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Indigenous Inland Fish Traps and Pots of Maharashtra, India

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Abstract

Variety of trap designs are operational in the inland and marine waters of India. Limited records are available on the structure and operational aspects of fish traps, especially from inland waters. A study was carried out for documentation of traditional fish trapping devices along six districts of Maharashtra. Of the traps surveyed, typical designs were identified such as rectangular, conical, and cylindrical either baited or un-baited, with or without funnels. Traps are eco-friendly fishing gears and their structure and designs vary with the region as well as the availability of materials. Over the period, the number of traditional fishing traps is decreasing due to various facts viz. non-availability of raw materials, lack of expertise for construction, low catch rate etc. Most of the depicted traps were indigenous, used for capturing crabs, shrimps, and small finfish from the inland waters, and actively operated during the pre and post-monsoon season as a livelihood option for the fishers. There is a possibility for modernising the traditional fish traps with the most efficient designs and durable gear materials for recuperating the efficiency, which will ultimately improve the life of fishers.

Keywords: Passive fishing, indigenous, traditional traps

Introduction

Maharashtra is one of the major coastal states in India with a coastline of 720 km. The state contributes 6.63 lakh tonnes to the total annual fish production (CMFRI, 2017). The state is bestowed with an inland water resource spread over an area of 3 lakh ha. Variety of craft and gear combinations exist for harvesting the diverse fishery resources in which traps are the passive gears regularly expended by traditional fishermen during monsoon and post-monsoon seasons. Trap fishing has advantages like low investment, ease of fabrication and operation, high fuel efficiency, etc. making it as preferred fishing gear in Maharashtra. The structural diversity of traps operated in the state ranges from small portable to large net barriers stretched over several meters. The traps are designed, fabricated and operated by fishers using the traditional knowledge acquired from their ancestors, and these techniques are usually simple and effective. Study and documentation of traditional knowledge are essential in preserving it for succeeding generations (Adikant et al., 2011). The documentation of traditional fishing systems and techniques will provide insight into the skill and understanding of fishing and allied activities of the traditional fishers. The knowledge of traditional fishing practices will provide data for refining the existing techniques for further improvement (Mundy, 1991).

Several reports on the designs and operational aspects of fishing traps are available from the inland waters of the North-Eastern states (Joseph & Narayanan, 1965; Lalthanzara & Lalthanpuii, 2009; Pravin et al., 2011; Baruah et al., 2013; Nissa et al., 2021) but limited documentation is available from the North-Western region of India (Kharat et al., 2013). This points towards the need for design documentation and preparation of a database on the structural and operational aspects of traditional small-scale fishing systems. In this background, a survey was conducted to study the fish trapping devices of Maharashtra.

Materials and Methods

A detailed survey was conducted for a period of one year from Mach 2018 to April 2019 along the 6

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districts of Maharashtra. Among them, five were coastal districts and Pune represents riverine and reservoir fishing sites (Fig. 1). Data was collected using semi-structured questionnaires (Table 1), key informants were identified to acquire the details about the gear dimension, design, material, operation, area of operation, species targeted, operating seasons and the operational cost. Discussions were carried out in the local language, *Marathi,* and the respondents belonged to the age group of 20-65. People who seemed comparatively more knowledgeable in the group were contacted individually and in-depth interviews were held with them. Data were validated through focused group discussions with experienced fishers.

Results and Discussions

The traps were classified as per the FAO (2001) with slight modifications. Identified traps were classified into 5 major categories considering the design, and operational methods (Fig. 2).

Kirkinda or Kivutta is a type of habitat trap constructed with bushes, twigs, stones, pebbles, logs, weeds, etc. with a sloppy middle portion. A small piece of PVC pipe or hollow bamboo was inserted at the centre, which facilitates the fast movement of water along with aquatic organisms. Bamboo pots (*Kivattae*) of different dimensions and shapes were set below the PVC or bamboo tubes, which permits the entry of fish into the trap but prevents its escape (Fig. 3). *Kivattae* is normally fabricated with locally available natural materials like stem, and barks of the tree, bamboo, etc. These traps were operated in sloppy riverine areas with water flow during the post-monsoon season. Catfishes, carp, barbs, *Puntius* spp., etc. were targeted with this trap.

