

# **STUDIES ON THE TRADITIONAL FISHING METHODS OF INLAND WATERS OF TAMIL NADU**

*Thesis submitted in part fulfillment of the requirements for the Degree  
of **Master of Fisheries Engineering and Technology**  
to the Tamil Nadu Fisheries University, Nagapattinam*

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## CERTIFICATE

This is to certify that the thesis entitled, "**Studies on the traditional fishing methods of inland waters of Tamil Nadu**" submitted in part fulfillment of the requirements for the degree of **Master of Fisheries Science** in Fisheries Engineering and Technology to the Tamil Nadu Fisheries University, Nagapattinam is a record of bonafide research work carried out by **Mr.S.MUTHUKUMAR, MFT 1322** under my supervision and guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship or similar titles or prizes and that part of thesis has been published in peer reviewed journal(s) and copy / copies appended.


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*Dedicated to My lovable  
Parents,  
Sister and Guide*

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# *Abstract*

## ABSTRACT

The present study was conducted to document various traditional fishing

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methods and gears employed to capture inland fish species in freshwater systems of Tamil Nadu. Sixteen different fishing methods and fishing gears have been reported from Thirunelveli, Madurai, Theni, Dindigul, Coimbatore, Tiruchirappalli, Erode, Dharmapuri, Krishnagiri, Nagapattinam, Pudukottai, Thanjavur, Thiruvarur, Vellore, Cuddalore, Kanchipuram and Tiruvannamalai districts of Tamil Nadu. The reported gears were categorized under different groups of fishing gears such as traps, baskets, aggregating devices, dragged gear and barriers. Under the traps, *Tholugu Pari*, *Iruvaai Pari*, *Ayirai Koodu*, *Paanai Pari*, *Kottu Pari*, *Vilaangu Koodu*, *Yantha Pari*, *Thappai Pari* and *Moongil Pari* were recorded. The basket type fishing gears such as *Ootha* and *Katcha* were reported in many districts. Fish aggregating devices such as

*Aaralkaththai* and *Kattu Fishing* were found in some districts. *Shar Fishing* is a type of fish barrier reported from Thanjavur and Thiruvarur districts. *Ayirai Valai* and *Kachaal Fishing* were reported in different districts of Tamil Nadu.

The traditional gears reported under this study were documented for their distribution, construction, operation, catch composition, seasons of operation and cost. Most of the traditional gears reported in Tamil Nadu were found to be constructed with locally available natural plant materials such as coconut leaflet sticks, split bamboo, *Poolan* sticks etc. These traditional gears of inland waters of Tamil Nadu are operated in the shallow waters of rivers, canals, channels, lakes, ponds and tanks and operation was found to be seasonal in nature. The CPUE, scope for upgradation and optimization of inland fishing gears were studied.

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## 1. INTRODUCTION

Fisheries is an important occupation practiced by many people over several years throughout the world. It is one of the important sources of livelihoods for many developing and developed nations, particularly for low-income families in rural areas, where job options are limited. The fisheries sector provides vital and unique nutritional benefits such as protein, vitamins, minerals and micro-nutrients apart from employment opportunities to millions of people. When it comes to the economical side, fisheries have significant contribution towards the Gross Domestic Production (GDP) and it earns a lot of foreign money through export.

The global fishery production reached 158 million tonnes, of which 104.4 million tonnes from marine waters and 53.5 million tonnes from Inland waters. As far as marine capture fisheries is concern, it is observed that the production has collectively decreased from 93.7 million tonnes in 2011 to 91.3 million tonnes in 2012 mainly due to over fishing (Anon, 2014).

Fisheries is a growing sector in India. It provides livelihood for over 14 million people and contributes Rs.30, 213 crore through export (Anon, 2014). India is bestowed with vast marine and inland fishery resources amenable for capture fisheries and aquaculture. While the marine waters used mainly for capture fisheries resources and the inland water bodies widely used both for culture and capture fisheries. India is one of the prominent fish producing country which ranks 6<sup>th</sup> in marine and 2<sup>nd</sup> in Inland fish production (Anon, 2014).

Presently, India is the second largest in inland fish producing nation next to China, contributing about 5.4% of the global fish production.

Fisheries sector contributes for about 1 percent to the overall GDP and 4.6% of the agricultural GDP (2012-13). The total fish production during 2012-13 (provisional) is at 9.04 million tonnes (MT) with a contribution of 3.32 MT from marine sector and 5.72 MT from inland sector. The historical scenario of Indian fisheries reveals a paradigm shift from marine dominated fisheries to a scenario where inland fisheries have emerged as a major contributor to the overall fish production in the country. Inland fisheries presently have a share of 63.3% in total fish production of the country (Anon, 2014).

Inland fish production in the country has recorded a remarkable increase during the last few decades. India's inland fish and fisheries resources are diverse and are abundant, include rivers (29,000 km), canals and streams (1,42,000 km), lakes (0.72 million ha), reservoirs (3.152 million ha), ponds and tanks (2.85 million ha), flood plain wetlands (202,213 ha), swamps and derelict waters (53,471 ha), upland lakes (720,000 ha), brackish water (2.7 million ha), estuaries (300,000 ha), back waters (48,000 ha), lagoons (140,000 ha), wetlands (Bheries) (42,600 ha) and mangroves (356,000 ha). These resources offer immense scope and potential for development of aquaculture and fisheries in India. The major contributing states to the inland fisheries of India are Andhra Pradesh, West Bengal, Uttar Pradesh, Bihar, Odisha, Chattisgarh, Assam, Karnataka, Tamil Nadu and Kerala (Anon, 2014).

Among those Tamil Nadu is one of the leading states in India showing a steady increase in the fish production and optimum utilization of resources. It is a unique state having Bay of Bengal on the East, flanked by Indian Ocean and Arabian Sea on the South and West, with 1.9 lakh sq. km of Exclusive Economic Zone (EEZ), a continental shelf of 41,412 sq.km, coastline of 1,076 km and livelihood for 9.24 lakh fisher population living in 608 fishing villages from the 13 coastal districts. Tamil Nadu marine fishery contributes 12.62% of the country's marine fish production.

Tamil Nadu is endowed with 3.83 lakh ha of effective water spread area, in which 69% of the water spread comprises of long seasonal/short seasonal irrigation water resources. The inland fisher population is about 2.26 lakh. The inland waters includes reservoirs (52,055 ha), long seasonal irrigation tanks (92,304 ha), short seasonal tanks (1, 63,486 ha), brackish water and swamps (56,000 ha) and others (9,851 ha). It is ranked fifth in marine and ninth in inland fish production (2013-14) in India. Fish production of this state during the year 2013-2014 was 6.23 lakh tonnes with a marine production of 4.32 lakh tonnes and 1.91 lakh tonnes of inland production. Marine fish production contributes 69.67%, while inland production contributes only 30.32 %.( Anon 2015). The major contributing fish species to the inland fish productions are Indian Major Carps, for about millions of people depending on the inland waters for their livelihood.(Anon,2014). The fishermen of this state uses traditional trap to modern fishing trawl and craft from simple catamaran to advanced trawler for exploitation of fish and fishery resources in marine waters. However, the fishery

resource of inland water is still mostly exploited by traditional or artisanal fishing crafts such as inflated rubber tube, coracle catamaran etc. and as per the fishing gears are concern trap, pot, hand line etc.

Traditional fishing gear is a device which could be defined as the fishing gear passed down from predecessors to present generation. These gears have their significance because they inherit the traditional knowledge of the community and the livelihood practices they play enhancing our understanding on their cultural heritage Samajdar and Saikia (2014). India is the second largest producer of inland fish in the world and the aquatic resources are harvested from different water bodies using a variety of fishing gears. But the information available on the existing gears and methods is incomplete, as many of them have only a brief description on the fishing methods as data are available only on the qualitative and quantitative aspects of fish landings. The role of traditional fishing gears in the inland water fisheries is inevitable and which contributes to a notable level but the studies on these traditional fishing gears are very few and many are in the stage of vanishing from the field. Therefore, the present study was aimed to document these gears to upgrade and optimize for better exploitation in the inland waters of Tamil Nadu.

The study was undertaken with the following objectives.

**Objectives of the study**

- 1) To study the existing traditional fishing methods of inland waters of Tamil Nadu.
- 2) To study the scope for upgradation of traditional fishing gears of inland waters of Tamil Nadu.
- 3) To study the scope for optimization of traditional fishing gears of inland waters of Tamil Nadu.

## **2. REVIEW OF LITERATURE**

The inland aquatic resources of the country are vast and scattered in nature. Though the fishery resources are exploited continuously from both marine and inland waters of the country, due to the absence of scientific information on the existing traditional methods of fishing the yield remains very poor. The fishery resources of the inland waters are still exploited by traditional fishing gears and crafts. A variety of traditional fishing gears have been developed over the centuries with reference to the species, fishing ground, weather, currents, and other hydro-biological conditions and local availability of materials and skills. With the advent of new fishing techniques, many of the traditional gears have become non-remunerative and hence they are being phased out (George, 1991). In this chapter the various research works carried out pertaining to the traditional fishing methods and gears in different parts of the world are reviewed.

### **2.1 Traditional fishing methods in world waters**

A brief account on traditional fishing methods and gears in Panay islands, Philippines were documented by Kawamura and Bagarinao (1980). They have recorded various traditional fishing methods and gears such as collection by hands and feet, collection with small improvised tools, diving, wounding gears, stupefying devices, ichthyotoxic plants, lines, hand lines, pole and lines, troll line, jigs, traps, baskets, bag nets, scoop nets, dragged gear, seine net, surrounding nets, lift nets and gill nets.

Neuwinger (2004) has reported the plants used for poison fishing in tropical Africa. There were 325 fish-poisoning plants, spread among 71 plant families with 183 genera reported to found in Africa. The plants species such as *Tephrosiavogelii*, *Munduleasericea*, *Euphorbiatirucalli*, *Gnidiakraussiana*, *Adenialobat*, *Balanitesaegyptiaca*, *Swartziamadagascariensis*, *Neorataneniamitis*, *Tetrapleuratetraptera* and *Strychnos aculeate* have been used widely as fish poison.

Coll et al (2004) have studied the spear fishing in the Balearic Islands of west central Mediterranean. A brief account on diversity of selective and non-selective fishing gears and their impact on inland fisheries in Bangladesh was given by Kibria and Ahmed (2005). Al-Baz et al (2007) have reported on the fishing selectivity of *hadrah* (fixed stake trap) in the Coastal waters of Kuwait.

Kingdom and Kwen (2009) have surveyed the fishing gears and methods in the Lower Taylor Creek Area, Bayelsa State, Nigeria. The results showed that the commonest gear used in the area include traps (60%), hook and line/long line (60%) and drift/gill nets (47.8%). Ibrahim et al (2009) reported a survey of the artisanal fisheries of Kontagora reservoir, Niger state, Nigeria.

A brief account on check list and assessment of efficiency of some traditional gears and crafts used on river Benuae given by Obande et al (2010). They observed that the fishing gears such as scoop net, doubled chambered cane trap, woven trap, and Malian trap and also the crafts such as planked canoe, dugout canoe and calabash in the study area.

The detailed account on various fresh water fishing gears of the North West Bangladesh was given by Hassan et al (2012). They have documented 70 different kinds of fishing gears categorized into 13 major groups, such as gill net, seine, bag, drag net, cast net, lift net, scoop net, clap net, FADs, trap, spear, hook and lines etc.

A report on fish diversity and traditional fishing methods in Semi-arid irrigated system in the Bajo Vinalopo region, south eastern Spain was given by Belda et al (2013). Fishing gears of the Meghna River Estuary of Chandpur, Region, Bangladesh have been documented by Siddiq et al (2013). They have recorded 5 gill nets, 2 seine, 1 fixed purse, 1 cast net, 1 dip net, 1 lift net, 2 dragnet, 6 traps, 7 hook and lines and 3 wounding gears.

Kembarawati et al (2014) have reported the catch and selectivity of several traditional fishing gears of Katingan of Indonesia. It was found that 13 traditional fishing gears such as *Rengge, Banjur, Rawai, Kabam, Rempa, Salambau, Pangilar, Jala, Pisi, Tampirai, Buwu, Hempeng, and Beje* were found used by the fishermen in BaunBango Village. Fishing gear productivity can be measured by the total number of fish catches per trip. Based on the data analyses, *Salambau, Pangilar, Hempeng and Beje* have been considered as the gears which have high productivity since they were able to produce 150-240kg/trip, while other fishing gears only produced approximately 20-70 kg/trip. Fishing gears such as *Salambau, Rempa and Pangilar* were considered as the low selectivity fishing gears since the selectivity score of mean value were 2, 14-3, and 90. Thus, it indicates that the above fishing gears, namely *Salambau,*

*Rempa and Pangilar* are to be watched out, given more attention, and regulated to use them as eco-friendly fishing gears.

Asia et al (2014) have reported the traditional fishing gears and fishing methods of Ilocos Norte, Philippines. They recorded 48 fishing gears which could be classified into 4 categories. The traditional gears such as hand instruments, trap, lines, and nets. Azam et al (2014) have reported the fishing gears and crafts commonly used at Hatiya Islands, a coastal region of Bangladesh. Arana (2014) studied about the ancient fishing activities developed in Easter Island.

## **2.2 Traditional fishing methods in Indian waters**

Few studies have been carried out with respect to inland fishing gears and methods in Indian waters. Wilson (1920), Hornell (1924), Hornell (1925), Hornell (1938), Hora (1926), Job and Pantulu (1958), Saxena (1964) and Sehgal (1971). The studies included the description of fishing gears operated in various riverine and lake systems, classification of fishing gears and their fish catching efficiency in both inland and backwater system. George (1971) described the inland fishing gears and methods of India. He had recorded the technical characteristics of various inland fishing gears such as line fishing, traps, aerial traps, bag nets with fixed mouth, surrounding nets, falling nets gill nets, purse net etc. Operated in various inland water system. Fishing gears of the upper and the middle Hooghly estuary has been studied by Mitra et al (1987). In India most of the works have been reported from tribal dominated areas, (Samajdar and Saikia ,2014).

The plants used by the Hill Miri tribe of Arunachal Pradesh in ethnofisheries have been studied by Tag et al (2005). They have recorded 21

plants significant for ethnofisheries, of which 12 plants were used as ethnotoxic (Fish Poison) and rest of the 9 species were used in different ethnofisheries techniques. Remesan (2006), studied about the inland fishing gears of North Kerala. Remesan and Ramachandran (2008) have reported the fish traps in inland waters of north Kerala. Dutta and Bhattacharjya (2008) have studied the indigenous community fishing practices of Tirap district of Arunachal Pradesh.

The traditional fishing practices followed by the fisher folk of Tamil Nadu have been studied by Rathakrishnan et al (2009). They have recorded ancient fishing gears and crafts such as *pari*, *katcha*, *ootha*, *soratai*, *catamaran* and *karaivalai* in different parts of Tamil Nadu. They also insisted the sustainability of these traditional fishing practices is extremely important to protect the naturally occurring resources along the coastal areas such as coral, mangrove, wetland and sea grass bed habitats.

The traditional fishing method of Assam for capturing catfishes using duck meat as an attractant have been reported by Dutta and Bhattacharjya (2009). In this practice, small cat fishes (*Mystus.sp*) are caught in marginal areas of the river using raw meat of domestic duck as an attractant.

An account of various fishing methods in the rivers of north east India has been studied by Gurumayum and Choudhury (2009). They have recorded the existing fishing methods such as hooks and line, maze/barricade, encircling gear, entangling gear, impaling gear, scooping gear, groping, impoundment, indigenous trap and noose fishing in various Hill streams of North east India.

An account on traditional fishing methods in rivers and streams of Mizoram, north-east India has been given by Lalthanzara and Lalthanpuui (2009). They have recorded the fishing methods such as *assangha-tlang-vuak* (community herbal fishing), *Ngawidawh* (arial trap), *Bawngdawh* (maze/ barricade), *Len den* (cast net), *Hawlhrawk* (poking net), *Lungtuk* (hammering), *Lungbuk* (stone pilling), *Lensuah* (scooping), *Luithliar/ thliarleh* (water diversion), *Suardan* (temporary water blockage), *Lui hung* (pool fencing), *Chawnzial* (cave fencing), *Bel chiah* (pot immersion), *Tuithehkang* (water bailing), *Lui tea sangha lut lo dan* (intercept process), *Lenkhangzar* (entangling gear), *nghakuaichiah* (fishing rod / hooks) and *Sangha chum* (spear/ harpoon). They have also opined that the selection of fishing methods and gear are influenced by various factors such as physiography of the water body, nature of fish stock, characteristics of the materials from which fishing gears are fabricated and standard of living. Therefore, variation in application of gears can be observed in different rivers, which have characteristic of their own due to unique nature of the water resources of the region. The existing fishing methods being followed in inland water bodies should be modified and improved, as new eco-friendly fishing methods. Anthropogenic activities should be regulated in order to conserve the fish diversity in the rivers and streams.

Kalita et al (2010) have reported the indigenous technical knowledge for fish harvesting in Karbi-Anglong district of Assam. Adikant et al (2011) have documented various traditional fishing techniques of tribes in Bastar region of Chattisgarh. They have recorded different types of fishing nets, fishing gears,

bamboo frames etc. which are commonly used in running as well as stagnant inland waters. These gears are locally known as *Jali, Gari, Pelna, Thapa, Bisar, Dandar* and *Sodiya*.

The indigenous fishing gears in Suraha Lake, Ballia, Uttar Pradesh, India have been documented by Srivastava and Srivastava (2011). They have recorded gillnet and cast net as the main gears and reported the contribution of the catches more than 80% by these two gears. The authors also suggested the management measures for the improvement and sustainable fishery of Suraha Lake. They stressed that awareness campaigns need be organized by the Government and local NGOs on proper scientific fishing methods for all stakeholders, for the conservation and protection of fish diversity. Further they also stressed that killing brooders should be banned and nets with less than 2 cm meshes should be strictly banned in this lake to conserve the Indian major carps.

Manna et al (2011) have studied the fishing crafts and gear in river Krishna. They have recorded gillnet, cast net, push net (triangular), scoop net, ring net, hook and line, lantern net (light trap), box trap and cradle trap in the Krishna riverine system. They have reported that traditional fabrication materials are still prevalent in this area for fabrication of both gears and crafts. Diversity was observed in gears to exploit fishes despite the dominance of gill nets. Further, invariably all the crafts and gears indicated the creativity of the fishermen, as evidenced through their knowledge on appropriate colour of the net, desirable gear materials for the capture of different types of fishes.

