted: *manjili* and *kontia*

The *gado jaal* is a very important net for estuarine fishing and is used in the Rushikulya river and other estuarine areas of Ganjam. It catches all types of fish in the river, but mostly *manjili* (grey mullet) and *kontia machi* (catfish). Fishing with this gear can be done at any time during the day. Operation of this net requires six fishermen—two on the shore to hold the rope of the net which is about 40 m long; and four on the boat, two to spread this huge net as the boat moves in a circle in the water and the other

two to row. Once the boat has completed its round, three fishermen from the boat come to the shore and pull the other end of the rope. As the five fishermen on the shore thus pull the net towards them, the one sitting in the boat pulls the net towards him. In this manner they move closer together until the boat reaches the shore and the net is pulled out. The net consists of a bag which collects the fish; it however also draws up large quantities of bottom sediment from the riverbed.





Irigalli jaal

Length: 60 m

Height: 30 m

Species targeted: *chandi*, *kokili*, *chotta kabala*, *ilish*, *chotta kanakurda*, and *savala*

Tietze's records in the mid 80s state that the *irigalli*—a boat seine, was operated off the coast of Ganjam, Puri and south Cuttack districts from February to August.² This net is very rarely used nowadays. The catch consisted mainly of ribbonfish, sardine, mackerel, silver belly, small threadfin and shrimp.

The net is operated using two kattumaram from early morning until noon within 5 km from the shore. The irigalli net is made of cotton, floats are made of wood or thermocol and sinkers of stone.

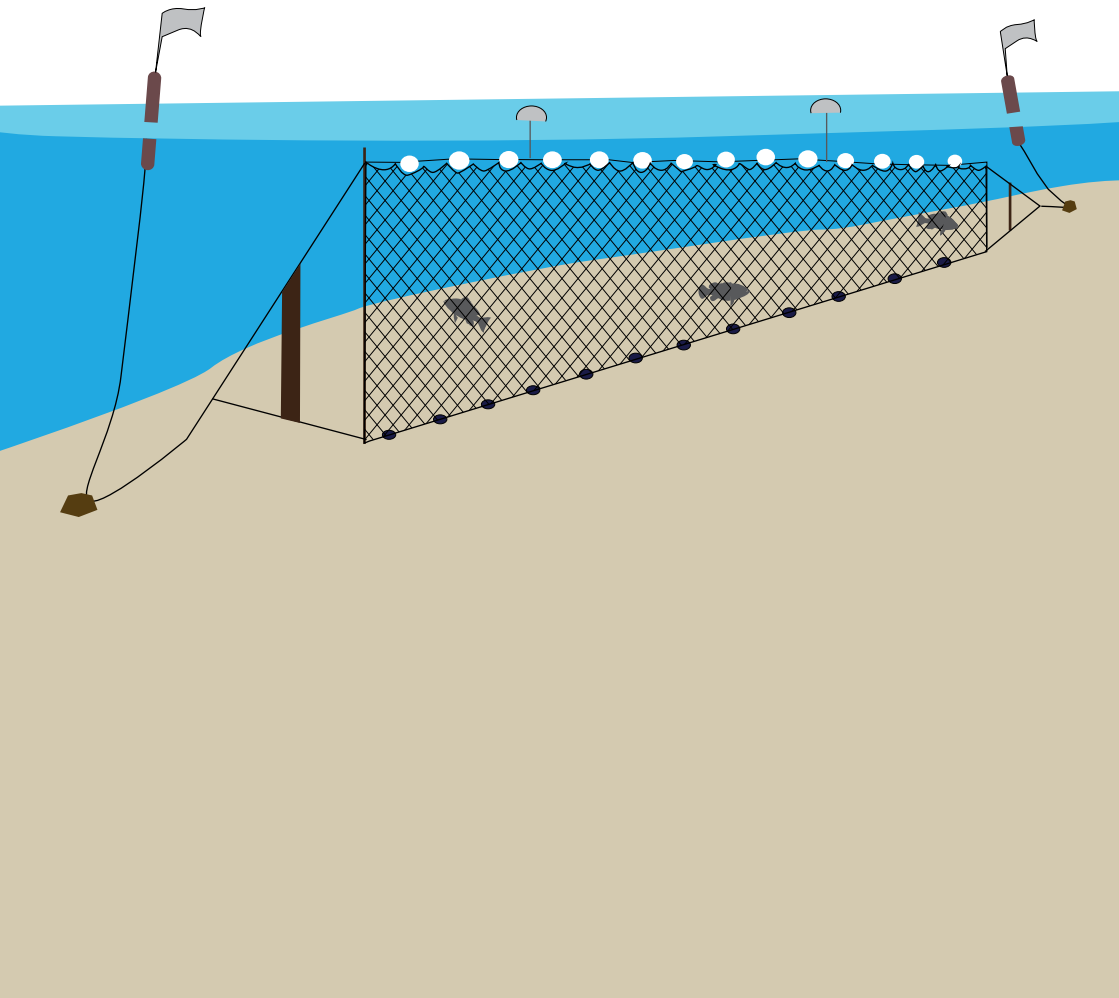
Two kattumaram or teppa, one of which carries the irigalli, are used for deploying this net. On reaching the fishing ground both boats come together, each holding one end of the net, and then move away from each other to stretch out the net. The two boats move in opposite directions, spreading out the net and approximately 60 m of rope as well, on each side. When the net is fully released the boats turn at right angles and move along a parallel course, usually with the current. Finally, they move closer to each other and haul the lines and wings together, directing the fish into the bag.



