

## **A survey on the traditional and indigenous fishing methods in the Kali River, Uttarakhand, India**

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### **ABSTRACT**

The rain-fed river Kali (29°24'09 "N, 80°15'17 "E) of Uttarakhand was the study area. To know the fishing techniques capture fisheries status were the objectives of the study. This study will be helpful for farmers, researchers and sustainable capture fishery development practice. One year of sampling and data collection methods were; interaction- based data collection, direct interactive field survey, field own observation-measurement of different nets and communication with the local community. Fishing net classification and identification was done by literature. Three types of fishing methods were used in the area; 'commonly used methods' included fishing with cast nets, gill nets, dip nets, hand nets, dragged nets, hooks, and traps, whereas 'rarely used' (only 2%) methods included only some nets and techniques, and 'cost-effective method' included the use of explosives and 06 ichthyo-toxic plants. Fishing tools were designed according to fish for size specific capture of fish. The use of fishing methods depend upon the topography, geography and climatic conditions of that area.

Figure : 01

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KEY WORDS : Central Himalaya, Fishing craft, Fishing gear, Uttarakhand

### **Introduction**

Fishing methods mainly include 'fishing gear', a type of instrument : mechanical device or tool used to capture or harvest fish and 'fishing crafts', which are commonly utilized to carry fishermen and gear to the fishing ground<sup>14</sup>. The application of fishing methods is a result of knowledge and experience that was gained over a long period of time. In India, the use of fishing crafts and gear is mostly ancient and non-mechanized<sup>4,12</sup>. The habita tecology and topography of the water body play a major role in the use of different types of gear while fishing<sup>18</sup>. Fishing gear and nets are devices of different forms and sizes that are used to harvest fish species of different sizes from the water body<sup>2</sup>.

The resources necessary to make fishing gear include twine, net, plastic sheets, small clips, strong ropes, wire ropes, steel wire ropes, sheet of polyester, polypropylene, cotton clothes, nylon fibers, small sinkers, and floats, mixed types of fibers, wooden parts, bamboo

sticks and purse rings, etc<sup>10</sup>. Several researches have been done on the use of fishing techniques, fishing methods, fishing gear and crafts used in freshwater in India and abroad<sup>1,9,14,17</sup>. In this study, we were taking the area of Uttarakhand state to document the use of traditional indigenous fishing methods in the hill streams of Uttarakhand.

Uttarakhand has been blessed with diverse natural freshwater resources that serve as a possible fishing resource<sup>20</sup>. Since then, little or no literature has been found on this aspect. Therefore, finding out all the fishing techniques used in the river was the first objective, along with illustration and understanding the capture fisheries of the river with their complete explanation was the second objective of the study. This study would be helpful for farmers and researchers in the future for a better understanding of capture and culture fisheries. The knowledge of fishing technology helps in enhancing fish capture and fishing operations techniques, resulting in a sustainable capture fishery.

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TABLE-1 : Commonly (98% of the total) used fishing gears in the area

S.No.	Gears	Common name	Captured fish species	Targeted fish body part	Use in the state	Use percentage
1.	Gill net	Galfas jaal	Indian major carps and catfishes.	Gills	++++	11%
2.	Cast net	Ghaghra jaal	Tor species, Small sized fishes and <i>Schizothorax</i> species	Whole body	++++	15%
3.	Dragged net	Mahajaal	Small fish species and juveniles	Wholebody	++++	19%
4.	Dip net	Ghari jaal	Small catfishes and minor carps	Fins	++++	09%
5.	Hand net	Fatela jaal	Minnows, small carps,	Head and Fins	++++	07%
6.	Trap	Fash	<i>Bariius</i> species and small fishes	Wholebody	++++	05%
7.	Hooks	Kanta	Carnivorous and carnihervivorous fishes species	Head and mouth	++++	07%
8.	Hanging rope	Latka	<i>Bariius</i> species,	Fins and head	++++	05%
9.	Explosives	Blast	Not species specific	Sensoryorgan	++++	09%
10.	Fish poisons	Vish	Not species specific	Respiratory organ	++++	11%

## Material and Methods

**The study area:** The rain-fed river Kali (29°24'09 "N latitude, 80°15'17 "E longitude) in the Pithoragarh district of Uttarakhand, with four sampling sites, which rises from the Namik Glacier and is the primary river of the Ganges River System of Uttarakhand, was the subject area of this study.

**Data collection:** Sampling frequency was month wise, up to one year. For this study, four types of methods were used to collect the material. Firstly, interaction-based data collection was done by contacting net shopkeepers and net markets at local level. Secondary by direct interactive field survey or field own observation by approaching a river bank and self- observation about operation methods and building materials. Tertiary types of data collection were done by the field measurement of length, width, height and mesh size of different nets. Finally, collection was done by communication with the local community, like local fishermen and local boys.

**Data analysis:** Fishing method parameters (characteristics analysis of the sample population) were calculated and estimated by using statistics, mainly frequency and dominance. Fishing gear or techniques identification and classification were done through previous works and reports<sup>7,10,21</sup>. After analysis, various primary and secondary data sources were also used for this purpose. Three types of methods were used; commonly used, rarely used and a cost-effective methods. In our research study, various kinds of gears were commonly used (upto 98%).

