



# Fishing Methods of River Cauvery (Western Ghats, India) in Altered Habitat Conditions

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## Abstract

River Cauvery is the third largest river in peninsular India. With the increasing demand of water for different social sectors, the entire river course was greatly altered due to water diversion by several dams, anicuts, and barrages. These modifications have its visible influence on the river habitat, flora and fauna - diversity, distribution, behaviour, etc. Based on the prevailing habitat conditions of the river and available fish species at various zones, fishers have modified their fishing gears to harvest the fish fauna in all the ecological niche within the river. The fishing practices followed along the river Cauvery were observed to be traditional but modified to suit the nature of fishing grounds. The present study recorded 31 different types of fishing gears including destructive fishing from river Cauvery.

**Keywords:** Cauvery, fishing, river, habitat, gear

## Introduction

River Cauvery, the third largest river in peninsular India with a length of 850 km in the states of Karnataka and Tamil Nadu completes her journey into the Bay of Bengal (BoB) at Pazhayar and Poompuhar in Tamil Nadu. Based on the nature of draining area, the river course has been classified

into three zones – mountainous (origin to Sivanasamudra), plateau (Sivanasamudra to Hogenakkal) and plains course (Hogenakkal to confluence in BoB). Each of these three zones is characterized by distinct topography and represented by a unique fish fauna (Jayaram et al., 1982; Sibinamol et al., 2019). ICAR- Central Inland Fisheries Research institute recorded 146 species (90 freshwater, 56 estuarine) of fish from the river Cauvery and the peak fishing is during the post monsoon months. The average fish yield from the river was estimated at 1.4 tonnes/km/yr during 2019-20 (Das et al., 2020). With the increasing demand of water for different social sectors, the entire river stretch was greatly engineered with several dams, anicuts and barrages. Hence, river depth and flow presently depend on the regulated discharge of water from the barricades. Based on the prevailing habitat conditions of the river and available fish species at various zones, fishers have modified their fishing gears to harvest fish fauna in different ecological hitches. To develop the most effective gear, it is also essential to have a thorough knowledge on fish behavior as well as the habitat characteristics. This in turn play a significant role in the conservation and management of fish populations. Also, sustainable riverine fisheries demands habitat-specific management practices. Extensive knowledge on different kinds of fishing gears presently being operated in a river is pre-requisite for formulation of such guidelines. In river Cauvery, Singh et al. (2003) recorded six types of fishing gears operated at various stretch of the river. Manna et al. (2011), Kamble et al. (2022) and Sudheesan et al. (2023) documented the fishing crafts of the peninsular rivers Krishna, Tapti and Mahanadi, respec-

Received 06 December 2023; Revised 15 April 2024; Accepted 16 April 2024

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tively. There are also reports on the traditional fishing methods in various regions in India (Hornell, 1938; Bhattacharjya et al., 2004; Rathakrishnan et al., 2009; Shaji & Laladhas, 2013) and specific fishing methods adopted by fishermen in different aquatic systems (Singh et al., 2003; Muthukumar et al., 2016; Raju et al., 2016; Manna et al., 2016; Manna et al., 2020; Manna et al., 2022). A record on the details of fishing gears from river Cauvery is lacking and hence the present study documents various fishing gears that are being operated in the river in prevailing habitat conditions.

## Materials and Methods

Studies were carried out at 13 selected centers (Fig. 1) on river Cauvery during 2017 to 2020 to understand the fishing practices in perspective of the prevailing habitat condition. In majority of the cases, primary information of fishing gears was gathered by directly observing the fishing gear operation at various stations and subsequent measurement of the dimensions of the gear, mesh size, etc. Secondary information was collected based on interaction with the fishers.

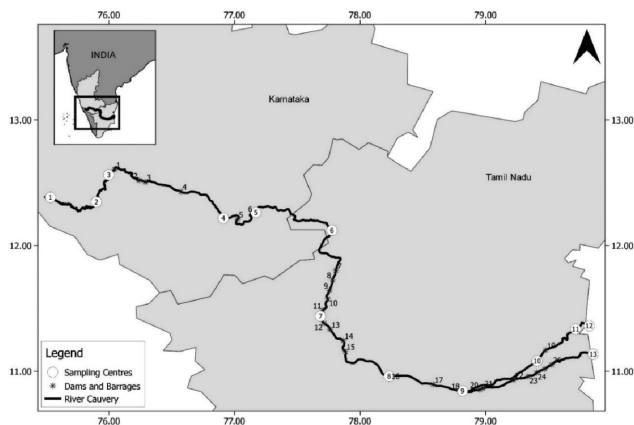


Fig. 1. GIS map depicting the sampling centres on river Cauvery (1. Bhagamandala, 2. Valnoor, 3. Kudige, 4. T. Narasipura, 5. Shivanasamudram, 6. Hogenakkal, 7. Bhavani, 8. Mayanoor, 9. Grand Anicut, 10. Lower Anicut, 11. Kollidam, 12. Pazhayar, 13. Poompohar)