Shaji and Laladhas (2013) have described monsoon flood plan fishery and traditional fishing methods in Thrissur district, Kerala. They have recorded the fishing gears locally called as *Adichil*, *Chaattom*, *Nathoodu* and *ootal*. In Kerala “*ootal*” (Ootha type of gear) was found to use extensively to fish during the onset of monsoon. They have also reported that the monofilaments gill nets had replaced the traditional traps in many places studied. The fishers had found shifted to gill net and cast nets instead of traditional traps like *Koodu*, *Chaattom*, etc. The gill nets of varying mesh sizes (10-50mm) were found used indiscriminately during the monsoon fishing season sweeping apparently almost all macro-aquatic organisms irrespective of size, species etc. Dead snakes, swamp eel, frogs and water birds by were found to be sighted creatures in the paddy fields where *Ootal* fishing is intense. A conspicuous reason for the option of gill net was that the fabrication of the even the simplest traditional trap is time consuming and requires considerable monetary input.

Barman et al (2013) reported the indigenous techniques of catching the mud eel (*Monopterus albus*) in Goalpara district, Assam. They have recorded different wounding gears (spear, knives and sickle), ichthyotoxic plants (*Derris elliptica* –Wall), hand lines, bunding and digging, light fishing and traps in the study area. Catching eel required traditional experiences on habitats, high skill on fishing and artisanal craftsmanship for making the gear. Although the techniques they employ for fishing needs further investigation and proper validation, it is imperative to record the information that has passed on from their ancestors and might disappear in course of time.

The indigenous fishing devices of Tripura have been studied by Upadhyay and Singh (2013). They have recorded three types of fishing devices like hooks, spears and traps. Both selective and non-selective type of fishing gears were being used by the fishermen of the study area. The fishing devices like spears, hook and traps are specifically designed to catch a particular type of fish species. A spear *Gathynna/Guthia* was used to mainly locate *Monopterusuchia* (eel) in swampy areas and hook *BoalBarshi* used to catch riverine fish *Boal (Wallago attu)*. Another type of gear called *GuchaBarshi*, used to catch snake fish *Monopterusuchia*. The authors were also observed that the indiscriminate fishing, fishing in the breeding season, poisoning and fishing with gill nets in the study area.

The traditional fish trapping devices and methods in the Brahmaputra valley of Assam have been studied by Baruah et al (2013). They have reported that 28 different types of traps, classified under 5 major categories based on the principle of capture, design and operational methods. The shape of the traps varied widely from conical, cylindrical, and pyramidal to rectangular shaped mostly and were found made of fine screen work with slender splits of bamboo. A wide number of traditional fishing gears and methods for harvesting the fishery resources have been developed by the fishers in the state of Assam. Traps are unique of their own as these are indigenously designed and fabricated by the traditional fishermen themselves, taking into consideration, the area, location and behavior of the fishes. Majority of the traps have been made up of bamboo

stripes and were found widely used in throughout the state in the rivers, *beels* and other wetlands.

Prasad et al (2013) have reported the indigenous traditional fishing methods of Faizabad district of eastern Uttar Pradesh, India. They have recorded ancient traditional fishing devices like *Taap, Gaanj, Parha, Gadia, Dugla and Pachki, Sarhas, Fhekuajal, Fasla* in the study area. These fishing methods have been used in sustainable way of harvesting inland fisheries resources without causing any damage to the aquatic environment. The authors also opined that operation of traditional fishing devices could be helpful in promoting the sustainable exploitation of fishery resources to conserve or minimize the collapse of inland water fish stock. Traditional fishing practices of Eastern Uttar Pradesh have been reported to be extremely important as they are providing livelihood for a large section of fishing communities.

The traditional fishing crafts and gears used by the Nicobari tribes in Car Nicobar have been studied by Ahmed et al (2013). They have recorded dugout canoe, spears, hook and line, trolling line, bow and arrow. Also they formed that indigenous technical knowledge plays an important role in every tribal culture, which has a set of ideas for defining issues for their betterment. Their knowledge of fishing methods, vessels, design, propulsion and processing has been effectively used to overcome specific localized problems and to enable the use of local resources in sustainable way.

Devi et al (2013) have studied the traditional fishing methods in central valley region of Manipur, India. This state has been reported to have rich and

diverse fish fauna, concentrated in major rivers, reservoirs, natural lakes, etc, and fishing gears such as lift net, dip net, gill net, long line, encircling net, drag net, scoop net, plunge cover-basket, spear, pole line, bamboo basket, tubular trap and conical trap. Fishermen of the central valley use wide array of fishing methods to catch fishes, for their livelihood and nutritional security. The authors opined that the present fishing practices do not pose any destruction to natural biodiversity.

Dutta and Dutta (2013) have documented the *Bheta* fishing- a traditional community fishing practice of Nocte tribe of Tirap district, Arunachal Pradesh. In this practice, fishes are caught in the lower reaches by obstructing water flow of the stream. Fishes in their attempt to overcome this obstruction ultimately got trapped. The migratory behavior of cyprinids has been effectively utilized by the local fisher folks in *Bheta* fishing for catching those using locally available materials and little drudgery. *Bheta* fishing practiced by *Nocte* tribe of Tirap district based on the indigenous knowledge systems passed on from generation was found to be very efficient in catching fishes from the hill stream. It was unfortunate to observe that in some portions of the streams, fisher folks started using short-cut methods like dynamiting, agriculture pesticides, chemicals etc, for catching fishes. These fishing practice were found to causes a great threat to the fish diversity and the ecology of the stream as they kill both target and non-target species along with their eggs and young ones. These destructive fishing practices should be strongly discouraged and eco-friendly indigenous fishing

practices like *Bheta* fishing should be promoted in order to ensure sustainable utilization of the fishery resources of these hill streams.

A brief account of traditional fish aggregating wisdom of Manipur, northeastern India, has been dealt by Devi et al (2013). Five aggregating methods of fishing viz, *phoomnamba*, *Phoomadothumba*, mass of weeds, macrophytes and *Kao* in lake, low lying areas and in the rivers have been reported. FAD in the study area ranged from device operated by individual (*Kao*) to device operated by group of fisherman (*phoomnamba*). Study revealed that the surveyed community had been well acquainted with habit, habitat, feeding, and breeding behavior of the fishes. Among the reported categories *phoom* fishing was exclusive and unique practice to the Loktak Lake. *Phoomadothumba* was perfectly used to capture the air breathing fishes by taking the advantages of their air breathing nature. The mass of aquatic weeds used to capture grass carp as it mainly feed on aquatic macrophytes. Fishermen were found to use the benefits of its feeding behavior and use the bunches of aquatic weeds in the water.

Sinha and Sinha (2013) have studied the diversity of selective and non-selective fishing gears and their impact on Ganga fishery in Bihar. They have recorded 28 different kinds of commonly used gears, lines and nets in the lower middle stretch of the Ganga. Islam et al (2013) have reported the fish diversity and fishing gears used in the Kulsi river of Assam, India.

Lekshmi et al (2013) has studied the *Agaralaa* traditional fishing boat of Karnataka. *Agaralaa* boat or coracle is a traditional fishing boat used for

estuarine and riverine fishing in Karnataka. The traditional boats were found to ensure sustainable fishing using eco-friendly fishing methods. The main objective of the study was to explore the nature of crafts, the unique design of the crafts used and type of fishes caught. Fishing in *Agaralaa* was found to provide good source of income to the fishermen using these simple, traditional environment friendly and cost effective crafts which made sustainable use of the scarce fishery resources.

A preliminary study on fishing crafts and gears in Dhaura Reservoir, Uttarakhand, India, was done by Varun and Kamad (2013). They have recorded wooden boat as the fishing commonly used craft while the commonly used fishing gears used gill nets, cast nets, scoop nets and hook and lines. Saha and Nath (2013) reported the Indigenous Technical Knowledge (ITK) of fish farmers at Dhalai district of Tripura, NE India. Talwar et al (2013) reported the catching efficiency of artisanal estuarine winter migratory bag net operated along Hooghly – Matlah Estuary, West Bengal, India.

Samajdar and Saikia (2014) have reported the traditional fishing gears of Birbhum district, of West Bengal, India. They have recorded a total of 23 indigenous fishing gears from the district, of which a total of 9 gears were made of bamboo, 2 hooks were made of metal, 6 gears made up of bamboo and nylon webbing together and 3 exclusively made of nylon as well as mosquito net.

Pijush et al (2014) have reported the crafts and gears operated in brackish water fed canal for harvesting fishes in different seasons to maintain livelihood of the fishermen communities. They have recorded different types of gear and

crafts used for capturing fishes are *Dinghi*, *Vala*, cast net, gill net, scoop net (without handle), hook and lines, fixed net, *suti net*, *Been Jal* and *Ber Jal*.

A brief account on fishing crafts and gears of Bhopal district, Madhyapradesh, India, has been given by Chourey et al (2014). They have recorded different types of fishing nets including gill net, drag net, cast net, scoop net, hook and lines. Laxmappa and Bakshi (2014) reported the types of fishing gears being operated Mahabubnagar district along of Krishna River fishery and its impact on the reverine fishery. They have reported that small mesh size of fishing gears like seine net used for catching of all sizes of fish affected the reverine fishery. The use of these kind of fishing gears were also responsible for the sharp decline of the economically important Indian major carps in Krishna river. A brief account on traditional fishing gear used by the fisher folk of chatla flood plain area, Barak Valley, Assam was given by Purkayastha and Gupta (2014).

### **3. MATERIALS AND METHODS**

#### **3.1 Description of the study area**

Tamil Nadu, the southernmost state of the Indian peninsula is spread over 1, 30,058 Sq. Km. It lies between 13.0900° N, 80.2700° E and accounts for about 4 per cent of the total area of the country. The topography of Tamil Nadu broadly consists of the coastal plains in the east; uplands and hills as one proceeds westwards; the plains account for more than half the area of the state. Tamil Nadu has number of rivers that are relatively small and not perennial. Barring the hills, the climate of Tamil Nadu can be classified as semi-arid tropic monsoon. Tamil Nadu has number of seasonal rivers; the, surface water resources are almost fully harnessed by impounding the available water in 61 major reservoirs and also in 39,202 big and small tanks.

The study was conducted from August 2014 to June 2015 at Tirunelveli (8.7319° N, 77.7003° E), Kanyakumari (8.0780° N, 77.5410° E), Thoothukudi (8.8100° N, 78.1400° E), Madurai (9.8333° N, 77.8333° E), Theni (10.0090° N, 77.4700° E), Dindigul (10.3540° N, 77.9850° E), Salem (11.6646° N, 78.1460° E), Coimbatore (11.0125° N, 76.9714° E), Tiruchirappali (10.7946° N, 78.6850° E), Erode (11.3500° N, 77.7333° E), Dharmapuri (12.1260° N, 78.1540° E), Krishnagiri (12.5180° N, 78.2130° E), Nagapattinam (10.7670° N, 79.8330° E), Pudukottai (10.3800° N, 78.8200° E), Thanjavur (10.7856° N, 79.1401° E), Thiruvarur (10.7716° N, 79.6368° E), Vellore (12.9111° N, 79.1361° E), Cuddalore (11.7500° N, 79.7500° E), Kanchipuram (12.8200° N, 79.7100° E) and Tiruvannamalai (12.4167° N, 79.1167° E) districts of Tamil Nadu. In the districts

of Kanyakumari and Thoothukudi no specific inland fishing gear were recorded as the inland fisherman have adopted to modernized fishing gear such as monofilament gill nets and cast nets.

A total of 300 inland fishermen covering the selected districts were contacted in person and the information pertaining to traditional fishing practices were collected and recorded. During the survey 20 group discussions were made to gather information about traditional fishing gears and their operation. Each district was visited twice in study period and the enquiry was made with the pretested questionnaire related to the construction and operation of the gears. The secondary data pertaining to region wise inland fishing gear practices were also collected from fabrication and 20 Inland regional centres of Tamil Nadu Fisheries department.

The information such as (i) Name of fishing gears, (ii) Length of gear, (iii) Gear breadth,(iv) Gear depth, (v) Gear material, (vi) Thickness of the gear material/materials, (vii) Composition of gear materials and their number per gear, (viii) Duration of seasoning of the gear materials, Fabrication duration per gear, (x) Life expectancy of gear,(xi) Gear Cost, (xii) Habitat of operation- (lake/pond/river/lagoons/creek/stream), (xiii) Mean fishing hours (xiv) Operational timings of gears, (xv) Mean catch rate, (xvi) Depth of operation and (xvii) Fishing season were collected on each fishing gear recorded. In addition to the data collection, photographs were also taken on each step of the gear method.

Various food and ornamental fishes recorded under different fishing practices were identified upto species level as per the identification keys

described by (Mercy et al, 2006) and (Kumar and Arun, 1991). The technical specifications the fishing gears were measured by using either with a scale or with a measuring tape.

The technical diagrams of different fishing gears were drawn based on the guidelines prescribed in the FAO Catalogue of Fishing Gears (1972).

### **3.2 Estimation of catch per unit effort (CPUE)**

The catch data collected in terms of mean catch in kilogram per day operation of the gears were divided by the corresponding soaking hours per day to obtain catch per unit effort (CPUE) which was expressed in term of Kilogram per hour.

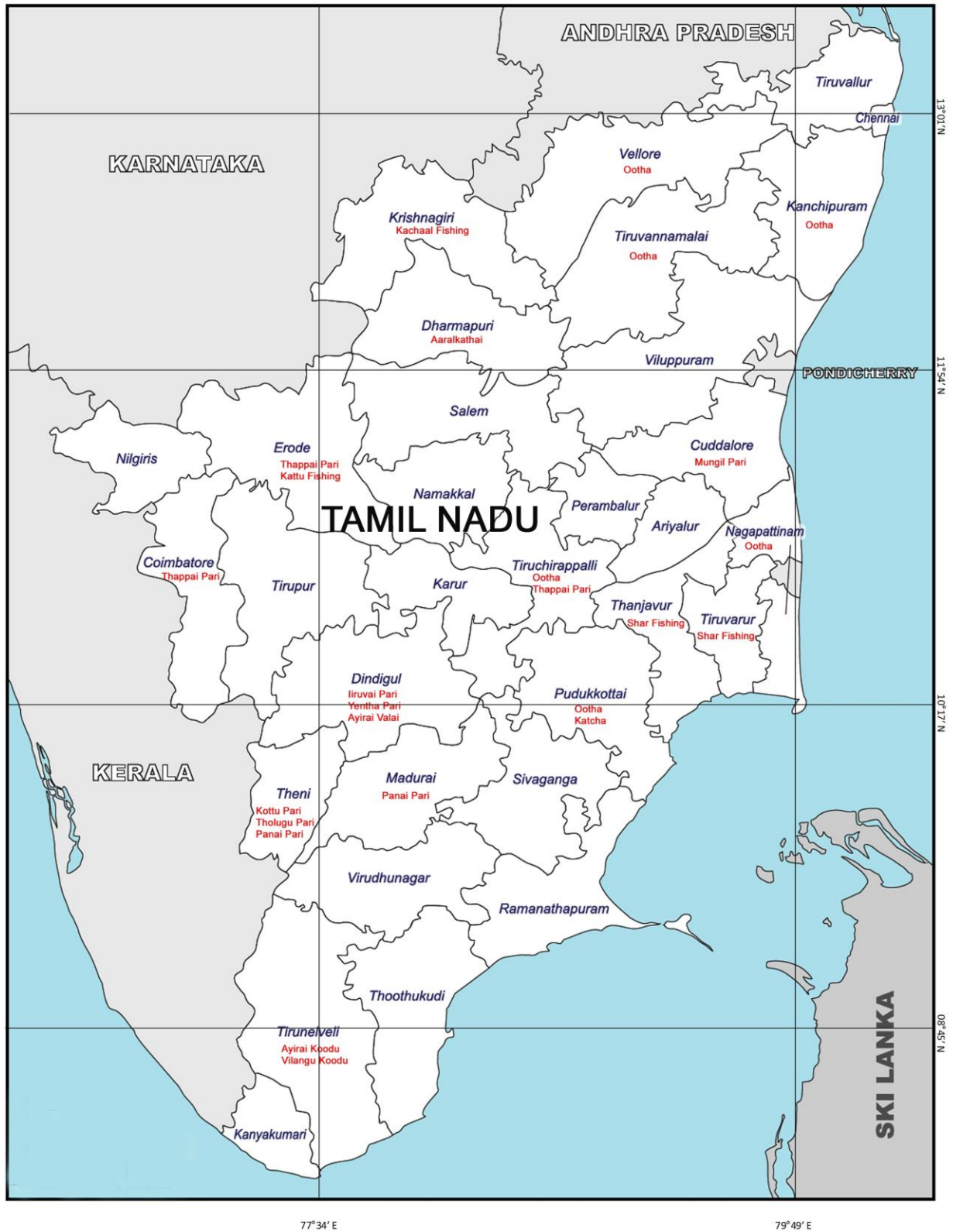


Figure.1. Map Showing Study Area

## 4. RESULTS

### 4.1. Distribution of traditional fishing gears and methods in Inland waters of Tamil Nadu.

The traditional fishing gears have been reported from 17 districts out of total 32 districts of Tamil Nadu. The details of distribution of traditional fishing gears in different districts of Tamil Nadu are presented in Table 1. In total, 16 different types of fishing gears and methods were recorded and were found practiced traditionally in different districts of Tamil Nadu. Seven different types of *Pari* (traditional traps) were recorded in the present study. *Pari* was found operated in Madurai, Theni, Dindigul, Coimbatore, Tiruchirappalli, Cuddalore and Erode districts in the river beds of Bhavani, Cauvery, Paalaru and Vaigai. Three different types of *Pari* were recorded in Theni district. A traditional type of cover pot locally called as *Ootha* was found operated in Tiruchirappalli, Nagapattinam, Pudukottai, Kanchipuram, Tiruvannamalai and Vellore districts. *Shar Fishing* generally known as fishing with screen barrier was reported to practice in two districts viz Thanjavur and Thiruvarur on Cauvery delta areas. The inland fisherman of Tirunelveli district living on the banks of river Thamirabarani, were reported to practice two traditional fishing methods called *Ayirai Koodu* for the capture of loaches and *Vilaangu Koodu* for the capture of eels. The fish aggregating device such as *Aaralkaththai* and *Kattu Fishing* were found practiced in Erode and Dharmapuri districts. Traditional drag nets locally known as *Ayirai Valai* and *Kachaal Fishing* were reported from Dindigul and Krishnagiri districts.

Only one type of traditionally made fish carrying basket called *Katcha* was reported in Pudukottai district.