## Results

The main gears which were used in our study included cast and gill nets, dip and hand nets, dragged nets, hooks, traps, fish poisons and hanging rope. (Table-1). In some situations, fishing without gear was also noticed, but it was rare, whereas Table-3, concluded rarely used gear 2% of the total. Explosives and Ichthyotoxic plant parts or fish poisons were also used by farmers as cost-effective methods.

Explosives were used to kill the fishes by affecting their sensory receptors through explosions or by making them semi-conscious. Mostly explosives acquired from road construction organizations. Later, they were modified by local fishermen. Some common plants which were used as a whole or part of a fish poison included bark, leaf juice and fruit powder of 'Tim bur' (*Zanthoxylum armatum*), buds and leaves of 'Khinna' (*Sapium insigne*), fruit powder of 'Reetha' (*Sapindus mukorossi*), whole plant body of 'Rambans' (*Agave americana*), bark of 'Pangar' (*Aesculus indica*) and leaves of 'Rigadi' (*Acacia pennata*) were very common.

From small to large, various kinds of species were

captured by local people through the use of different fishing methods (Table-1). Fishing methods were designed according to specific fish body parts by the farmers; the whole body, gills, mouth, head, fins and sense organs mainly (Table-1). These resources were utilized and used to make these gears, which contained twine, netting, steel wire, plastic, long ropes, cotton cloth, wire ropes, nylon fiber, mixed fibers, sheets of polyester, polyethylene, polypropylene, bamboo sticks and wood etc. Various fishing nets differed in their length, height, mesh size, shape, use of fishing period and the number of fisherman required to operate them (Table-2).

## Discussion

This present study aims to cope with the fishing tools and techniques within our study area. In this study, mainly four kinds of nets were used; hand net, gill and cast net, dip net and dragged net. Apart from these traps, hooks, hanging rope, fish poisons and explosives were also used. Evaluation of this study indicates that only a few methods were mainly used for fishing. These findings were also supported by previous studies<sup>15,17</sup> which describe the main fishing techniques used in the region. Major gear which is in use may be classified as an active gear and passive gear as per the working specialty. Fishing gear was alienated into two main categories based on the method of fishing: one was active gear that drove or towed in search of the target species and the other was passive gear, in which target species stirred into or forward<sup>11</sup>.

The different fishing gears in our study were of various shapes, sizes and uses. All the fishing gears were almost specific to the area and particular species. 'Fishing gear and nets generally have different forms and structures, and are operated in river water to capture and harvest different sizes of fish'<sup>2</sup>. 'Nets were selected according to size ranges and fish movement'<sup>2</sup>. Fish explosives and poisons were notably appealing as they were used for regional effects rather than against any single individual, but they were polluting and harmful to the aquatic ecosystem by assassinating many aquatic biotas like nekton, neuston, benthos, periphyton, fingerlings and fry. Our research findings are strongly supported by some other previously cited literature<sup>3,16,19</sup>.

In this research work, we observed and noticed that all the major fishing gears were self-made by fish farmers by utilizing their own knowledge. In India, the use of fishing gears and crafts for harvesting fish while fishing was mostly primitive and non-mechanized<sup>8,12,15</sup>. Fishing by using gear and crafts was an excellent technique which was used for a long time in different parts of India. These crafts and gears were mostly old-fashioned and Indigenous<sup>5,13,14</sup>.

TABLE-2 : Details of fishing net measurement by field observations

S.No.	Type	Length	Height	Mesh size	Shape	Fishing Period	Fisherman required
1.	Gill net	30-40 ft	0.65-3.5m	20 mm to 120 mm.	Rectangular	Round the year, except monsoon	2-3
2.	Cast net	20-25ft	1.0-2.0m	1-3.5cm or 1-2 cm	Umbrella like, circular in shape	Round the year	1
3.	Dragged net	30ft	6ft	25-50	Rectangular	Winter and Summer months	2-4
4.	Dip net	1-2m	1 ft	1-2 cm	Rectangular, & triangle	Winter season	1
5.	Hand net	1mt	1mt	1.5-2.0cm	Square	Summer, winter, and spring season	1
6.	Trap	3ft	1ft	-	Rectangular & conical	Winter months	2
7.	Hooks	3 inch	-	-	Pointed	Round the year, monsoon	1
8.	Hanging rope	2-5m	1 ft	1-2 cm	Conical spherical	Round the year	1

TABLE-3 : Some rarely (02% of the total) found fishing techniques in the area

	Fishing Techniques	Use		Fishing Techniques	Use
1. Tangle nets	Trammel nets	+	4. Bag nets	Scraps nets	++
	Double walled	+		5. Grappling gear	Cross bow
	Single walled entangling	+	Harpoons		++
2. Lift nets	Fish wheels	+	Bows & arrows		++
	Blanket nets	++	Spears		+
	Mechanical lift nets	+	Raking devices	+	
	Hand lift nets	++	Clamps	+	
3. Surrounding nets	Ring net	+	6. Stupefying devices	Striking gear	+
	Purse seines	++		De-oxygenation	++
				Chemical	++

### Conclusions

This study indicates that the fishing methods were mostly simple and ancient strategies even in this modern time. Various types of techniques are used for fishing in different localities or purposes. Non-eco-friendly

techniques were quite common, alongwith other methods. Fishing gear was low priced and self-made, so it was non-mechanical and technical. The use of different kinds of fishing methods mainly depend upon the topography and geography of that area, the climatic conditions, the financial status of the fishermen, etc.