## Results and Discussion

Cauvery river basin is known for inadequate water holding to meet the demand for various purposes. To meet the water demand, the river is engineered with at least 19 major barricades (marked with

Asterix, \* in Fig. 1) on the main river channel. Water release from the dams, barrages and anicuts, to a great extent controls the habitat of Cauvery river. The uppermost stretch of Cauvery river (Bhagamandala to Kudige) depicts usual hill stream habitat (narrow channel with 9.5 to 55 m river width), high canopy cover (>60%) on stream, high (>80%) riparian vegetation and higher velocity. Middle stretch of the river (Bhavani and Mayanoor) observed an average width of 315 m. The lower estuarine stretch of River Cauvery (at Kollidam, Pazhayar and Poompohar) exhibited typical run habitat.

The fishing practices followed along the river Cauvery were observed to be traditional but appropriately modified to suit the nature of the fishing grounds i.e., habitat at various zones. No fishing activity was observed at Bhagamandala stretch which is considered sacred. A 35 km stretch from Sirangala to Siddhapur bridge was declared as protected zone for conserving the mahseer population, where only licensed angling is permitted under the superintendence of the Coorg Wildlife Society. The river stretch of about 200 km from Mayanoor barrage to Kollidam remains nearly dry most of the year. However, some fishery activities were noticed at two important anicuts viz., Grand Anicut and Lower Anicut located in this stretch whenever water is released from upstream barrages, especially during the monsoon and post-monsoon months. Present study recorded 31 different types of fishing gears from 12 stations along the river (Table 1). The recorded gears are classified under 12 categories based on Von Brandt (1984) and FAO (1968 and 1987).

*Grappling and wounding gear:* In the mudflats around mangroves at the lowermost estuarine sampling station, Pazhayar, crab fishing with thin long iron rods having curved end fitted to a wooden handle called '*Sorati*' was observed (Fig. 2a). The crabs are pulled out from the crevices along the mangrove vegetation using the curved end of the rod or when the crab hold tight on the rod using its chelipeds. Similar fishing rods for catching crabs were reported from mangrove habitats like Indian Sundarbans (Hora, 1935), coastal Andhra Pradesh (Raj, 1992) and rice fields in Nagapattinam, Tamil Nadu (Rathakrishnan et al., 2009). Shrinking of the mangrove area due to inadequate freshwater discharge into the estuary and human interventions like encroachment for aquaculture, has its influence on

Table 1. Distribution of Fishing gears of river Cauvery in relation to habitat

Sl.	Fishing gear type	Local name	VLN	KDG	TNP	SSM	HGL	BVN	MYN	GAN	LAN	KLD	PZR	PMR
	<b>1. Grappling and wounding gear</b>													
1.	Curved iron rod	Sorati												
	<b>2. Stupefying devices</b>													
2.	Dynamiting	Thotta												
3.	Electrofishing	-												
	<b>3. Line fishing</b>													
4.	Without rod	Chadi gala/ Ghana												
5.	With rod	Thoondil												
6.	Eel catching	Aaral thoondil												
7.	Set multiline	Pantithoondil												
	<b>4. Fishing traps</b>													
8.	Dome shaped	Kodave												
9.	Cubical	Koondu												
10.	Cylindrical	Pari												
11.	Rectangular	Butty/Komma												
12.	Circular	Nandu Kacchha												
	<b>5. Aerial fishing trap</b>													
13.		Ottuvala												
14.		Rohu vala												
15.		Paachvalai												
	<b>6. Gill net</b>													
16.	Small mesh	Viduvala												
17.	Large mesh	Rangoonvala												
18.		Kattavala (Aaral vala)												
19.		Pint vala												
20.		Raal Valai												
	<b>7. Entangling net</b>													
21.	Trammel net	Periya/Kenda/ Pothvala												
	<b>8. Drive-in fishery</b>													
22.	Encircling net	Manibele												
23.	Tilapia Nets	Thattuvalai												
24.	Juvenile catching	Kacchhavalai												
	<b>9. Falling gear -</b>													
25.	Cover pot	Ootha												
26.	Cast net without pocket	Kalluvalai												
27.	Cast net with pocket	Manivalai												
28.	Prawn catching	Visuruvalai												
	<b>10. Scoop net</b>													
29.		-												
	<b>11. Drag net</b>													
30.		Iluvalai												
	<b>12. Bag net</b>													
31.		Kandalbale												

**Stations** VLN: Valnoor; KDG: Kudige; TNP: T Narsipura; SSM: Shivanasamudram; HGL: Hogenakkal; BVN: Bhavani; MYN: Mayanoor; GAN; LAN: L. Annaicut; KLD: Kollidam; PZR: Pazhayar; PMR: Poompohar

the declining use of this traditional fishing gear in the river Cauvery.

