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Fishing methods of local communities in Melghat and riverine systems of Amravati district, Maharashtra

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Abstract
Melghat, a pristine wilderness in the heart of Maharashtra, India, is renowned for its rich biodiversity and distinctive tribal heritage. Several tribal communities, including the Korku and Gond, inhabit this region, each preserving unique traditions and customs. Among them, the Korku tribe is particularly well-known. These indigenous people have developed a deep connection with the land and its resources through centuries of coexistence with the forest. This paper documents various traditional fishing methods practiced by the local tribes of Melghat and other riverine systems in the Amravati district, Maharashtra, since time immemorial. The data were collected through interviews with local fishermen and an intensive survey conducted between December 2022 and July 2024. In total 12 traditional fishing techniques, such as *Zolni*, strainer, *Kokru*, Kokree, rods, wooden containers, cloth nets, plant extracts, and aluminum containers, were identified and documented from the rivers in Melghat and neighboring areas. These indigenous methods are eco-friendly, cost-effective, sustainable, and crucial for the subsistence of small-scale tribal populations. However, the use of destructive fishing practices, such as dynamite explosions, was also documented, although it is neither common nor legal. This harmful method poses a significant threat to both fish and other aquatic fauna and is prohibited worldwide, including in India.

Keywords: Tribal communities, traditional fishing methods, rivers, Melghat, Maharashtra

Introduction
Fishing, the practice of catching fish and other aquatic animals, is an ancient activity that has been carried out since time immemorial. Historically, sedentary organisms along the shores of lakes, rivers, and seas were caught by handpicking (Das, S.C.S. *et al*., 2017) [5]. Over time, more advanced techniques such as spears, clamps, tongs, rakes, indigenous nets, and trap fishing were developed. Inland fishery resources, particularly, have been largely exploited through traditional methods and gears. The choice of fishing method often depends on factors such as the target species, fishing grounds, climate, and other hydrobiological parameters, resulting in a variety of methods used in different regions.

However, unscientific exploitation and the use of destructive fishing techniques, such as mosquito netting, explosives, and toxicants, have been identified as major causes of the drastic decline in fishery resources and aquatic life (Das, S.C.S., *et al*., 2017) [5]. In contrast, traditional knowledge (TK) continues to play a vital role in sustaining millions of people worldwide, particularly in biodiversity-rich countries like India, where the documentation of such knowledge is crucial. Traditional Ecological Knowledge (TEK) encompasses the knowledge, innovations, and practices of indigenous and local communities globally (Dkhar, M. *et al*., 2020) [8].

In many regions of India, tribal communities have long integrated fish into their diets, and fishing remains an essential part of their livelihoods. These communities rely primarily on naturally available resources, which are often difficult to replicate in other settings. Fish farming in India can be traced back to as early as 1900 AD (Singh, S. *et al*., 2015) [16].

The tribal communities of Melghat employ a range of fishing methods based on Indigenous Knowledge Systems passed down through generations. These techniques are used not only to catch fish but also other aquatic organisms like crabs and prawns for sustenance. Despite the significance of these traditional practices, there is scant documentation of the indigenous fishing methods used by the tribes of Melghat. Against this backdrop, the present study seeks to document the existing indigenous fishing practices of the Melghat tribes and other local communities along the rivers of the Amravati district, Maharashtra, India.

This paper explores some of the lesser-known, traditional fishing techniques that are still widely practiced by the local tribes of Melghat.

Materials and Methods – Study Area

The Amravati district is situated between 76° 37' to 78° 27' E longitude and 20° 32' to 21° 46' N latitude, covering an area of 12,149.7 square kilometers. Three major river the Tapi, Purna, and Wardha flow through this region. During the study, significant tributaries of these rivers were surveyed, including the Sapan, Chandrabhaga, Pedhi, Sipna, Gadga, Khandu, Khapra, and Dolar rivers. The Tapi river flows through the southern part of the Melghat Hills, a region known for its diverse and rugged terrain.

The Melghat area, named after its prominent hill chain, forms part of the Satpura Range, with elevations averaging 600 meters above sea level, and some peaks reaching up to 1000 meters. Numerous rivers, such as the Khandu, Khapra, Sipna, Gadga, and Dolar, which are tributaries of the Tapi River, cut across the ghats, shaping the landscape.

Melghat experiences a tropical climate with dry, deciduous forests. December is the coolest month, and the region receives an average annual rainfall of 800-1000 mm. The temperature ranges from a minimum of 10 °C in winter to a maximum of 42 °C in summer. Humidity levels vary from 10-15% during drier months to 60-95% during the monsoon season.

