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TRADITIONAL TECHNOLOGICAL ASPECTS OF FISHING CRAFTS IN NORTH COASTAL ANDHRA PRADESH, EAST COAST OF INDIA

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Abstract

The study focuses on different types of boats used in marine fishing by traditional communities inhabiting the northeast coastal Andhra Pradesh. These boats are grouped into tied, stitched and moulded. A few of these prototypes of mechanised boats are added by mechanical devices. All these boats are fabricated by indigenous technologies by using local materials. The fabricators are illiterate fishing people. Their ingenuity of maintaining ratios in relation to keel, stem, hull, mast and rudder of a boat to navigate on open sea is astonishing. Further, the study discusses different types of nets used in harvesting various types of fish. The other fishing paraphernalia like hooks, lines, lures etc are also discussed.

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INTRODUCTION

Anthropological Studies of marine communities have traditionally focussed on three subjects which are modern fishers, shipboard life and prehistoric marine adaptations (Acheson, 1981). Depending upon ecological, economic and cultural factors anthropologist can distinguish between traditional fishing societies, peasant fishing societies, and modern industrialized fishermen (Johnson, 1979). Peasant fishing society people are a relatively simple with non-mechanized technology, traditional fishermen people have simple technology and fish mainly for their subsistence and industrialized fisher men fish with mechanized and capital intensive equipment.

The kinds of crafts, gear and techniques employed for fishing in India are bewildering in their variety. The methods of their employment depend on various factors like marine environment, climatic conditions, and the species of fish and the cultural economy of the region. According to the Food and Agriculture Organization (FAO) report, Bay of Bengal Programme- Traditional Marine Fishing Craft and Gear of Orissa (1986), the most common craft north in Cuttack district is *danga-dhingy*, *sabot*, *choat*, *patia* and *sarbado*. This report delineates that the *patia*, the *danga* and the *dhingy* are made of *sal* wood, *patia* and *danga* are clinker-built while *dhingy* is carvel-built.

Mukharjee (1970) has delineated the differences between the boats of the West Bengal fisher folk and those of the Nolia (Orissa State). According to him, in the case of former nails are used whereas in the latter case planks sewn with ropes (*kata*) are made of coir. He also mentioned that in West Bengal sea-fishing boats are different carrying capacities (150-450 mds.), which are used in net fishing. It is also mentioned that the *bihurdi*, *chandi* and *dara* nets are operated from the boats which vary in length from 2' 10" to 3' 1".

Mathur (1978) has classified the traditional fishing crafts into two types, namely the indigenous or non-mechanized and mechanized. He further mentions that the indigenous crafts are again divided into three types- catamarans, the dugout canoes (*beppu toni*) or *odum* and plank-built *tonis*. He has delineated the following boats:

1. Catamaran: This is the traditional fishing craft employed along the East Coast from Orissa to Kanyakumari (Tamil Nadu and Kerala states). The catamarans are 2' and 1.4" in length. Four to five logs of light-wood

are tied together with coir. These catamarans are used today for hook-and-line fishing and also for launching the gill nets.

2. Dugout Canoes: Dugout canoes are made from large logs of ayini (Ailanthus), mango and chini (Austriaria) trunks. All over Kerala it had a length varying from 32 to 42 feet.
3. Plank-built boats: These boats are made of Ayini wood covered with fire. It has five *kallis* (compartments) and six *padis* (cross bars)

Norr (1972) has identified different fishing techniques among the men of Minakuppam in Tamil Nadu. According to this study the major types of boats is a simple log raft which is a catamaran. The study discusses another type of boat which is called the *peria badga* (big boat), which is a double-ended rowboat, fifteen to twenty feet long of ribs and planks construction and with an unusually deep draft for its length.

Suryanarayana (1977) in his study among fishing communities has brought out the technology and organization of fishing in Andhra Pradesh. According to him, the fishing craft includes catamaran or *teppa* which is a keel-less raft formed of two to four logs of wood. He further says that the wood used for these boats is *erra chinda*, *tell chinduva*, *kiyyapa karra*, *nidraganneru* and *badisa*. He also described padava (boat). It is called masula boat which is also keel-less, formed of planks stitched together with Palmyra leaf fibre. According to him, the Jalaris (fishing community) of Visakhapatnam prepare two types of padavas – *pedd padava* (big boat) and *chinna padava* (small boat). He further says that the length of the *pedda padava* is about 30 feet and the depth 5 feet and this boat is used for operation of the *pedda vala* (big net). The length of *chinna padava* is about 22 feet and width of about 4 feet. In his book Suryanarayana has also delineated various types of fishing gears, gill nets, boat-seines, shore-seines and hand-lines. He mentions that while the gill nets are made of both cotton and nylon, the boat seines and shore-seines are of pure cotton. Different types of nets like pedda vala, iraga vala, alivi vala, isuru vala, katla vala etc., have been discussed in this monograph.