## **4.2 Construction, Operation and scope for upgradation of different traditional fishing gears of Tamil Nadu**

### **4.2.1 Conical Trap-*Tholugu Pari***

*Tholugu Pari* is one of the traditional fishing gears, employed for capturing of freshwater fishes from small streams and canals and operated at kk patti, Chinnamanur and Ammapatti villages of Theni district. The materials and techniques used for construction of the trap are indigenous in origin and passed over generation. Presently, very few fisherman that too old generation are familiar with construction of this trap.

#### **4.2.1.1 Construction of Bundh**

Bundh is built across the flowing water stream by using stones, sand bags, boulders and pebbles. It is rectangular in shape with almost 2.4 M width and 0.6 M height (Plate 1). This rectangular bundh is supported by a square bundh with the size of 0.6 L X 0.6 H X 0.6 B Meter. These two bundhs are built in the shape of letter 'L' with a small opening to facilitate the water flow down wards and the trap was fixed on the other end as shown in the Plate 1. It took about a week period to complete the bundh construction and make it fully operational. The construction cost of bundh is ranging from Rs. 2000 – 4000 including labour cost. The bundh need to be repaired once in a year before starting of the fishing season.

**Table1: Traditional Fishing gears recorded in different districts of Tamil Nadu**

Districts	Tholugu Pari	Iruvaai Pari	Ayirai Koodu	Paanai Pari	Kottu Pari	Vilaangu Koodu	Yeantha Pari	Ootha	Thappai Pari	Moongil Pari	Ayirai Valai	Kachaal Fishing	Shar Fishing	Aaral Kaththai	Kattu Fishing	katcha
Thirunelveli	-	-	✓	-	-	✓	-	-	-	-	-	-	-	-	-	-
Madurai	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-
Theni	✓	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	-
Dindigul	-	✓	-	-	-	-	✓	-	-	-	✓	-	-	-	-	-
Coimbatore	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-
Tiruchirappalli	-	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	-
Erode	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	✓	-
Dharmapuri	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-
Krishnagiri	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-
Nagapattinam	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-
Pudukottai	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	✓
Thanjavur	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-
Thiruvarur	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-
Vellore	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-
Cuddalore	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-
Kanchipuram	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-
Tiruvannamalai	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-

#### 4.2.1.2 Construction of trap

The materials such as coconut leaflet sticks, *Poolan* sticks (*Phyllanthus spp*), bamboo, coir rope, nylon twine, knife, wooden sticks and stones are used for constructing this trap. Coconut leaflet sticks separated from coconut leaves are soaked in water for 1-2 days and skinned to remove the extra fiber adhering with stick and cut neatly and uniformly at the edges.

The body of conical shaped *Tholugu Pari* is fabricated with thicker coconut leaflet sticks by providing wide opening on the top and narrow opening in the bottom. The body part of this trap is locally known as '*Pari*'. The mouth piece (locally called as '*Tholugu*') is fabricated with thinner coconut leaflet sticks by providing two openings for the fish entry. The body and mouth piece of this trap are stitched by using nylon twine.

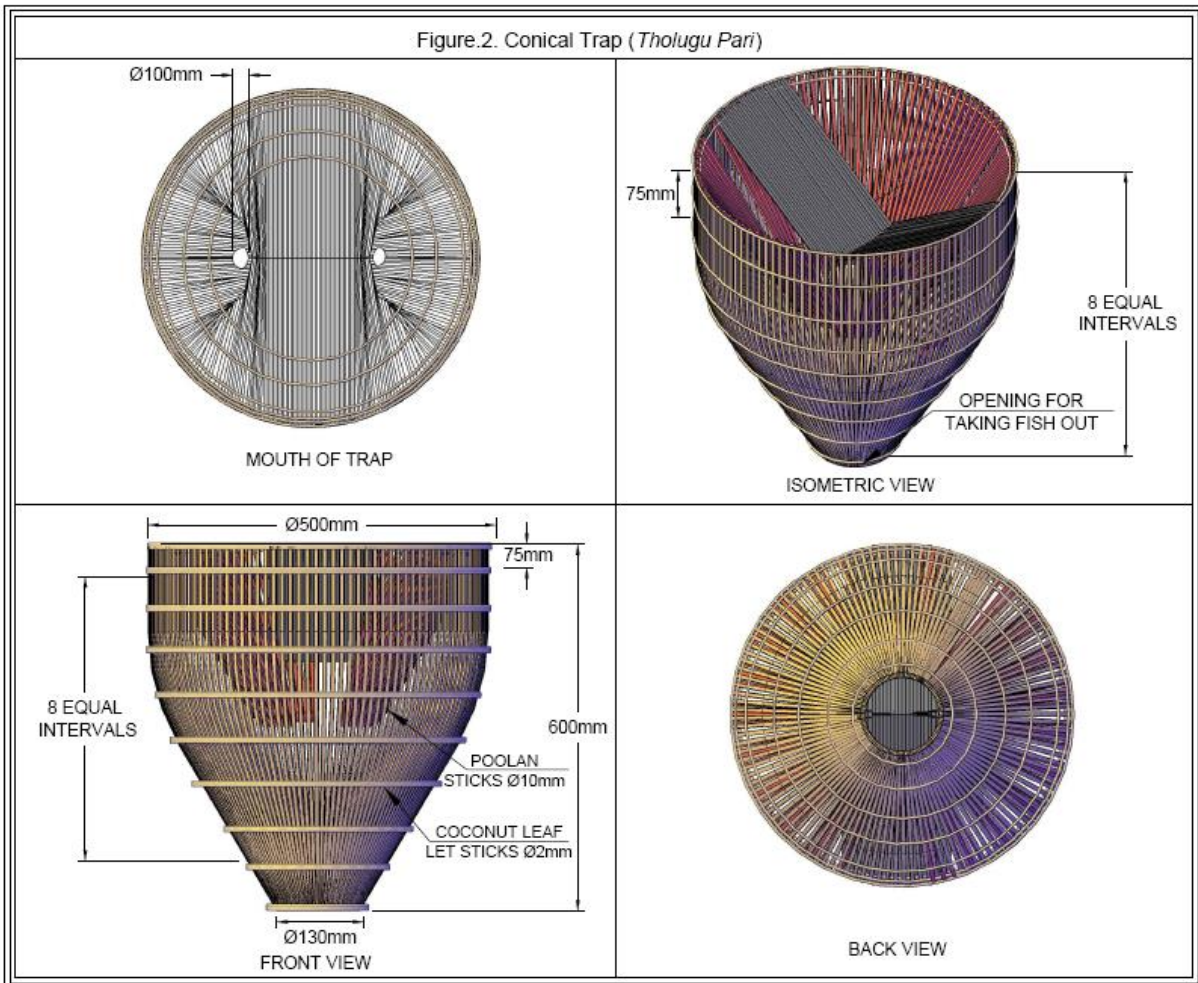
The body of the trap is further strengthened by stitching with 8 *Poolan* sticks having dia meter of 10mm. The gap between consecutive *Poolan* sticks is kept as 75 mm. Nylon twine is used for stitching purpose.

The narrow lower end of the *Tholugu Pari* is further reinforced with coir ropes for mechanical strength and to retain the shape of the trap during operation. The bottom is closed with cloth while operation. The total length of the trap is 600 mm, the diameter of upper opening 500 mm and the diameter of the lower opening is 130 mm. The upper wider opening is closed with mat by providing two mouth openings measuring 100 mm dia meter. The details of this trap are given in the Table 2.

**Table 2: Details of Conical Trap- *Tholugu Pari***

SI.No	District	Water source/ Place	Operation details	Catch details	Season of operation	Cost (Rs)	Life expectancy of the gear (year)
1	Theni	River Vaigai / KK Patti, Chinnamanur and Ammapatti.	River, stream and canals <b>Duration:</b> 10hrs <b>Depth:</b> 3-5 feet.	I. Loaches ( <i>Ayirai</i> ) <i>Lepidocephalus thermalis</i> . II. Catfish ( <i>Nattu Keluthi</i> ) <i>Pangassius spp.</i> III. Eel ( <i>Vilaangu</i> ) <i>Anguilla spp.</i> IV. Barred spiny eel ( <i>Aaral</i> ) <i>Mastacembalus spp.</i> V. Barbels ( <i>Nattu Kendai</i> ) <i>Barbus spp.</i>	December to March	800	1-2

Figure.2. Conical Trap (*Tholugu Pari*)



#### 4.2.1.3 Operation

The *Tholugu Pari* trap is fixed in between the large and small bundhs constructed in the shape of letter 'L' as shown in the Plate 1. A reed mat with dimensions 25 cm L X 25 cm B is fixed in between the water flow channel and trap. The water is allowed over flow through the larger bundh and also through the diverted small passage provided in between the larger and small bundhs.

As the fishes are having tendency to swim against the current the water flowing through small passage would induce the fishes to jump and fall over the reed mat provided in between the trap and bundh. The reed mat allows the water to filter through and the fishes are directed to the mouth of trap. The water passed through the reed mat joins with main stream and the fishes are collected in the trap. At the end of the operation, the trap is taken out and the cloth cover of the bottom opening is opened to take the fishes out. Fishing by *Tholugu Pari* has been mainly practiced in rivers, shallow streams and small canals. The trapped fishes are collected twice a day normally in the early morning and late evening. Average fish catch is about 12-15 kg/trap/day. The peak fishing season is from December to March. The fishes like loaches locally known as (*Ayiraimen*) *Lepidocephalus thermalis*, cat fish (*Nattu Keluthi*) *Pangassius spp*, Eel (*Vilaangu*) *Anguilla spp*, barred spiny eel (*Aara*) *Mastacembalus spp* and Barbels (*Nattu Kendai*) *Barbus spp* were mostly harvested. The construction cost of this method is Rs.4800 – 5500/- which includes trap cost Rs.800/-. After every operation the trap is washed thoroughly in running water to remove adhered particles and stored in a shadow and good ventilated area.

#### **4.2.1.4 Scope for upgradation**

The conical trap *Tholugu Pari* is reported with bycatches of water snakes and frogs. They are entering into the trap through the reed mat along with fishes and they are reported to eat the fishes. The design of the *Tholugu Pari* may be upgraded to prevent the entry of water snakes and frogs. Hence, further studies are required to upgrade the gear.

#### **4.2.2 Box Trap-Iruvaai Pari**

*Iruvaai Pari* is a kind of trap used for catching fishes from inland waters. The reason behind naming of this trap as *Iruvaai Pari* in Tamil means, presence of two openings or mouth in the trap which allow the fish to enter inside the trap. This type of trap is common in Dindigul district. The indigenous traditional knowledge learned over a period by inland fishermen is used in construction of the trap by locally available resources such as Bamboo sticks, *Poolan* sticks (*Phyllanthus spp*) and twines.

##### **4.2.2.1 Construction**

The *Iruvaai Pari*– box trap is constructed by knitting process like mat making. The first step of mat fabrication with coconut leaflet sticks is almost same as in the case of *Tholugu Pari*. The shape of *Iruvaai Pari* is elliptical where as the shape of the *Tholugu Pari* is conical. The woven coconut leaflet sticks mat is joined with the help of nylon twine to make into elliptical box. The inner part of the elliptical box is strengthened by means of stitching *Poolan* sticks (*Phyllanthus spp*) at the interval of 200 mm.

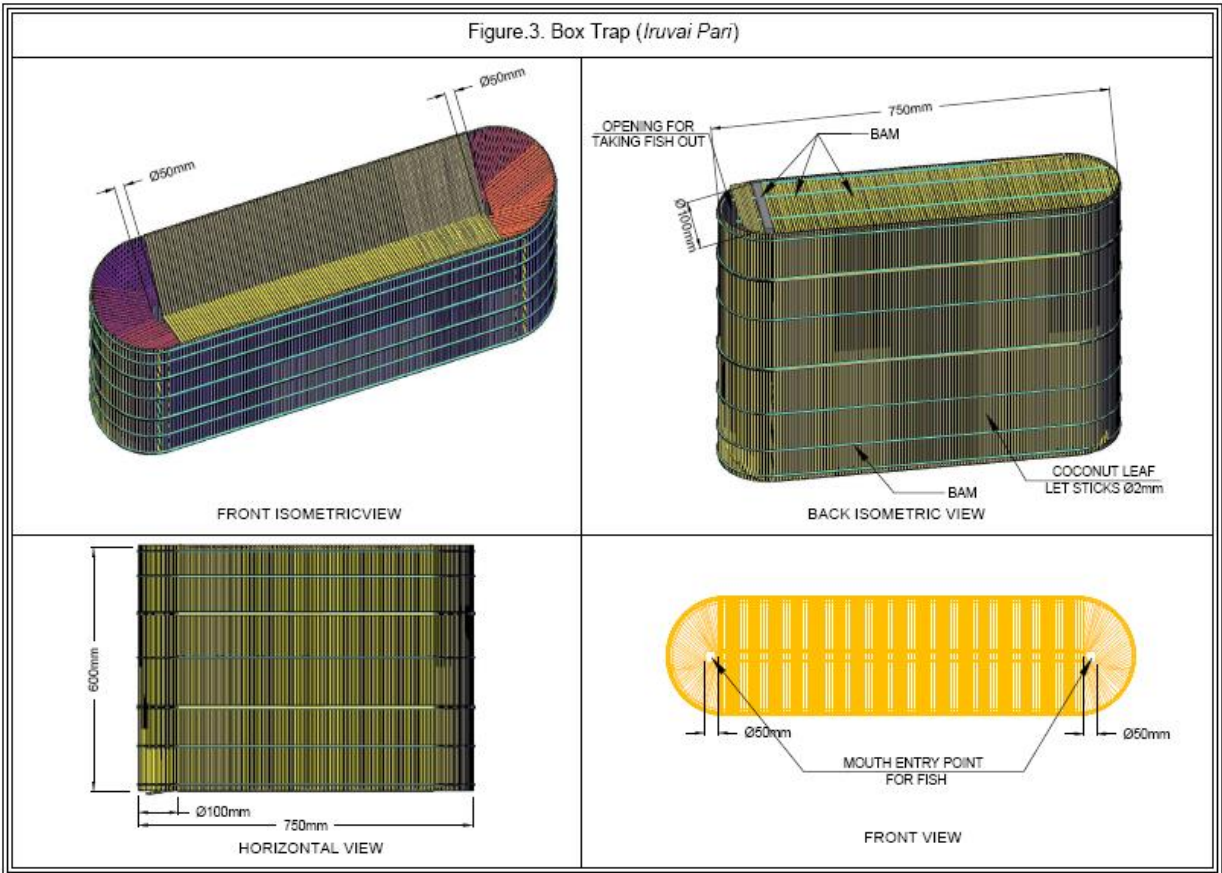
The outside of the box is further strengthened by split bamboo sticks exactly in line with *Poolan* fixed inner side as shown in the plate 2. Two separate coconut leaflet sticks mats are fabricated, joined together like letter 'V' and fixed on the one end of the elliptical box. This structure is provided with two openings called mouths with dimension of 50 mm L and 40 mm W at the two extremes of the box. The bottom of the *Iruvaai Pari* is closed with a mat of coconut leaflet sticks by providing small openable portion for about 10% of the base area. This would serve as the collection point for the fishes entrapped in the *Iruvaai Pari*.

This box trap measure is 600 mm Hx750mm L, operated with bundh enclosures like *Tholugu Pari*. Both men and women are involved in construction of this trap and the cost of each trap was Rs 1000-1200. The trap is operated mostly during night hours (6.00 pm-6.00 am). A well maintained trap could be used for 2 years. The fishes like Spotted Snake head (*Kuravai*) *Obhiocephalus punctatus*, Minnows (*Velichi*) *Chela spp*, Barred spiny eel (*Aarai*) *Mastacembalus spp*, Loaches (*Ayirai*) *Lepidocephalus thermalis*, Catfish (*Nattu Keluthi*) *Pangassius spp* and Glass fish (*Kannadimeen*) *Ambassis spp* are mostly harvested.

### **Operation**

The operation of *Iruvaai Pari* is similar to that of *Tholugu Pari*.

Figure.3. Box Trap (*Iruvai Pari*)



**Table 3: Details of Box Trap- Iruvaai Pari**

Sl. no	District	Water source/ Place	Operation details	Catch details	Season of operation	Cost (Rs)	Life expectancy of the gear (year)
1	Dindigul	River Shanmuganathi/ Palani	River and canals <b>Duration:</b> 12 hrs <b>Depth:</b> 2-4 feet.	I. Spotted Snake head ( <i>Kuravai</i> ) <i>Obhiocephalus punctatus</i> . II. Minnows ( <i>Velichi</i> ) <i>Chela spp.</i> III. Barred spiny eel ( <i>Aaral</i> ) <i>Mastacembalus spp.</i> IV. Loaches ( <i>Ayirai</i> ) <i>Lepidocephalus thermalis</i> . V. Catfish (Nattu Keluthi) <i>Pangassius spp.</i> VI. Glass fish ( <i>Kannadimeen</i> ) <i>Ambassis spp.</i>	November to March	1000-1200	1-2

#### **4.2.2.2 Scope for upgradation**

As in the case of *Tholugu Pari* in *Iruvaai Pari* also the frogs and water snakes are caught along with the fish catches. In some cases, the water snakes are standing in front of the reed mat and capture the fishes before their entry into the trap. Hence, this trap has scope for upgradation of the design.

