



Traditional Fishing Gears and Craft of Dal Lake: Insights into Indigenous Fishing Practices in the Kashmir Valley, India

Shabir Ahmad Dar^{1*}, Gohar Bilal Wani¹, Ashfaq F. Aga¹, and Imtiyaz Qayoom²

¹Division of Fishery Engineering, ²Aquatic Environmental Management,
Faculty of Fisheries, Rangil, Sher-e-Kashmir University of Agricultural Sciences and Technology,
Kashmir, Srinagar-190 006, India

*Corresponding Authors Email: shabiradar777@gmail.com

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Abstract: The present study documents indigenous fishing gear and crafts traditionally used in Dal Lake, the Kashmir Himalaya, with emphasis on their design, specifications, and operational features. A variety of gears, including the cast net, gill net, pole-and-line (*Bisliya*), hook-and-line, multiple-head spear, and double-pronged spear, were systematically described and standardized in terms of dimensions, materials, mesh sizes, and target species. Cast nets, identified as the dominant lacustrine gear across the valley, are primarily used to capture *Cyprinids* such as *Schizothorax* spp. and *Cyprinus carpio*. Gill nets (*Patij*) and pole & line (*Bisliya*) also play a crucial role in selective fishing, targeting commercially important species. Spears and other traditional gears highlight the adaptive strategies of local fishers in shallow, weedy zones of the lake. Traditional crafts (*Naav*), largely plank-built from durable deodar wood, remain the primary means of operating gear and transporting fish. This study provides baseline technical specifications of the gears and crafts, reflecting the ecological adaptation and socio-cultural heritage of Dal Lake fishers and serving as an important reference for sustainable fisheries management, the conservation of indigenous practices, and future aquaculture engineering innovations in the Himalayan region.

Keywords: Dal Lake, Fishing craft, Traditional fishing, Gears.

1. INTRODUCTION

Kashmir is endowed with diverse inland water resources, with lakes constituting the primary water bodies, followed by rivers, streams, and springs. These inland fisheries resources play a pivotal role in the regional economy, particularly in sustaining the livelihoods of the fishing communities (Shakire et al., 2023). Among the prominent fisheries, Dal Lake is a major contributor to the total fish catch of Jammu and Kashmir. The lake covers an area of 11.56 km² and is located at 34°05' N, 74°09' E (Bhat et al., 2024).

Despite the ecological and socio-economic importance of Dal Lake, there is a significant gap in comprehensive documentation of the fishing techniques employed in the lake, which poses challenges for effective resource management and the promotion of sustainable fisheries (Qayoom et al., 2016; 2019; Bhat et al., 2025). The present study investigates and characterizes the traditional fishing gear and techniques used by local fishers, thereby generating insights essential for both conservation planning and the sustainable development of fisheries in Jammu and Kashmir.

2. MATERIALS AND METHODS

2.1. Study Area

The study was conducted in Dal Lake, one of the largest freshwater lakes in Jammu and Kashmir, from June 2021 to May 2022. To ensure adequate spatial coverage, five fishing villages and landing centers situated along the lake, Hazratbal, Dal Gate, Fishermen Colony, Moti Mohalla, and Dhobi Ghat, were selected as representative sites. These locations were chosen based on their high fishing activity and the dependence of local communities on capture fisheries.

2.2. Sampling Design and Data Collection

Data were collected at bimonthly intervals over a period of one year, enabling the assessment of short-term temporal variations in fish species composition, catch abundance, and fishing practices. A combination of qualitative and quantitative approaches was employed.

2.3. Field Observations

Direct monitoring of fishing operations, including deployment and retrieval of gears, types of craft employed, and catch composition.

2.4. Physical Measurements

Standard measurements of fishing gears (mesh size,

length, depth) and crafts (length, breadth, construction material).

2.5. Structured Interviews

Semi-structured questionnaires and conversations with local fishers to document indigenous knowledge, fishing techniques, seasonal preferences, and socio-economic aspects. Respondents were approached at multiple points, including landing centers, individual households, and the fisheries cooperative society, to obtain a broad representation of fishing communities. Secondary information on fish landings, fishing practices, and management frameworks was collected from the official records of the Department of Fisheries, Jammu and Kashmir. These data sources were used to complement and validate field-based observations.