Fishing gears vary greatly in their structure, materials and the principles of capture processes and methods of operation. Fishermen use several fishing gears and methods appropriate for the species and environmental and ground conditions. Fishing gears whether primitive or sophisticated use five mechanisms in the capture process viz., gilling and tangling (gill nets and trammel nets), trapping (traps and pound nets), filtering (trawls, seines and other net fishing systems, hooking and spearing (hook and line and harpoons) and pumping (fish pumps) (Fridman, 1986 and Hameed and Boopendernath, 2000).

Methodology

The fishing gear includes navigation facility (boats for sailing), fishing gear (nets and hooks) and storage (baskets and refrigeration) equipment. These material manifestations show variation across the marine boarders, but in the present study reports the detailed accounts of the gear (type and item-wise) used along the coast of North East Coastal Andhra Pradesh (NECAP). The data is sought on physical verification right on the place of economic activity (sea coast), enquiry through interview with the persons involved (aged and experienced) and physical measurements of the equipment. The description is presented under three heads: 1. Boats and boat building, 2. Nets and Hooks, and 3. other fishing paraphernalia.

In order to understand and delineate the indigenous knowledge on fabrication of boats the data is collected through individual face-to-face interview with the persons involved in fabrication right at their place of work, while performing the job. A meticulous care is taken to document several aspects of the fabrication technologies. Technology type and group-wise classification of boats mentioned above are showing some type of evolutionary pattern, and they are described hereunder.

Major materials used in fabrication are wooden planks, grass and twine. Except the cotton twine replaced by the plastic fibre, the wooden planks and grass are locally available in the nearby Eastern Ghat hill tracts or at the foothills of these tracts. Carpentry tools like axe, adze, chisel, saw and driller are used in fabrication and they are brought from local markets. Several hundreds of boats are seen on the coast either anchored or on sail. A close look at these boats indicates a wide range of types of different sizes, shapes and materials.

Results and Discussions

Boats and Boat Building

Boat is a compound device had several key components. The hull is the main structural component of the boat which actually provides buoyancy for the boat. Roughly horizontal, but chambered structures spanning the hull of the boat are referred to as the deck. The keel is a lengthwise structural member to which the frames are fixed and they are the backbone to the boat. The front (forward end) of a boat is called the bow, while the rear (aft end) is called stern, the right side (facing forward) is starboard and the left side is port.

Among the 191 villages/habitations located in NECAP region, three varieties of boat building yards are noticed. They are traditional country boat, fibre boat and trawler building yards. The country boat building is of two types, a traditional sail type while the other fixed with 9 hp diesel engine. The fibre boats are invariably with engines of different horsepower. The trawlers are of high powered engine boats/vessels with storage facility. All these varieties of boats are fabricated right on the coasts at different locales, which are part and parcel of fishermen habitations. Fabricators of these boats are fishermen only. A few fishermen specialized in boat fabrication technologies, traditional as well as mechanized including fibreglass boats, and they are the sole suppliers of boats for the local fishing needs.

Boat Building

Country boat building yards are seen at 61 habitations. Most of these yards are located under the grove of trees contiguous to the beach and sea coast. Only a few are seen either within or at the periphery of the settlements. Such are mostly for fabricating the Fibre Reinforced Plastic (FRP). There is no specific name for the yard, a boundary or a brand. All the yards are casual and operated on informal mutual obligations and understandings. The size, type, cost and the delivery date of the boat are on mutual consent by the fabricator and the buyer. An interesting observation is that the traditional country boat fabricators are illiterates and carry no measuring instruments as they cannot read letters and numbers, but had the knowledge of count on number of fingers and arm lengths. Such an indigenous knowledge has been time tested as evidenced by the production of several hundreds of boats fabricated and delivered from these yards.

Fibre Boats

This is one variety of modern catamarans made from synthetic fibre glass material. The shape of the catamaran is similar to the ordinary *katla theppa* but they are larger in size and well streamlined for better floating and navigation. These are called Beach Landing Crafts (BLC) with either in boat motor (IBM) or out boat motor (OBM). The length of the *fibre theppa* is about eleven *mooralu* i.e., sixteen and half feet and the width is about two and half *mooralu* i.e., about three and half feet. The hull of this catamaran is filled with pieces of thermo coal. Sail (*thera chaapa*) is used for sailing/navigation which is smaller than the one used for *katla theppa*. Maintenance of this type of catamaran is cost effective and more durable; hence the fishermen are slowly shifting to the use of this streamlined synthetic fibre glass material made catamaran. About three to four members can go for fishing with fishing nets such as *nara/naram vala*, *disco vala*, fishing lines such as *gelam thaadu*, *jami thaadu* and *vanjuram thaadu* etc.