#### **4.2.3 Box Trap-Ayirai Koodu**

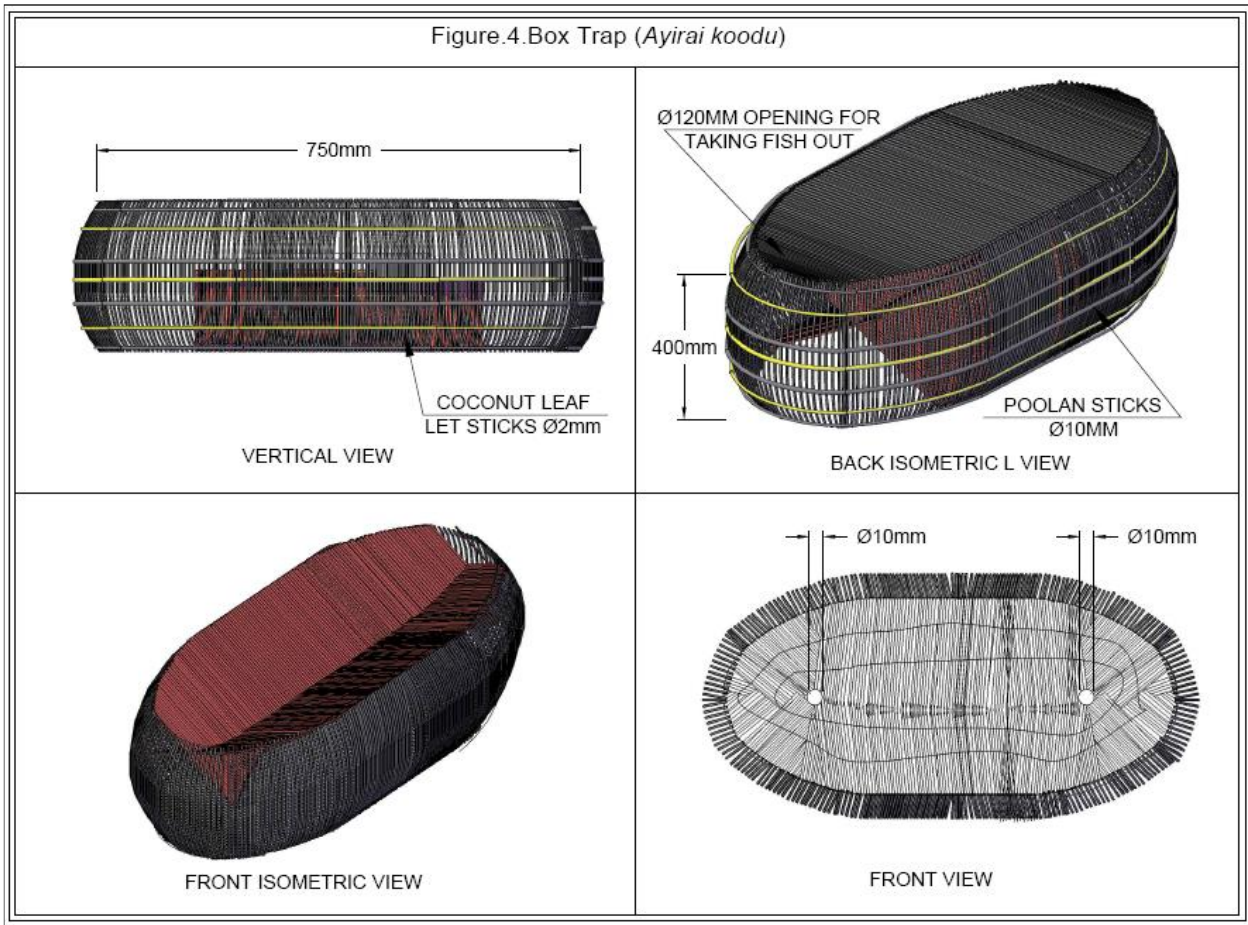
An indigenous fish trap locally known as *Ayirai Koodu* is used for capturing the loaches locally called as *Ayirai (Lepidocephalus thermalis)*. This traditional trap is operated in flowing water of canals and rivers. It is a traditional method of catching Loaches from small canals of Thamirabarani river of Ambasamudram, Pappankulam, Idaikal, Sengulam and Kallidaikurichi villages' in Tirunelveli District.

##### **4.2.3.1 Construction**

The construction, shape and operation of *Ayirai Koodu* are similar to that of *Iruvaai Pari* and operated in Dindigul district. The technical details of this gear is given in Fig. 4. Though the structure of *Ayirai Koodu* looks like *Iruvaai Pari*, the inner of *Ayirai Koodu* is provided with one more additional layer of coconut leaflet sticks mat to prevent the escape of fishes.

The trap is box shaped with two openings, one is on the upper side and other on lower side. The upper side opening is wider, when compared to the lower opening. The upper opening is again bifurcated into two smaller circles through which the fishes enter in to the trap. The time required for making an

Figure.4.Box Trap (Ayirai koodu)



*Ayirai Koodu* is one week. The total cost for making a trap is about Rs 4000. The life expectancy of the trap is about 1-2 years. The operation of *Ayirai Koodu* is similar to that of *Iruvaai Pari*.

The length and height of the trap is about 750 mm and 400 mm respectively. The diameter of lower side opening is about 80 mm, which is used for taking the fishes out from the trap. The upper side of the trap is with two mouths the diameter of the each mouth is about 100 mm. The trap is operated for 10-12 hours per day with the average catch of 30 kg per day. In this method fishes are collected in a live condition. Minimum two labourers are required for operating this type fishing trap. The peak fishing season of *Ayirai Koodu* is August to December. After fishing, the *Ayirai Koodu* is washed thoroughly with fresh water and stored in a shadow place to protect from direct exposure of sunlight.

#### **4.2.3.2 Scope for upgradation**

In the case of box trap *Ayirai Koodu* frogs are reported as by catch. But, the frogs are found standing in front of the mouths of the *Ayirai Koodu* and capture the loaches before their entry into the trap. This type trap has scope for design improvement.

During the study, it was recorded that some of the fisherman were tying the mouths of trap by small piece of fine meshed nettings with 1 cm dia hole on it. This hole allowed only loaches, not even catfishes into the trap. Further studies are required to make this technique perfect.

**Table 4: Details of Box Trap-Ayirai Koodu**

SI.No	District	Water source/Place	Operation details	Catch details	Season of operation	Cost (Rs)	Life expectancy of the gear (year)
1	Tirunelveli	River Thamirabarani/ Ambasamudram, Pappankulam, Idaikal, Sengulam and Kallidaikurichi.	River and canals <b>Duration:</b> 10-12hrs <b>Depth:</b> 5 feet.	I.Loaches <i>(Ayirai)</i> <i>Lepidocephalus</i> <i>thermalis.</i>	August to December	4,000	1

#### **4.2.4 Pot Trap- *Paanai Pari***

Pot trap is locally called *Paanai Pari* is unique and most popular fishing method in Madurai and Theni districts of Tamil Nadu. Comparatively, a narrow channel measuring 2-4 feet width is selected for operating this type of trap. Unlike the earlier methods, here the fishes swimming along with the flow of water are trapped in the mud pot.

##### **4.2.4.1 Construction**

The suitable place for operating this trap is selected by checking the water flow in a narrow channel. The selected place on the channel is blocked by using rectangular wooden plank supported with sand bags as shown in the Plate 4. Two vertical poles are erected in front of the wooden plank to avoid sliding of the wooden planks. The height of the wooden plank is adjusted in such a way that the water is flowing only on one side of the channel. This arrangement will also facilitate to increase the speed of the water flow. The side in which water is flowing, a reed mat (25 cm L X 25 cm B) is fixed and leading to buried mud pot. The diameter of the mouth of the mud pot ranges from 150-200 mm.

The water fall on the reed mat, get filtered and fishes, if any, are forced to fall into the mud pot. The trapped fishes are collected from the pot periodically. Unlike *Tholugu Pari* and *Iruvai Pari* the pot is used for this method is having open mouth, fishes may escape from the pot.

#### **4.2.4.2 Operation**

*Paanai Pari* is one of the seasonal fishing methods practiced in the areas adjacent to rivers, streams and canals. Generally this fishing is operated in the early morning and late evening hours. Every operation last for about four to five hours then the pot (*Paanai*) is checked for the fishes. Normally, 2-4 fishermen are required for constructing of bundh and for operation only one fisherman is sufficient. The peak fishing season for this trap is from January to March. The construction cost for this trap is about Rs.600. Fishes like Loaches (*Ayirai*) *Lepidocephalus thermalis*, Catfish (*Nattu Keluthi*) *Pangassius spp* and Barb (*Nattu Kendai*) *Barbus spp* are harvested with an average catch rate of 7 kg per day.

#### **4.2.4.3 Scope for upgradation**

As the mouth of mud pot is wide and this lead to escape of catches from the pot. The jumping nature of the fishes also lead to loss of some quantity of catch during operation. Unlike other types of traditional traps, the pot has no provision for filtering the water enter into the pot. This lead to escape of fishes from the pot once it filled with water and fishes. There is a scope for improving the design of pot meant for *Paanai Pari*. Further study is required to improve the mouth design and filtering effect of this gear.

#### **4.2.5 Cylindrical Trap-Kottu Pari**

*Kottu Pari* is a cylindrical trap commonly used in Theni district. This traps looks like “*Kottu*” (a traditional musical instrument of Tamil Nadu). Bundh construction and operation are similar to *Paanai Pari*.

##### **4.2.5.1 Construction**

The inland fishermen of Theni district are using locally available materials for construction of *Kottu Pari*. As in the case of other traditional traps, the materials such as *Poolan* sticks, coconut leaflet sticks and coir rope are used for construction of this trap. The coconut leaflet sticks are seasoned by soaking in water for 2 days and shaved for removing this fiber attached on them. Thicker sticks are used for the construction of the main body of the trap and thinner sticks are used for making the mouth of the trap. Coconut leaflet sticks mat is woven and stitched together to make the cylindrical body of the trap.

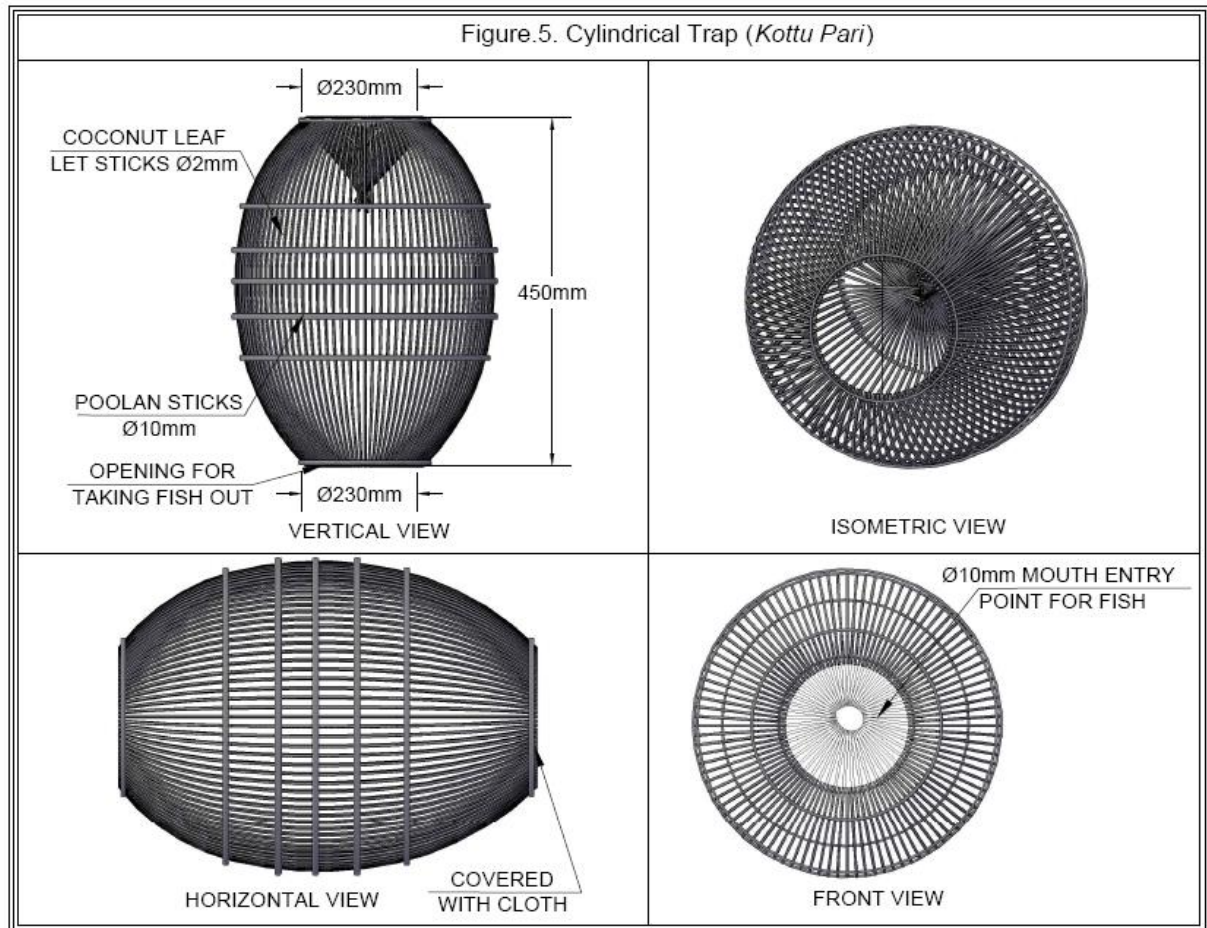
One end of the cylinder is closed with mouth piece, made of thinner coconut leaflet sticks as shown in the Plate 5. The other end of the trap is kept

open and closed with cloth, when it is in operation. The technical specifications of the trap are depicted in the Fig. 5. The cylinder of the trap is strengthened by stitching *Poolan* sticks (10 mm dia) with the interval of 8 cm on both inner and outer sides. This trap has non-return arrangements in the mouth region. This trap could accommodate more quantity of fishes than *Paanai Pari*. The cost for making a trap is Rs 800/-. The peak season for catching of fishes by using this trap is from December to March. The fishes like Catfish (*Nattu keluthi*) *Pangassius spp*, Loaches (*Ayirai*) *Lepidocephalus thermalis* and Barbs (*Nattu Kendai*) *Barbus spp* are mostly harvested. Once the fishing is completed then the trap washed thoroughly with fresh water and stored in a shadow area to extend the shelf life.

#### **4.2.5.2 Scope for upgradation**

There is no by catch problems noticed in this type of gear, but the bottom of the trap is closed with cloth. There is a scope for designing the larger size *Kottu Pari* with openable lid on the back sides.

Figure.5. Cylindrical Trap (*Kottu Pari*)



**Table 5: Details of Pot Trap-Paanai Pari**

Sl.No	District	Water source/ Place	Operation details	Catch details	Season of operation	cost (Rs)	Life expectancy of the gear(year)
1	Theni	River Vaigai/ Veerapandi, Markayankottai and Kottur.	River, streams and canals <b>Duration:</b> 4 hrs <b>Depth:</b> 2-3 feet.	I.Loaches ( <i>Ayirai</i> ) <i>Lepidocephalus thermalis</i> . II.Catfish (Nattu Keluthi) <i>Pangassius spp.</i> III.Barbels ( <i>Nattu Kendai</i> ) <i>Barbus spp.</i>	January to March	600	1

**Table 6: Details of Cylindrical Trap-Kottu Pari**

Sl.No	District	Water source/ Place	Operation details	Catch details	Season of operation	cost (Rs)	Life expectancy of the gear(year)
1	Theni	River Vaigai/ Rayapati, Gokilapuram and Vaikalpati.	River ,stream and canals <b>Duration:</b> 3 hrs <b>Depth:</b> 2-4 feet.	I.Catfish (Nattu keluthi) <i>Pangassius spp.</i> II.Loaches ( <i>Ayirai</i> ) <i>Lepidocephalus thermalis</i> . III.Barbels ( <i>Nattu Kendai</i> ) <i>Barbus spp.</i>	December to March	800	1-2

#### **4.2.6 Cylindrical Trap- *Vilaangu Koodu***

*Vilaangu koodu* is a cylindrical trap mainly operated in Ambasamudram, Pappankulam, Idaikal, Sengulam and Kalidaikurichi of Tirunelveli district. As the name implies the trap is used for capturing eels (locally called as *Vilaangu*).

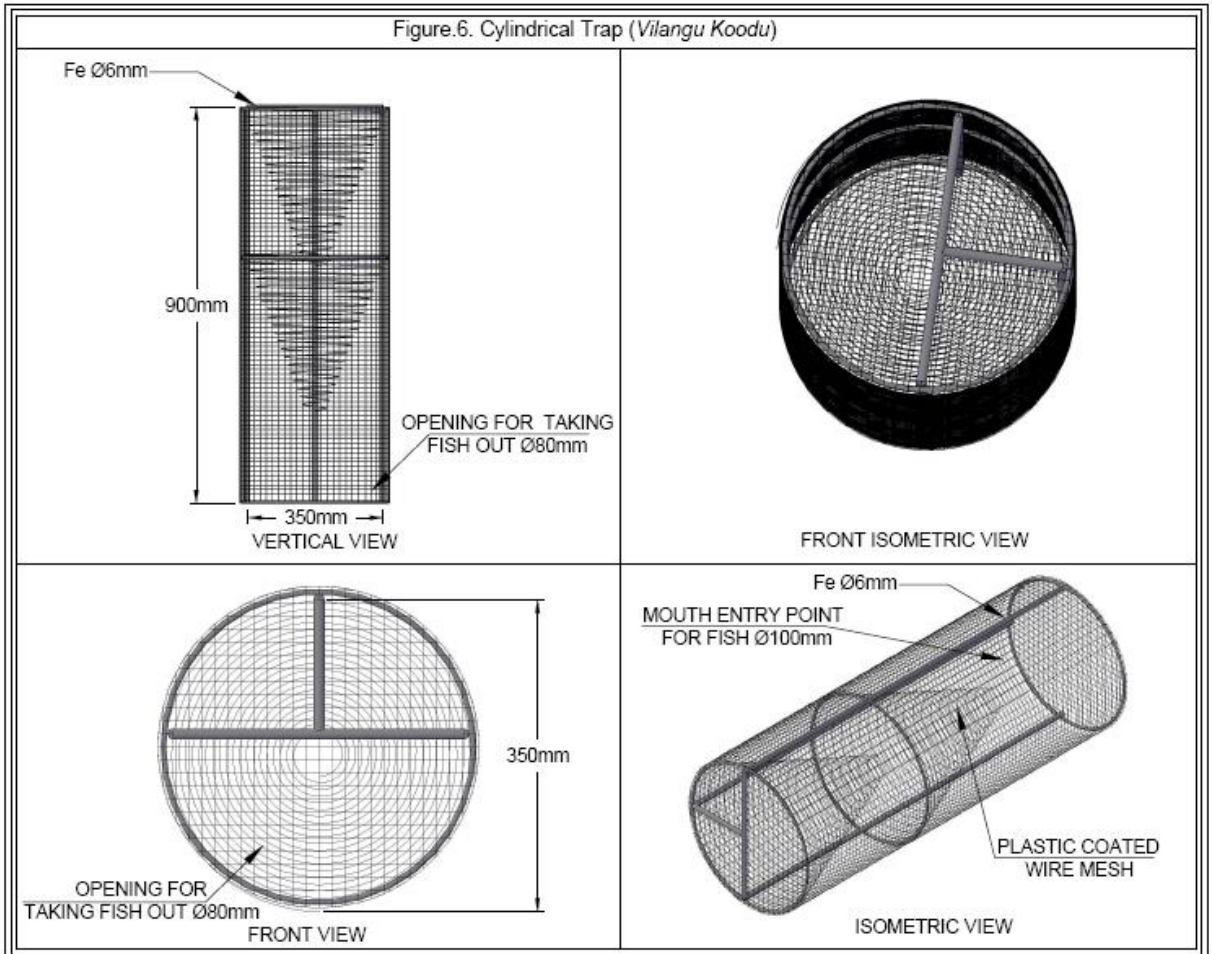
##### **4.2.6.1 Construction**

*Vilaangu Koodu* is constructed with iron rings, plastic coated wire mesh and nylon twine. A cylindrical skeleton is fabricated with three iron rings each measuring 350 mm dia and 900 mm in length. Both iron rings and rods are made of 6 mm thickness iron rods. The skeleton of iron structure is covered with plastic coated wire mesh. One end of the cylinder is made into mouth with non-return arrangement as shown in the Fig. 6. The other end of the cylinder is partially closed with plastic coated wire mesh. The stitching is done with iron wire.