*Stupefying devices:* Taking advantage of the sluggish flow and low water depth of the modified riverine habitat, fishers in the upper stretch occasionally use dynamites (*Thotta*) and electric fishing, two destructive fishing methods, though prohibited, to harvest fish. Singh et al. (2003) reported dynamite fishing in the Tamil Nadu stretch of river Cauvery as a matter of concern for riverine fishery. Shajin & Laladhas (2013) and Bhattacharjya et al. (2004) reported destructive fishing using electrocution, from the neighbouring state, Kerala and in streams of Northeastern states of India, respectively.

*Line fishing:* Hook and lining or lining is a simple, inexpensive but effective fishing method in which fish are caught offering different kinds of baits. "Angling" using rods and lines for recreational fishing targeting Mahseers are being carried out at Valnoor following the catch and release model, monitored by the Coorg Wildlife Society. Hooks and lines are locally called as '*Ghana*' or '*Thoondil*'. There are both hand lines and set lines operated in various stretches of the river.

Hand lines (*Chadi gala / Ghana*) (Fig. 2b) are made of monofilament lines (0.7 -1.0 mm thick) varying from 20-90 m in length to operate single or multiple stainless-steel hooks. A lead sinker weighing 20-30 g is also be tied to the line. When multiple hooks are used, there will be three hooks on a vertical mainline. One hook at the end of the line and 2 hooks, one each on 15 cm long branch lines tied to the main line, 30 cm above the former hook. Live fish, earthworm, live crabs, frogs, eggs of *Mastacembelus armatus*, ragi balls, periphytic algae, etc. are used as bait for fishing. It is a time-consuming activity and takes about an hour to catch a fish. Handlines without fishing rod are operated in the deep pool below Hogenakkal falls, especially during summer season. Like Valnoor, proper fishing rods was also observed at Hogenakkal among hobbyists. However, a line tied to a locally available bamboo twig (*Thoondil*) was observed to be used in entire stretch of the river.

Species-specific hooks and line for catching eels, locally known as '*Aaral thoondil*' (Fig. 2c) was found to be used along the rocky bottom at Bhavani stretch of the river. The fishing rod is made of 1 m long bamboo twig and a line is tied tightly over this rod with a hook at the end. The fishing rod is held tight

and placed between rocks mainly to attract and catch the hiding *Mastacembelus armatus* using baits like earthworm or *M. armatus* eggs or idli mixed with turmeric attached to the smaller sized hooks numbering 18-20. This gear in its operation takes advantage of the regulated water release from the upstream Mettur dam that maintains a low water level ensuring bottom visibility, especially during the pre-monsoon period.

Set lines (*Panathi / Davani thoondil*) are unwatched long lines that usually have 10-12 branch lines with hooks suspended from a long thicker line, at 1 m. Set lines designed for catching *Channa* spp. at Kudige and Hogenakkal is locally called as '*Panathi thoondil*'. There are 100-150 hooks attached to the mainline with about 30 cm between hooks. Medium sized hooks numbering 12-14 are used. Kudige and Hogenakkal (above falls area) are devoid of much submerged aquatic macrophytes which allow set lines to be operated. On the other hand, densely infested T. Narasipura and Sivanasamudra stretch do not encourage operation of such set lines. Similar long set lines have been reported by Manna et al. (2020) from river Ganga.

*Fishing traps:* The present survey recorded five variants of traps in operation along the Cauvery river. Each of the trapping device was designed to suit the topography of the fishing grounds and behaviour of the available species. *Kodave* is operated at T. Narasipura stretch to catch small prawns during the monsoon season when water level is high. It is a dome-shaped trap with a mouthpiece attached to the main body that acts as a unidirectional valve. The mouthpiece is 70 cm wide horizontally and 60 cm wide vertically. The dome structure has a diameter of 50 cm at the inlet and 15 cm at the exit in rear. The whole structure is made of coconut leaf mid ribs (Fig. 2d). The trap is set along the direction of the flow and secured at the river bottom using mud. Low water depth with thick infestation of macrophytes promotes the aggregation of small prawns which is caught by the trap. Similar trap named '*Koodu*' has been reported by Shaji & Laladhas (2013) during monsoon flood-plain fishery in Thrissur, Kerala.