For a larger variety fibre boats pre-fabricated moulds are used. Thereby, the size and shape of the boat depends on the moulds. Initially emulsion glass fibre and liquid polyester resin are used to mould the hull of the boat. Then the wooden ribs are fixed at different intervals to make compartments by partitioning with plywood. The wooden and plywood parts of the chambered compartments are totally covered by applying glass and resin. Later, a wooden frame is fixed over the hull to make the deck part of the boat. The entire deck is again plastered with glass and resin. While doing so, a special room or space is provided to lodge the engine. The craft is finally fitted with required horsepower engine inside or outside of the boat, as the case may be, depending upon the size. This type of crafts has the facility of storage, chilling space and accommodate about 9-12 people for a day or two.

An interesting observation here is none of the manufacturers are having education or a formal training in fabrication. Just they follow the instructions of the one leader of the team who had an informal training in handling fibreglass and related chemicals and the ratios of mixing. Even the carpenters deployed in the process are fishermen do not have any formal or informal training but they mastered the technique by trial and error method. A moderate sized fibre boat may take about 10-12 days with manpower of 6-8 persons, who are familiar with resin mix, application, grinding and carpentry. Quality of the boat is certified by Indian Registrar of Shipping, located at Mumbai. The boat's parts are taken as samples for testing quality control to Mumbai for certification. Each craft is given warranty for three years only for manufacturing defects.

Moulded Boats / Fibreglass boats

Fibre glass boats are extremely strong, and do not rust (iron oxide), corrode, or rot. However, they are susceptible for structural degradation from sunlight and extremes in temperature over their lifespan. Fibre glass provides structural strength, especially when long woven strands are laid, sometimes from bow to stern, and then soaked in epoxy or polyester resin to form the hull of the boat. Whether hand laid or built in a mould, FRP (fibreglass reinforced plastic) boats usually have an outer coating of gel coat which is a thin solid coloured layer of polyester resin that adds no structural strength, but does create a smooth surface which can be buffed to a high shine and also act as protective layer against sunlight. Even in this category two types of boats are delineated and they are partial and total fibre boats.

Partially Moulded Boats

As mentioned earlier stitched boats are of several types. Among these the partially fibre plated is one variety, which stand as intermediary between the traditional stitched boat and the fibre boat. The hull of the stitched boat is fixed with ribs made out of pasi (*Anogislus acuminata*) or thumba (*Acacia luecophloea*) karra (wood). Later the hull is portioned by plywood. Leaving the engine platform (*anakapeeta*) the rest of the hull is covered with plywood. The entire plywood area is moulded with fibreglass of different colours. The additional advantage with this up-gradation extends storage and chilling space to the country mechanized boat besides durability.

Nets:

Fishing net or fishnet is a net used for fishing. Nets are devices made from fibres woven in grid-like structures. Fishing nets are usually meshes formed by knotting a relatively thin thread. Early nets were woven from grasses, flaxes and other fibrous plant materials. Later on cotton was used. Modern nets are usually made of artificial polyamides like nylon.

Fishing (includes fish, prawn, crab and squids) at sea is done in several ways. Several types of nets, hooks and traps are used. The type and size of these fishing gear depends on the boat on which the fisher sails and the type of fish to be caught. In the study region several types of fishing paraphernalia are observed and they are described hereunder to present the indigenous modes of knowledge on fishing.

Chinna Kvallu Vala (named after fish type)

This type of net is prepared with cotton yarn of forty counts. The mesh size of this net is one fourth of an inch. Since it is made from cotton yarn, the net lasts for about two years. The *Chinna Kavvallavala* is operated from October to March months. A small boat (*chinna padava*) or a small catamaran (*theppa*) is used for operating this variety of net. The fish usually caught in this type of net are small sardines (*chinna kavvullu*), white bait (*nettalu*), paravalu and karalu.

Nadipi Kavallu Vala (named after fish type)

The mesh size of this net is half an inch. Cotton yarn of forty counts is used for the manufacture of this kind of net. The season for operating this variety of net is from March to May months. Small boat (*chinna padava*) or a cataraman (*pedda theppa*) is used along with this net. The fish caught in this traditional fishing net are mackerals (*kanagadathalu*), small sardines/ painbow (*china kavvullu*) and white bait (*nettallu*).