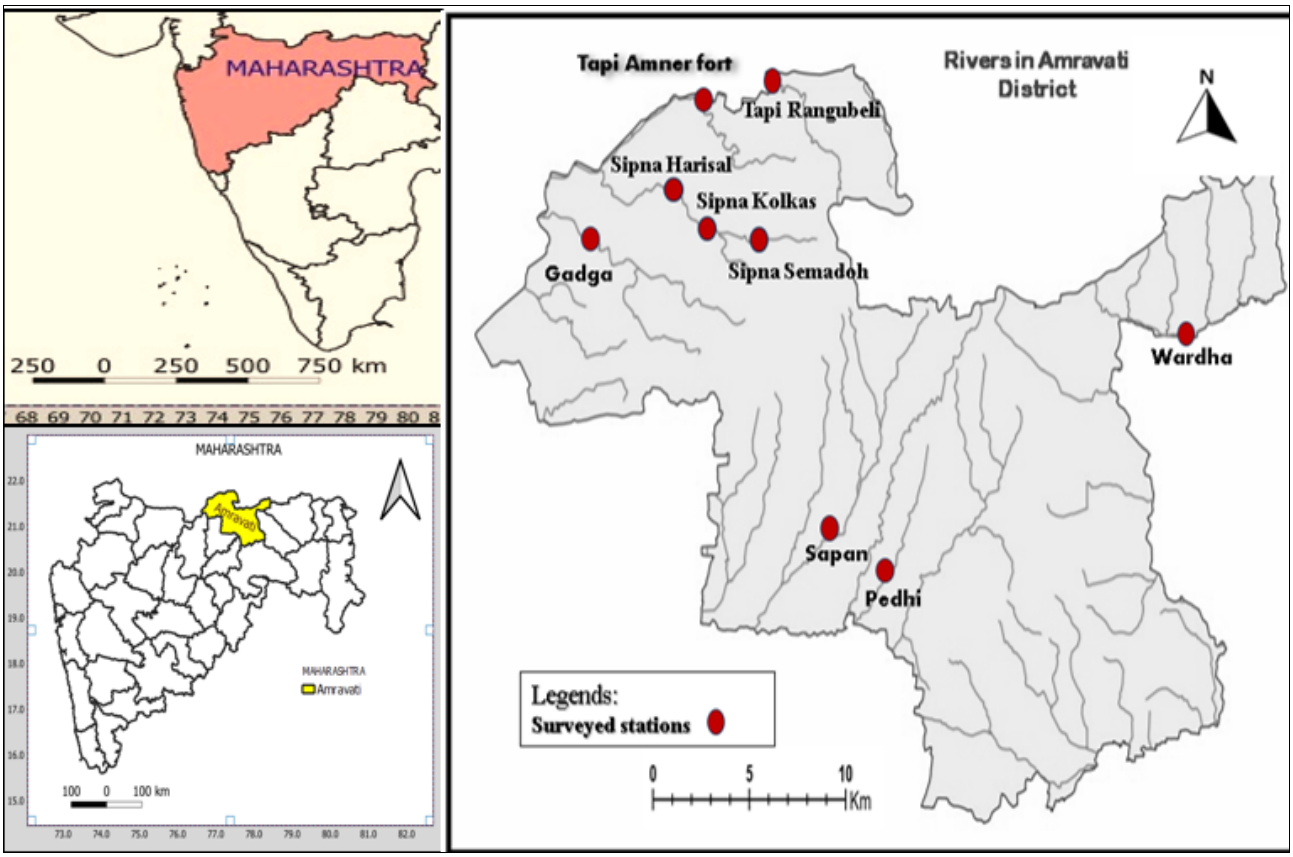

Fig 1: Map showing surveyed stations in the rivers of Amravati District, including Melghat

Table 1: Coordinates of Surveyed Stations by River.

Rivers	Surveyed Stations	GPS coordinates
Tapi	Rangubeli	77.14015°N and 21.71775°E
	Amner fort	76.78457°N and 21.52881°E
Sipna	Semadoh	77.31222°N and 21.497444°E
	Kolkas	77.17418°N and 21.50213°E
	Harisal	77.124218°N and 21.523066°E
Gadga	Dhakna	76.78457°N and 21.52881°E
Dolar	Dolar	77.05934°N and 21.433778 °E
Wardha	Upparwardha	78.022228°N and 21.30918°E
Purna	Asegaon Purna	77.569182°N and 21.1267°E
Pedhi	Walgaon	77.70328°N and 20.99899°E
Sapan	Sawali	77.485433°N and 21.310439°E
Chandrabhaga	Wadgaon	77.438672°N and 21.279106°E

Fig 2: Images from surveys documenting local fishing methods.