*Koondu* is a cuboidal trap made of bamboo strips held together using plastic lines, with an inlet and an exit made of metallic mesh. The dimension of the trap is 1.0 × 0.5 × 0.75 m and weighs around 7 kg. It is operated in macrophyte infested shallow near-shore waters in river Cauvery at Bhavani stretch



(Fig. 2e). The traps once set will be left in water for two days maintaining a minimum gap of 2 m between the traps and the catch will be taken only on the second day. After each operation the trap will be sun dried to get rid of the rotten smell. Similar cubical trap with bait used for giant river prawn fishery was reported from river Krishna by Manna et al. (2011).

*Pari* is a cylindrical trap (Fig. 2f and Fig. 2g) specifically operated targeting eel, *Anguilla bengalensis* (locally called Velangu) below the barrage at Mayanoor. Made of split-bamboo strips, the trap is fabricated in different dimensions (60 - 90 cm in height and 15-16 cm diameter). To allow entry of eels, the trap entrance is made of stitched midribs of coconut leaves to provide a unidirectional flexible conical valve. The rear or exit is closed with PVC-made circular plate (with small holes), tied to the trap with thin ropes. Fishers, from their traditional knowledge on behavior of the species, set the trap at river-bottom (near boulders) where water level is around 1.5 - 2 m. Small boulders are kept over the traps to prevent their dislocation by river flow or other means. Using this trap, *A. bengalensis* is caught in live condition without any injury. Another trap with similar name was reported by Rathakrishnan et al. (2009) from Nagapattinam district of Tamil Nadu.

*Butty/ Komma* is a V-shaped trap operated in the Kudige stretch of Cauvery river for catching

*Mastacembelus* sp, *Puntius* sp. and other small sized indigenous fishes.

A round trap popularly known as '*Nandu Katchha*', which was once in use at Pazhayar to catch crabs (locally called as *Nandu*). A bag net mount on a circular metallic ring was suspended from a float with the help of a central rope that is tied to the ring by three strings. Fish flesh tied on a rope across the ring act as bait. Raj (1992) reported similar trap from Pulicat lake and Killai backwaters. Presently, it is banned in Pazhayar as the fish catch from the region reportedly reduced due to the operation of this gear which utilizes rotten fish as bait. The foul smell from the trap probably distracted fish, as believed. Now, these traps are operated here in offshore area to catch snails (*Natha*) which have an export value. Rathakrishnan et al. (2009) described a different fish trap from Nagapattinam district, Tamil Nadu by the name '*Katchha*'.

#### Aerial fishing trap

Fish tend to jump at waterfalls or at barrages and the jumping nature of the fish against obstructions is utilized to catch them setting aerial traps. In rural Tamil Nadu, this behaviour of fish was utilized in traditional fishing method like '*Pathakattai*', where fish jump and fall on a created mud flat. Shaji & Laladhas (2013) reported '*Chaattom*' from Thrissur, Kerala, and Bhattacharya et al. (2004) reported '*Dolonga trap*' from Northeast India which use the



Fig. 2. (a) Fisher with '*Sorati*' at Pazhayar (b) Hand line without rod (Pazhayar) (c) *Aral thoondil* (Bhavani) (d) *Kodave* (T. Narasipura) (e) *Koondu* (Bhavani) (f) *Pari* – entrance (Mayanoor) (g) *Pari* – rear part (h) '*Paach Valai*', an aerial trap net ready to be deployed at Lower Anicut

same technique. Present study recorded the aerial traps locally known as *Ottuvala*, *Rohuvala* and *Paachvalai* from river Cauvery.

*Ottuvala* is used below Hogenakkal waterfalls. It is a 25 mm net placed horizontally above the water surface to catch small-sized jumping fishes like *Cirrhinus reba* (*Arinja*). Currently operation of the gear has been banned due to wanton destruction of juvenile fish.

*Rohuvala* is a larger version of *Ottuvala* (20 ft length, 6 ft depth) with mesh size of 25 mm targeting Rohu like fishes, also a prohibited gear still possessed by 2 - 3 people at Periyabani, Hogenakkal. It is operated by a group of 8-10 persons below the falls to catch the jumping fish.

'*Paachvalai*' (Fig. 2h), made of rectangular small-mesh net supported with two bamboo poles, of about 2 m length, at two opposite sides is being operated in Lower Anicut. When water is released from the barrage, the cradle-type aerial trap is lowered and placed just above the water level, to trap the fishes accumulated below the sluice gate and continuously jumping to reach barrage upstream. Earlier studies (Singh et al., 2003) reported extensive use of '*Thonguvalai*', a similar aerial trap with gunny bag, at many barrages of river Cauvery. Aerial trap operated at Prakasam barrage downstream on river Krishna, which also functions in similar manner, but to catch juveniles of prawn was reported by Manna et al. (2011).