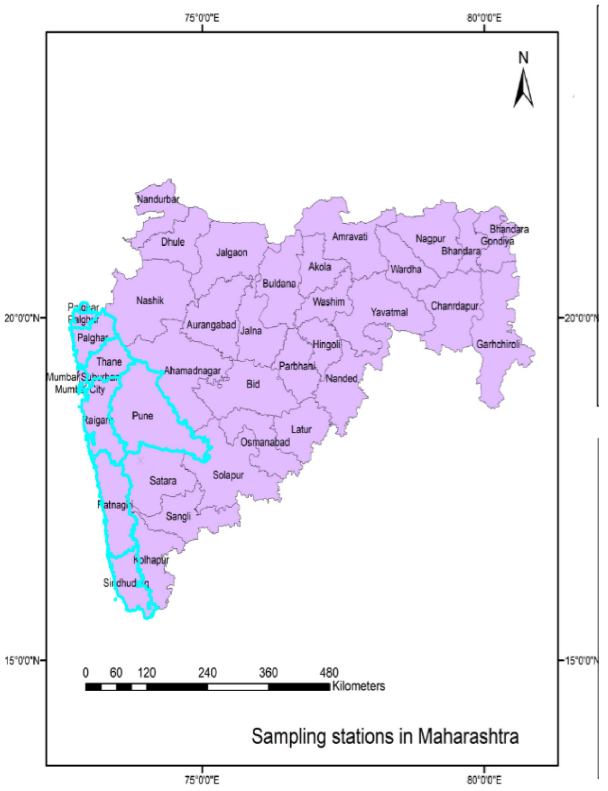

Fig. 1. Map showing the sampling districts in Maharashtra

Table 1. Details of the questionnaire

Gear details	Catch details	Operational details	Economics
The local name of the fishing trap	Name of the targeted species	Fishing area/location	Cost of raw material
Type of the fish trap	Size of catch	Type of water bodies	The market price of the gear
Mouth opening diameter	Average catch/day	Depth of operation	Transportation cost
Width of the gear and mouth	Maximum catch	Number of persons engaged/in operation	Duration of construction
Number of mouth openings	Peak season	Number of operations/days	Cost of bait
The material used for fabrication The lifespan of the gear	Bait used in traps		The market price of catch/kg