GILL NETS

Gill nets and entangling nets are strings of single, double or triple netting walls, which are placed near the surface, in mid-water, or at the bottom. Fish swimming into these

nets will entangle or enmesh in them. Gill nets have floats on the upper line (head rope) and, in general, weights on the ground line (foot rope).¹



Kabala jaal

Length (median measurement): 300 m
Length range: Between 75 m and 1,500 m
Height (median measurement): 17 m
Height range: Between 1.5 m and 45 m
Species targeted: *kabala* and *chungdi*
Mesh size: 2 cm (average)
Mesh type and material: Monofilament, nylon

The *kabala jaal* is the most popular net used in the villages of Ganjam. It is now made only of nylon and has plastic floats and lead sinkers. Most villages have between five and seven varieties of the net. The kabala jaal is also the most expensive net and it comes in various mesh sizes—the smaller the mesh size, the more expensive the net.

The kabala jaal is used throughout winter from November to December. During the months of November and December, only small *kabala* (sardines) are caught, generally between 10 and 13 cm in length. Bigger sized and larger catches of sardines are landed from January onwards until March, when the catch ceases. The kabala jaal is taken out for fishing between 4 am

and noon and fishing with this net is done between 1 and 7 km from the shore. The thickness of the filament in the kabala jaal is 0.016 cm and it is available in the following mesh sizes: 1 cm, 1.3 cm, 1.6 cm, 1.8 cm, 1.9 cm, 2cm, 2.2 cm, 2.3 cm, 2.6 cm, 2.8 cm and 2.9 cm.

There is another variety of kabala jaal, locally known as *gundhli jaal* which has a filament of 0.02 cm thickness and which comes in mesh sizes of 3 cm, 3.4 cm and 3.5 cm. This net is used to catch up to ten species of fish, namely *chungdi* (prawn), *kabala* (sardine), *savala* (ribbonfish), *konduballu*, *bingiri*, *golora* (croaker), *gullbinda* (goat fish) and crab. This variant of the kabala jaal was observed only in Gokhurkuda village.



Jaga jaal

Length (median measurement): 800 m

Length range: Between 150 m and 6,000 m

Height (median measurement): 25 m

Height range: Between 3 m and 90 m

Targeted species: *kanakurda*, *kontia*, *onogaru*, small/medium *para* and small *menjiram*

Mesh Size: 5.5 cm

Mesh type and material: Monofilament, plastic

The *jaga jaal* is used to catch different species of fish depending on its mesh size. The main target catch using this net is

mackerel, locally known as *kanakurda*. The *jaga jaal* has thermocol floats and cement sinkers.



Koni / Ghagra jaal

Length (median measurement): 1,000 m

Length range: Between 450 m and 1,500 m

Height (median measurement): 20 m

Height range: Between 7.5 m and 52.5 m

Targeted species: *koni*, *bada mogro*, *para*, *onogaru*, *menjiram*

Mesh size: 13.5 cm (average)

Mesh type and material: Multifilament, high density polyethylene (HDPE)

The *koni jaal* targets seer fish and is used only from the month of November until April. There are two varieties of the koni jaal commonly used; the *chotta* (=small)

and *bada* (=large). Both are multifilament nets which consist of three filaments, and their mesh widths are 12.9 cm and ~14.5 cm respectively.



Ilish jaal

Length (median measurement): 1,500 m

Length range: Between 300 m and 3,750 m

Height (median measurement): 10 m

Height range: Between 7.5 m and 22.5 m

Targeted species: *ilish*, *para*, medium *kontia*, *menjiram*, *betti* and *bada kara*

Mesh size: 6.5 cm

Mesh type and material: Monofilament, nylon

The *ilish jaal* is used from the month of February and even during the monsoons. The *ilish jaal* is used mainly to catch *hilsa*

or the Indian shad. This monofilament net is made of nylon, and uses thermocol floats and rounded cement stones as sinkers.



Chandi jaal

Length (median measurement): 1,500 m

Length range: Between 300 m and 3,000 m

Height (median measurement): 15 m

Height range: Between 7.5 m and 30 m

Targeted species: *chandi*, *para*, *mogro*, *kontia*, *telia* and *savala*

Mesh size: 13.5 cm

Mesh type and material: Monofilament, nylon

The *chandi jaal* is used from the month of February. It mainly targets white and black pomfret (*chandi*) while occasionally landing other catch as well.

The *chandi jaal* is a monofilament net and is made of nylon. It also uses thermocol floats and rounded cement stones as sinkers.



Bettis / Menjiram jaal

Length (median measurement): 1,000 m

Length range: Between 900 m and 1,050 m

Height (median measurement): 12 m

Height range: Between 7.5 m and 15 m

Targeted species: *betti*, *kontia*, *koni* and *para*

Mesh size: 7 cm

Mesh type and material: Multifilament, nylon

The *menjiram/bettis jaal* is used to catch smaller pomfret and *hilsa* in the months of November and December. This is a

monofilament net made of nylon, and uses thermocol floats and rounded cement stones as sinkers.