*Gill net*: In the river Cauvery, gill nets are the most common nets observed at all the sampling stations except Valnoor. Gill nets with mesh size varying from 16-150 mm are observed in operation at different stretches of the river. Based on the purpose of the gill net or the target species, they are known by different names.

'*Bidubale*' or '*Viduvala*' is the commonly used gill net along the Cauvery river stretch. Efficiency of the net

mainly depends on the netting material. Hence, polyethylene monofilament and polyamide monofilament material are commonly in use. The thickness of the material varies from 28 - 80 No. depending on the fish species targeted. Green, blue, and white colour monofilaments are used depending on the habitat characteristics of the fishing ground to ensure lowest visibility of the gear. Usually, the nets are left unwatched after setting but in fast flowing waters, intermittent checking in every 10 minutes to half an hour interval is practiced. The length of the gill nets varies from 10-25 m and 1- 6 m in height. Two persons operate 10-15 kg net from a coracle in a zig-zag manner covering about 1 km. Plaited lines are used as head and foot ropes which ensures an evenly distributed buoyancy. There are different ways of operation of the net based on the target fish group; as bottom set, floating and free drifting gill nets to catch bottom, column and surface-dwelling fish, respectively.

*Rangoonvalai* is a gill net with mesh size greater than 300 mm and used to catch large sized *Labeo catla* and *L. rohita* weighing above 10 kg. The headropes are equipped with thermocol floats at every 3 m. Such nets are mainly operated at Hogenakkal and Bhavani stretch of the river.

*Kattavala* (*Aaral vala*) is a gill net with 28 mm mesh size specifically designed to catch *Mastacembelus armatus* at Bhavani stretch of the river. *Pint vala* are gill nets with mesh size greater than 80 mm used at Kollidam stretch. *Raal Valai* is operated in the month of October to catch prawns in the brackishwater stretch of the river at Pazhayar.

*Entangling net*: Trammel nets locally called *Periyavala*, *Kendavalai* or *Pothvala* (Fig. 3a), are operated below the Kollidam stretch, mainly in saline conditions. The mesh size of the inner panel is 50 mm and that of the outer panels is 250 mm. The meshes of outer panels are rhombic. It is made of nylon monofilament with a length of 150-200 m and a depth of 3



Fig. 3. (a) Periyavala (Kollidam) (b) Manibele (T. Narasipura) (c) Thattu vala / Udu vala (Bhavani)



m. The target species is *Mugil cephalus* and are also operated to catch large sized crabs during February-April.

*Drive-in fishery*: The encircling gill net operated at Narasipura stretch of the river is locally called as 'Manibele' (Fig. 3b). It is made of nylon multifilament and have a mesh size of 100 mm. The gear is equipped with 50-60 apple floats made of plastic and 100 sinkers of clay. Length of the net is 18 m with a height of 3 m and weighing 3 kg. It is operated only in the daytime when the water depth is 4-5 ft. Four such nets are operated by a team of four persons, encircling the macrophyte vegetation. Then, the macrophytes are disturbed to scare and drive the fishes resulting in gilling or entangling of the fish in net.

*Uduwala / Thattuwalai* (Fig. 3c is an encircling 60 mm set gill net operated in Bhavani stretch of the river on Sunny days. Hollow bamboo twig pieces are used as floats and small metallic lead pieces as sinkers. An area is encircled using the gear and the water is disturbed by 'tap / stroke' to scare the fishes so that they get trapped in the net. Besides *Oreochromis* spp, *Etroplus suratensis* is also caught by this gear. Large nets of 100 m length are also operated in the Mayanoor stretch.

In Cauvery river, when water is released, fish move against the current and get accumulated near the

pillars of barrages. Likewise, juvenile fishes were observed to congregate at the not-so-gentle slope above the steps below the Grand Anicut. To catch this fish, a group of 8-10 fishers hold a stake net, called 'Kachha valai' (Fig. 4a), at the lowermost step and around 20 fishers drive the fish juveniles into the net with their legs. Huge number of fish juveniles of minor carps like *Cirrhinus reba*, *Labeo bata* etc. are caught by this gear. This is an example for indiscriminate fishing happening due to the impoundments constructed on rivers which is highly destructive for riverine fisheries.

