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Types of fishing gears operating and their impact on Krishna river fishery in Mahabubnagar district, T.S. India

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Abstract

Fishing gears and their impact on Krishna river fishery in Mahabubnagar district was investigated from 2012 to 2014. Documentation of gears in rivers of India is scanty. The paper describes a wide range of traditional as well as modernized fishing gears used by subsistence and professional fishers in the river Krishna and their impact on the fisheries and ecosystem of the same. The minute mesh size fishing gears, like seine nets used in the catching of all sizes of fish impacting the fisheries of the river. The use of this kind of fishing gears is also the major cause of sharp decline of the economically important Indian major carps in the river. An awareness programs should be extended amongst the fishers to create awareness of the long-term effects of their fishing practices and to impart knowledge of fishing laws. The present account is an attempt to document the occurrence of 5 different kinds of gears, lines and nets in the entire stretch of the Krishna river in the district. The objective of study is to present the recent data of fishing gears and nets operated for fishing in the river and their impact on the Krishna fishery.

Keywords: Mahabubnagar district, Krishna river, Gill nets, Seine nets, Cast net, Box trap

1. Introduction

The last fifty years have seen rapid and major changes in the development of the fishing industry. The improvement and modernization of crafts and gears have increased productivity and efficiency influencing the working conditions and lives of fisher folk. There is a well-defined pattern and distribution of fishing techniques in the riparian sectors based on the topography, ecology and habitat of the resource available. For Indian rivers like the Ganges, some records of crafts and gears were in the literature in both freshwater and estuarine zone [2, 4]. Fishing gear and methods of river Brahmaputra in Assam were surveyed [3].

The Krishna is one of the longest rivers of India and flows about 1400 km in length. It originates at Mahabaleswar in Maharashtra, flows through the states of Maharashtra, Karnataka, Telangana and Andhra Pradesh and meets the sea in the Bay of Bengal at Hamasaladeevi in Andhra Pradesh (A.P). Mahabubnagar is the largest district in Telangana state (T.S) in India in terms of the spread, with geographical area of 18,432 sq. km. The river Krishna enters in to Telangana in Mahabubnagar district. Approximately 300 Km stretch of the river Krishna passes through the district of Mahabubnagar play an important role in ecology and fishery of the district (Fig. 1)

Detailed reports are available on the craft and gears for most of the lakes, rivers and reservoirs in the country. However, only limited works have been done on various aspects of crafts and gears of the rivers in Mahabubnagar district. In the present study, a detailed investigation was undertaken to document the type of gears and its impact on fishery in the entire stretch of river Krishna in Mahabubnagar district of Telangana state.

2. Materials and Methods

Fishing gears data along with information on fisheries were collected from selected 40 stations along the entire stretch of river Krishna, from Mudumal in upstream to Amaragiri in downstream from 2012 to 2014. The stations can be divided in to 8 in upstream (above Priyadarshini Jurala Project), 12 in midstream, i.e. below the project and 20 in downstream i.e. Srisailem Backwaters

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(above Srisailem Project). Gears were measured and materials and descriptions were recorded from each sampling

area (Fig. 2 and Table 1 & 2).



Fig 1: A view of Krishna river in spate at Beechpally ghat, NH 7 in Mahabubnagar district