Bahal jaal

Length (median measurement): 1,500 m

Length range: Between 300 m and 3,000 m

Height (median measurement): 15 m

Height range: Between 7.5 m and 30 m

Targeted species: *ilish*, *bahal*, *bhoroi*, *kontia* and *para*

Mesh size: 15 cm

Mesh type and material: Monofilament, HDPE

The *bahal jaal* of Kendrapara and the chandi jaal of Ganjam appear to be the same kind of net. However, the bahal jaal has a bigger mesh size than the chandi jaal. It is used from the month of February onwards till

the monsoon. It is meant mainly to catch white and black pomfret. The net is made of monofilament HDPE, and uses thermocol floats and rounded cement stones as sinkers.



Koni jaal

Length (median measurement): 1,000 m
Length range: Between 450 m and 1,500 m
Height (median measurement): 20 m
Height range: Between 7.5 m and 52.5 m
Targeted species: *koni*, *telia* and *kontia*
Mesh size: 15 cm
Mesh type and material: Multifilament, HDPE

The *koni jaal* targets seer fish and is used only in the months of January, February and March. It is a multifilament net made

from high density polyethylene (HDPE) twine, and uses plastic floats and rounded cement stones as sinkers.



Ilish jaal

Length (median measurement): 1,500 m
Length range: Between 300 m and 3,750 m
Height (median measurement): 10 m
Height range: Between 7.5 m and 22.5 m
Targeted species: *ilish*
Mesh size: 9–9.5 cm
Mesh type and material: Monofilament, HDPE

The *ilish jaal* is used mainly during the monsoon. As the name suggests, this net is used primarily to target *hilsa*, or the Indian

shad. The net is monofilament and made of HDPE, and uses thermocol floats and rounded cement stones as sinkers.



Bhetki jaal

Length (median measurement): 1,000 m
Length range: Between 900 m and 1,050 m
Height (median measurement): 12 m
Height range: Between 7.5 m and 15 m
Targeted species: *bhetki*, *kontia*, *koni* and *para*
Mesh size: 15–20 cm
Mesh type and material: Multifilament, nylon

The *bhetki jaal* is used to catch smaller sea bass, pomfret and *hilsa* in the months of November and December. The net is multifilament and made of nylon and uses thermocol floats and rounded cement stones as sinkers. The Orissa Traditional Fish

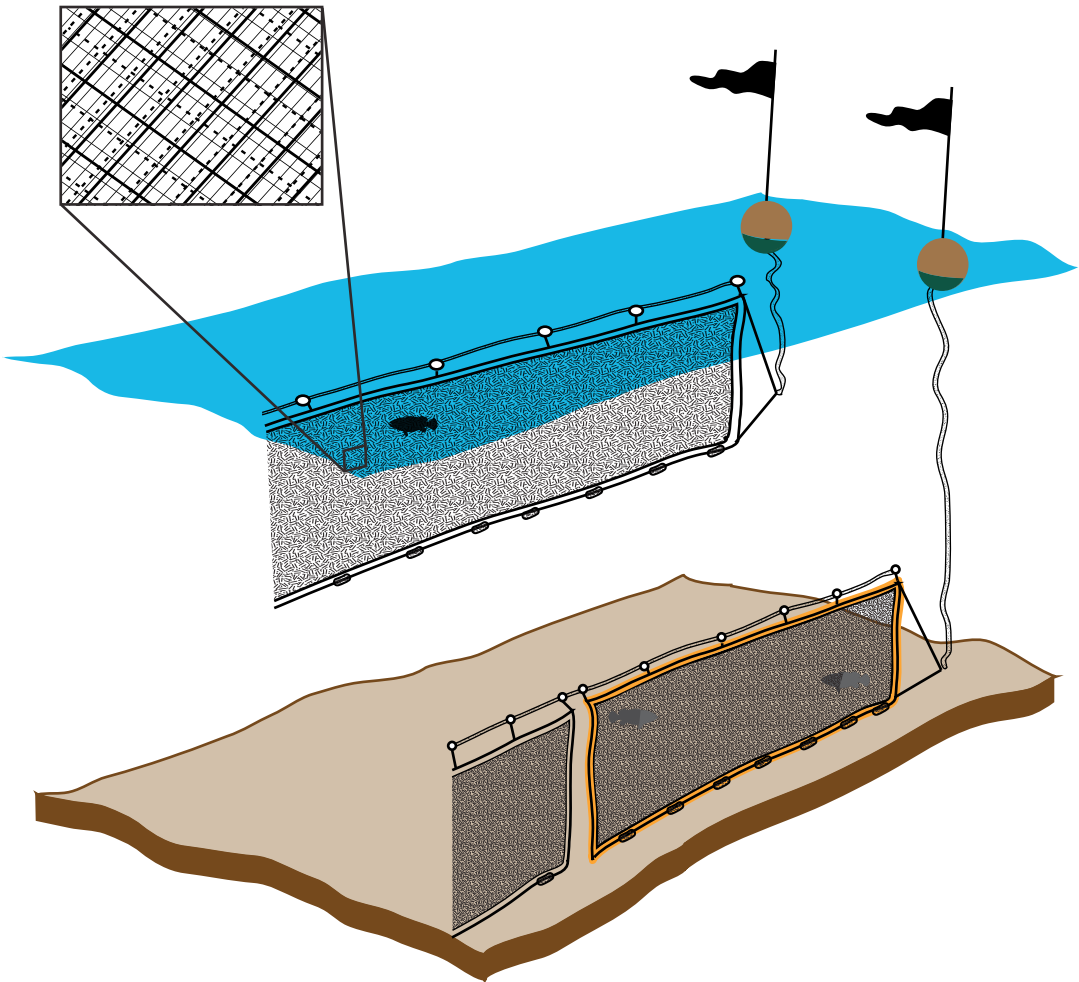
Workers' Union proposed an informal ban of this net in the year 2004 as a community-based measure to protect sea turtles. Since the announcement of the ban, it is rarely used by fishers, except by larger mechanised gill netters.