##### **4.2.6.2 Operation**

The trap is set on the bottom of the ponds, where aquatic weeds are densely populated. Chicken intestine around 0.5 kg is kept inside the trap as lure for eels. The trap is set around 5 pm and taken in the early morning hours of the next day. The entrapped fishes are collected by partial opening on the other side. The average CPUE is around 3 kg/ for 12 hrs of soaking. This trap is mainly operated during December to March.

Figure.6. Cylindrical Trap (*Vilangu Koodu*)



#### **4.2.6.3 Scope for upgradation**

*Vilaangu koodu* is a upgraded version of *Thappai Pari* gear mainly used in Erode district. Plastic coated wire mesh and iron skeleton were used instead of split bamboo. Presently, *Vilaangu Koodu* is soaked along with chicken intestine as bait. There is a scope for upgradation and improvement in baiting with different natural baits. Hence, further studies are required to evolve suitable baiting techniques for this trap.

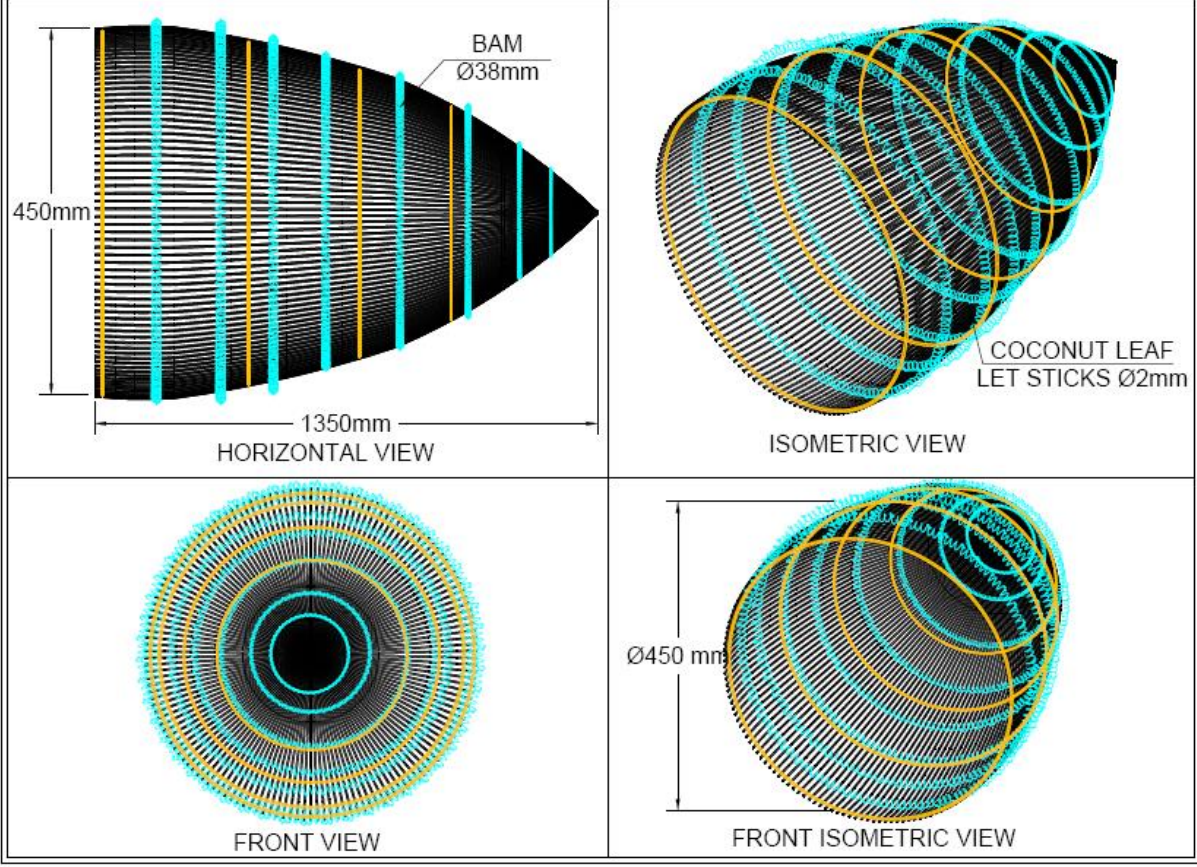
#### **4.2.7 Conical Trap- *Yeantha Pari***

*Yeantha Pari* is one of the most common fishing methods in Dindigul district of Tamil Nadu. Inland fishermen are using their indigenous knowledge for making this kind of trap. Locally available materials such as coconut leaflet sticks, *Poolan* sticks and coir rope are used for making this trap. This trap is operated only in shallow canals.

##### **4.2.7.1 Construction**

The conical trap-*Yeantha Pari* is made with mat of seasoned coconut leaflet sticks as in the case of other traps. The mat is stitched in such a way that the body retains the conical shape. One end of the trap is closed by stitching the coconut leaflet sticks mat with coir rope. The mouth region is kept open without any non-return arrangement. The technical specifications of the trap are depicted in the Fig. 7. The conical shape trap *Yeantha Pari* is further reinforced with split bamboo on the outer side and *Poolan* sticks in the inner side at the distance of 250 mm.

Figure.7. Conical Trap (Yentha Pari)



**Table 7: Details of Cylindrical Trap- Vilaangu Koodu**

Sl.No	District	Water source/Place	Operation details	Catch details	Season of operation	Cost (Rs)	Life expectancy of the gear(year)
1	Thirunelveli	River/Thamirabarani Ambasamudram, Pappankulam, Idaikal, Sengulam and Kallidaikurichi.	pond or stagnated water <b>Duration:</b> 12 hrs <b>Depth:</b> 2-4 feet.	Eel ( <i>Vilaangu</i> ) <i>Anguilla</i> spp.	December to March	1000	3-4

**Table 8: Details of Conical Trap- Yeantha Pari**

Sl. No	District	Water source/ Place	Operation details	Catch details	Season of operation	Cost (Rs)	Life expectancy of the gear (year)
1	Dindigul	River Shanmuganathi/ palani	Shallow canals <b>Duration:</b> 2hrs <b>Depth:</b> 3 feet.	I. Barbels ( <i>Nattu Kendai</i> ) <i>Barbus</i> spp. II. Catfish ( <i>Nattu Keluthi</i> ) <i>Pangassius</i> spp. III. Freshwater Shark ( <i>Valaimeen</i> ) <i>Wallago attu</i> .	October to December	800	1

Coir ropes are used for stitching and lacing the sticks. The diameter of the mouth is around 450 mm.

#### **4.2.7.2 Operation**

*Yeantha Pari* is operated like scoop net. This gear is operated in running water and fishes coming along with water are scooped. Fishermen, who operate this gear, hold the mouth of the net by both hands by facing against the flow of water. Fishermen scoop and lift the net out of water and collect the fishes. This kind of fishing is practiced mostly during early morning from 5 am to 7 am. The fishing season is from October to December. Fisherwomen are also involved in operating this type of trap. The average catch is about 2 kg per day. *Yeantha Pari* is used to capturing variety of fishes like Barbs (*Nattu Kendai*) *Barbus spp*, Catfish (*Nattu Keluthi*) *Pangassius spp* and Freshwater Shark (*Valaimeen*) *Wallago attu*.

#### **4.2.7.3 Scope for upgradation**

*Yeantha Pari* is a type of conical trap categorized under active fishing gear, and life expectancy is found to be six month only. The life expectancy of this trap could be increased by using plastic sticks instead of coconut leaflet sticks. Hence, design upgradation studies are required for this trap.

#### **4.2.8 Cover Pot – Ootha**

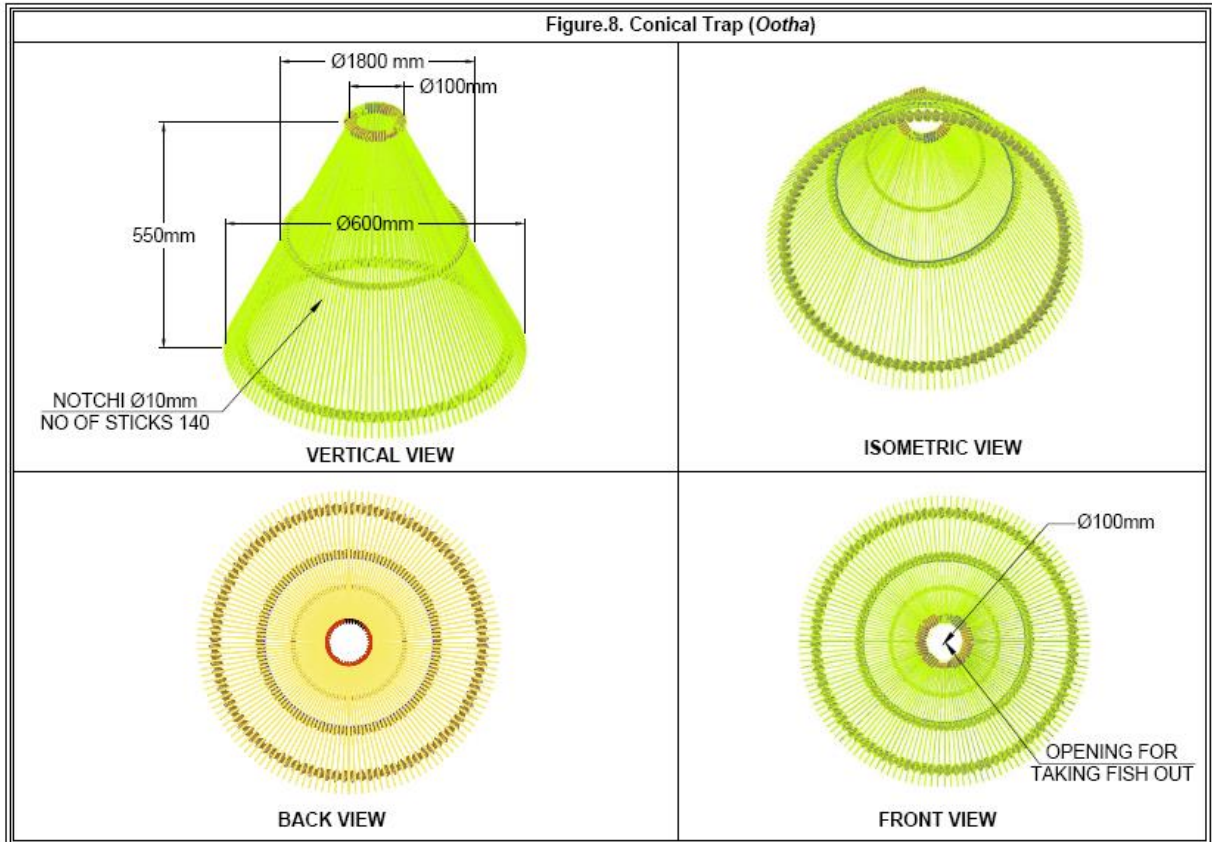
*Ootha* is an active fishing gear categorized under cover pot or plunge basket. Cover pot is a conical trap open at both ends, broad opening at the bottom and narrow at the top. The gear is operated in the water by keeping

broader opening at the bottom and smaller opening on the top. It is a primitive fishing gear practiced by inland fishing communities of the Tiruchirappalli, Nagapattinam and Pudukottai, Vellore, Kanchipuram and Tiruvannamalai districts of Tamil Nadu. The fabrication of *Ootha* requires a skill and the inland fishermen of these districts having excellent indigenous knowledge on making this basket. Inland fishermen of Nagapattinam and Pudukottai districts are making this pot from locally available plant *Notchi* (*Vitex negundo*) .Tiruchirappalli, Vellore, Kanchipuram and Tiruvannamalai district fishermen construct this gear with Bamboo.

#### **4.2.8.1 Construction**

The fishermen are using the indigenous traditional knowledge for making this basket. Tender sticks of *Notchi* plant are commonly used for fabrication .The flexibility of the stick is playing crucial role in fabrication of this basket. The sticks of 3-4 months old is considered best for making of this basket. The sticks are cut into 550 mm length and 10 mm thickness using knife and soaked in the water for 4-5 days to increase the flexibility and strength of sticks. After seasoning, iron ring with the radius of 100 mm is tied closely with 120-140 numbers of seasoned *Notchi* sticks around the ring with help of coir rope and hemp to serve as the mouth of *Ootha* as shown in the Plate 8. Mean while, a conical shaped pit is made on the sandy ground with help of spade for the required depth and radius in accordance with the size requirement of *Ootha*.

Figure.8. Conical Trap (*Ootha*)



The fabricated mouth region of the *Ootha* is placed exactly on the pit and the fishermen offer pressure by standing gently on the centre of the same. Due to the weight of fishermen, mouth of the pot goes down to the pit and sticks come to slanting position. The person who stands on the pit now sits on it and starts knitting the inclined sticks together by providing three intervals at a height of 200 mm. Coir rope, hemp and nylon are commonly used fabrication. The free end of the sticks at the broad mouth area (550-600 mm dia) is sharpend for easy operation in muddy bottoms. The space between the adjacent stripes is 3-5mm.

#### **4.2.8.2 Operation**

*Ootha* is operated in the shallow waters (less than 1 m depth) of canals, seasonal ponds, culture ponds and tanks by single or by a group people. Cost of making and life expectancy of this pot is Rs.350-500/- and 2 years respectively. Generally, it is operated in the morning or evening hours during April to July. According to the fishermen the *Ootha* fishing has been practiced in the Cauvery delta area for more than 100 years. The fishes like Giant murrel (*Channa marulius*) locally called as *Viral* and striped murrel (*Channa striatus*) *Auvri*, cat fish *Keluru*, and eel *Vilaangu* are mostly harvested by using this pot.

An average of 8 kg fishes per day are harvested by three fishermen using *Ootha*. This method is suitable for capturing fishes like murrel and eel having burrying nature and habit to live in the muddy water. Generally once in a year or based on the requirement the pots are repaired by loosening of all the sticks or dismantling the pot,

**Table 9: Details of Conical Trap- Ootha**

Sl. No	District	Water source/Place	Operation details	Catch details	Season of operation	cost (Rs)	Life expectancy of the gear (year)
1	Nagapattinam	River Cauvery/ Voimedu, Ayakkaranpulam and Karupanpulam.	canals, seasonal ponds, culture ponds and tanks <b>Duration:</b> 2 hrs <b>Depth:</b> <1 meter	I. Giant murrel ( <i>Viral</i> ) <i>Channa marulius</i> . II. Striped murrel ( <i>Auvri</i> ) <i>Channa striatus</i> . III. Cat fish ( <i>Nattu Keluthi</i> ) <i>Pangassius</i> spp.	April to July	500	2
2	Pudukottai	Pamparu river/ Mumpalai and Manmelkudi.	canals, seasonal ponds, culture ponds and tanks <b>Duration:</b> 2 hrs <b>Depth:</b> <1 meter	I. Striped murrel ( <i>Auvri</i> ) <i>C. striatus</i> . II. Giant murrel ( <i>Viral</i> ) <i>C. marulius</i> .	March to July	450 to 500	2
3	Tiruchirappalli	Kollidam/ Lalgudi	canals, seasonal ponds, culture ponds and tanks <b>Duration:</b> 2 -3hrs <b>Depth:</b> <1 meter	I. Eel ( <i>Vilaangu</i> ) <i>Anguilla</i> Spp. II. Striped murrel ( <i>Auvri</i> ) <i>Channa striatus</i> . III. Cat fish ( <i>Nattu Keluthi</i> ) <i>Pangassius</i> spp. IV. Giant murrel ( <i>Viral</i> ) <i>Channa marulius</i> .	Through-out the year	500	2-3

4	Vellore	Palar/ Tiruppattur	canals, seasonal ponds, culture ponds and tanks <b>Duration:</b> 2 -3hrs <b>Depth:</b> <1 meter	I. Giant murrel ( <i>Viral</i> ) <i>Channa marulius</i> . II. Striped murrel ( <i>Auvri</i> ) <i>Channa striatus</i> .	Feb to May	600	2
5	Kanchipuram	Palar river/	canals, seasonal ponds, culture ponds and tanks <b>Duration:</b> 2 -3hrs <b>Depth:</b> <1 meter	I. Eel ( <i>Vilaangu</i> ) <i>Anguilla Spp.</i> II. Striped murrel ( <i>Auvri</i> ) <i>Channa striatus</i> .	Feb to June	500	2
6	Tiruvannamalai	Thenpennai/ Chengam	canals, seasonal ponds, culture ponds and tanks <b>Duration:</b> 2 -3hrs <b>Depth:</b> <1 meter	I. Giant murrel ( <i>Viral</i> ) <i>Channa marulius</i> . II. Striped murrel ( <i>Auvri</i> ) <i>Channa striatus</i> . III. cat fish ( <i>Nattu</i> <i>Keluthi</i> ) <i>Pangassius</i> <i>spp.</i>	Jan to April	600	2

then the sticks are attached on the iron ring and starts follow the full construction procedure.

#### **4.2.8.3 Scope for upgradation**

The cover pot type of gear *Ootha* is made with locally available materials, used only during fishing season (3-4 months) and remaining months used as cover pot for poultries. As per the experience of fisherman and the observation made during study period, this gear doesn't require any upgradation.