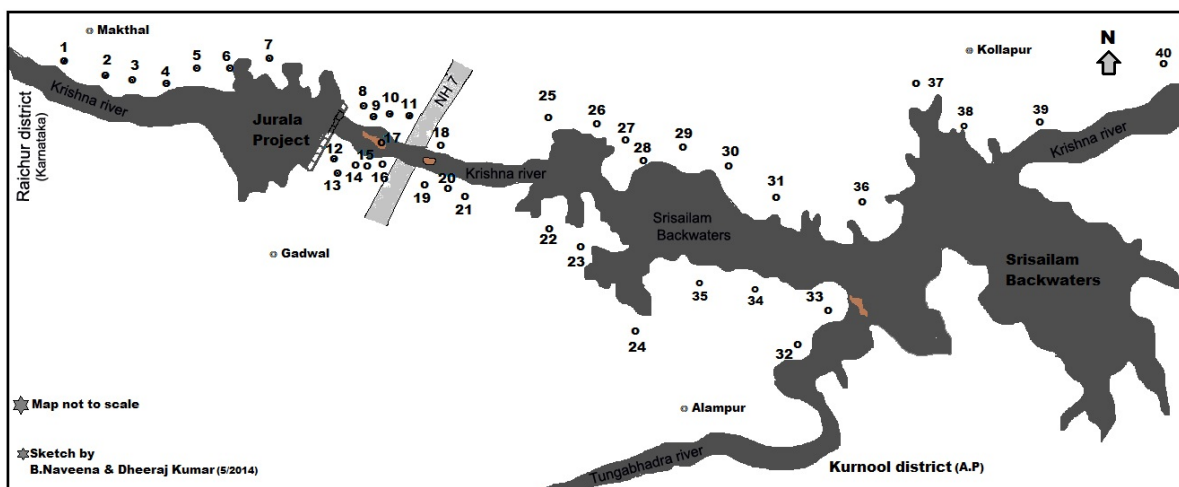


Fig 2: Schematic diagram showing locations of sampling stations of Krishna river in Mahabubnagar

3. Results and Discussion

The Krishna river fisheries resources have played a significant role in the economy, culture, tradition and food habits of the people of Mahabubnagar district too. It provides about 4000 sustenance livelihood to local fishing communities of about 106 villages as well as other riparian population in the district. The river provides sufficient fish production for consumption in Mahabubnagar and excess fish export to the other states in the country. However due to various natural and man-made changes the catch from the river has declined alarmingly over the last few years. During the present study in a large stretch of the river Krishna in Mahabubnagar 5 different types of nets and gears were

recorded in which some of the nets were found to be very selective. In the survey a number of fishing methods and gear types observed and their impacts on the fisheries and the environment were also recorded.

The principle gear used in Krishna river system in Mahabubnagar district is gill nets, seine nets, cast nets and hook lines. Box traps are also employed in upper stretch for fishing in the river. The present surveys conducted for two years in the entire stretch of the river Krishna between Mudumal and Amaragiri villages in Mahabubnagar district. Different types of fishing gears were recorded during the survey, which is briefly explained below.

Table 1: Principal fishing gears used in Krishna river in Mahabubnagar District.

Sl. No.	Category	Local name	English name
1	Gill nets	Katuchu valalu, Salu valalu, Disco valalu	A kind of monofilament / multifilament gill net
2	Seine nets	Alivi vala, Pattu vala, Lanja vala	A kind of Multifilament Seine net/ Drag net
3	Cast nets	Visuru vala	A kind of cast net
4	Hook lines	Galalu	A kind of Hooks
5	Box traps	Buttalu	A kind of bamboo splints trap

3.1 Gill nets

Different mesh size ranging from 16 mm to 250 mm was observed in the gill nets used in the entire stretch of the river Krishna in Mahabubnagar district (Fig. 3-6). Gill nets are panels of netting held vertically in the water column by a series of floats attached to their upper edge (the float line or cork line) and weights attached to their lower edge (the foot

rope or lead line). As passive gear, their catching ability relies on the movement or migration of fish through the area where the nets are set and the operculum of fishes get entangled into the meshes of nets, when the fishes try to pass through it. Depending upon mesh size, the size of the fish caught for this was normally 250 gms to 10 kg and occasionally caught up to 20-30 Kg or even more size fishes.