*Falling gear*: Cast nets locally known as 'Veesuvalai', with mesh size varying from 15-100 mm made of nylon or polyethylene monofilament lines, are found to be operated. The diameter of the cast net varies from 3-12 m and the height 2-5 m. The sinkers (*gundu*) are of iron or lead and its size varies with the size of the cast net. It will be operated by a single person for 1-2 hours a day, either from a boat or the riverbank. In the upper stretch of the river, cast nets are mostly operated in the months of June and July when the water level is high. In the middle stretch, the operation depends on the release of water from Mettur dam during June to January. In the lower stretch the gear is specifically operated to catch prawns during February-April. It is operated during day as well as night, but the catch is found to be high during evening hours.



Fig. 4 (a) 'Kachha' (Grand Anicut) (b) 'Kalluvulai' with eel catch (Bhavani) (c) 'Manivalai' (Hogenakkal) (d) 'Veechuvulai or Visuruvalai' (Mayanoor) (e) 'Ootha' (Mayanoor) (f) Scooping migrating fish juveniles below Grand Anicut barrage

*Kalluvalai* is a cast net without central line and pockets. The mesh size ranges between 18 mm and 100 mm. The height of the net is only 2.5 m and is operated in shallow running water. The net is thrown from a boat and a person wearing a goggle dive into the water to collect the fish trapped in the net. The fish are also caught gilled in this net while struggling to escape. *Mastacembelus armatus* is the major catch of *Kalluvalai* in Bhavani stretch of the river (Fig. 4b). *Kalluvalai* is also observed to be operated extensively below barrage at Mayanoor,

Lower Anicut, etc. to catch fish utilizing the flow of water released from the barrage.

*Manivalai* is a cast net with strings connected to the central line which form pockets while hauling and trap the fish (Fig. 4c). The apex of the gear has an opening held by a short ring, to tow the strings together with the central line while hauling. It is operated in stagnant or slow-moving waters. The height of the gear is more than 3m and is operated from a boat. The gear is used especially where it is

Table 2. Details of common gears in operation along the Cauvery river

Gear	Vernacular name	Time of operation	Cost of material/ gear	Number of fishers involved	Catch per operation	Major species caught
Hook and line	Ghana Aaral thoondil	Day time	Line: Rs. 50/90 m	One	0.5-2 kg/hr	<i>Wallago attu</i> , Carps <i>Mastacembelus armatus</i>
		Night (Sept.-Nov.)	(50-60 No.) Rs. 100/90 m (100 No.) Hook: Rs. 5-10/piece	Two	2-20 kg	<i>Channa</i> sp.
	Kodave	Night (Monsoon)	Rs. 400/gear	One	0.25-5 kg	Small Prawns
Trap	Koondu Pari Butty/ Komma	Night	Rs. 2000/gear Rs. 300/gear Rs. 500-600/gear	One One	5 kg 1-7 kg	<i>Oreochromis</i> spp, <i>Channa</i> spp <i>Anguilla bengalensis</i> <i>Mastacembelus</i> sp, <i>Puntius</i> sp and other small indigenous fishes 16 mm: Half and full beaks 25 mm: <i>Garra</i> spp 30 mm: <i>Mastacembelus</i> sp, <i>Mystus cavasius</i> 45-60 mm: <i>Oreochromis niloticus</i> , <i>Labeo calbasu</i> , minor carps 75-105 mm: <i>L. catla</i> , <i>L. rohita</i> , <i>Cirrhinus mrigala</i> and <i>Cyprinus carpio</i> >110 mm: >1 kg sized fish
Gill net	Bidubale	09:00-12:00 hrs. 17:30 - 06:00 hrs.	500-900/kg 1500-4000/gear	One/Two	2-10 kg	<i>Mugil cephalus</i> , <i>Elops machnata</i> , <i>Megalops cyprinoides</i> , <i>Etroplus suratensis</i> , <i>E. maculatus</i> , <i>O. niloticus</i> , <i>O. mossambicus</i> , <i>Chanos chanos</i> , <i>Sillago sihama</i> , <i>Gerres filamentosus</i> , <i>Scatophagus</i> spp, <i>Terapon</i> spp.
	Manibale	Day time	Rs. 3000	Four	10-20 kg	<i>Channa</i> spp
Trammel net	Periyavala	01:00 hrs. and 05:00 hrs.	Rs. 9000	Two	2-10 kg	<i>Mastacembelus armatus</i> Small mesh: <i>Cirrhinus reba</i> , <i>Ompok bimaculatus</i> , <i>Mystus</i> spp, <i>Oreochromis niloticus</i> and <i>O. mossambicus</i> Large mesh: <i>Wallago attu</i> , <i>Labeo catla</i> , <i>L. rohita</i> , <i>C. mrigala</i> ,
Cast net	Manivalai	Day/Night	Rs. 3000-6000	One/Two	2-4 kg	



difficult for fisher to go inside water. For example, when water is released into the side canals at Lower Anicut, juvenile fish (minor carps) accumulate below the gate and are indiscriminately caught by fishers using *Manivalai*.