2.6 Data Analysis

Information from primary and secondary sources was compiled, tabulated, and categorized according to gear type, mode of operation, and target species. A comparative analysis across sites and time intervals was conducted to identify patterns in gear use, fishing effort, and resource dependence. Descriptive statistics were applied to summarize observations, and qualitative data from the fishermens' interviews were thematically analyzed to highlight indigenous knowledge and traditional practices.

3. RESULTS AND DISCUSSION

3.1 Fishing Crafts (NAAV)

The construction and design of fishing crafts in Dal Lake are largely determined by the availability of local materials, durability requirements, and functional adaptability to different fishing practices. The majority of boats on the lake are plank-built, locally referred to as Naav, which remains the predominant mode of water transport and fishing in the region. Wood is the primary raw material used, and among locally available timber species, Deodar (*Cedrus deodara*) is preferred for its high strength, water resistance, and long durability, making it particularly suitable for boat construction in freshwater ecosystems. The Naav exhibits significant variability in size and structural dimensions, reflecting both ecological conditions and the intended fishing operation. Based on overall length (OAL), the crafts in Dal Lake can be broadly categorized into three groups. Fishing crafts operating in the lake can be broadly classified into three categories based on size. Large-sized crafts generally measure 7 to 10 meters in overall length (OAL), with a breadth of 1.0 to 1.5 meters and a depth of 0.2 to 0.6 meters. Medium-sized crafts are relatively small, with an overall length of 6 to 8 meters, a breadth of 0.7 to 1.0 meters,

and a depth of 0.2 to 0.5 meters. The small-sized crafts are the most compact type, usually measuring 4 to 5 meters in length, 0.5 to 0.7 meters in breadth, and 0.2 to 0.3 meters in depth.

The OAL represents the total length of the fishing craft from the bow's foremost point to the stern's aft-most point. Plank-built construction involves joining wooden planks edge-to-edge and fastening them to form the hull, which is often designed with a slightly curved or V-shaped bottom. Such a shape enhances hydrodynamic efficiency, reducing drag and improving stability during fishing operations, particularly when nets are deployed.

These crafts are primarily used to operate cast nets, gillnets, and scoop nets. Propulsion is traditionally achieved with oars, locally called *Khoor*, crafted from wood. Depending on the craft's size, 2–3 oars are used, allowing the fishers and anglers to row in either direction and providing high manoeuvrability. In shallow zones of the lake, bamboo poles are also employed for navigation. The majority of Naav are open-decked, providing sufficient working space for fishers to manage gear, sort catches, and execute fishing operations efficiently. The classification of fishing crafts in Dal Lake aligns with similar observations from other inland water bodies. Syed et al. (2021) categorized fishing crafts of Wular Lake into three length-based groups (2–5 m, 5–8 m, and 8–12 m), while Manna et al. (2011) reported the prevalence of plank-built boats measuring 8–10 m in length and 1.0–1.5 m in breadth in the Krishna River. These comparative findings highlight regional similarities in plank-built boat construction while also reflecting adaptations to local ecological conditions and fishing requirements (Table 1).

3.2. Fishing Gears

3.2.1 Cast net: The cast net, locally known as *Zaal*, is one of the most commonly used fishing gears in Dal Lake, characterized by its circular design and efficient encircling mechanism. The average total length of the net is 4.55 m, with the webbing fabricated from polyamide (P.A.) multifilament yarn, ensuring both flexibility and durability in aquatic environments. The webbing is constructed with a specification of 210D×2×2×210D×4×3, with an average mesh size of 42 mm, designed to target medium-sized lacustrine fish species.

The webbing is white, with a selvedge mesh size of 48.50 mm, reinforcing the gear's periphery's structural strength. The net is weighted with an average of 336 sinkers, made primarily of lead or iron, each weighing 30.5 g and having a diameter of 11.25 mm. These sinkers enable rapid sinking of

the gear, ensuring effective encirclement and capture of fish (Table 2). The present study highlights the technical specifications of the *Zaal*, which are consistent with the typical design of cast nets used in other lacustrine systems of the Himalayan region. Dar et al. (2024 & 2025) documented the cast net as the most dominant fishing gear in the Kashmir valley owing to its simplicity, efficiency, and adaptability to shallow waters. The average mesh size of 42 mm observed in Dal Lake closely matches the ranges reported by Shakir et al. (2023) for other Kashmir lakes, indicating a standardized mesh size suitable for capturing native *Schizothorax* spp. and *Cyprinus* species. Furthermore, the number and weight

of sinkers (average 336 units, 30.5 g each) recorded in this study are slightly higher than the observations of Bhat et al. (2024), where sinker counts between 280–320 per net were observed in Wular Lake. The additional sinkers in the Dal Lake cast nets likely increase sinking velocity, thereby improving catch efficiency in the lake's deeper, more vegetated habitats of the lake. The use of polyamide multifilament as the primary material is also consistent with studies by Megalhaes (2023), which emphasized its high tensile strength, low water absorption, and abrasion resistance, making it a preferred choice among traditional fishers.