**Fig 3:** Fishermen with monofilament gill nets**Fig 4:** Use of multifilament gill net in Krishna river at Rekulapally village



Fig 5: Author observing monofilament gill net at Byrampally village



Fig 6: Gill net fishing at Somasila in Krishna river

Table 2: Fishing gears recorded in different sampling stations of Krishna river in Mahabubnagar district

S. No	Name of the fishing village/ station	Type of Gear operated	
		Major	Minor
Upper stretch (Upstream)			
1	Mudumal	Gill net	Cast net, Hook-line
2	Panchadevpad	Gill net, Cast net	Hook-line
3	Parevulu	Gill net, Cast net	Hook-line
4	Muslaipally	Gill net, Cast net	Hook-line
5	Anugonda	Gill net, Cast net	Box trap, Hook-line
6	Mustipally	Gill net, Cast net	Box trap, Hook-line,
7	Peddakadmur	Gill net, Cast net	Hook-line
8	Nandimalla	Gill net, Cast net	Hook-line
Middle stretch (Midstream)			
9	Mulamalla	Gill net, Cast net	Hook-line
10	Juriyal	Gill net, Cast net	Hook-line
11	Arepally	Gill net, Cast net	Hook-line
12	Revulapally	Gill net, Cast net	Hook-line
13	Rekulapally	Gill net, Cast net	Hook-line
14	Settiagraharam	Gill net, Cast net	Hook-line
15	Nadiagraharam	Gill net, Cast net	Hook-line
16	Thimmapur	Gill net, Cast net	Hook-line
17	Gurramgadda	Gill net, Cast net	Hook-line
18	Rangapur	Gill net, Cast net	Hook-line
19	Kondapet	Gill net, Cast net	Hook-line
20	Shaikpally	Gill net, Cast net	Box trap, Hook-line
Lower stretch (Downstream)			
21	Chandoor	Gill net, Shore-seines	Cast net, Hook-line
22	Marmunagala	Gill net, Shore-seines	Cast net, Hook-line
23	Sheirpally	Gill net, Shore-seines	Cast net, Hook-line
24	Kyathur	Gill net, Shore-seines	Cast net, Hook-line
25	Tippaipally	Gill net, Shore-seines	Cast net, Hook-line
26	Gummadam	Gill net, Shore-seines	Cast net, Hook-line
27	Yaparla	Gill net, Shore-seines	Cast net, Hook-line
28	Gaddabaswapur	Gill net, Shore-seines	Cast net, Hook-line
29	Bekkam (Gudem)	Gill net, Shore-seines	Cast net, Hook-line
30	Peddamaroor	Gill net, Shore-seines	Cast net, Hook-line
31	Chinnamaroor	Gill net, Shore-seines	Cast net, Hook-line
32	Byrampally	Gill net, Shore-seines	Cast net, Hook-line
33	Gundimalla	Gill net, Shore-seines	Cast net, Hook-line
34	Utkoor	Gill net, Shore-seines	Cast net, Hook-line
35	Bheemaram	Gill net, Shore-seines	Cast net, Hook-line
36	Chellapad	Gill net, Shore-seines	Cast net, Hook-line
37	Jetprole	Gill net, Shore-seines	Cast net, Hook-line
38	Manchalakatta	Gill net, Shore-seines	Cast net, Hook-line
39	Somasila	Gill net, Shore-seines	Cast net, Hook-line
40	Amaragiri	Gill net, Shore-seines	Cast net, Hook-line

3.2 Seine nets

These nets are a type of drag nets and are designed to be towed in an arc around fish shoals to surround them. Methods of employing seine nets vary. Frequently one end of the net is attached to a pulley or anchored on the shore and a boat/coracle is used to pull the net into a large arc back to the shore before hauling in.

3.2.1 Alivi vala

It is a kind of large shore- seine and locally called Alivi vala of varying dimensions and sizes are operated by a group of fishermen with the help of boats / coracles in the river and

highly inundated areas in the stretch. It is commonly used in this river at lower stretch during the dry season when water flow is minimal particularly from December to May (Fig. 6-9). This net is usually hauled by a team of fishers (20-30), the number depending on the size and weight of the net. It is a rectangular net with floats on the head rope and weights on the ground rope. The ground rope is made of thick twisted jute fibers and the head rope is thin nylon or polyethylene. It is very large in size, usually 200-400 m long and 5-6 m wide. Mesh size ranges between 5-23 mm. Length, depth and mesh size vary with the size of the water body and the species to be caught. After surrounding part of a water body with this

net, the two ends of the net are drawn together and the ground rope is hauled up from the center of the water body to catch the fish. This gear can be operated by day and by night.