Photoplate 1: Traditional fishing methods used by locals in the study area, 1) Zolni 2) Kokru 3) Use of plants extract 4) Use of wooden containers 5) Use of tube to cast net, 6) Use of clothes7) Koorkee 8) Motor rod 9) Cage method 10) Gill net 11) Semi-circular Scoop Net, 12) Use of container (Aluminium)

Methodology

The study was conducted from December 2022 to July 2024 in the Melghat region and adjoining water bodies, including rivers in the Amravati district of Maharashtra, India. Data on indigenous fishing methods were collected through intensive field surveys, interactions, and interviews with local fishermen, fisherwomen, and community members from the Melghat region of the Amravati district.

During the interviews, participants were asked questions focusing on the following aspects:

1. Primary source of livelihood and income, and the tools they commonly used for fishing.
2. The time they spent fishing.
3. Types of fishing techniques employed.
4. Fish species commonly found (Shweta S., *et al*., 2015).
5. Foods they typically consume.

Community members were approached on various occasions to gather traditional knowledge about fishing methods (Das S. C. S., *et al*., 2017) [5]. The interview method was employed as a key data collection tool.

Several field visits were made, and data were collected from the banks of the Tapi, Sipna, and Gadga rivers in Melghat, the Upper Wardha Reservoir in Morshi Taluka, and the Sapan and Pedhi rivers. These water bodies were surveyed as they represent locations where local communities practice various ethno-fishing techniques. Tools such as focus group discussions and personal interviews with indigenous fishers were effectively utilized during the study.

Results

The local tribes of Melghat, such as the Korku and Gond, generally engage in individual fishing activities. These tribal communities primarily depend on fish from regional water bodies, including rivers, streams, and waterlogged areas. 12 different types of fishing methods have been documented from the different rivers of the Melghat landscape and the adjoining rivers in the Amravati district. Most prominent methods like Zolni, Kokru, Kookree, use of clothes, and use of plant extract are found in the Melghat region. Also, fishing methods like cage traps from the Upparwardha reserve were found specific to the reserve. In general, Wild-water bodies in this region are known for smaller fish species.

The information gathered on traditional fishing methods used by the local tribes during the study is detailed as follows:

Table 2: Occurrence and frequency of fishing methods used:

Sr. No.	Fishing methods	Rivers	Frequency of used
1.	Zolni	Tapi, Sipna, Gadga	Common
2.	Kokru	Tapi, Sipna, Gadga	Moderate
3.	Use of plants	Tapi, Sipna, Gadga	Common
4.	Use of wooden container	Tapi, Sipna, Gadga	Common
5.	Use of tube to cast net	Tapi, Sipna, Gadga	Common
6.	Use of clothes	Tapi, Gadga	Moderate
7.	Kookree	Tapi, Sipna, Gadga	Moderate
8.	Motor rod	Sapan, Pedhi	Common
9.	Cage method	Uppaarwardha	Moderate
10.	Gill net	Uppaarwardha	Moderate
11.	Semi-circular Scoop Net	Tapi, Sipna	Moderate
12.	Use of container (Aluminium)	Tapi, Sipna, Gadga	Common

1. **Zolni:** A handcrafted strainer-like tool made with a nylon mesh of 2–4 mm is used by tribal communities in the Melghat region to catch small fish from the upper water column of the Tapi River. A wooden handle is attached to the strainer for ease of use in water bodies. Fish such as stone loaches and stigma barbs are commonly captured using this method (Photoplate 1 - Image 1).
2. **Kokru:** Moderate-sized stones are strategically placed in water bodies to create artificial channels, allowing fish to be manually extracted from these confined spaces. The resulting channel is nearly circular in shape. Surface-dwelling fish like snakeheads, loaches, fingerlings, and crabs are caught using this method (Photoplate 1 - Image 2).
3. **Use of Plants:** Local communities use plant extracts to stupefy fish, making them easier to capture. A plant called *Blumea*, locally known as "Mirchya Zara" in the Korku language, has camphor-scented tall stems and branched herbs. This plant grows wild along riparian edges of rivers. Essential oils from the leaves are known to have analgesic, hypothermic, and tranquilizing properties. The odor of these chemicals attracts fish to the surface, where they become semi-paralyzed and easier to catch (Photoplate 1 - Image 3).
4. **Use of Wooden Containers:** Moderately sized bamboo containers are used for catching fish. Bamboo is collected from the forest, sun-dried to remove moisture, and crafted into a container with a string attached for easy transport. This eco-friendly method can capture fish from depths of up to 50 cm (Photoplate 1 - Image 4).
5. **Use of Tubes to Cast Nets:** Rubber tubes are used to spread nets along the bottom of water bodies. Mesh sizes range from 2 mm to 15 mm, depending on the size of the fish targeted. Fingerlings as well as larger fish like *Catla*,