TRAMMEL NETS

A trammel net consists of two or three layers of netting with a slack inner netting of a small sized mesh lying between two large mesh sized outer layers of netting. The fish get

entangled between these three layers. These nets are deployed to remain more or less vertical in water with the help of floats on the head rope and weights on the foot rope.¹



Disco jaal

Length (median measurement): 450 m
Length range: Between 60 m and 1,500 m
Height (median measurement): 5 m
Height range: Between 1.5 m and 18 m
Targeted species: *chungdi* and *chopda*
Mesh size: outer: 14 cm, inner: 5 cm
Mesh type and material: Multifilament, cotton

The *disco jaal* is used by the fishermen of Odisha exclusively to catch *chungdi* (prawns). This net is made of three layers: two layers of *dubi jaal* and one layer of disco jaal. The *dubi* has a much larger mesh size compared to the disco jaal. The *dubi* is made up of two or three filaments whereas the disco is made up of four filaments. The net is made of monofilament nylon—also called *fisery* in Odiya, the floats are made of plastic and the sinkers of *seesa* (lead pellets). This net is operated from early in the morning at 4 am

until noon; it takes longer to fish for prawns than other fish. Sometimes, this net is taken for fishing in the afternoon at 3 pm. One net is made up of many smaller individual units which are joined together on the boat at the time of deployment. A single piece of this net varies from 60 m to 30 m. While fishing, between four and five pieces are joined and deployed at once. A boat often carries about 20 individual pieces at a time. This is because the net gets easily damaged and fishermen can replace the torn segments while at sea.

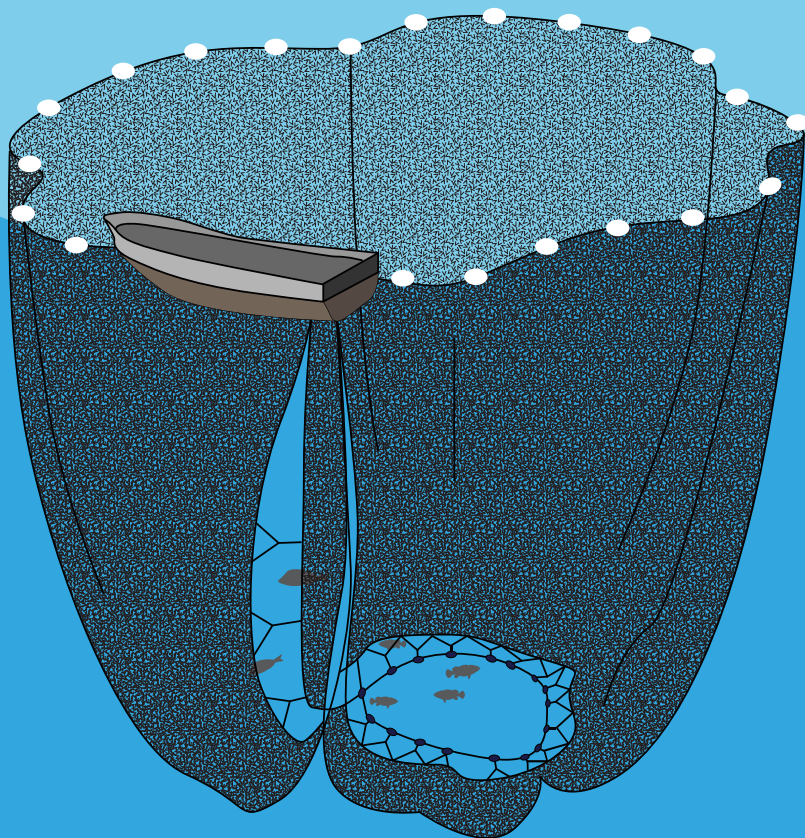




RING NETS

A ring net is an encircling net which is similar in operation to a purse seine. In a ring net, the line passing through the rings at the lower edge of the net is drawn in like a string purse. It targets shoaling fish and is an active fishing net. An active fishing gear is one which is used to chase and trap fish

into it. These types of nets require the fishing vessel to pursue, herd and capture shoals of fishes rather than waiting for the latter to get trapped in a relatively stationary net (such as passive fishing nets like the gill net). Once a shoal is surrounded the lines are drawn in and the entire catch is hauled in as in a bag.¹



Ring jaal

The *ring jaal* is only used in Ganjam district and is not found in Kendrapara. They are of three main varieties, depending on the size of the net and are called *bada* (=large),

mojje (=medium) and *sano* (=small). The operation methods for all three nets are basically the same and the size of the net is chosen depending on the target catch.