3.2.2 Pattu vala

It is also a kind of shore-seine and locally called Pattu vala of varying dimensions and sizes are operated by a group of fishermen with the help of coracles in the river and highly inundated areas in the stretch (Fig. 10 & 11). The net is also carried by one or more coracles, laid out in a semi-circle, and hauled by 15 to 20 numbers of fishermen. This net is similar to Alivi vala but mesh size is above 100 mm. In this medium (about 400 grams) to big size of fishes are caught by these nets. The length of these nets is 150 to 200 m and width 5-6 m.

3.2.3 Lanjavala

It is a small seine and operated by 2 people, generally from the same family. It is operated in lower stretch of the river

scatter for exploiting prawns and small fishes which were more market value.

3.3 Cast net

It was the most commonly observed gear being operated in the river Krishna. The obvious reason was that it can be operated single handed. Different mesh and pocket size targeted to particular species were also encountered. The cast net, is commonly used which spreads when thrown out to catch fishes. It is hand operated by a single person. Cast net requires considerable expertise to handle it effectively and are usually liked by the most professional fishermen. They employed this gear in the river channel or other areas where natural congregation of fish takes place. These nets are not important as it contributes only 2-3 per cent of the total catch in the river Krishna (Fig. 11-14). Some fishermen were found operating this net in the river Krishna throughout the year.



Fig 7: Alivi vala (Large shore-seine)



Fig 8: Fisherman hauling Alivi vala into Coracle in Krishna river at Marumunagala village



Fig 9: Fishermen taking Alivi net into to the river for fishing at Chellepad village



Fig 10: Pattu vala in coracle on the bank of Krishna at Chandoor village



Fig 11: Pattu vala fishing at Somasila in Krishna river

3.4 Hook line

Hook lines are observed to be used throughout the entire stretch of river Krishna. Using earthworm as living bait and snail-flesh as dead bait, fisherman used to catch cat fishes from the river. The size of the fish caught for this was normally 250 gms to 2 kg and occasionally caught up to 10 Kg or even more size fishes. During the investigation observed about 10 kg Krishna mystus, *Hemibagrus maydelli* (Rossell) caught by fisherman at upper stretch of Mudumal village in 2012 (Fig. 15).

3.5 Box trap

Box trap was a cube shaped trap made of bamboo sticks knitted with some durable creepers. A bicuspid non-returning uni-directional vertical valve along the height of the trap was made to be used an entrance for fishes and prawns. The sticks used to make this valve were thinner and knitted with nylon rope. The trap was kept in vertical position under the water. A float made of thermocol was tied with the trap with cotton wire to help in locating the position of the trap. The

dimension of box traps is 2.25 length x 1.75 height x 1.75 width foot size and consist of only one-way entrance slits from both opposite sides and there is no way from inner to outside (Fig. 16). These entrance slits allows organism to enter inside and closes sticks automatically. These traps are cheap and made locally available materials.

3.6 Gear Selectivity

Mesh size of the gears were found to be highly variable from site to site and gears to gears. Most of the gears (seine/drag nets) with small mesh size (up to 20 mm) was found from Yaparla to Amaragiri village. Such gears were capable of retaining fish fry to fingerlings, and also fishes of smaller size to larger size fishes. Smaller fishes were regarded as undesirable and usually discarded by the traders at these sites. It was also found that nets with smaller mesh size (20 to 40 mm) were used whereas at other locations gill nets with both smaller and larger mesh size (40 to 250 mm) were in operation for fishing. Box traps used for fishing were observed at upper stretch. The selectivity's of the different gears depending on their mesh sizes. Certain gears are more effective at catching particular age classes of fish than others. Such gears thus demonstrate a strong qualitative 'catch ability' towards those age classes.