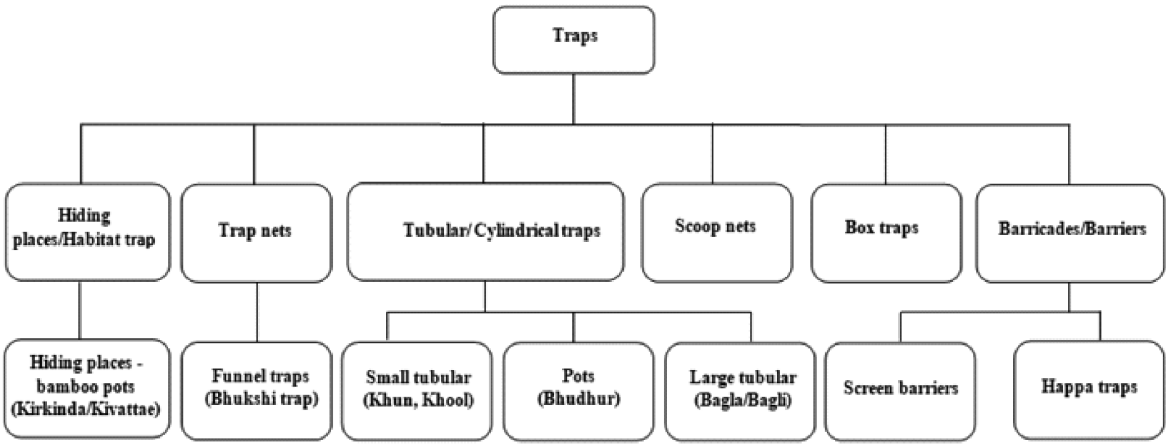

Fig. 2. Classification of fish traps of Maharashtra

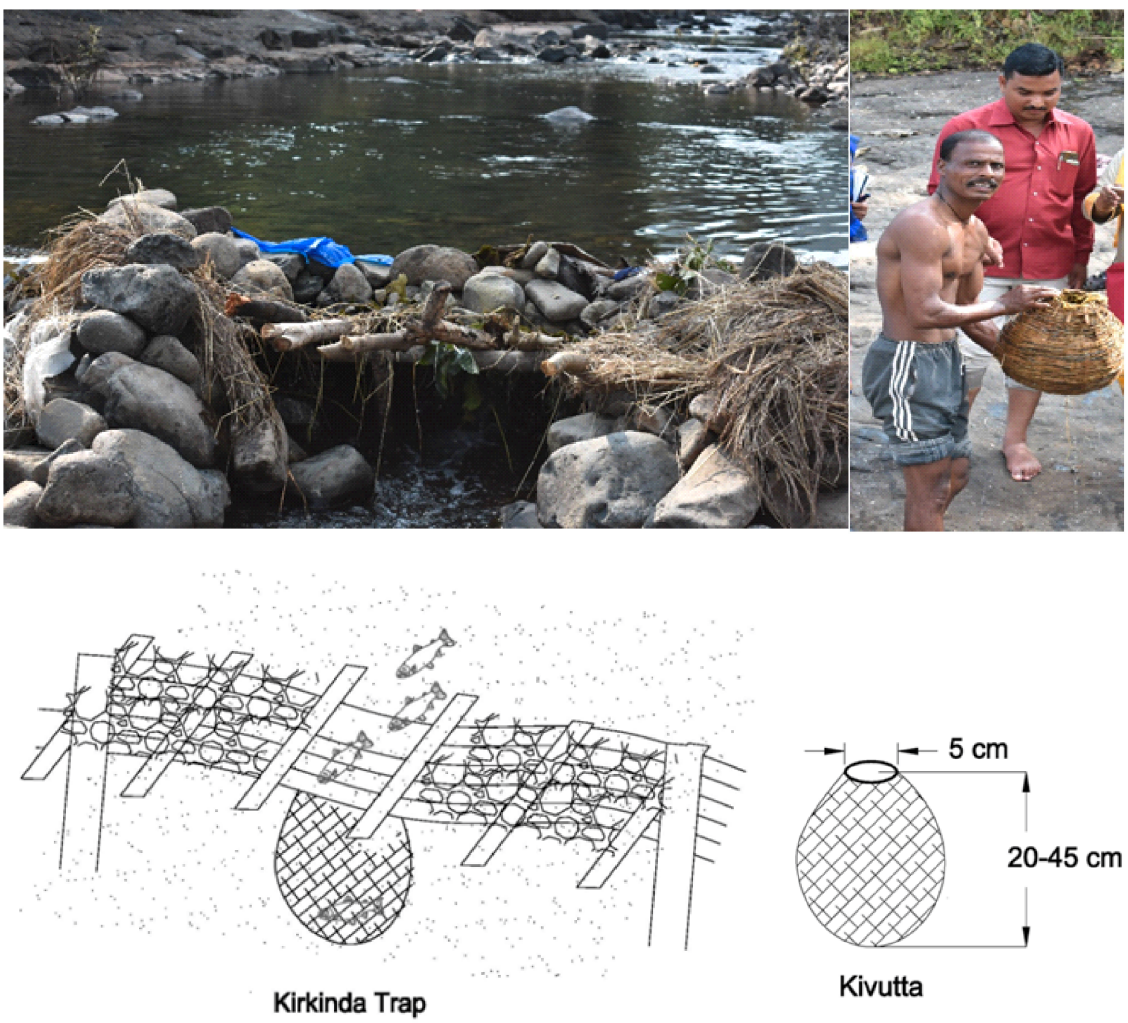

Fig. 3. Diagramatic representation of Kirkinda and Kivutta traps

The cost of these gears was approximately below Rs.1,000 and the life span of *Kivattae* was more than a year. Traps can be operated incessantly during day and night with periodic checking without any bait and the fish caught remains alive. On an average, the catch from individual operations was 1 to 1.5 kg of fish. Normally fisher operates this gear as an option for secondary livelihood. Fishers market these fish in the nearby local markets at the rate of Rs.50-100/kg. This gear is very common around the tribal villages of Dimbhe reservoir. Kharat et al. (2013) described the operation of *Kivate* practiced in the Tamhini region of Western Ghats, Maharashtra by *Katkari*, a local tribal community.