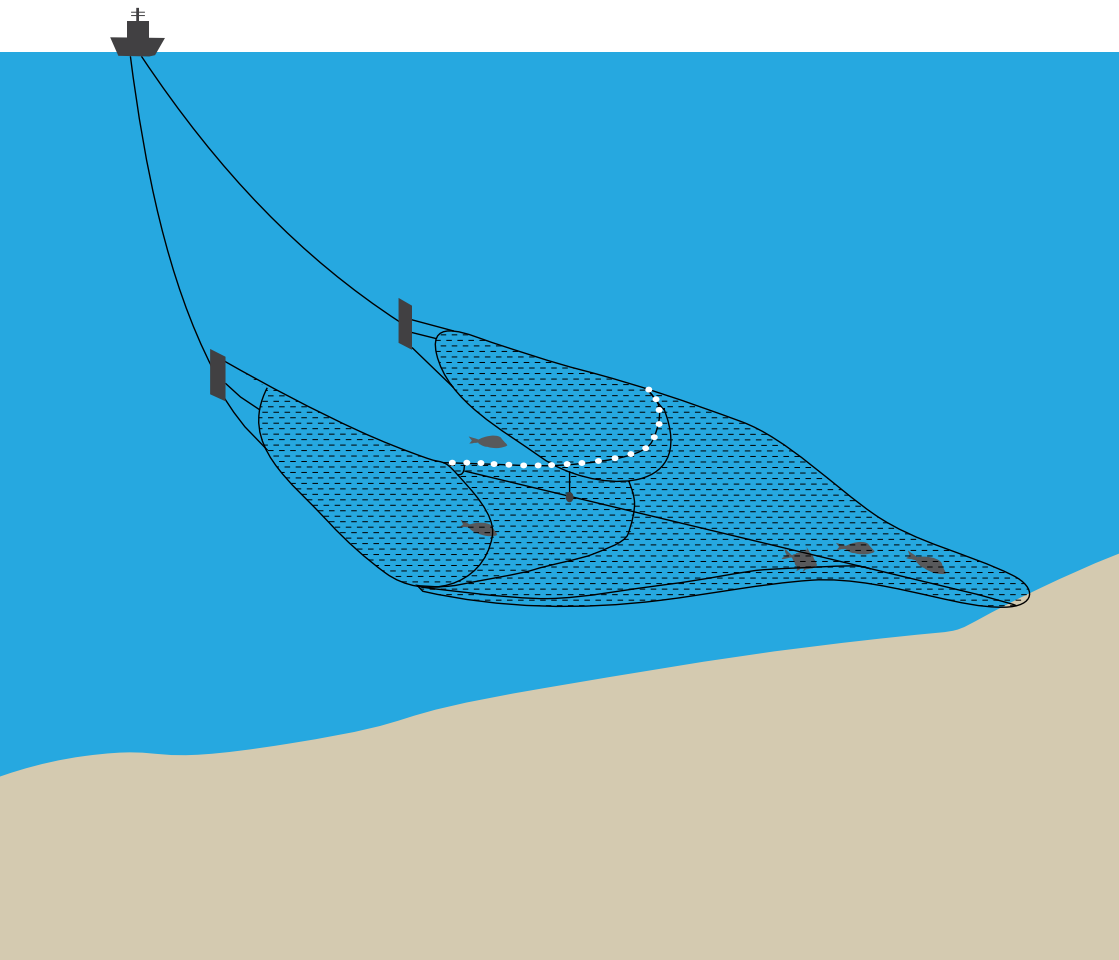
	Bada	Mojje	Sano
Length (m)	500 (375–600)	450	350 (300–375)
Height (m)	40 (37.5–42)	37.5	30 (25.5–30)
Target catch	<i>koni, para and mogro</i>	<i>kanakurda, bada kabala, medium tumbada and medium para</i>	<i>chotta kabala, chotta kokili, chotta chungdi and chotta kanakurda</i>
Mesh size (cm)	13.5	5	1.5
Filament type	Multifilament	Multifilament	Multifilament
Material	Nylon	Nylon	Nylon



TRAWL NETS

A bottom trawl net is constructed in a cone shape, and is towed (by one or two boats) along the seabed. It consists of a body, ending in a cod-end, which retains the catch. Normally, the net has two lateral

wings extending forward from the opening. The mouth of the trawl is framed by the head rope and foot rope. It is designed and rigged to catch species living on or near the ocean floor.¹