Rohu, and *Wallago* can be caught using this method. These nets, called "cast nets," are categorized based on mesh size (e.g., "Don Boti" for 2 mm and "Teen Boti" for 3 mm). The nets are typically set in the evening or at night to prevent fish from noticing them (Photoplate 1 - Image 5).

6. **Use of Clothes:** Women, especially, use moderate-sized clothes like sarees to catch surface-dwelling fish such as suckerfish and *Rasbora*. A group of 3–4 women spread the cloth in the water to trap fish swimming over the surface (Photoplate 1 - Image 6).
7. **Kookree:** The primary purpose of this trap is to capture small fish, such as weed fish and air-breathing fish. The trap is typically placed where gentle water currents meet the mouths of rivers and lakes. Two detachable ropes are attached in opposite directions to the circular end of the larger, conical-shaped tapering component, while the smaller half has a tubular shape that tapers towards the end. The former portion functions as a place of assembly or gathering, while the latter is the cod end for fish collection. A detachable rope, attached at the mouth of the smaller half, connects the two pieces (Devi B Nightingale *et al*., 2013) [7]. The tapering round end of the first portion is put into the mouth of the second section, forming a continuous one. The fish are harvested in the early hours of the morning by removing the smaller portion of the trap, which is left in place throughout the operation in the evening. This allows the trap to continue operating for the entire day (Photoplate 1 - Image 7).
8. **Motor Rod:** A plastic rod with a battery-operated motor extends to a certain length, enabling fish to be caught using hooks. Small fish are attracted to the bait attached to the hooks, making this an advanced version of the rod fishing method (Photoplate 1 - Image 8).
9. **Cage Method:** A cage-like structure made from wooden sticks is placed at the bottom of water bodies. Fish swimming through the cage are trapped inside. Species such as snakeheads and larger cultured fish like *Catla* and *Mrigal* are caught using this method (Photoplate 1 - Image 9).
10. **Gill Net:** This net, which entangles fish by their gills, is set vertically using two rods to support it in the water current. Fish passing through the net get caught by their gills. Mesh sizes vary to catch a range of species, from smaller fish like *Shinghala* to large catfish (Photoplate 1 - Image 10).
11. **Semi-circular Scoop Net:** This hand-operated scoop net, made with a semi-circular wooden frame and netting material, has a mesh size of 0.5–2.0 mm. The women of Pawra community mostly use it in the Melghat region to catch fish like *Channa* sp., *Colisa* sp., *Osteobrama*, *Rasbora* sp., and *Puntius* sp. (Photoplate 1 - Image 11).
12. **Use of Aluminium Containers:** Moderate-sized aluminum containers are used by the tribals for fish catching. An aluminum container, covered with a cloth with an opening in the center, is filled with bait to lure fish. The container is placed in slow-moving water to capture fish at depths of up to 50 cm. This method is cost-effective and environmentally friendly (Photoplate 1 - Image 12).

Fishing methods such as *Zolni*, *Kokru*, Kookree, the use of plant extracts, clothes, gill nets, wooden containers, aluminum containers, cast nets, and rods are widely practiced along rivers like the Tapi, Sipna, and Gadga in the Melghat region, as well as the Upper Wardha Dam in Morshi Taluka of the Amravati district. Each method serves different purposes.

Methods like *Zolni* and *Kokru*, Kookreeare primarily used to catch surface-dwelling fish during the summer season. Women are more likely to use methods such as *Kokru* and the use of clothes for fishing, providing financial support, and dietary supplementation. Motor rods and bait-based fishing are used year-round for medium-sized fish, while gill nets and cast nets are employed throughout the year to catch larger fish.

Cage fishing, especially for species like *Channa striata* and prawns, is commonly practiced at the Upper Wardha Dam and is used across all three seasons. While the use of explosives is rare, dynamite fishing (known as "blast fishing") has been observed in the Tapi River in Melghat, which, though effective, is illegal and highly destructive to aquatic ecosystems. All these fishing methods are used both for commercial purposes and for personal consumption (Table 2).