Bhukshi is a type of filtration trap in which a funnel-shaped polyamide netting of about 50 cm is attached in a circular mouth made with the bark of a tree or climber. Netted funnel ends in a detachable tubular bamboo trap about 70 to 100 cm in length and the diameter of the mouth varies from 25 to 60 cm, which acts like a fish collecting device (Fig. 4). These traps are operated in inland riverine and low-lying waterbodies like estuaries and paddy fields. Operations are mainly during the monsoon and post-monsoon season without any baits. Carps, barbs, and *Puntius* spp. are the major targeted fish groups. The average catch is around 0.5 to 1.5 kg/single operation. The catch is usually sold, finding provision for their subsistence. Fishers sell their catch at the local markets at a rate of Rs.50-100/kg. These types of traps are mainly operated around the tribal villages of Dimbhe reservoir and Ghod river near Ambegaon, Pune.

Khun and *Khool* are funnel-shaped tubular traps made of split bamboo pieces. The length of the trap varied between 0.50-2.0m and the diameter of the mouth, which is wider than the body, varies between 20-50 cm. Around the mouth and body, circular rings with bamboo strips or rope are provided at definite intervals of the gear (Fig. 5). At the time of operation, the mouth of the gear is placed against the water current in a stream or water canal. The fishes are taken out by inverting the trap. Small and medium-sized fishes like catfishes, *Puntius* spp. and barbs are the major catch. Tubular traps were operated in riverine and low-lying waterbodies of Maharashtra.

Bhudhur is a type of tubular trap widely operated near the villages of Dimbhe reservoir in Pune, Raigad, and Sindhudurg districts. The gear is made with tightly interwoven strips of bamboo (Fig. 6). A wide funnel is attached at the mouth and the bottom is tapered with a small opening. A lid is also attached at the bottom for collecting the catch. Different designs and modifications of large and small *Bhudhurs* are available in many of the villages of the state. Bhudhur is used along with different types of other traps like *Kirkinda*. *Heteropneustus fossils*, *Puntius* spp., *Mystus* spp., *Channa* spp., *Garra* sp., and *Danio* spp. are the major species caught in the gear. CPUE is 0.50-1.0 kg/day/trap. The cost for the construction of a small trap is below Rs.1,000 and the service life is less than 2 years.