During monsoon the larger fishes were mostly caught by large gape size of gill nets. Later in the dry season, the larger

fish were mostly caught in large mesh size gill nets while smaller and medium fish were caught by active fishing and a few by cast nets and others. Several gears were capable of catching many species of fishes and prawns in the entire stretch of the Krishna. Thus to some extent gear selectivity was observed in area of study.

The fishing methods in river systems in India was discussed and opined that due to highly diverse nature of riverine habitat, the fishing methods range from catching with hands to the operation of large and indigenously designed nets for fishing^[5]. Various types of fishing crafts and gears were reported operating nature of the trained manpower in the fisheries sector together with the traditional as well as modern craft and gear combinations has increased the fish production of India including inland fish production^[1].

In fact in the district use of Alivi vala (large shore-seine) was common in lower stretch of river where the river bottom was clear and free from rocks and ideal for dragging. This gear is highly destructive as water gets filtered and due to dragging the river bed is completely cleaned leaving only sand and thus developing ecological desert. During operation, this gear destroys the habitat for wild species thus causing multiple harm to all the fish living in the river.



Fig 12: Fishermen operating cast nets in Krishna river at Juriyal village



Fig 13: Fish catching with cast net in Krishna river at Arepally village



Fig 14: Author interacting with fisherman in Krishna river at Berole villege



Fig 15: Author observing *Mystus sp* caught by fishermen with hook-line in Krishna river at Mudumal village

The present study recorded a decrease in catch per unit effort and in the profitability of the fisheries. A large number of different types of fishing gear are used, some of which catch large numbers of undersized carp (which is illegal), some catch a few illegal carp and others catch only legal-size carp. Some gear does not catch carp but are very destructive for wild fish population. The indiscriminate exploitation of fish fry and fingerlings by using the 'Alivi vala' (large shore-seine) from the lower stretch of the river, results in loss of the entire populations of wild fish species, including brood fishes and juveniles. This behavior suggests that biodiversity is sacrificed for short-term economic benefits.

The small mesh (25-50 mm) monofilament fixed gill net usually used to catch small species. Gill net with larger mesh sizes (50-160 mm) were used mainly for capturing Indian Major Carps and *Mystus sp* while nets with small mesh size (10- 20 mm) were used for catching small catfishes, carps and others in winter and summer. Being light weighted and almost invisible in nature the small mesh gill nets are extremely

dangerous not only for juveniles of Indian Major Carps but also to other species. And also monofilament gill net use is maximum in the entire stretch of the river Krishna in Mahabubnagar district.



Fig 16: Box trap

Alivi vala (large shore-seine) is very harmful net and is responsible for the decline in fish populations in rivers and floodplains. This net is a very effective net and should be banned by the Government because of its potential to overexploit juvenile carp, catfishes, prawns etc. This net is operating in the certain stretches of the river Krishna from December to May in the year. It is also used in river during the dry season when water flow is minimal. During the study, its maximum operation was observed at Gummadam, Yaparla, Gaddabaswapuram, Marumunagala, Pragatoor, Seripally, Kyathur, Gundimalla, Byrampally, Peddamaroor, Chinnamaroor, Chellepadu, Gudem, Manchalakatta, Somasila and Amaragiri from January to May as the water level gradually recedes in the river significantly. Pattu vala (shore-seine) was also widely operating in the lower stretch of the river Krishna where the places Alivi vala was operated from November to April every year during day time by local fishermen. It is also harmful net and is responsible for the decline in fish populations in rivers.