Overall, the present findings reaffirm that the *Zaal* cast net in Dal Lake is an efficient and adaptive fishing gear, optimized for the lake's ecological conditions while reflecting both traditional knowledge and modern material preferences.

3.3. Gill Net

The gill net, locally referred to as *Patij*, is an important passive fishing gear employed in Dal Lake for the capture of medium- to large-sized fish species. The net is operated at an average depth of 4.5 m, with a total length of 4.12 mand a depth of 2.12 m, making it suitable for lacustrine environments with moderate water depths. The webbing is fabricated from polyamide monofilament, with a mean mesh size of 67 mm, optimized for selective entanglement of species such as *Schizothorax* spp. and *Cyprinus* carpio.

The selvedge is constructed from polyamide multifilament, specified as 210D×2×2, with a mean mesh size of 36.5 mm and approximately 4.4 meshes in depth, ensuring structural reinforcement and durability. The net is supported by an average of 10 cylindrical plastic floats, which provide buoyancy and maintain the gear's vertical orientation of the gear during operation. For sinking, the net is weighted with 17 oval lead sinkers, each measuring 48 × 20 mm and weighing 12.4 g. The sinkers are distributed along the footrope at an average spacing of 284 mm, enabling uniform sinking of the gear. Both head and foot ropes are fabricated from polyethylene (PE) with diameters of 5–7 mm, providing adequate tensile strength for field operations (Table 3).

The specifications of the *Patij* gill net in the Dal lake closely resemble those of traditional lacustrine gill nets described from other parts of Kashmir. The average mesh size (67 mm) recorded in this study is comparable to the findings of Dar et al. (2019) and Shakir et al. (2023), with mesh sizes ranging from 60–70 mm in Wular and Manasbal lakes, targeting cyprinids and schizothoracines. Larger mesh

Table 1. Technical and structural specifications of fishing craft (*NAAV*) operating in the Dal Lake

Specifications	Average
Local name	<i>Naav</i>
Length overall (m)	7.82 ±1.24
Breadth at midship (m)	1.12 ±0.30
Breadth at stern (m)	0.28± 0.10
Depth of vessel (m)	0.35±0.10
Freeboard (cm)	22.02 ±1.70
Draught (cm)	12.96 ±1.20
Material	<i>Cedrus</i> wood
Weight of vessel (kg)	92.10 ± 4.70
Length (m) of fish hold	0.86 ± 0.10
Breadth (m) of the fish hold	0.69 ± 0.07
Depth (m) of fish hold	0.32 ±0.10
Fish holding capacity (kg)	47.13 ±3.20

Table 2. Cast Net: Structural and operational specifications in the Dal Lake

Local name of the Gear	Cast Net
Local Name	<i>Zaal</i>
Total length of net (m)	4.55±0.21
Material of webbing	P.A multifilament
Specification of webbing	210D×2×2×210D×4×3
Mesh size of webbing (mm)	42±1.50
Colour of webbing (mm)	White
Selvedge mesh size (mm)	48.50±6.11
Number of sinkers	336±3.22
Materials of sinker	Lead/Iron
Weight of sinkers (g)	30.5±4.95
Diameter of sinkers (mm)	11.25±1.35

sizes have been associated with higher selectivity, thereby reducing the capture of juveniles, which aligns with the ecological conservation practices in the valley. The number of floats (10 per net) and their cylindrical plastic design correspond with the specifications reported by Zarka et al. (2023), who emphasized the transition from traditional wooden floats to synthetic plastic floats for improved durability and buoyancy. The distribution of lead sinkers (average spacing 284 mm) in Dal Lake nets is wider than the 200–250 mm spacing in Wular Lake reported by Bhat et al. (2024). This wider spacing may reduce net tension, thereby improving entanglement efficiency in the relatively calm waters of Dal Lake.