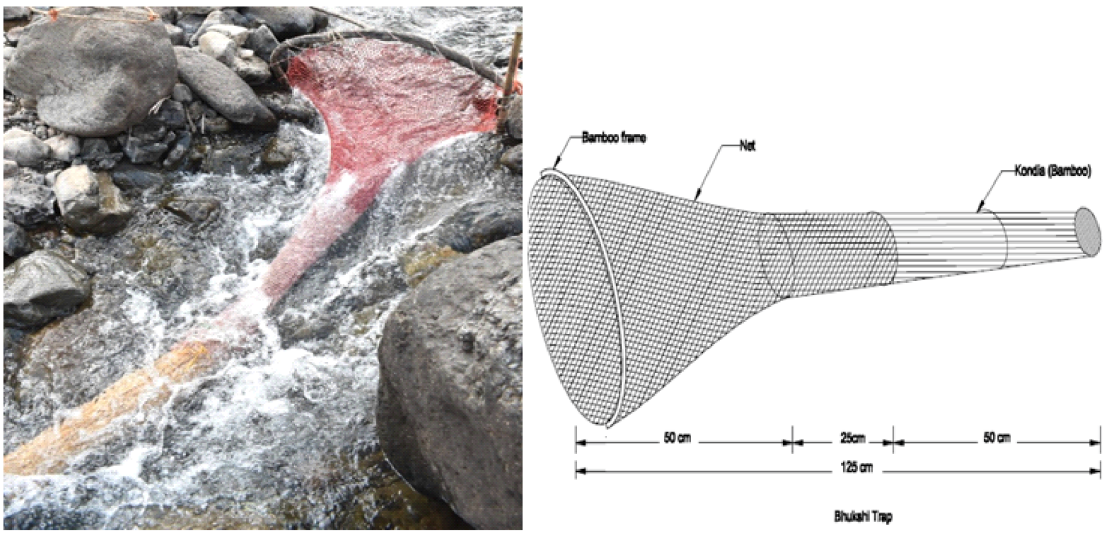

Fig. 4. Structural details of Bhukshi trap

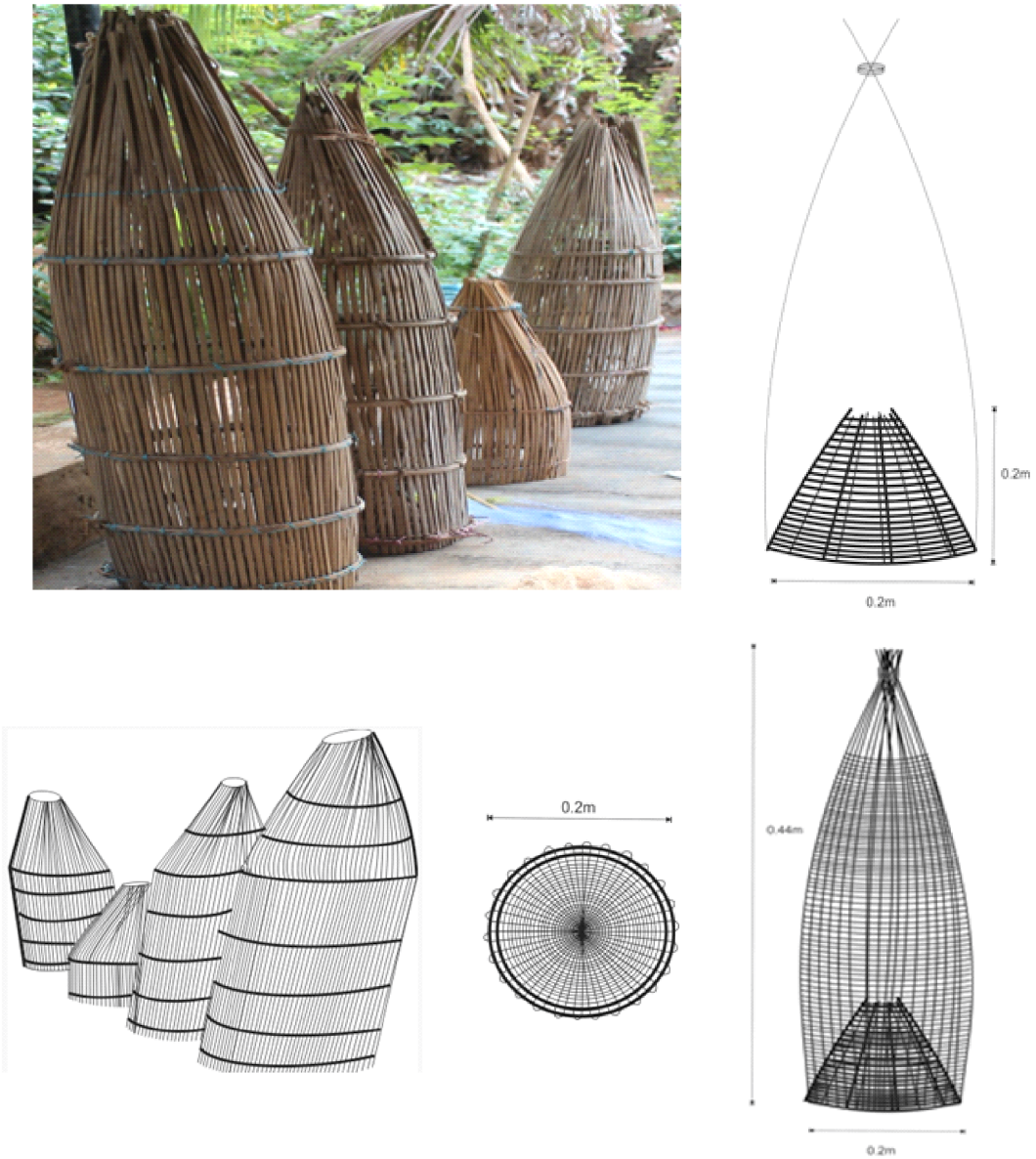

Fig. 5. Design details of Khun and Khool

Bagla/Bagli is a large funnel-shaped tubular trap made with long bamboo pieces weaved erratically and generally operated in estuarine waterbodies. The length of these traps is 2.0-3.0 m and the diameter of the mouth varied between 50–80 cm. The mouth has a circular ring and at the time of operation, the mouth of the gear is positioned against the current in a stream where the fish cannot retreat (Fig. 7). This trap is operated either by a single fisher or as a group consisting of 4-5 fishers. The fishes are removed by inverting the trap. In Maharashtra, these traps are very common in Vasai and Nogoan villages in Palghar and Raigad districts. This gear is mainly used for catching Asian seabass *(Lates calcarifer)* seeds, which are further used for aquaculture. The cost of the trap varied from Rs. 5,000-10,000 and has a life span of 2 to 3 years.

Crab traps of Maharashtra locally known as *Fug* or *Pugare* a type of scoop nets that act as one of the main sources of livelihood for the fishers in villages of Mahul, Versova, and Ratnagiri of Maharashtra. The design of the trap is simple with a bag of mesh or webbing with polyamide or polyethylene