A very small version of *Kalluvulai* locally called as '*Veechuvulai* or *Visuruvalai*' is observed to be in use upstream of Mayanoor barrage to catch giant river prawn '*Macrobrachium malcomsonii*' (Fig. 4d). Height of the net is 1.0 m. Mesh size of the net is 30 mm. Along the periphery, small sinkers are tightly knitted. The net is usually operated during the post monsoon season and is in use since 2019 as the giant river prawn landing increased significantly.

Cover pot, '*Ootha*' (Fig. 4e), is a conical falling gear. It is made of sticks prepared from bamboo splits which are knitted together with coir ropes. The gear has two openings- the bottom one is around 70 cm in diameter whereas the top one is around 12 cm, through which fisher inserts hand to collect the trapped fishes. The gear is used to catch medium to large sized fish. Cover pots are operated only in knee-deep water and are operated both in day and night. The gear is operated by a single person, but it will be more effective when many fishers together operate the gear in adjacent areas. It is more efficiently operated below barrage at Mayanoor at transparent knee-deep water where fish accumulate attempting to reach barrage upstream. The gear was earlier reported from Tamil Nadu by Hornell (1938), Rathakrishnan et al. (2009) and Muthukumar et al. (2016). From other parts of India also, similar cover pots have also been reported like '*Ottal*' from Thrisur, Kerala (Shaji & Laladhas, 2013), '*Odhe*' in Andhra Pradesh (Raju et al., 2016) and '*Polo / Juluki / Jolpi*' from NE states (Bhattacharjya et al., 2004).

*Scoop net*: Fish swim heavily to negotiate the high velocity of water released from a barrage that push them downwards. At the Grand Anicut, 2 ft deep rectangular concrete structures control the water flow and fish try to jump over these structures. Those fish jumping to negotiate the flow are caught by fishers operating scoop nets, held with their hands and mouth, just below the barrage. (Fig. 4f).

*Drag net*: Though prohibited, drag nets locally known as "*Iluvalai*", made of mosquito mesh which are illegal are in use in upper parts of the river Cauvery. The nets are usually operated by two persons holding the ends at two coracles. The net

filters all the fishes that comes along its way irrespective of the size or species challenging sustainability of resources.

*Bag net*: Bag nets locally known as '*Kandalbale*' are used to catch big fishes from pools infested with aquatic macrophytes, where gill nets cannot be operated. It is operated in Kudige stretch of the river during peak summer.

Details of the common gears operated along Cauvery river such as time of operation, cost of the gear, number of fishers involved in operation, catch per unit effort and the major species caught are given in Table 2.

## Conclusions

The current study provides the first comprehensive documentation of the fishing gear used throughout the entire Cauvery River, particularly in light of habitat changes due to the construction of multiple dams, weirs, and barrages. It was noted that many fishing methods typically effective in still waters are also employed successfully in the Cauvery, especially during the slow-flowing conditions of the non-monsoon period. Notably absent was the drift gill net, commonly used in running waters. Local fishers have adapted their traditional fishing gear in response to the altered behaviour of fish in these modified riverine environments. Alarming, the use of some harmful fishing practices like dynamiting has been reported in the Cauvery River, raising significant concerns for conservation efforts. It is essential that the use of various gears along the river be carefully regulated to halt destructive fishing methods, such as dynamiting, and also the deployment of certain traps and dragnets that indiscriminately capture young fish. This study can serve as a valuable resource for researchers and fishery managers to develop effective gear based conservation strategies and help them to draft policies aimed at promoting the sustainable use of the fishery resources in the river, as well as those in other rivers affected by similar habitat alterations.

## Acknowledgements

Authors are thankful to the fishers of Cauvery River for their whole-hearted co-operation during the study. Thanks are due to the Officials of Dept. of Fisheries, Govt. of Karnataka, and Govt. of Tamil Nadu for their necessary support. Technical Officers of ICAR-CIFRI like Mr. R. C. Mandi, Mr. A. Roychoudhury, Mrs. A. Sengupta, Mr. R.

Pal, and Support Staffs like Mr. D. Das, Mr. A. Prasad and Mr. M. Pennappa extended full support during the field survey and hence appreciated.