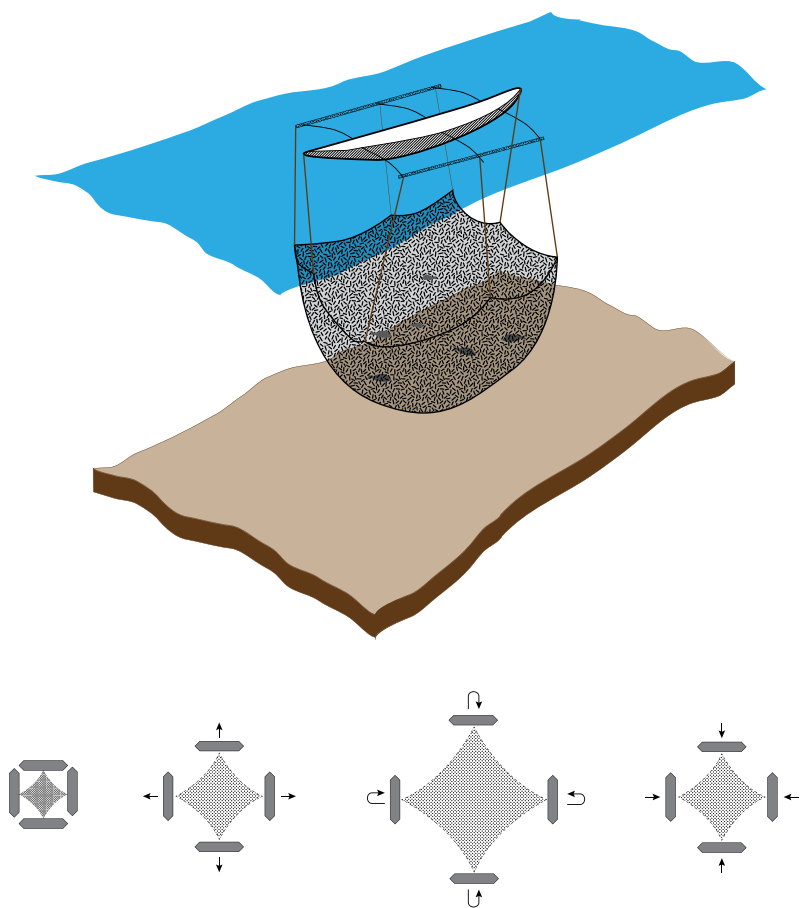
MISCELLANEOUS ESTUARINE GEARS



LIFT NETS

Lift nets are horizontal netting panels, sometimes bag-shaped (pyramid- or cone-shaped), with the opening facing upwards. These nets are submerged at a certain depth and left stationary for a period

of time before they are lifted out of the water rapidly, thereby scooping up the fish passing over it at that time.¹ This action is performed periodically at certain times of the day.



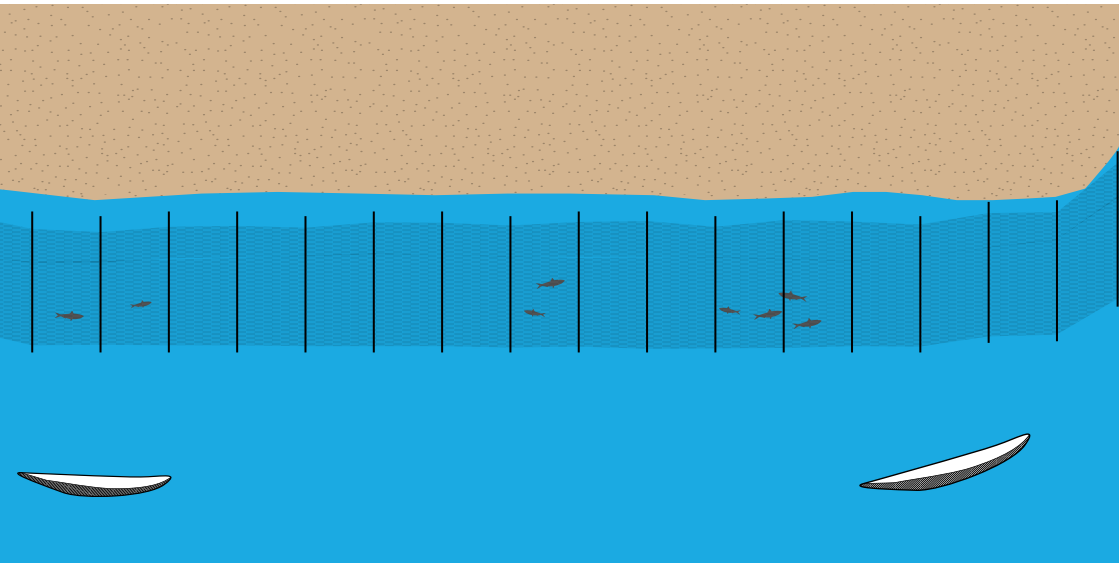
Marala jaal

The *marala jaal* is operated using four teppa/kattumaram with two fishermen in each boat. One fisherman operates the boat and the other operates the net. All four boats let down their side of the net at the same time and the net forms a bag between them. Many varieties of estuarine fish are

caught in the bag, and at the end of the operation, the four boats come together to the shore with their catch. This net is used in the early hours of the morning at about 2 or 3 am until sunrise and mainly targets *chungdi* and *khainga*. Sometimes, fishing also takes place just before dusk.



TIDAL WALL NETS



Bhet jaal

Tietze (1985)² describes a type of tidal wall net called the *malo jaal* from Puri. In Kendrapara, this type of net is locally known as the *bhet jaal*. The net is made of polyethylene fibre and is attached to bamboo sticks at intervals of 2.8 m to 4.4 m along its length and is set during low tide on flat, gradual shorelines. The gear is operated continuously for 7 or 8 days during new

moon and full moon, when tidal differences are maximum.

Fish passing over the net at high tide are trapped in the meshes during low tide and collected with the help of scoop nets. Up to ten fishermen are required to operate the net. Today, tidal wall nets are still commonly used, wherever the area is suitable.



CAST NET

The cast net is a commonly used fishing gear in all types of water bodies throughout Odisha. It is a circular net with small lead sinkers distributed along its edge. In Ganjam, it is locally known as *phinga jaal* and is made of cotton or nylon. The net is cast by hand in a

manner such that it spreads out in the water and sinks. It is then slowly hauled in by hand.