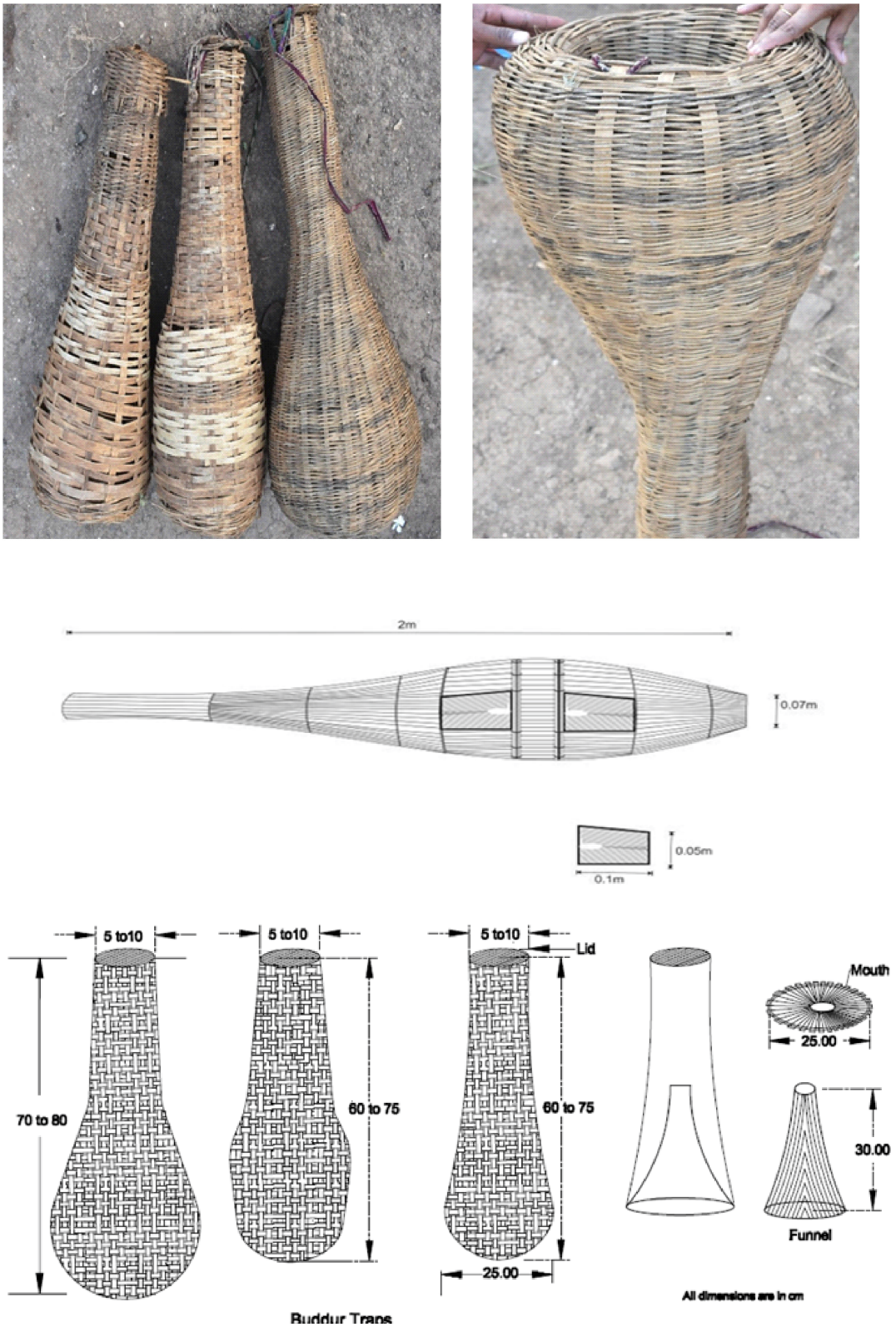

Fig. 6. Design details of *Bhudhur*

Fig. 7. Fully rigged large tubular trap/*Bagla*

monofilament or multifilament on a circular metal ring made of steel plate or iron rod attached by a bridle to a pulling cord. The loop is 30-80 cm in diameter and webbing (0.32 mm) of mesh size of 20-60 mm (Fig. 8). Floats were made of thermocol attached with traps having dimensions ranging from 8x4x2-15x13x6 cm. Traps are operated in the near shore area within a kilometre from the jetty and the peak season for the operation is during the post-monsoon period. Each fisherman operates 80-100 traps and the average number of traps used per trip is 30-45 in number. The average soaking time for these traps is 15-30 minutes. Non-motorized wooden fishing boats of size 4.6-5.0 m with one or two crew members usually operate the traps. Fish waste such

Fig. 8. Details of circular crab trap

as catfish/eel and poultry waste are normally used as the bait, which is attached at the center of these traps by the fishers. Major targeted crab species are *Scylla serrata* and *Portunus pelagicus*.

Box traps identified from Maharashtra are modified traditional fish or crab traps that were operated in aquaculture farms. Traditional traps made of bamboo splits and funnels, which guide the fish or crab into the traps were modified with nylon meshes. There are many variations in the design and names of these traps. Most of the box traps with multiple funnels are operated in flowing water bodies and aquaculture ponds. The major targeted group are seabass, pearlspot, mud crabs (*S. serrata*), etc. The bait used in these traps was poultry and fish waste. Remesan & Ramachandran (2008) reported the economics of box trap operations in the Kuppam river, Kerala. ICAR-CIFT developed a collapsible fish trap (Remesan et al., 2018).

Barricades and barriers are operated in the tide-influenced estuarine areas, where the fishes accidentally enter the traps due to interception in the fish movement or migration pathway. Physical barriers like dams, fences, nets, etc. may or may not be closed after the entry of the fish (Prajith & Remesan, 2019).

Screen barriers with split bamboo and nylon nets are used to block a river or channel of rivers or estuaries. During the high tide, sluice gates are opened and the fishes like mullet, pearlspot, seabass, tilapia, etc. and shrimps & crabs are trapped inside the screen barriers (Fig. 9). Barriers are long screens in shallow waters to lead the fish to a gathering ground. The fish trapped are usually harvested with scoop nets. In Maharashtra, most barriers were utilized for the finfish/crustacean seed collection for aquaculture as well as for the fattening of crabs.