The adoption of polyamide monofilament webbing and multifilament selvedge is consistent with trends noted across Himalayan fisheries (Ali et al., 2014). Monofilament nets provide transparency in water, thereby increasing catch efficiency, while multifilament selvedge strengthens the margins of the gear, reducing breakage during retrieval. Overall, the design and operational specifications of the

Patij gillnet highlight its functional efficiency in Dal Lake fisheries. The moderate dimensions, combined with selective mesh sizes and durable synthetic materials, make it a highly effective gear for artisanal fishers, while still aligning with sustainability considerations documented in previous studies.

3.4 Pole and Line (*Bislia*)

The pole and line, locally known as *Bislia*, is a traditional active fishing gear widely operated in Dal Lake for targeting *Cyprinus carpio* and *Schizothorax* species. The gear is generally operated at an average depth of 2.12 m, making it suitable for nearshore and shallow-water habitats where these species aggregate.

The line is fabricated from polyamide multifilament, specified as 210D×6×3, with an average length of 4.2 m, providing adequate strength and flexibility for repeated casting and retrieval. The pole is constructed from locally available wood, measuring 2.63 m in length and 20 mm in diameter, offering durability and ease of handling by a single fisher. The hook, locally called *Wool*, is made of stainless steel and is of the barbed type, ensuring better retention of fish upon hooking. Commonly used hook sizes include No. 3 and No. 5, with an average hook gap of 8.7 mm and a total hook length of 26 mm. Each line typically carries a single hook (1.00), allowing for selective, controlled fishing operations. A single sinker, made of iron, lead, or occasionally pebbles, is attached to the line. The sinker is cylindrical, with an average length of 16 mm, and is used to maintain the baited hook at the desired fishing depth (Table 4).

The pole-and-line (*Bislia*) represents one of the simplest yet most selective gears in Dal Lake fisheries. Its reliance on a single barbed hook (No. 3–5) ensures high species selectivity and reduces bycatch, which aligns with the sustainability considerations highlighted by Shakir et al. (2023) in their documentation of artisanal fishing gears in the Kashmir valley. The average line length (4.2 m) and pole dimensions observed in this study correspond with the traditional pole-and-line methods described by Dar et al. (2015) for riverine fisheries in Kashmir, emphasizing the adaptability of this method across different aquatic ecosystems. The use of polyamide multifilament lines confirms a broader trend in artisanal fisheries, where synthetic fibers have replaced natural fibers due to their superior tensile strength, knot-holding capacity, and resistance to wear (Yousuf et al., 2020). Similarly, the adoption of stainless-steel barbed hooks aligns with the observations of Bhat et al. (2024), indicating their durability

Table 3. Gillnet in the Dal Lake: Design and operational specifications

Name of the Gear	Gill net
Local name	<i>Patij</i>
Depth of operation (m)	4.5±1.00
Mesh size of webbing (mm)	67±24
Twine type of webbing	P. A monofilament
Total length (m)	4.12±0.61
Total depth (m)	2.12±0.26
Twine type of selvedge	P.A multifilament
Specification of selvedge	210D×2×2
Mesh size (mm) of selvedge	36.5±2.30
No. of meshes in depth in selvedge	4.4±2.70
No. of floats	10±0.56
Material of floats	plastic
Shape of floats	Cylindrical
Dimension of sinkers (mm)	48×20
Number of sinker	17±4.03
Material of sinker	Lead
Weight (g) of sinker	12.4 ±1.42
Shape of sinker	Oval
Distance between two sinkers (mm)	284 ±113.30
Material of Head rope/ foot rope	PE
Diameter of head (mm)	5-7±1.10

and efficiency in enhancing hook retention compared to traditional iron hooks.

The single cylindrical sinker recorded in this study (average length 16 mm) differs from the multiple small sinkers sometimes employed in riverine pole-and-line fisheries in the Himalayan region (Ali et al., 2022). The use of a single, heavier sinker in Dal Lake may reflect local adaptations to calm lacustrine waters, ensuring quick sinking of the bait without excessive line tension. Overall, the pole and line (*Bislia*) exemplifies a highly selective, low-cost, and eco-friendly gear that continues to play an important role in the subsistence fisheries of Dal Lake. Its structural simplicity, combined with durability and efficiency, demonstrates the balance between traditional fishing knowledge and modern material innovations.