## References

- Bhattacharjya, B. K., Manna, R. K. and Choudhury, M. (2004) Fishing Crafts and Gear of North East India. Bulletin. 102: 67
- Das B. K., Manna, S. K., Pandit, A., Behera, B. K., Roy, A., DebRoy, P., Chakraborty, S. and Chatterjee, S. (2020) Annual Report. 301p, ICAR-Central Inland Fisheries Research Institute, Barrackpore, Kolkata, India
- FAO (1968) Modern fishing gear of the world, 607 p, Fishing News Books Ltd, London
- FAO (1987) FAO catalogue of small-scale fishing gear, II<sup>nd</sup> edn., 224 p, Fishing News Books Ltd, London
- Hora, S. L. (1935) Crab-fishing at Uttarbhag, Lower Bengal. Curr. Sci. 3(11): 543-546
- Hornell, J. (1938) Fishing Methods of Madras Presidency - part 2: The Malabar coast. Madras Fish. Bull. 271: 69
- Jayaram, K. C., Venkateswarlu, T. and Ragunathan, M. B. (1982) A survey of the Cauvery river system with a major account of its fish fauna. Miscellaneous publication occasional paper no. 36, 115
- Kamble, S. P., Bhakta, D., Meetei, W. A., Vaisakh G., Solanki, J. K., Koushlesh, S. K., Chanu, T. N., Behera, B. K., Suresh, V. R., Samanta, S. and Das B. K. (2022) A Comprehensive Account of Fishing Crafts and Gears of River Tapti, India. Fish. Technol. 59(3): 215 – 218
- Manna, R. K., Das, A. K., Rao, D. S. K., Karthikeyan, M. and Singh, D. N. (2011) Fishing crafts and gear in river Krishna, IJTK 10 (3): 491-497
- Manna, R. K., Sarkar, S. D., Das, S. K., Roshith, C. M., Bose, A. K., Raychaudhuri A. and Sharma, A. P. (2016) Improved crab trap as attachment of bag net: a novel fishing practice in lower Ganges. J. Indian Soc. Coastal Agri. Res. 34(1): 131-138
- Manna, R. K., Ray, A., Samanta, P., Aprajita-Bhowmik, T. S., Baitha, R., Paul, S. K., Behera, S. K. and Das, B. K. (2020) Bait specificity in Hook and line fishery of River Ganga and associated conservation issues. IJTK 19(1): 61-72
- Manna, R. K., Sibina Mol, S., Vijaykumar, M. E., Kumar, L., Roshith, C. M., Sharma, S. K., Suresh, V. R.; Samanta, S. and Das, B. K. (2022) Fish attractants used in deep pool at Hogenakkalfalls of River Cauvery, India. Fish. Technol. 59(3): 219-223
- Muthukumar, S., Sundaramoorthy, B., Ravikumar, T. and Neethiselvan, N. (2016) *Ootha*: a traditional fishing pot of inland waters of Tamil Nadu. J. Exp. Zool. India 19(1): 615-618
- Raj, M. M. (1992) A review of the mud crab fishery on the east coast of India and in Kerala state. In: A report on the seminar convened in Surat Thani, Thailand, November 5-8, 1991. Angell (ed.). BOBP/REP/51. Bay of Bengal Programme, Madras, India, 103-125
- Raju, C. S., Rao, J. C. S., Rao, K. G. and Simhachalam, G. (2016) Fishing methods, use of indigenous knowledge and traditional practices in fisheries management of Lake Kolleru. J. Entomol. Zool. 4(5): 37-44
- Rathakrishnan, T., Ramasubramanian, M., Anandaraja, N., Suganthi, N. and Anitha, S. (2009) Traditional fishing practices followed by fisher folks of Tamil Nadu. IJTK 8(4): 543-547
- Shaji, C. P. and Laladhas, K. P. (2013) Monsoon flood plain fishery and traditional fishing methods in Thrissur district, Kerala. IJTK 12(1): 102-108
- Sibinamol, S., Jaiswar, A. K., Panikkar, P., Behera, B. K., Sanath Kumar, H., Roshith, C. M., Vijaykumar, M. E., Sharma, S. K., Manna, R. K. and Das, B. K. (2019). Length-weight relationship and relative condition factor of five *Labeo* spp. from river Cauvery in India. Indian J. Fish., 66(2): 115-119
- Singh, D. N., Murugesan, V. K., Das, A. K., Krishna Rao, D. S., Palaniswamy, R. and Manoharan, S. (2003) River Cauvery – environment and fishery. Bulletin No. 119, 28p, Central Inland Fisheries Research Institute, Barrackpore, Kolkata
- Sudheesan, D., Sajina, A. M., Samanta, S., Paul, S. K., Nag, S. K., Baitha, R. and Bhowmick, S. (2023) Fishing crafts and gears used along selected stretch of River Mahanadi. Fish. Technol. 60(3): 173-180
- Von Brandt A. (1984) Fish catching methods of the world, 418p, Fishing News Books Ltd, London