The local fishermen or local leaders or both colludes and invites the coastal fisherman of Andhra Pradesh, makes financial agreements and allows for the operation of this prohibited nets in their village vicinities. After financial commitments, these fishermen migrates and make temporary shelters / huts in the vicinity of river bank and start operation of the Alivi nets during night time clandestinely. Daily operates two to three hauls from 6 pm to 6 am and catches about 100 Kg to 500 Kg or more fish of all sizes in each haul. Every year about 90 to 130 Alivi nets used for fishing in Krishna river in Mahabubnagar district, particularly in lower stretch where the river bottom is ideal for the operation of seine nets (Table. 2). And the same numbers of Alivi nets are also operated in Kurnool district area by other batches of coastal fishermen.

4. Conclusion

About 5 different types of fishing gears and nets with varied length, diameter and mesh sizes were used in the river in Mahabubnagar district. Diversity was observed in gears to exploit all elements of the fish community, despite the dominance of gill nets, monofilament gill nets were the extensively used gears throughout the year in Krishna river. The operation of nets and gears to vary with current, depth of water or river, nature of fish to be captured and availability of raw material. Nearly, all riverine fishing gears were found to be artisanal, small scale and labour intensive and are traditionally being employed in Mahabubnagar district for many decades. Nevertheless, with the advancement of technical knowledge, certain gears have been replaced by nylon nets. Many of the fishing gears were employed for short-time when water level found to be suitable for their use. As a result, fishermen used a series of gears especially when the water level starts increasing with the onset of monsoon or when flood starts receding. During monsoon, some of the large mesh size gill nets were used for the catching brooder fish. Most of the riverine fishermen revealed that the Indian major carps catching declined and *Tilapia sp* catching increased significantly since last couple of years in the Krishna river in the district.

Since there is availability of mechanized and modernized fishing gears in the market that attracts the non-traditional fishers for fishing in the river. So the number of fishers also increased, resulting sharp decline of total catch per unit effort

of the fishes. Involvement of more fishers, habitat alteration, encroachment of exotic fishes particularly *Tilapia sp*, wide use of seine nets and fall in catch per unit effort of more economically important fishes especially major carps affecting reluctant approach of new generation fishers fishing in the river. Fishermen are very skilled in operating the fishing gears as they know how and what kind of fishing gears should be used to catch maximum fishes in minimum effort. They use the gears according to the topography and conditions of the river.

The state government is banned the operation of shore-seines (Alivi vala and Pattu vala) and filing the cases against illegal operators, still they are operating clandestinely with the cooperation of local leaders or fisher folk or both. Immediate action is required to stop this method; otherwise, it will have deleterious effects on fishery in lower stretch of river Krishna.

Though the use of several types of fishing gear is limited and regulated under the fishery laws, they are still in use. The operation of all types of fishing gears should also be restricted in breeding period i.e. from July to September. The use of small mesh size gill nets and shore-seines should be completely banned. An awareness / training program should be organized to fishers to create an awareness of the factors affecting the health of the fisheries and the rationale for the restrictions on a particular fishing gear in a particular season. This will improve compliance with the regulations and improve yields in the long term.

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6. References

1. Hameed MS, John AT. Types of fishing craft and gear operating in Indian waters. *Fishing Chaims* 1996; 15(11):36-39.
2. Hornell J. The fishing methods of Ganges, *Memoires Asiatic Society Bengal* 1929; 8:201.
3. Joseph KM, Narayanan KP. Fishing gear and methods of the river Brahmaputra in Assam. *Fish Tech* 1965; 2:205.
4. Mitra PM, Ghose KK, Saigal BN, Sarkar ND, Roy AK, Mondal NC. Fishing gears of the upper and middle Hooghly estuary. *Bull. No. 49, Cent. Inland fish. Res. Inst. Barrackpore*, 1987, 22.
5. Saxena RK. Fishing methods in river Systems. In: *Conservation and Management of Inland Capture Fisheries Resources of India*. (Eds). Jhingran AG, Sugunan VV. *Inland Fisheries Society of India* 1988. CIFRI, Barrackpore, West Bengal., 61-68.