3.5 Long Line

The long line, locally referred to as WaelRaez, is a traditional fishing gear employed in Dal Lake for catching *Cyprinus* spp. The operation of this gear typically requires two fishermen, reflecting the labor-intensive nature of its setting and retrieval. The main line is fabricated from polyamide (P.A.) multifilament, specified as 210D×8×3, with an average length of 1000 ± 125 m, allowing coverage

of a considerable fishing area. Branch lines, also made of P.A. multifilament (210D×3×2), measure 55 in length and are attached to the main line at an average spacing of 2.75 m.

Hooks used are of the barbed, typically sizes No. 5 and No. 6, with an average of 1000 ± 175 hooks deployed per line. To ensure proper sinking, the gear is weighted with an average of 329 ± 41.92 sinkers, placed at intervals of 3 m along the line. This arrangement ensures hooks remain at the desired depth, increasing the likelihood of successful fish capture. The technical specification of the long line is given in Table 5.

The long line (*Wael Raez*) represents one of the more extensive passive fishing gears operated in Dal Lake, designed to target larger populations of *Cyprinus* spp. The deployment of up to 1000 hooks per operation reflects its high catching efficiency, consistent with descriptions of longline gears in other inland fisheries. Similar large-scale hook-line operations have been reported by Dar et al. (2019) in Wular Lake, Dar et al. (2015) in Manasbal Lake, and by Shakir et al. (2023) in the Jhelum River system, where hook numbers typically range between 800–1200 per gear.

The use of polyamide multifilament for both main and branch lines corresponds with trends in modern artisanal fisheries, replacing natural fibers due to their durability and low water absorption, as also emphasized by Monda et al. (2019). The line specifications in Dal Lake (210D×8×3 for the main line and 210D×3×2 for the branch line) closely match those reported in Himalayan riverine fisheries by

Table 4. Pole & line (*Bislia*) operated in the Dal Lake: typical specifications

Name of Gear	Pole & Line
Local Name	<i>Bislia</i>
Depth of operation	2.12±0.42
Main species caught	<i>Cyprinus</i> & <i>Schizothorax</i>
Material of the line	PA multifilament
Specification of the line	210D×6×3
Length of line (m)	4.2±0.36
Material of the pole	Wooden
Length of pole	2.63±0.32
Diameter of pole (mm)	20±0.00
Material of Hook (Woal)	Stainless steel
Type of Hook	Barbed
Hook No.	No.3, No.5
Hook Gap	8.7 ±0.54
Length of Hook (mm)	26±1.44
No. Hooks	1±0.00
Material of sinker	Iron/ lead/ pebble
Shape	Cylindrical
Length of Sinker	16±2.01
No. of sinker	1±0.00

Table 5. Design and specification of long line

Local name of the Gear	Long line
Local Name	<i>WaelRaez</i>
Main species caught	<i>Cyprinus</i> Spp.
No. of fishermen	2
Material of main line	PA multifilament
Specification of main line	210D×8×3
Length of main line (m)	1000±125
Material of branch line	PA Multifilament
Specification of branch line	210D×3×2
Length of branch line (mm)	55±1.80
Distance between two branch lines (m)	2.75 ±1.85
Type of Hook	Barbed
Hook No.	No. 5, No. 6
No. of Hooks	1000±175
No. of sinkers	329±41.92
Distance between sinkers	3±0

Bhat et al. (2024), indicating a standardized material preference across the region.

The average branch line spacing (2.75 m) and hook size (No. 5–6) are comparable to those reported of Ali et al. (2022), who noted that these dimensions optimize both hooking probability and species selectivity. The high number of sinkers (329 units) at a short spacing (3 m) ensures uniform line sinking, particularly critical in still-water habitats like Dal Lake, where water movement is minimal. This design adaptation likely enhances bait presentation and hooking efficiency compared to riverine environments.

Overall, the *WaelRaez* long line is a highly efficient fishing gear in Dal Lake, designed for large-scale harvesting of *Cyprinus* spp. Its reliance on durable synthetic materials, standardized hook sizes, and dense sinker arrangement reflects both traditional fishing knowledge and practical innovations suited to lacustrine conditions.

3.6. Hand Net/ Dip Method

The scoop net, locally known as *Khurizal*, is one of the traditional hand-operated fishing gears practiced in Dal Lake. This gear is primarily used to target *Schizothorax* spp. and *Cyprinus carpio*, particularly in shallow near-shore areas where fish shoals congregate. The scoop net consists of a wooden central bisecting pole with an average length of 2.94 ± 0.90 m and a diameter of 42 ± 1.5 mm, providing sufficient strength for repeated handling. Attached to this is a semicircular wooden frame, measuring 5.35 ± 0.70 m in length with a diameter of 28 ± 2.00 mm, which supports the netting material.