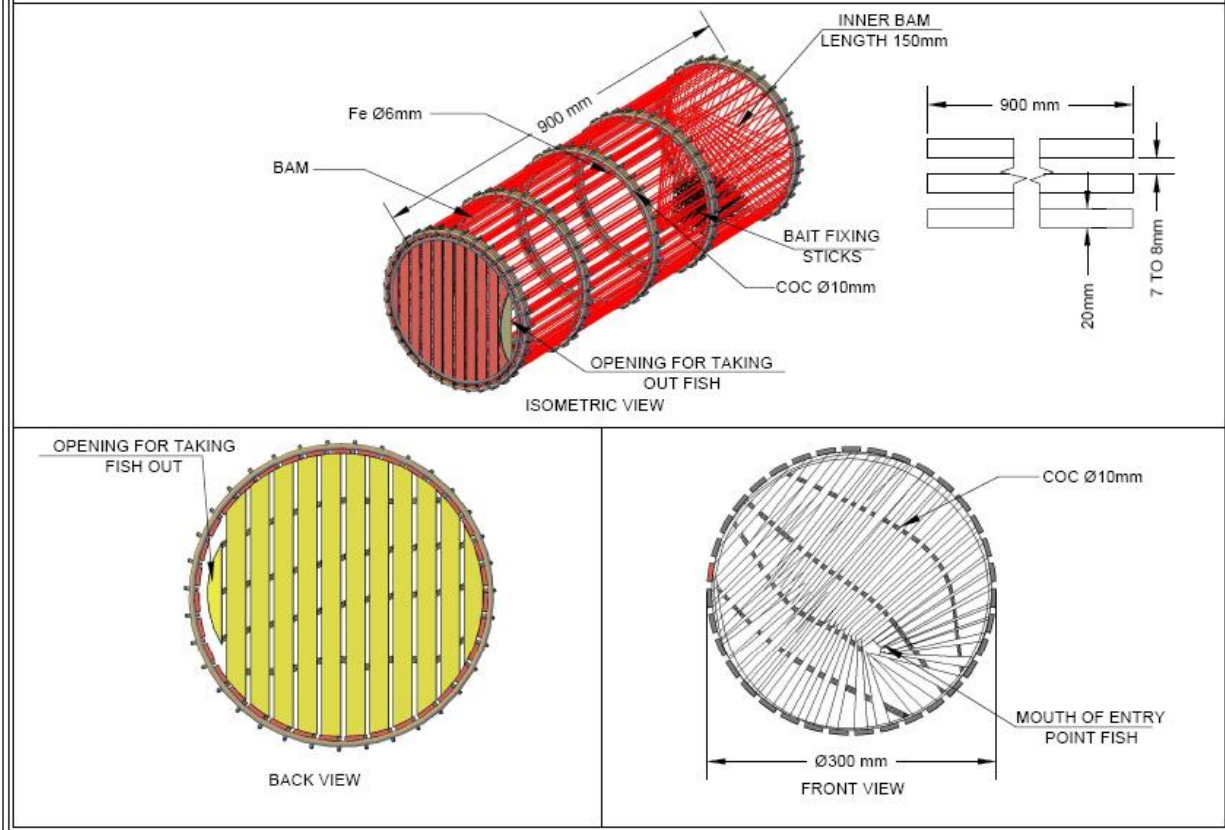
#### **4.2.9 Cylindrical Split Bamboo Trap – *Thappai Pari***

*Thappai Pari* is a cylindrical trap and primitive to *vilaangu koodu*. *Thappai Pari* is mainly operated in shallow water channels around Bhavanisagar dam, of Erode District.

##### **4.2.9.1 Construction**

The design of *Thappai Pari* is almost similar to the *Vilaangu koodu* operated in Tirunelveli district. Here, the *Thappai Pari* is made of bamboo sticks instead of iron and plastic coated wire mesh. Tender bamboos are selected for the construction of this gear. Bamboo sticks are split into 7-8 mm size stripes and seasoned by soaking in water for 2 days. The bamboo splits are shaved with knife to remove fibres adhering on them and dried under direct sunlight for 2 days. The seasoned bamboo sticks (40 Nos) are tied lengthwise to form tubular shape by stitching with iron sting and coir rope. There are two sizes of *Thappai Pari* recorded in Erode District.

Figure.9.Cylindrical Trap (Thappai Pari)



The small sized *Thappai Pari* with 900 mm length and 300 mm diameter and the larger one with 1500 mm length and 600 mm diameter are recorded.

A funnel shaped mouth is made separately and fixed in one end of the cylindrical body as shown in Plate 9. The other end is closed with partial openable lid to remove the fishes collected in the trap. The mouth of this *Thappai Pari* has extended pieces of split bamboo to hold the bait. Chicken intestine and dead fishes are used as baits. The varnish is applied all along the body of this trap to increase the life of the trap.

#### **4.2.9.2 Operation**

The baited *Thappai Pari* traps are immersed in the river and canals which has very slow water flow and thicker aquatic vegetation. The preferable water depth for this trap operation was 1.5 – 3 M. The fishes like Eel (*Vilaangu*) *Anguilla spp* and barred spiny eel (*Aaral*) *Mastacembalus spp* were mostly harvested by using this trap. End of operation, it is washed thoroughly by using fresh water in order to remove the adhered particles present in the trap. Both younger and elder generation are practicing this kind of fishing practices in this area. Normally, one person operates about 5 to 6 *Thappai Pari* at a time. The *Thappai Pari* fishing starts at 5 pm in the evening and ends at 6 am of the next day morning. Approximately, 4-6 kg of fishes is harvested in a *Thappai Pari* during peak season (July to November). There are about 200 fishermen families around the area of Bhavanisagar dam involved in this fishing.

**Table 10: Details of Cylindrical Split Bamboo Trap- *Thappai Pari***

SI.No	District	Water source/Place	Operation details	Catch details	Season of operation	cost (Rs)	Life expectancy of the gear (year)
1	Erode	River Bhavanisagar/ Pudur, Kodiveri and Keel Vani.	River and canals <b>Duration:</b> 10-12hrs <b>Depth:</b> 5 feet.	i. Eel ( <i>Vilaangu</i> ) <i>Anguilla</i> spp. ii. Barred spiny eel ( <i>Aaral</i> ) <i>Mastacembalus</i> spp.	July to November	600	2
2	Tiruchirappalli	River Kollidam/ Lalgudi	River and canals <b>Duration:</b> 12hr <b>Depth:</b> 5 to 10 feet.	i. Eel ( <i>Vilaangu</i> ) <i>Anguilla</i> spp. ii. Barred spiny eel ( <i>Aaral</i> ) <i>Mastacembalus</i> spp.	October to December	400	1
3	Coimbatore	River Bhavani	River <b>Duration:</b> 12hr <b>Depth:</b> 5 to 7 feet.	i. Eel ( <i>Vilaangu</i> ) <i>Anguilla</i> spp, ii. Barred spiny eel ( <i>Aaral</i> ) <i>Mastacembalus</i> spp.	July to December	500	2

#### **4.2.9.3 Scope for upgradation**

*Thappai Pari* is mainly used for capturing eels with low CPUE. The design could be improved by using iron frame and plastic coated wire mesh as in the case of *Vilaangu Koodu* operated in Tirunelveli district. Further studies are required to upgrade the design of *Thappai Pari* and also the bait studies could be carried out to improve the CPUE.

#### **4.2.10 Conical Bamboo Stick Trap- *Moongil Pari***

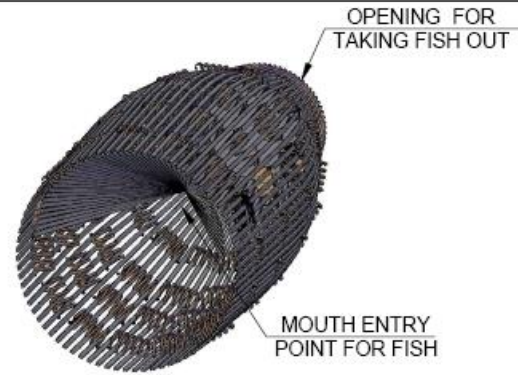
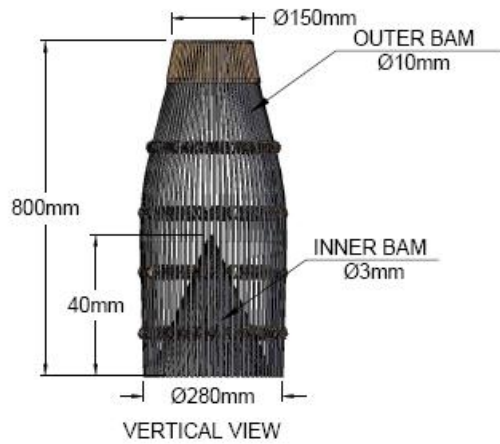
*Moongil Pari* is a trap operated in Cuddalore district. Indigenous knowledge of fishermen of Cuddalore district particularly Sathamangalam, Ponnankovil, Orathur areas familiar in making and operating this gear.

##### **4.2.10.1 Construction**

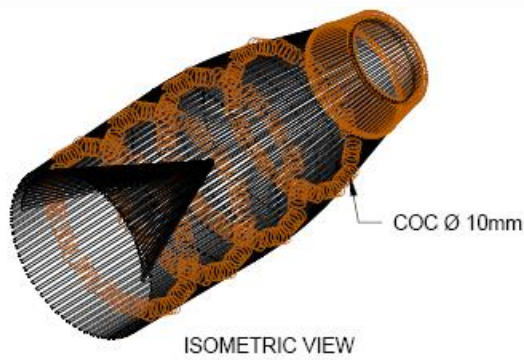
The construction of this type of gear is slightly different from *Thappai Pari* recorded in Erode district. Instead of split bamboo, here the whole bamboo sticks are used for construction of *Moongil Pari*. The total length of the *Moongil Pari* is slightly shorter (800 mm) when compared to *Thappai Pari* (900 mm). The shape of *Moongil Pari* is conical. Tender whole bamboo sticks are seasoned by soaking in water for two days and then laced with coir rope.

A funnel shaped mouth is made separately and fixed in the wider side (280 mm) of this gear. There is no special arrangement for keeping baits inside the gear. The bottom side of the gear (150 mm dia) is kept open and cloth is

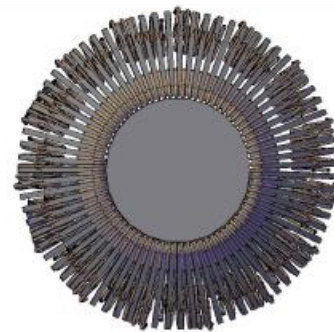
Figure.10. Conical Trap (Mungil Pari)



FRONT VIEW



ISOMETRIC VIEW



BACK VIEW

**Table 11: Details of Conical Bamboo Stick Trap - *Moongil Pari***

SI.No	District	Water source/Place	Operation details	Catch details	Season of operation	cost (Rs)	Life expectancy of the gear (year)
1	Cuddalore	River Ponniyar/ Sathamangalam Ponnankovil and Orathur	River and canals <b>Duration:</b> 12hrs <b>Depth:</b> 3-4feet.	I. Eel ( <i>Vilaangu</i> ) <i>Anguilla spp.</i> II. Barred spiny eel ( <i>Aaral</i> ) <i>Mastacembalus spp.</i> III. Barbels ( <i>Nattu Kendai</i> ) <i>Barbus spp.</i> IV. Catfish ( <i>Nattu Keluthi</i> ) <i>Pangassius spp.</i>	Dec to March	800	2-3

used to close at the time of operation of gear. The thickness of whole bamboo sticks used for body of the trap is 10 mm and the stick used for making mouth is 3mm. The technical details of this gear are given in the Fig. 10.

#### **4.2.10.2 Operation**

*Moongil Pari* is soaked in river and canals around evening 6 pm and take out in early morning 6 am. Fishes like eel (*vilaangu*) *Anguilla spp*, barred spiny eel (*Aaral*) *Mastacembalus spp* and catfish (*Nattu Keluthi*) *Pangassius spp*, are commonly caught by using the trap. The total cost of making a trap is about Rs 800. The life expectancy of the gear is about 2-3 years. After fishing the trap is thoroughly washed with freshwater to remove the adhered particles.

#### **4.2.10.3 Scope for upgradation**

*Moongil Pari* is designed with locally available materials and operated without bait. The Catch Per Unit Effort is recorded better than *Thappai Pari* (Table.17). The existing design could be continued without any modification.

#### **4.2.11 Dragged Gear-Ayirai Valai**

*Ayirai Valai* is a kind of drag net used for capturing *Lepidocephalus thermalis* (Loaches) in stagnated water bodies and canals of Palani and Dindigul districts. Fishes like Loaches and small cat fishes are mostly caught by using this net.

#### **4.2.11.1 Construction**

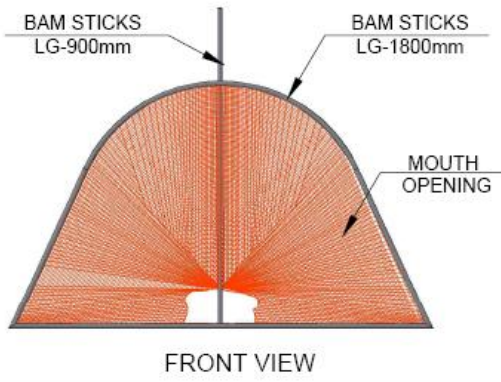
The construction of *Ayirai Valai* is simple, when compared to other indigenous gears reported under this study. Split bamboo stick measuring 1800 mm in length is made into inverted 'U' shape as shown in the Plate 11. Conical shape bag is made of mosquito net with the mouth opening. The mouth of the net was stitched with bamboo frame. A *Poolan* stick (*Phyllanthus spp*) with 900 mm in length is attached in the center portion of the mouth frame as shown in the Fig 11. The bottom of the mouth part is left as such without any frame structure.

#### **4.2.11.2 Operation**

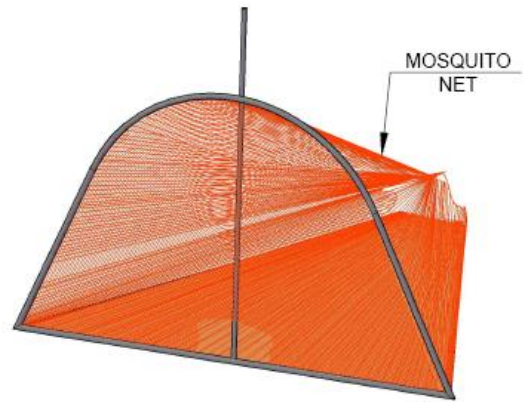
Two fishermen are required for operation of this gear. One on each side of the net and slowly drag on shallow waters fishermen standing either side of the net by holding the net frame in one hand and a lengthy stick on the other hand. The net is slowly pushed by fishermen by holding the net by agitating the water with the lengthy stick on the other hand. The fishes are frightened and directed to go inside the net as shown in the Plate 11.

If this net is carefully maintained the life expectancy could be even 3 years. After every fishing operation, the fishing net is thoroughly washed with fresh water for removing clay and other adhered particles and stored in well ventilated place. The cost of *Ayirai Valai* is Rs.800-1000/-. Fishing by this gear is carried out in the early morning or late evening hours. The average fishing duration is about 4-5 hrs/day and capture for about 10 kg of fishes/ day. The major fishing season is August to December.

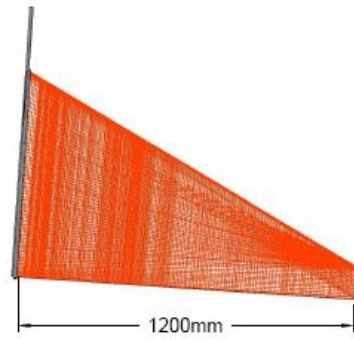
Figure.11.Dragged Gear (*Ayirai Valai*)



FRONT VIEW



ISOMETRIC VIEW



HORIZONTAL VIEW

#### **4.2.11.3 Scope for upgradation**

A type of drag net *Ayirai Valai* is recorded in Dindigul district for capturing the loaches. This gear is found to capture catfish *Pangassius spp* as by catch. The captured catfish were very small in size (around 50 mm total length) that too size before attaining first maturity. As the size of loaches ie, targeted fish is much smaller than the catfish, it is not possible to increase the mesh size. Instead, the fisherman could be advised to release the young catfish caught by this net.

#### **4.2.12 Dragged Gear-*Kachaal* Fishing**

*Kachaal* is a type of hand operated drag net. This is one of the widely practiced method in Krishnagiri district. Fishermen belonging to the villages of Penneshwaram, Thalialli, Marchchetialli and Jayanur are practicing this method, for capturing fishes from shallow water bodies covered with aquatic plants like water hyacinth and provide shelters to the small and newly recruited fishes.