Some of the commonly caught fish using this net are *chungdi*, *surdi*, *rongua*, *kabala* and *kontia*.



HOOKS

A variety of hooks are used along the Odisha coast depending on the size of the preferred catch. Hook sizes are commonly denoted by a number on a scale of 1 to 20: 1 being the largest and 20 being the smallest for round bent-type hooks. These hooks can be used individually or in multiple numbers with a range of items used as bait. The hooks are attached to a long plastic line along with a sinker and are dropped into the water. This method of hooking can be used in estuarine areas and even at sea. Some hooks are best used on the surface of waves or breakers

at sea. This type of hook-and-line method targets smaller fishes like mullet or catfish.

Larger predatory sea fish are caught using the more intensive long line method, where a long line of high density polyethelene (HDPE) twine is laid on the surface of the water (1–2 km long) with floats, where for every 50 m interval individual hooks on shorter lines are attached with sinkers. These hooks are baited with smaller fishes such as sardines and usually target fishes such as tuna, kingfish, sharks and large rays.



SAILS, SINKERS AND FLOATS

In Ganjam district, almost all sea faring vessels also have an option of attaching a bamboo mast, which is usually 15–25 ft in length, and triangular sail cloths, which measure about 15–25 ft in height and about 10 ft at the lower angular side. These sails are used only during times of favourable winds, and since the adoption of motorised engines, are seldom used today. In most cases, sails are used on boats when they are returning to shore with their catch in order to conserve fuel.

Sinkers are an important part of all types of nets and are used to weigh them down while in operation. Sinkers are usually made

of lead or are locally prepared with cement. The number of sinkers used varies for each type of net depending on the weight of the net and its type of operation (e.g., heavier sinkers are used for bottom-set nets).

Floats are attached on the top line of nets and for long line hooks. Most floats used in Ganjam and Kendrapara are made of hollow plastic and come in various sizes. In some cases, as a means of reducing expenditure, styrofoam pieces covered with plastic sheets are used for shorter nets. The size and number of floats used vary according to size as well operation of each net.





GLOSSARY

Local names of some main targeted species

Local name	Common name	Local name	Common name
<i>bada chauli</i>	anchovy	<i>kontia</i>	catfish
<i>bahal</i>	pomfret	<i>kumiti muna</i>	squid, cuttlefish
<i>bhetki</i>	sea bass	<i>magar</i>	shark
<i>bhoroi</i>	croaker	<i>manjili</i>	grey mullet
<i>chandi</i>	pomfret	<i>marua</i>	mackerel
<i>chopda</i>	prawn	<i>mayur pankhi</i>	swordfish
<i>chungdi</i>	prawn	<i>menjiram</i>	seer fish
<i>dhala chandi</i>	Chinese pomfret	<i>mogro</i>	tuna
<i>dhala kakiti</i>	white sardine	<i>nalliborai</i>	threadfin bream
<i>disco kabala</i>	rainbow sardine	<i>nallisankara</i>	threadfin bream
<i>disco kokili</i>	rainbow sardine	<i>olta patta</i>	mangrove red snapper
<i>ghee chandi</i>	silver pomfret	<i>onogaru</i>	torpedo scad
<i>lilish</i>	Indian shad	<i>para</i>	yellowtail scad
<i>kabala</i>	Indian oil sardine	<i>rongua</i>	John's snapper
<i>kala chandi</i>	black pomfret	<i>sankucha</i>	ray
<i>kalirinda</i>	squid, cuttlefish	<i>savala</i>	ribbonfish
<i>kanakurda</i>	mackerel	<i>soola</i>	tuna
<i>kankda</i>	crab	<i>soosta</i>	John's snapper
<i>kara</i>	ponyfish	<i>soringa</i>	northern whiting
<i>khainga</i>	mullet	<i>sukha macha</i>	white sardine
<i>kokili</i>	anchovy	<i>surdi</i>	mullet
<i>konda netta</i>	anchovy	<i>telia</i>	giant catfish
<i>koni</i>	seer fish	<i>tumbada</i>	tuna

Area of operation: This refers to the aquatic zone within which the particular fishing craft is most likely to be deployed.

Assembled prefabricated mould: In this style of boat construction, the external structure of the boat is built (often with fibreglass or variants of plastic) using a standard mould.

Bar boat: This refers to a type of boat which is made by stitching together planks, but which has high sides, is hollow inside and is flat-bottomed. It is mostly deployed on open seas and surf.

Carvel style: This is a style of boat hull construction where planks are fastened edge to edge and are not overlapping, thus forming a smooth surface.

Fibre-reinforced plastic (FRP): This is a commonly used fibreglass-based polymer, which is used in boat construction.

Foot rope: The rope along the bottom edge of a fishing net is called foot rope.

Hand-fitted: This is a term used when the engine of a boat is assembled by hand using locally available engine components.

Head rope: The rope along the upper edge of a fishing net is called head rope.

High Density Poly-Ethylene (HDPE): This is a petroleum-based plastic, which is popularly used for making fishing nets. It is more commonly used nowadays due to its high strength-to-density ratio.

Mesh size: This refers to the width of an individual mesh in a fishing net. It is defined as the inside distance between opposite knots in the same mesh when fully extended diagonally.

Monofilament: A monofilament fishing net is woven from yarn composed of a single strand of plastic.

Multifilament: A multifilament fishing net is woven from multiple strands of natural or synthetic yarn.