### References

1. Adikant P, Nag SK, Patil SK. Traditional fishing techniques of tribes in Bastar region of Chhattisgarh. *Indian Journal of traditional knowledge*. 2011; **8** (1):51-58.
2. Azam S, Saha AKM, Asadujjaman KR, Minar MH. Fishing gears and crafts commonly used at Hatiya island: A coastal region of Bangladesh. *Asian Journal of Agricultural Research*. 2014; **8** (1):51-58.
3. Badola SP, Singh HR. Fishing method in Garhwal hills, *Proc Nat Acad Sci India*. 1997; **47** B,III,177-181.
4. Bahuguna P, Joshi HK, Dobriyal AK. Conventional and non conventional fishing techniques used by rural folk in Mandal valley, Uttarakhand. *Uttar Pradesh Journal of Zoology*. 2010; **30** (2): 221-223.
5. Bhakta D, Manna RK, Meetei WA, Solanki JK, Sah RK. Traditional fishing crafts and gears of Ukai reservoir, Gujarat, India. *International Journal of Fisheries and Aquatic Studies*. 2016; **4** (4) :142-145.
6. Bose R, Gupta S, Das AK, Suresh VR, Bose AK. Traditional fishing crafts and gears of Madhya Pradesh, India. *International Research Journal of Biological Sciences*. 2019; **8** (3) : 29-36.



Fig, 1 : A view on different types of gear (1) Gill net, (2) Cast net, (3) Dragged net, (4) Dip net, (5) Hand net, (6) Trap, (7) Hooks (8) Hanging rope. Adapted and modified.

7. Brandt AV. Fish catching methods of the world, London, Fishing News Books Ltd. 1984; pp:1-418.
8. Chakravartty P, Sharma S. Different types of fishing gears used by the fishermen in Nalbari district of Assam. *International Journal of Social Science & Interdisciplinary Research*. 2013; **2**(3) : 177-191.
9. Devi NBL, Ngangbam AK, Biswal NN. A review on the current fisheries management system in Manipur with special reference to Loktak Lake. *Journal of agriculture and veterinary science*. 2014; **7** (4) : 44-76.
10. Hameed MS, Boophendranath MR. Modern Fishing Gear Technology, Das Publishing House, Delhi. 2000; p 3.
11. Jennings S, Kaiser MJ, Reynolds JD. Marine fisheries ecology. Blackwell Science, Oxford, U.K. 2001; p44.
12. Khanna SS, Singh HR. A textbook of fish biology and fisheries. Narendra Publishing House. 2003.
13. Kokate AA, Bhosale BP, Metar SY, Chogale, ND, Pawar RA, Nirmale VH. Indigenous fishing crafts and gears of Krishna River with respect to Sangli district of Maharashtra, India. *International journal of fisheries and Aquatic Studies*. 2016; **4** (6) : 434-438.
14. Kumar V, Kamad K. A preliminary study on Fishing craft and gears in Dhaura Reservoir, Uttarakhand, India. *International Research Journal of Biological Sciences*. 2013; **2** (8) : 76-78.
15. Manna RK, Das AK, Rao DSK, Karthikeyan M, Singh DN. Fishing crafts and gears in river Krishna. *Indian Journal of Traditional Knowledge*. 2011; **10**(3) : 491-497.
16. Negi KS, Kanwal KS. Plants used in fish toxin in Garhwal region of Uttarakhand Himalaya, *India Journal of Traditional knowledge*. 2009; **8** (4) : 535-538.
17. Radhakrishnan T, Ramsubramanian M, Anandaraja N, Suganthi N, Anitha S. Traditional fishing practices followed by fisher folks of Tamil Nadu. *Indian journal of Traditional Knowledge*. 2009; **8** (4) : 543-547.
18. Raju CS, Rao, JCS, Rao KG, Simhachalam G. Fishing Methods, Use of Indigenous Knowledge and Traditional Practices in Fisheries Management of Lake Kolleru. *World Journal of Zoology*. 2016; **11** (4) : 173-182.
19. Samant SS, Pangety YPS. Diversity of ichthyotoxic plants of Kumaon Himalya, *Indian Journal of forestry*. 1995; **18** (1) : 80-86.
20. Verma R. A study on fish and fisheries of river W. Ramganga from Central Himalaya, India. *Species*. 2014; **7** (17) : 20-24.
21. Welcomme RL. Inland Fisheries: Ecology and Management. Fishing News Books, Blackwell Science, UK. 2001; p358.