**Table 12: Details of Draggged Gear-Ayirai Valai**

Sl.No	District	Water source/Place	Operation details	Catch details	Season of operation	Cost (Rs)	Life expectancy of the gear (year)
1	Dindigul	River Shanmuganathi/palani	River and canals <b>Duration:</b> 4-5hrs <b>Depth:</b> 3 feet.	I. Loaches ( <i>Ayirai</i> ) <i>Lepidocephalus thermalis</i>	August to December	800-1000	2-3

**Table 13: Details of Draggged Gear-Kachaal Fishing**

Sl. No	District	Water source/Place	Operation details	Catch details	Season of operation	Cost (Rs)	Life expectancy of the gear (year)
1	Krishnagiri	River Thenpennai/Thalialli, Penneshwaram, Marchchetialli and Jayanur.	River and canals <b>Duration:</b> 3hrs <b>Depth</b> :< 1 meter.	I. Reba Carp ( <i>Arainjhan</i> ) <i>cirrhina reba</i> . II. Olive barb ( <i>Panjala</i> ) <i>Puntius sarana</i> . III. Catfish ( <i>Nattu Keluthi</i> ) <i>Pangassius Spp</i> . IV. Spotted Snake head ( <i>Kuravai</i> ) <i>Obhiocephalus punctatus</i> .	December to March	1500	2

#### 4.2.12.1 Construction

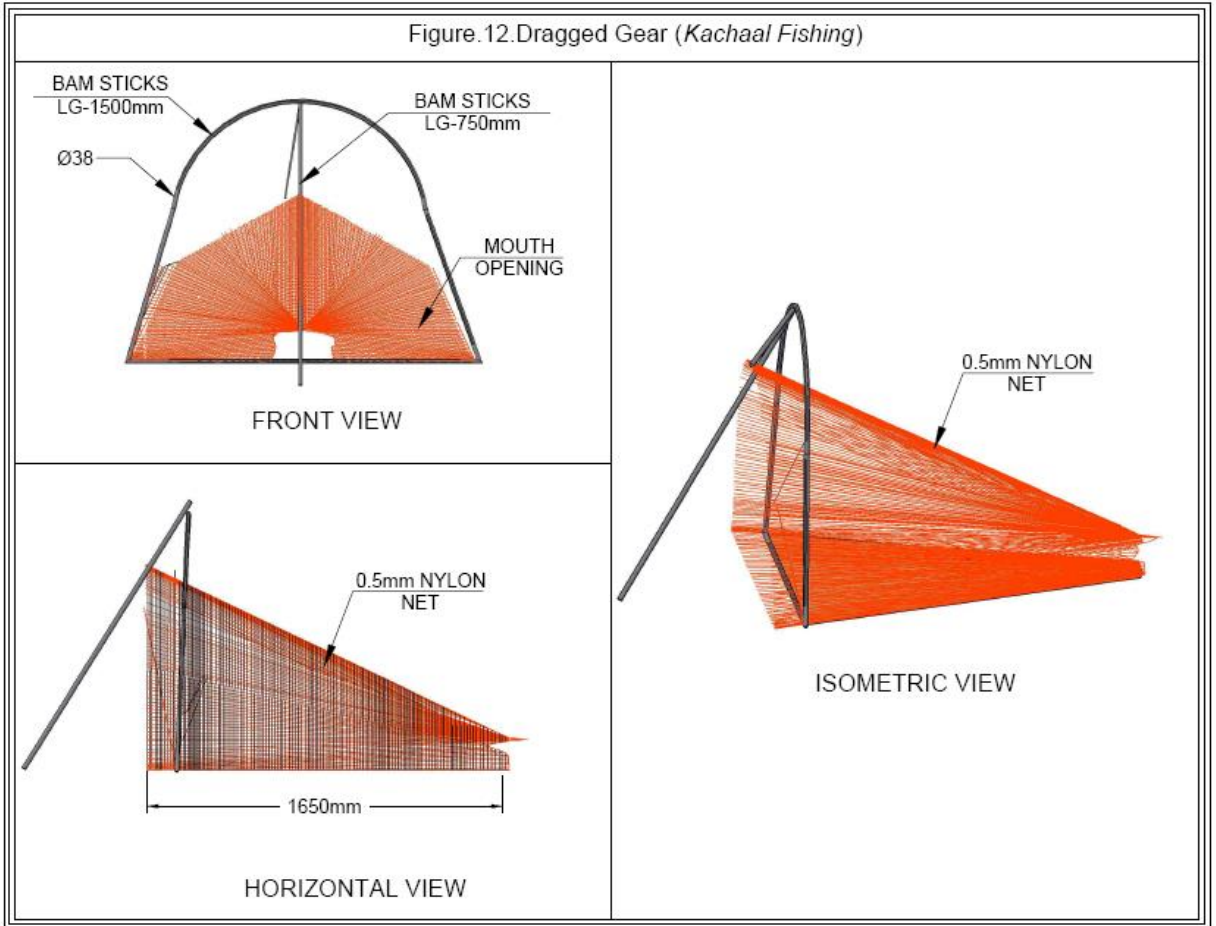
The structure of *Kachaal* net is depicted in the Fig .12. The general shape of the *Kachaal* is like *Ayirai valai* operated in Dindigul district. The frame is made with a fresh clean edged bamboo stick with 1.5 inch diameter and 1.5 m length. The bamboo stick is bend into semi circle shape and the conical bag (mesh size 0.5 mm) was stitched to it. The mouth opening at the bottom is around 1m. One more bamboo stick with the length of 0.75 m is attached vertically at the middle of the mouth frame and this provides good support and easy operation. Unlike *Aiyarai Valai* the frame of this net was not fully covered with nylon net and the operation of this net by a single fishermen. The cost of this net is around Rs.

1, 500/-

#### 4.2.12.2 Operation

This is an active fishing gear operated by hand dragging. Two fishermen are required for operation of this gear. One person operates the net and another for dispersing and disturbing the aquatic weed which shelters the fishes. This net is operated during morning hours and at a stretch this fishing net is operated for about 3 hrs. This fishing gear is mostly used for capturing the fishes like *Arainjhan* (*Cirrhina reba*), *Panjala* (*Barbus sarana*), *Nattu Keluthi* (*Pangassius Spp*) and *Kuravai* (*Obhiocephalus punctatus*) and operated from the month of December to March.

Figure. 12. Draggd Gear (*Kachaal Fishing*)



#### **4.2.12.3 Scope for upgradation**

As per the experience of the fisherman and the observation made during the study, the existing design doesn't require any modification.

#### **4.2.13 Bamboo Screen Barrier- *Shar Fishing***

*Shar Fishing* is a type of screen barrier, is used for capturing fishes from delta region of Cauvery and its tributaries like Puthu Aaru, Vadaaaru, Vennaru, Vettaru and Kudamurutty. This method is operated in seasonal running water bodies of Thanjavur and Thiruvarur district to harvest the fishes. However, it is the most prevalent in the villages of Thanjavur like Ammapettai, Ayyampettai, Vaiyalur and Thiruvaiyaru. It is strongly believed that this method evolved from the effort of fishermen from these districts.

##### **4.2.13.1 Construction**

In this method, the fishes are captured by screening. The channel with 3 M width and 1.8 M depth is screened by using two bamboo panels as shown in the Plate 13. The first panel is in the shape of 'V' with the gap of about 3 inches in between bamboo sticks. The second panel is in the shape of square fixed vertically across the canal. The gap provided in the first 'V' panel allows the fishes to pass through and get trapped in between the panels. The gap between the two panels is about 1.5 meter. The bottom of the channel cleared without grasses then dig for about 7.5 cm width and 15 cm depth for fixing the panel vertically. Two poles with the specification of 1 meter height and 5 cm dia, are hammered near the sharp edges of the first panel for about 15 cm on the bottom of the channel, to provide support, withstand water force and

**Table 14: Details of Bamboo Screen Barrier- Shar Fishing**

SI.No	District	Water source/ Place	Operation details	Catch details	Season of operation	Cost (Rs)	Life expectancy of the gear (year)
1	Thanjavur and Thiruvarur	River Cauvery/ Ammappettai, Ayyampettai, Vaiyalur and Thiruvaiyaru.	canals <b>Duration:</b> 10hrs <b>Depth:</b> 5-7 feet.	<p>I. Barbels (<i>Nattu Kendai</i>) <i>Barbus spp.</i></p> <p>II. Catfish (<i>Nattu Keluthi</i>) <i>Pangassius spp.</i></p> <p>III. Eel (<i>Vilaangu</i>) <i>Anguilla spp.</i></p> <p>IV. Barred spiny eel (<i>Aaral</i>) <i>Mastacembalus spp.</i></p> <p>V. Spotted Snake head (<i>Kuravai</i>) <i>Obhiocephalus punctatus.</i></p> <p>VI. Giant murrel (<i>Viral</i>) (<i>Channa marulius</i>)</p>	September to December	3000	5

maintain the gap between two panels. Later, the trapped fishes are collected by using mosquito net and scoop net.

The success of this method purely relies on construction of panels. The locally available resources such as reed, bamboo and eechai (*Phoenix Pusilla*) are used for making of this panel. Coconut coir is most widely used for securing the sticks together. The sticks used for making panels seasoned before starting construction. This is done for getting required moisture level, which eases the construction and realizing proper shape. The sticks of different species have different seasoning procedure. Reed sticks are dried under direct sun light after removing its bark. Bamboo is seasoned by dipping it in water for about 3 days. This boosts the bamboos flexibility and comfort in construction of panel. The construction of bamboo panel takes almost 5 days. The diameter of reed used for making panel is 2.5 cm and the length is about 1.5 meter. The space between the reed sticks maintained for about 0.5 cm in the panel. The panels of bamboo have the life expectancy of about 5 years and the cost of construction is Rs 3000/-. Panoramio panel have the life span of 2 years and the cost for construction is Rs 1000/ but in case of reed panels have the life span of 1 year and the cost is Rs 600/-.The major fishing season for this method is from September to December. The average quantity harvested per day is 15 kg. The main species captured by using this method is Barbs (*Nattu Kendai*) *Barbus spp*, Catfish (*Nattu Keluthi*) *Pangassius spp*, Eel (*Vilaangu*) *Anguilla spp*, Barred spiny eel (*Aaral*) *Mastacembalus spp*, Spotted Snake head (*Kuravai*) *Obhiocephalus punctatus* and Giant murrel (*Viral*) (*Channa marulius*).

#### **4.2.13.2 Scope for upgradation**

The barrier used for *Shar Fishing* in Thanjavur and Thiruvarur districts; require design upgradation to increase the life expectancy of the gear. The barrier could be designed by using synthetic webbings supported with wooden poles.

#### **4.2.14 Fish Aggregating Device (FAD) - *Aaralkaththai***

*Aaralkaththai* is a type of fish aggregating device used for capturing fishes from shallow stagnant waters. *Vathalilai* (*Turkey berry* leaves) and *Kakattan* plants are widely used for fish aggregating purpose. Fishermen belong to Dharmapuri district mainly from the fishing villages such as Neruppur, Kottayoor and Pennaharam are employing this technique to harvest fishes.

##### **4.2.14.1 Construction**

The plant branches with leaves of *Vathalilai* Turkey berry leaves (*Solanum torvum*) and *Kakattan* plants are tied together in three layers as a bunch. The first layer with *kakattan* (ground layer), second one with *Vathalilai* (centre layer) and third layer (top) is *kakattan*, are arranged and tied properly. Both front and back end of the bunch are tied tightly and the centre loosened. The looseness of centre of the bunch facilitates fishes to enter inside and hide.

##### **4.2.14.2 Operation**

The tied bunch of branches are fixed at the bottom by using stones. The place where the fishermen kept the bunches marked with a closed plastic container, which is tied with the centre line of bunch by using thread. During the

peak season, bunches of leaves are also tied horizontally from main line at a distance of 30 cm like longlines. The plastic containers are connected at both ends as markers.

During soaking in water, the leaves in the bunches get decayed and this is believed to attract the fishes. After 2 days the fishermen take the bunch and shake it in a container to remove the hidden fishes from the bunches. From one branch line bunch about 4 kg of fishes harvested during peak fishing season during April to July.

#### **4.2.15 Fish Aggregating Device (FAD) - *Kattu Fishing***

Like *Aaralkaththai* the *Kattu Fishing* is also a type of fish aggregating device. This fishing method is mostly practiced at Bhavanisgar areas. This area blessed rich amount *Poolan chedi* (*Phyllanthus spp*), *Thulasi* (*Ocimum tenuiflorum*), *Poonkamaram chedi* (*Millettia spp*) and whose topographical feature supports for the same.

##### **4.2.15.1 Operation**

The fishermen of Bhavanisagar area are utilizing the local resources for from the running/ stagnating waters. Fresh leaves of the plants mentioned above the tied together and anchored in the bottom of the water body by using stone. The target species of fishes are *Vilaangu* (eel), *Aaral* (Barred spiny eel). It is believed that the *Kattu* soaked in the water provides cool shelter and pleasant smell which, helps in attracting the fishes especially the *Thulasi*. The time required for making a *Kattu* fishing was about 2-3 hrs. The life expectancy of

*Kattu* is one months. Approximately 3 kg fish captured per day of operation by using of one *Kattu*. Generally *Kattu* was anchored at evening or late evening and take it out by after 2 days. This type of fishing was followed both by fishermen and fisherwomen. The operation depth of this kind of fishing is 3-5 feet. The immersing time of '*Kattu*' is 48 hrs and operated throughout the year.

**Table 15: Details of Fish Aggregating Device (FAD) -Aaralkaththai**

Sl.No	District	Water source/ Place	Operation details	Catch details	Season of operation	Cost (Rs)	Life expectancy of the gear (year)
1	Dharmapuri	River Cauvery/ Pennagaram	River, streams and canals <b>Duration:</b> 48 hrs <b>Depth:</b> 3-5 feet.	I. Barred spiny eel ( <i>Aaral</i> ) <i>Mastacembalus spp.</i>	April to July	No investment	1 month/ one FAD

**Table 16: Details of Fish Aggregating Device (FAD)-Kattu Fishing**

Sl.No	District	Water source/Place	Operation details	Catch details	Season of operation	Cost (Rs)	Life expectancy of the gear (year)
1	Erode	River Bhavanisagar/ Pudur, Kodiveri and Keel Vani.	River, streams and canals <b>Duration:</b> 48 hrs <b>Depth:</b> 3-5 feet.	I.Eel ( <i>Vilaangu</i> ) <i>Anguilla spp.</i> II.Barred spiny eel ( <i>Aaral</i> ) <i>Mastacembalus spp.</i>	Throughout the year	No investment	1 month/ one FAD

#### **4.2.16 *Katcha* (Palmyra bag)**

*Katcha* is a collection bag used for storing the fishes caught from the pond or lake. It is made of using palmyra leaves and coir ropes. Upper side of this conical the bag is open and narrow but the bottom is wider and closed. The neck portion of the bag laced with a coir/nylon rope which is used for tie the bag tightly around the hip of the fishermen. A provision is given on the neck portion of the bag to shrink/purse for prevent escaping of collected fishes. The height of the bag is 30 cm, length is 60 cm and width is 30 cm. The storage capacity of *Katcha* is 10 to 15 kg. This type of practice is mostly prevailing among the fishermen of Pudukottai district.

#### **4.3 Catch per unit Effort (CPUE) of Traditional fishing gears of Tamil**

##### **Nadu**

The details of average Catch Per Unit Effort (CPUE) for various traditional fishing gears operated in inland waters of Tamil Nadu are presented in the Table 17. The traditional fishing gears reported under this study were seasonal, mainly operated during the post monsoon of North East. The inland fishing gears such as *Vilaangu Koodu*, *Paanai Pari*, *Kottu Pari*, *Yeantha Pari*, *Thappai Pari*, *Moongil Pari*, *Kattu Fishing* and *Aaralkaththai* were found to operated by a single fishermen. The gears such as *Aiyirai koodu*, *Tholugu Pari*, *Iruvaai Pari*, *Ayirai Valai* and *Kachaal Fishing* were operated by two fishermen. *Shar Fishing* practiced in Thanjavur and Thiruvarur districts were reported to be operated by four fishermen. In the case of *Ootha* fishing performed in the Tiruchirappalli, Nagapattinam, Pudukottai, Vellore, Kanchipuram and Tiruvannamalai districts

were operated by a group of fishermen comprised of 2-3 numbers. But each fishermen will operate a *Ootha* gear and the total catch is shared among them. Since the gear is operated in very shallow stagnant water the gear is operated for only one hour. Mainly during night hours. *Yeantha Pari* is a active fishing gear operated for 2 hrs continuously by fishermen. The fishing gears such as *Paanai Pari* and *Kottu Pari* are operated for short period of time as the size of fishing gear is small and quickly filled with fish catch during peak seasons.

The CPUE for each net has been calculated and expressed in terms of kg/hr/ gear. High CPUE (more than 2 kg/hr/gear) has been recorded with *Ayirai Koodu*, *Kottu Pari*, *Ayirai Valai*, *Kachaal Fishing* and all types of *Ootha* fishing gears operated in many districts of Tamil Nadu.

Moderate catch around 1.5 kg/hr/gear was reported from *Paanai Pari*, *Tholugu Pari*, *Iruvaai Pari*, *Yeantha Pari* and *Shar Fishing* gears. Very poor CPUE was recorded with *Vilaangu Koodu*, *Thappai Pari*, *Moongil Pari*, *Kattu Fishing* and *Aaralkaththai* types of fishing gears. So that gears reported from various districts of Tamil Nadu showed higher value of CPUE more than 2.5 kg/hr/gear.

**Table: 17 Catch Per Unit Effort (CPUE) of Traditional fishing gears of Tamil Nadu**

Districts	Gear	No. of person involved in operation	Average soaking hours per day	Average Total catch (kg)	Average CPUE kg/hr/gear
Tirunelveli	<i>Ayirai Koodu</i>	2	12 hrs	30	2.500
	<i>Vilaangu Koodu</i>	1	12 hrs	03	0.250
Madurai	<i>Paanai Pari</i>	1	5hrs	08	1.600
Theni	<i>Kottu Pari</i>	1	3 hrs	08	2.666
	<i>Tholugu Pari</i>	2	10hrs	15	1.500
	<i>Paanai Pari</i>	1	4hrs	6	1.500
Dindigul	<i>Iruvaai Pari</i>	2	12 hrs	15	1.250
	<i>Yeantha Pari</i>	1	2hrs	02	1.000
	<i>Ayirai Valai</i>	2	5 hrs	10	2.000
Coimbatore	<i>Thappai Pari</i>	1	12 hrs	04	0.300
Tiruchirappalli	<i>Thappai Pari</i>	1	12 hrs	04	0.300
	<i>Ootha</i>	2*	1 hr	06	3.000
Erode	<i>Thappai Pari</i>	1	12 hrs	06	0.500
	<i>Kattu Fishing</i>	1	48hrs	03	0.062
Dharmapuri	<i>Aaralkaththai</i>	1	48 hrs	04	0.083
Krishnagiri	<i>Kachaal Fishing</i>	2	3 hrs	06	2.000
Nagapattinam	<i>Ootha</i>	3*	1 hr	09	3.000
Pudukottai	<i>Ootha</i>	3*	1 hr	08	2.600
Thanjavur	<i>Shar Fishing</i>	4	10hrs	15	1.500
Thiruvarur	<i>Shar Fishing</i>	4	10 hrs	15	1.500
Vellore	<i>Ootha</i>	2*	1 hr	05	2.500
Cuddalore	<i>Moongil Pari</i>	1	12 hrs	04	0.333
Kanchipuram	<i>Ootha</i>	2*	1 hr	08	4.000
Tiruvannamalai	<i>Ootha</i>	3*	1 hr	08	2.600

\**Ootha* type of gear will be operated by group of fishermen with one fishing gear per person. The total catch is shared by the group of fishermen

## 5. Discussion

### 5.1 Distribution of Traditional Fishing gears in Tamil Nadu

Sixteen different traditional fishing gears were reported from 17 districts of the state. The sixteen gears included 10 types of traps, two fish aggregating devices, one fish baskets, two dragged gears and one fish barrier. *Katcha*, a small fish carrying basket traditionally constructed, was found used in Pudukottai district. Of the 17 districts surveyed, the inland fishermen of Theni and Dindigul districts were found to use three different traditional fishing gears specific to each districts. Further, three districts viz, Tirunelveli, Tirchirappalli and Erode Districts were reported with 2 traditional gears specific to each of them. The remaining districts Madurai, Coimbatore, Dharmapuri, Krishnagiri, Nagapattinam, Thanjavur, Thiruvarur, Vellore, Cuddalore, Kanchipuram and Tiruvannamalai were reported each one with a specific traditional fishing gear.

Rathakrishnan et al (2009) have reported only two traditional fishing gears, and one fish carrying basket in Nagapattinam districts of Tamil Nadu. They have reported two types of fishing gears such as *Pari* and *Ootha* in Nagapattinam district. However, in the present study, only *Ootha* was reported and *Pari* was not reported in any of the fishing villages surveyed in Nagapattinam district.