Navigability: This refers to the average distance a fishing craft can sail. It is also a measure of the capacity of the boat.

Stitched plank type: This is a type of boat which is built using planks which are held or stitched together with coir, thread or flexible plant fibres.

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PHOTO CREDITS

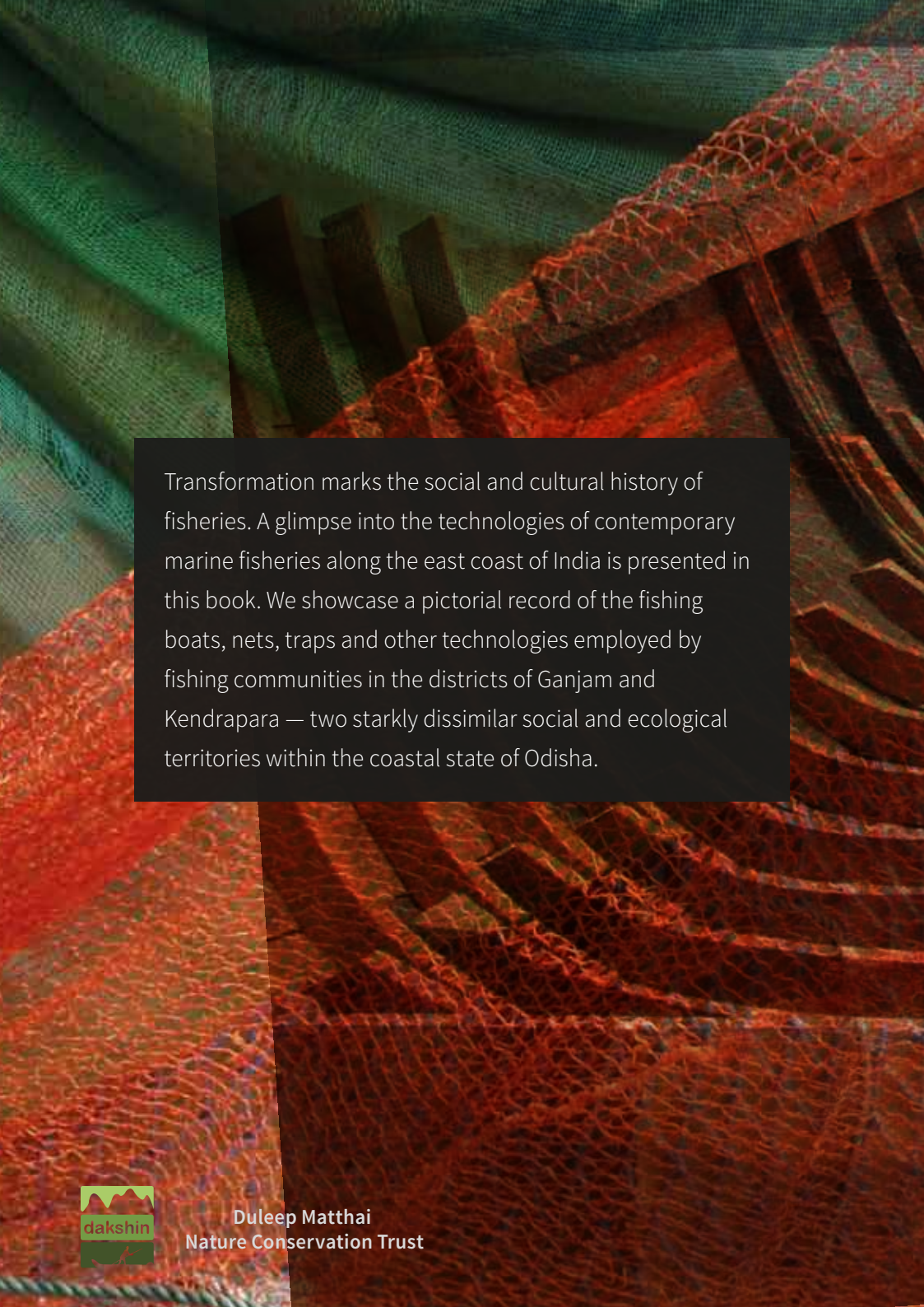
Aarthi Sridhar: Pages 17, 27 (top *l*), 45 (top), 50, 51, 52, 53, 57 (bottom), 60, 65 (*l*), 69, 79, 84 (*r*), 85 (left, top *r*)

Arundhati Jagadish: Pages 16, 18, 19, 22, 23, 26, 27 (top *r*, bottom), 28, 29, 59 (bottom), 63, 64, 65 (*r*), 66, 67, 74, 75 (bottom), 81, 85 (bottom *r*), 86 (*l*)

Maya Khosla: Page 87 (top)

M. Muralidharan: Pages 34, 35, 38, 39, 42, 43, 44, 45 (bottom), 46, 47, 48, 49, 68, 70, 71, 72, 77, 83, 84 (*l*), 85 (bottom *l*), 87 (bottom *l*)

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Transformation marks the social and cultural history of fisheries. A glimpse into the technologies of contemporary marine fisheries along the east coast of India is presented in this book. We showcase a pictorial record of the fishing boats, nets, traps and other technologies employed by fishing communities in the districts of Ganjam and Kendrapara — two starkly dissimilar social and ecological territories within the coastal state of Odisha.



Duleep Matthai
Nature Conservation Trust