The webbing is constructed of polyamide (P.A.) multifilament, specified as 210D \times 3 \times 3, with an average mesh size of 32 ± 1.20 mm. This mesh dimension is suitable for capturing medium-sized lacustrine fish. The webbing depth is 1.47 m (range 0.81 m), enabling effective scooping action when the gear is submerged and dragged through fish-concentrated areas. The technical specifications of the Hand net/dip net are given in Table 6.

The structural design of *Khurizal* strikes a balance between simplicity and efficiency, making it widely adopted among subsistence fishers in Dal Lake. The recorded mesh size (32 mm) is consistent with scoop nets documented by Dar et al. (2019) and Dar et al. (2015), and Shakir et al. (2023) in other lakes of Kashmir, where similar dimensions were reported for targeting *Schizothorax* spp. This moderate mesh size ensures that the gear captures marketable fish while allowing smaller juveniles to escape, thus contributing to sustainable harvesting.

The use of polyamide multifilaments aligns with the findings of Mondal et al. (2019), who noted that multifilament yarn offers high strength, knot stability, and greater abrasion resistance than traditional cotton or hemp nets. The semicircular wooden frame and central bisecting pole described in this study are also similar to designs reported by Bhat et al. (2024) for scoop nets in Wular Lake, although frame lengths in Wular were slightly shorter (4.8–5.0 m), indicating a possible adaptation of Dal Lake scoop nets to deeper or more turbid habitats.

The average webbing depth (1.47 m) suggests that the *Khurizal* is designed for efficient operation in shallow waters, contrasting with riverine dip nets (Ali et al., 2022), which typically employ greater net depths to counter stronger currents. The Dal Lake scoop net thus represents a locally optimized gear type that combines traditional craftsmanship with material innovations to adapt to the lake's ecological conditions of the lake.

3.6. Spears

Spearing is one of the oldest traditional fishing methods practiced in Kashmir and is still observed in Dal Lake. It is classified as a wounding gear, as fish are captured by direct impalement rather than entanglement or enclosure. Although less commonly used today, this method continues to be practiced on a small scale by skilled fishers (Tables 7 & 8).

Design and types: Multiple-head spears (*Panzri*) consist of several pointed prongs fixed to a single handle, enabling the fisher to strike with a broader surface area and increasing the chances of impaling a fish. The *Panzri* is a traditional impaling gear widely employed in Dal Lake for capturing

Table 6. Design and specification of hand net/ dip method

Local name of the Gear	Scoop net/ Dip net/ Hand net
Local Name	<i>Khurizal</i>
Species Caught	<i>Schizothorax</i> and <i>Cyprinus sp.</i>
Material of Pole	Wood
Material of webbing	PA multifilament
Specification of webbing	210D \times 3 \times 3
Mesh size of webbing (mm)	32 \pm 1.20
Length of central bisecting pole (m)	2.94 \pm 0.90
Diameter (mm)	42 \pm 1.5
Length of semicircular (m)	5.35 \pm 0.70
Diameter (mm)	28 \pm 2.00
Depth of webbing (m)	1.47 (0.81)

bottom-dwelling and mid-water species, particularly *Schizothorax* spp. and *Cyprinus carpio*. The spear is manually operated and designed for the precise targeting of fish in shallow areas. The gear consists of a wooden pole measuring 3.32 m in length, with a diameter of 25 mm, providing sufficient strength and maneuverability. The total length of the gear is 3.54 m, including the pronged metallic head. The depth of operation is relatively shallow, averaging 0.95 m, which makes it suitable for use in clear, shallow stretches of Dal Lake.

The spearhead comprises 12 prongs made of durable steel, each measuring 0.33 m in length. Each prong is equipped with two sharp barbs, with an average barb length

of 9.95 mm, ensuring efficient impalement and preventing escape of the captured fish. The combination of multiple prongs with barbed ends maximizes the probability of successful strikes during manual thrusting operations.