At the Upper Wardha Reservoir and rivers like Purna, Sapan, and Pedhi, various fishing gear such as gill nets, cast nets, bamboo boxes, and motor rods are used, highlighting the versatility of fishing techniques based on specific needs and environments.

Discussion

Traditional fishing methods are deeply rooted in the practices of ethnic communities. Techniques such as net fishing, line fishing, the use of arrows, harpoons, barriers, set and mobile traps, night fishing, fish poisoning, and spearfishing are prevalent in the Kolhapur District (Bhilave MP, 2018) [2]. The Melghat region, with its diverse aquatic resources, sees a range of fishing techniques, including hand catching, native nets, and various ancient methods. The choice of fishing techniques and gear is influenced by several factors, including the physiography of water bodies, fish stock characteristics, materials used for fishing gear, and the standard of living of the local population.

Several studies across the country have documented traditional fishing methods. Fishing with clothing or containers is a long-standing practice. For instance, the "Zolni" method used in the Tapi River in Melghat is similar to the "Jakoi" technique from the Nalbari District of Assam, though the construction process differs slightly (Chakravartty, P. *et al*., 2013) [4], but the materials and operating principles remain the same. Kookree is used in Manipur called Sora in the Central Valley region. The structure and operation method of Kookree from the Melghat region is the same as that of Sora. (B Nightingale Devi *et al*. 2013). [7]

However, hand-picking methods employed by tribal women in the study area often overlook sustainability concerns, potentially leading to the depletion of aquatic resources. Nevertheless, traditional fishing methods, which are cost-effective and use locally available materials, promote sustainable fishing by targeting large fish and allowing juvenile fish to escape and mature.

In Melghat and its neighboring rivers in the Amravati district, other equipment like cast nets (Fhekua Jal), mosquito nets (Ghaghi Jal), and gill nets (Chundhi Jal) are also employed. Similar fishing crafts are found in rivers like Penganga, Kayadhu, Purna, Asna, Kapra, Dudhana, Godavari, Manar, Lendi, and Manjra in the Marathwada region of Maharashtra,

including the use of coracles, thermocol rafts, motor vehicle tubes, and wooden-frame boats (Waghmare, B.D., 2024) [20]. The most common fishing gears include gill nets, cast nets, hooks, and traps.

Though globally prohibited, poison fishing remains a common practice in the region's streams. Interviews with fishermen during a study of the Panchganga River revealed that the use of dynamites to kill fish in pools has severely impacted fish stocks, indiscriminately killing fish of all age groups, including those at mature and breeding stages. This unsustainable practice disrupts the recruitment of new fish stocks (Pawar, C.D., 1988) [15].

The importance of preserving these traditional fishing methods is aptly captured by the African proverb, "When an old knowledgeable person dies, a whole library dies." This reflects the value of oral traditions in storing cultural memories, values, beliefs, rituals, community laws, local languages, agricultural practices, and knowledge about equipment, plant species, and animal breeds.

Solitary fishing, with its focus on sustainable, low-capital methods, can help manage fish stocks and prevent overexploitation. Indigenous fishing techniques play a crucial role in the sustainable use of aquatic resources, providing food security for many tribal communities. Therefore, documenting these practices, particularly in under-researched regions like Melghat in the Amravati district of Maharashtra is of paramount importance.

Conclusion

Melghat and its surrounding areas are primarily known for their traditional fishing methods and gear. A total of 12 distinct fishing techniques have been documented from the Melghat landscape and its adjoining rivers. To support the tribals in enhancing fish production for commercial purposes, the government should provide them with proper training in modern fishing techniques. While the specifics of traditional fishing methods vary significantly between regions, an analysis of these methods reveals that the choice of techniques and equipment is largely dependent on the ecosystem being exploited.

The study also revealed that the indigenous tribes of Melghat practice sustainable fishing using simple tools that both men and women utilize to capture fish for commercial use. These tribes demonstrate a strong awareness of the importance of conserving their biological resources. Most of the fishing tools and crafts used are traditional and native to the region. This research aims to provide a deeper understanding of the customary fishing methods practiced by the native tribes of Melghat, which have yet to be thoroughly documented. These traditional methods, in use for generations, are not only socially and economically viable but also serve as a vital means of subsistence for a significant portion of the economically disadvantaged tribal communities of Melghat.

To protect the natural environment, a strict ban on dynamite fishing should be enforced. Ultimately, preserving this traditional knowledge will ensure long-term sustainability and the conservation of biodiversity, particularly inland fishery resources.

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