Fig. 9. Screen barriers under operation

Fig. 10. Happa trap erected in the river

Happa traps are constructed by erecting happa-like rectangular bag nets of 3x2x2 m in sloppy areas across water currents in rivers or estuaries. Half part of the happa net remains above the water level so that fishes jump over while it faces the screen on their way (Fig. 10). The upper portion remains open so that the fishes fall into the trap during spawning or feeding migration. These traps were available in the Palghar district and the riverine fishes were entrapped in these gears. Operation is mainly during the post-monsoon and pre-monsoon periods. The targeted fishes are major and minor carp, barbs, and catfishes.

Most of the identified fish traps of Maharashtra were indigenous and fabricated by traditional fishermen through their practical know-how and experiences after considering the targeted species and the area of operation.

In Maharashtra, traps are primarily used for catching mud crabs and shrimps from coastal waters, and fishes like *puntius* spp, barbs, catfishes, etc. from rivers and reservoirs. These gears are generally operated during the pre and post-monsoon season in shallow water with high flushing rates. Fabrication of traditional traps is done with natural and locally available materials like bamboo. Traps of different shapes and sizes, with or without bait and funnels were operated in the state. Trap fishing is highly efficient in which live and targeted fish can be caught, which ensures premium prices in the local markets, but these traditional gears are rapidly declining in Maharashtra due to technical difficulties, unavailability of raw materials in the construction of the gear, reduction in water depth and shallow water areas. Most of the fishermen were using traps as seasonal gear and as a secondary livelihood option. There is a scope for modernising the traditional fish traps with the most efficient designs and durable materials. Documentation of indigenous fish trapping devices in the country will provide a database on the number, design, and operational aspects of the gears and provide the baseline information for the formulation of management measures for sustainable small-scale fisheries.

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References

Adikant, P., Nag, S.K. and Patil, S.K. (2011) Traditional fishing techniques of tribes in Baskar region of Chhattisgarh, Indian J. Tradit. Knowl. 10(2): 386-387

Baruah, D., Dutta, A. and Pravin, P. (2013) Traditional fish trapping devices and methods in the Brahmaputra valley of Assam. Indian J. Tradit. Knowl. 12(1): 123-129

CMFRI. (2018) CMFRI Annual Report (2017-2018)

FAO. (2001) The State of Food and Agriculture 2001 (No. 33), P 315, FAO, Rome

Joseph, K.M. and Narayanan, K.P. (1965) Fishing gear and methods of the river Brahmaputra in Assam. Fish. Technol. 2(2): 205-219

Kharat, S.S., Kumkar, P.B. and Sonawane, K.S. (2013) Traditional fishing techniques of *Adivasi* tribes in Tamhini region of Western Ghats. Int. J. Fish. Aquacul. Sci. 3(2): 165-172

Lalthanzara, H. and Lalthanpuii, P.Á. (2009) Traditional fishing methods in rivers and streams of Mizoram, north-east, India. Sci. Vis. 9(4): 188-194

Mundy, P. and Campton, J.L. (1991) Indigenous communication and indigenous knowledge. Dev. Commun. Rep. 74(3): 1-4

Nissa, A., Lekshmi, M.N., Kumar, M.B., Das, S.K.E.P. and Goud, A. (2021) Structural and Operational Aspects of Fishing Traps of Meghalaya, North East India. Fish. Technol. 58: 147-154

Prajith, K.K. and Remesan, M.P. (2019) Design, construction and operation of fishing pots and traps, In Winter School manual Responsible fishing: Recent Advances in Resave and Energy Conservation, PP 319-326, ICAR: Central Institute of Fisheries Technology

Pravin, P., Meenakumari, B., Baiju, M., Barman, J. and Baruah, D. (2011) Fish trapping devices and methods in Assam – A review Indian J. Fish. 58(2): 127-135

Remesan, M.P. and Ramachandran, A. (2008) Fish traps in inland waters of North Kerala Fish. Technol. 45: 46-137