The *Panzri* spear represents one of the simplest yet effective traditional gears of Dal Lake fisheries. Its reliance on manual thrusting in shallow waters aligns with observations of similar spearing gears in Himalayan freshwater ecosystems (Azhar et al., 2020; Bhat et al., 2024; and Dar et al., 2025). The shallow operational depth (0.95 m) is consistent with its use in littoral zones, where *Schizothorax* and carp are most abundant. The use of 12 steel prongs is relatively higher than those reported in riverine spear designs of central India, which typically employ 4–8 prongs (Ali et al., 2021). This higher number of prongs enhances efficiency by increasing the strike surface area, which is advantageous in the relatively turbid and vegetated zones of Dal Lake. The presence of barbs (length 9.95 mm) also distinguishes the *Panzri* from simpler single- or double-pronged spears used in smaller water bodies, as reported by Bhat et al. (2024), thereby reducing fish escape rates. From a socio-cultural perspective, *Panzri* fishing is practiced by skilled individuals. However, being a selective gear with low catch-per-unit-effort, its modern use is declining, echoing patterns observed across South Asian inland fisheries, where traditional impaling gears are gradually being replaced by nets. Comparable double-pronged spears have been reported from Himalayan and South Asian inland fisheries, though variations in pole length and barb design are common (Dar et al., 2019; Ali et al., 2021). The presence of multiple barbs on each prong enhances retention efficiency, a design modification tailored to the turbid and vegetated conditions of Dal Lake. Similar observations have been made in Nepalese, Bhutanese, and inland fisheries, where spears with multiple barbs were preferred in shallow streams (Zarka et al., 2023; Bhat et al., 2024).

Table 7. Multiple head spear in the Dal Lake: Technical specifications

Name of the Gear	Multiple Head Spear
Local Name	<i>Panzri</i>
Main species caught	<i>Schizothorax</i> and <i>Cyprinus</i> Sp.
Depth of operation (m)	0.95
Total length (m)	3.54
Material pole	Wood
Length (m) of pole	3.32
Diameter (mm) of pole	25
Material of prongs	Steel
Length of prongs (m)	0.33
Number of prongs	12
Number of barbs	2
Barb length (mm)	9.95

Table 8. Double pronged Spear in Dal Lake: Technical specifications

Name of the gear	Double pronged gear
Local name	<i>Narchoo</i>
Main species caught	<i>Schizothorax</i> and <i>Cyprinus</i>
Depth of operation (m)	0.92
Total length (m)	2.66
Material of pole	Wood
Diameter (mm) of pole	2.51
Material of prongs	25
Length of prongs (m)	Steel
Number of prongs	0.10
Number of barbs	7
Barb length (mm)	2(14)
Barb length (mm)	9.93

4. CONCLUSION

The documentation of fishing crafts and gears operated in Dal Lake provides a comprehensive understanding of the traditional fishery practices sustained by local communities. The classification of fishing crafts into large, medium, and small categories clearly demonstrates the adaptability of fishers to the lake's ecological characteristics and fishing requirements. Large-sized crafts, with greater length and breadth, are suitable for extensive fishing operations and transportation of catch, whereas medium-sized crafts are more versatile, often employed for routine fishing activities within moderate depths of the lake. Small-sized crafts, being

compact and lightweight, offer easy manoeuvrability in shallow, confined areas, underscoring their importance for localized fishing operations. Similarly, the specifications of fishing gears reflect the ingenuity and indigenous knowledge of the fisherfolk. Tools such as multi-pronged and double-pronged spears, and pole & line gear are meticulously designed to target specific fish species, such as *Schizothorax* and *Cyprinus*, which dominate the lake's ichthyofauna. The use of nets, both cast and gill nets, further illustrates a strategic approach to maximize efficiency in fish capture while minimizing damage to the aquatic ecosystem. The variations in material, dimensions, and operational depth of these gears emphasize the harmonious relationship between traditional practices and ecological conditions. Preserving and documenting these practices is crucial, not only for sustaining the livelihoods of local fishers but also for maintaining the biodiversity and ecological integrity of the lake. Moreover, such traditional knowledge offers valuable insights for developing sustainable fisheries management strategies in inland water bodies facing increasing anthropogenic pressures.

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CRediT Authorship Contribution Statement

Shabir Ahmad Dar: Conceptualization, Data collection, Methodology, soft ware, writing- original draft, supervision, formal analysis. Gohar Bilal Wani: Reviewing and editing. Ashfauq F. Aga: Visualization. Imtiyaz Qayoom: Tabulation, Data curation

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author.

Declaration of Generative AI and AI-assisted technologies in the writing process

The authors declare that artificial intelligence (AI) tools were used only for language editing and improving the clarity of the manuscript. The authors take full responsibility for the content, accuracy, and originality of the work.

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