A cover pot type of trap locally called *Ootha* was found in six districts (Tiruchirappalli, Nagapattinam, Pudukottai, Vellore, Kanchipuram and Tiruvannamalai) of Tamil Nadu. Though the basic structure and operational method of *Ootha* reported in different districts remained the same, they differed

with respect construction materials which were unique and different for each district. Rathakrishnan et al (2009) reported a type of *Ootha* from Nagapattinam district. In the present study also *Ootha* was reported from Nagapattinam district. The *Ootha* has been reported in different parts of India by different authors Shaji and Laladhas (2013) reported an *Ootha* type of cover pot trap in Kerala, locally called as *Ottal/ Oothal*. Also they made a remark that the word *Ootha* might have originated from Tamil language. A bell shaped *Ootha* type plunge cover basket has also been reported in central valley region of Manipur state (Devi et al, 2013). A conical basket locally called as '*Taap*' was recorded from Faizabad district of eastern Uttar Pradesh (Prasad et al, 2013). The '*Taap*' types of *Ootha* have been used to capture fishes from weed infested ponds where net operation was difficult. However, usage of '*Taap*' was restricted only to shallow waters.

The second type of traditional fishing gear called *Thappai Pari* was recorded from three districts of Tamil Nadu. *Thappai Pari* was reported from river beds of Bhavani of Coimbatore and Erode districts and of Cauvery river beds of Tiruchirappalli district.

Third type of fishing gear was Pot trap namely *Paanai Pari*, fish barrier-*Shar Fishing* was reported from two districts each. The *Paanai Pari* was reported from Vaigai river beds of Madurai and Theni districts. *Shar fishing* barrier was reported in along the Cauvery River beds of Thanjavur and Thiruvarur districts.

The remaining 13 other fishing gears reported under this study had the distribution rate of one per district.

## 5.2 Construction of Traditional inland fishing gears of Tamil Nadu

The construction of traditional inland fishing gears were found to be carried out only with locally available natural plant materials. Out of 16 fishing gears reported in the present, five were found constructed using coconut leaflet sticks, derived from the leaves of coconut tree. As coconut tree leaves are available in plenty in most of the riverine areas of Tamil Nadu, the inland fishermen could be able get this material in adequate quantity. The traditional fishing gears such as *Tholugu Pari*, *Iruvaai Pari*, *Kottu Pari*, *Yeantha Pari* and *Ayirai Koodu* were found constructed using coconut leaflet sticks. The main body of the fishing gears were made using coconut leaflet sticks and further strengthened with *Poolan* sticks and split bamboo. However, in the case of *Thappai Pari* and *Moongil Pari*, bamboo sticks and bamboo splits were alone used for construction. These two fishing gears were common in the Coimbatore, Tiruchirappalli, Erode and Cuddalore districts, where the bamboo plants are available in plenty.

*Ayirai Valai* a dragged gear operated in Dindigul district was found made up of bamboo frame with mosquito net. Another dragged gear found operated in Krishnagiri district and locally called as *Kachaal* was also constructed as *Ayirai Valai*, however, nylon screen was used instead of mosquito net. These two fishing gears may be upgraded replacing the mosquito net and nylon screen with modern webbings. The frame structure of the two gears may be kept as such with bamboo sticks.

Dragged gear similar to *Ayirai Valai* of Tamil Nadu has been reported from slow moving rivers of North East Indian by Gurumayum and Choudhury (2009). *Srivastava* and *Srivastava* (2011) reported the practice of using a piece of mosquito net without frame for capturing small prawns (*Macrobrachium lamarrei*) and fishes from shallow water region of Lake Suraha of Uttar Pradesh. A simple drag net has also been reported by Manna et al (2011) from Krishna riverine areas of Andhra Pradesh, where the water depth ranges from 0.5 to 2 m. However, in the present survey *Ayirai Valai* and *Kachhal*, were found operated only in very shallow waters with depth ranging from 0.5 to 1 m.

The only one barrier type gear reported in the present study was *Shar Fishing* barrier, which was found operated across the streams of Thiruvavur and Thanjavur districts. This net was constructed with locally available materials such as bamboo, reed and *Panaromia* plant sticks. *Shar Fishing* barrier was found to be a traditional gear and construction was found to be done only by experienced person.

Fish fences or screen barriers are long leaders of converging screen erected in shallow waters in order to lead the fishes into the chambers fixed at the end. These types of barrier nets are common in both brackish water and freshwater system to capture fishes in many parts of the world. The fences (screen) made up locally available non-textile materials are generally known as weirs or pound nets. If the barrier is made up of netting then the net is called as set nets (Brandt, 1972). Weirs, made of bamboo screen locally called *Thatta-Khonda* has been reported in Lake Chilka, Orissa (Mohapatra, 1955).

Banas is a typical set net barrier used in northern India across the banks of the channels which connect beel to its riverine source (Yadava and Choudhury 1986, Choudhury, 1992). Similar types of barrier/ set nets have been reported from backwaters and brackish water region of different parts of India (Wishard 1976, Remesan et al 2002; Krishnamurthy and Rao, 1970).

Fishermen all over the world use some kind of traditional knowledge to attract and aggregate fishes to facilitate easy harvest. Use of Fish Aggregating Device (FAD) is common method of attracting fish to aggregate fish to a particular place. The FAD structure may be temporary or permanent. In general, temporary FAD structures are used in freshwater systems. In the present study, two FADs were reported one from Dharmapuri and another from Erode district. *Aaralkaththai*, a typical traditional FAD was found used in Cauvery river in Dharmapuri district. Leaves of two different types of locally available plants such as Turkey berry (*Solanum torvum*) and *kakattan*. Usage of similar types of FAD made up of plant leaves has been reported by Nightingale *et al* (2013) in Manipur state. The authors have reported the FADs as “*Phoom namba*” and “*Phoomdao thumba*” which were mainly used for air breathing fishes. The FAD locally called as ‘*Kao*’ has been used for capturing grass carps in Laktak Lake of Manipur.

The bunch of branches of plants were found attracted barred spiny eel (*Mastacembalus spp*) locally known as *Aaral*. The attraction of eel into the bunch of plant branches behaviour of eel may be attributed to hiding. This species of eel generally hide in crevices available in rocks and stones when the water level is high. When the water level comes down, the watershed area gets reduced and

the rocky stones are exposed. Hence, the eels start looking for hiding place, and the FAD *Aaralkaththai* was found suitable to hide.

A similar type of FAD has been reported from Bhavani riverine system of Erode district. This traditional FAD was locally known as '*Kattu Fishing*' made up of three types of plants, namely *Poolanchedi* (*Phyllanthus spp*), *Thulasi* (*Ocimum tenuiflorum*) and *Poonkamaram chedi* (*Millettia spp*). This FAD was also mainly used for capturing eels. Of the three types of plants used the '*Pungai*' plant was found to give dense and cool shades while *Thulsi* give a peculiar attractive smell on decay. The other plant *Poolan* was available locally in plenty and hence used for hiding purpose. As in the case of *Aaralkaththai*, this *Kattu* FAD was also found to attract eels in same way, when the water level recedes.

Generally the FAD are placed permanently in a specific location to attract fishes as may provide food and shelter. However, in the present study, the two types of FADs were found used temporarily to provide shelter in absence of their typical rocky and stony habitat.

*Katcha* a simple fish collection basket was reported from Pudukottai district. *Katcha* was found made from Palmyra leaves, which is locally available in Pudukottai district. Rathakrishnan et al (2009) has also reported the usage of *Katcha* in the inland waters of Nagapattinam district.

In general, almost all the traditional fishing gears reported during this study were found operated in the different riverine systems only during monsoon and post monsoon season.

### 5.3 Operation of traditional inland fishing gears of Tamil Nadu

Operation of diverse types of traps such as box traps, filter traps, tubular traps, plunge baskets, pound traps, etc. In the inland water bodies of India have been reported by Job and Pantulu (1953).

In the present study the traditional fishing gears were generally found operated in the shallow waters of rivers, canals, channels, lakes, ponds and tanks. Further, they were mostly found operated in rivers. Out of the 16 traditional fishing gears reported under this study, 13 viz *Tholugu Pari*, *Iruvaai Pari*, *Ayirai Koodu*, *Paanai Pari*, *Kottu Pari*, *Yeantha Pari*, *Thappai Pari*, *Moongil Pari*, *Ayirai Valai*, *Kachaal Fishing*, *Aaralkathai*, *Kattu Fishing* and *Shar Fishing* barrier were found used in rivers. Further, these gears were found mainly operated in small and medium sized canals / channels, where the water flow is less.

The fishing gears such as *Vilaangu Koodu* and *Ootha* were mainly used in shallow stagnant seasonal water bodies. *Ootha* were found operated in six districts and 2 to 3 fishermen were found involved in operation. Rathakrishnan et al (2009) reported the operation of *Ootha* fishing gears both in running and stagnated water bodies. However, in the present study operation of *Ootha* was found restricted to shallow stagnated water bodies of six districts of Tamil Nadu (Table 1). Usage of similar type of conical basket type gear called '*Taap*' in stagnant water bodies of Uttar Pradesh has been reported by Prasad et al (2013).

*Tholugu Pari*, *Ayirai Koodu* and *Iruvaai Pari* were found operated similarly between the banks of small canals of Vaigai, Thamirabarani and Shanmuganathi

respectively. All the three fishing gears were found used to capture loaches, freshwater catfishes and small carps. They were also found operated following same fishing duration. They were found set during late evening and fishes were collected during early morning hours. Further *Paanai Pari* and *Kottu Pari* were found operated mainly for loaches, catfish and carps. *Kottu Pari* had a good filtering mechanism than *Paanai Pari* as the former is constructed by coconut leaflet sticks. As *Kottu Pari* has filtering mechanism the fish caught in the gear could not easily escape, where as in *Paanai Pari* is a pot where in, escapement chance are found relatively high.

*Yeantha Pari* was found operated as an active gear in Shanmuganathi river of Dindigul district. Single fishermen could operate this gear to capture catfish and carps.

The operational procedure of *Vilaangu Koodu*, *Thappai Pari* and *Moongil Pari* in the rivers was found to be the same, however the *Vilaangu Koodu* was found operated in stagnant water bodies. In the present study the two types of FADs namely *Aaralkaththai* and *Kattu* were found operated adopting similar procedure. *Shar Fishing* barrier of Thanjavur district required a maximum four fishermen for construction and operation.

#### **5.4 Catch per unit Effort (CPUE) for traditional fishing gears**

The soaking duration hours of each of the traditional fishing gear reported in the study varied significantly. FAD such as *Aaralkaththai* and *Kattu Fishing* required 48 hours for complete operation. However, fishing gears such as *Ayirai*

*Koodu, Vilaangu Koodu, Iruvaai Pari, Thappai Pari* and *Moongil Pari* required a less soaking duration of 12 hours from 6.00 pm to 6.00 am.

*Tholugu Pari* and *Shar Fishing* barrier required a soaking duration of 10 hours during night. Though the operational procedure of both *Kottu Pari* and *Paanai Pari* remained the same, the farmer required a soaking duration of 5 hrs while the latter required just 3 hrs. The dragged gear like *Kachaal* and *Ayirai Valai* were operated for only 3 to 5 hours as may require continuous dragging by fishermen.

Among all the types of traditional gears observed *Ootha* was the fishing gear which required the least soaking duration of just one hour.

The maximum quantity of loaches as much as 30 kg catch was recorded for *Ayirai Koodu* in 12 hrs of operation and a minimum catch of 2 kg was recorded for *Iruvaai Pari*. *Tholugu Pari* and *Shar Fishing* barrier were also showed good catch rate. As higher as much as CPUE of 4.00 kg/ hr was recorded for *Ootha* reported in Kanchipuram district. This was mainly due frequent operation by a group of fisherman. Further, the fish caught in *Ootha* were also very large in size (400g/ fish). Very poor CPUE of 0.062 kg and 0.083 kg were reported for *Kattu* and *Aaralkaththai*, as these gears were soaked a long duration of for 48 hours. However, these two gears yielded higher total catch compared to other gears. The CPUE of *Ayirai Koodu, Paanai Pari, Ayirai Valai* and *Kachaal Fishing* were also found to be good compared to gears such as *Vilaangu Koodu* and *Thappai Pari*.

Rathakrishnan et al (2009) has reported the average total catch rate of *Pari* to range from 5 to 10 kg per operation. Upadhyay and Singh (2013) have reported an average catch details of different types of inland fishing gears such as gillnet (*Chat Jal*), Bag net (*Faloom Jal*), Dragnet (*Atha Jal*), dragnet (*Para Jal*), Bag net (*Chapila Jal*) as 10-15 kg/day, 15-29 kg/day, 60 kg/catch, 10-100 kg fish/time and 7-12 kg/ day respectively. However, in the present study operated in *Tholugu Pari* Vaigai River in Theni district recorded highest total mean catch of 15 kg per operation.

### **5.5 Upgradation and optimization of inland traditional fishing gears of Tamil Nadu**

All the fishing gears reported from inland water bodies of Tamil Nadu were found to be strictly seasonal. These gears were found used only for two or three months during monsoon and post-monsoon months. The inland fishermen involved in the fishing gear operation were identified as part time fishermen and hence, most of the gears were operated commercial scale. The gears operated targeting loaches were also operated on commercial scale.

As most of the fishing gears yield small quantity of catch and was seasonal, optimization of inland traditional gears studied could not recommended. However some of the fishing gears need upgradation in terms of design and operation.

The gears like *Tholugu Pari*, *Iruvaai Pari* and *Ayirai Koodu* were found to capture frogs and snakes besides loaches and hence they eat upon the loaches. Hence, design upgradation studies are suggested to prevent the entry of frogs

and snakes in to the collection chamber of *Tholugu Pari*, *Iruvaai Pari* and *Ayirai Koodu*.

With regard to *Paanai Pari*, the mud pot used as collection chamber is not allowing the flowing water to filter as in the case of other gears. As the water also gets collected along with the fishes in the pot, the pot gets filled with in short time. This cause the escapement of loaches and catfishes along with the overflowing water from the pot. Further research is required to optimize the mouth size of the *Paanai Pari* and providing mud pot with filtering mechanism. In the case of *Kottu Pari* may be increased to hold more quantity of catch.

The *Vilaangu Koodu* operated in the Thamirabarani riverine systems yielded very low catches despite the usage of bait during fishing. Though construction wise the gear is found ideal, better baits for eels may be invented for fishing eels with *Vilaangu Koodu*.

The catfishes caught along with loaches in *Ayirai Valai* were found to be very small and caught before attaining their first maturity. As the target species the loach very small cat fishes are also caught and exploited. Hence, the fishermen operating the *Ayirai Valai* may be advised to release small cat fishes back to the water. The fishermen may be advised to keep small cat fishes soon after their catch in a separate 'happa' to use for culture in stagnant water bodies so as to grow them up to marketable size. Awareness campaign may be arranged through fishermen co-operatives.

The barrier type of fishing gear operated in Thanjavur and Thiruvarur districts called *Shar Fishing* barrier also needs upgradation by introducing

synthetic webbings for the construction of barriers. Unlike the bamboo barrier it could be easy to create barrier with synthetic webbings.

In general the inland fishermen of Tamil Nadu may be advised to form organized body to collect the fishes and sell at reasonable prices. Except the loaches and murrels other fishes from inland water bodies are not sold on commercial scale as the catch per unit effort of them is low and the availability in seasonal. Hence, the organized bodies may be formed to create in a common sales counter so as to sell the valuable tasty inland fishes also on commercial scale at reasonable market prize considering benefit to the inland fisherman.

## 6. SUMMARY

The salient findings of the study are furnished below.

1. There were 16 different traditional fishing gears and methods reported from inland waters of 17 districts of Tamil Nadu.
2. A traditional trap called *Pari* was found in Madurai, Theni, Tiruchirappalli, Cuddalore and Erode districts. The construction and operation were unique for each district for the gear *Pari*.
3. A traditional type of cover pot called *Ootha* was recorded in Thiruchirappalli, Nagapattinam, Pudukottai, Kancheepuram, Thiruvannamalai and Vellore districts.
4. *Shar Fishing* generally known as screen barrier was reported to operate in two districts namely, Thanjavur and Thiruvarur of Cauvery delta areas.
5. The inland fishermen of Tirunelveli district were operating '*Ayirai Koodu*' for the capture of loaches and '*Vilaangu Koodu*' for the capture of eels in River Thamirabarani.
6. Fish aggregating devices such as *Aaralkaththai* and *Kattu Fishing* were found to be practiced in Erode and Dharmapuri district. The bunches of locally available plants are used as aggregating devices.
7. A traditional conical trap called '*Tholugu Pari*' is operated in Vaigai river beds of Theni district to capture loaches, cat fishes, eels and carps. It is suggested to upgrade the design of trap and operation method to prevent the entry of water snakes and frogs.
8. *Iruvaai Pari* is kind of box trap operated in Dindigul district. This was mainly found operated in shallow waters during November to March with the aim to capture murels, carps, cat fish etc.
9. Box type of trap '*Ayirai Koodu*' was reported to operate in Thamirabarani riverine system of Tirunelveli district to capture loaches, locally called '*Ayirai*'

10. A pot trap locally called *Paanai Pari* is unique and popular method to capture loaches and cat fishes in Madurai and Theni districts. In this trap mud pot is used instead of trapping device.
11. '*Kottu Pari*' is a cylindrical trap, whose shape is similar to the traditional musical instrument called '*Kottu*' and the operation of *Kottu Pari* is as similar to that of *Paanai Pari*.
12. *Vilaangu Koodu* and *Thappai Pari* are operated in Tirunelveli and Erode districts respectively with the aim to capture eels. Design and operation of these two gears are similar but the materials used for construction are different for these gears.
13. *Yantha Pari* is one of the most common active fishing gears operated in Dindigul district. This gear is operated like a scoop net.
14. *Ootha* is an active fishing gear categorized under cover pot or plunge basket and distributed in six districts of Tamil Nadu. This gear is mainly used for capture of eels and murels in shallow waters.
15. Two types of dragged gears *Ayirai Valai* and *Kachhal Fishing* are used in Dindigul and Krishnagiri districts.
16. A screen barrier type fishing gear is found operated in Thanjavur and Thiruvarur districts.
17. Two different types of fish aggregating devices reported in inland waters of Tamil Nadu, they are, *Aaralkaththai* and *Kattu Fishing*.
18. CPUE for different types of fishing gears are recorded and it is found that CPUE is higher for *Ootha*, as it catches bigger fishes.
19. All the fishing gears reported from inland waters of Tamil Nadu are found only seasonal.

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