Pedda Kavallu Vala (named after fish type)

The mesh size of this type of net is one inch. The *pedd kavvalla vala* is made from twenty or thirty count of cotton yarn. The net may lasts for about five years. The season for operating *pedda kavvallavala* is from March to May months. A big cataraman (*pedda theppa*) or a small boat (*chinna kuttu padava*) is used along with this net for fishing. The fish usually caught are big sardines/painbow/capline (*pedda kavvullu*), mackerals (*kanagadathalu*), pedda maravalu, gulivindalu and diccholu.

Disco Vala (disco net)

Disco net or *Disco vala* is one variety of modern nets. The net is rectangular in shape and comprises three nets. Of the three nets, the middle one is nylon net with mesh size of one inch is used and on either side nylon nets with mesh size of three to four inches are laced with the help of nylon ropes. The length of the three nets will be about 45 *baralu* ($45 \times 6 = 270$ feet), while the breadth of the three parts will be of various sizes. The nylon nets with three to four inches mesh size which are laced on either side of the middle net will be about six *mooralu* ($6 \times 1.5 = 9$ feet) in width, while the central/middle nylon net with one inch mesh (*kannu*) size will be about 8 *mooralu* ($8 \times 1.5 = 12$ feet) in width. The upper portion of the net is fixed with floats called *katla* with help of nylon rope called *maygala*. The bottom portion of the net is laced with sinkers (*thagaram poosalu*) with nylon rope called *kaygala* at fixed intervals of space.

Disco net is operated with the help of *katla theppa* or fibre boat by three or four persons. The fishermen take the net on a catamaran into the open sea for a distance of about half a kilometre to one kilometre from the high waves (*keratallu*) and then the net is dropped in the sea waters after identifying the locale of the shoal of fish. One person will leave the net into the water from the *katla* rope side (*maygala*) having floats made of plastic rings while another person sinks the net of the *kaygala* side which bears lead beads (*thagaram poosalu*) used as sinkers till the net touches the bottom of the sea and go around the sea in a circular form till the fishermen in the catamaran feel that some fish are trapped in the disco net. The net after keeping in waters for about two to three hours, is carefully pulled on to the catamaran's deck and the fish trapped in the disco net are carefully taken out and are kept in baskets

or bags (*bungalu*). These operations are repeated till the crew members assume that they had caught sufficient quantity of fish. It is informed that four to five disco nets are joined by lacing together for fishing good quantity of fish. The fish caught by this net are prawns (*royyalu*), white bait (*netthallu*), mackaral (*kanagadathalu*), parigelu etc.

Fishing Lines

In addition to different types of nets to catch fish hooks are used by the fisher folk of the study area. Fishing line is one of the fishing methods in which a line with a hook, usually baited, is lowered into the water from a drifting, anchored or moving boat or from a raised platform near the coast. Almost any kind of line or twine can be used and is selected on the basis of type of fish targeted. They use specific variety of lines and hooks for specific type of fish in a particular season.

Hooks are designed as either single hooks- a single eye, shank and point, double hooks- a single eye merged with two shanks and points, a treble- a single eye merged with three shanks and three evenly spaced points. Double hooks are formed by adding a single eyeless hook to a double hook and brazing all three shanks together. Hook sizes generally are referred to by a numbering system that places the size 1 hook in the middle of the size range. Smaller hooks are referred by larger hole numbers (e.g. 1, 2, 3. . .). Larger hooks are referred by increasing whole numbers followed by a slash and a zero (e.g. 1/0 one aught), 2/0, 3/0 . . .) as their size increases. The numbers represent relative sizes, normally associated with the gap (the distance from the point tip to the shank). The smallest size available is 32 and largest 20/0. Fish hooks used by the fishermen are purchased in the local markets and they are branded. The hooks are tied to the lines either singly or in multiples. The fisher folk use catamarans (*katla theppa*) or fibre boats to reach the fishing spots known to them, the details of which are described in the following paragraphs.

Konam Thadulu (threads to catch konam fish):

This is one type of fishing line. Earlier it was made from cotton thread (*noolu thaadu*) by spinning cotton on *thakili* and further by swindling (*neputa*) with hands the thin threads to a thick thread. Of late, cotton threads are no more in use for making mother lining (*thalli thaadu*). Now days they are using nylon get/wire of gauge No.70 or No.80, because of its strength and durability when compared with the cotton thread used earlier. The *konam thaadu* consists of three main lines called *thalli thaadulu* of three different lengths. The first *thalli thaadu* will be about 80 *baralu* in length (about 80x6=480 feet) approximately. At one end of this *thalli thaadu*, a strong cotton rope is tied to the get/wire to fasten the same to the waist of the fisherman at the time of fishing. At the other end of the *thalli thaadu*, a steel wire is joined and then a big hook (*koyya*) of No.3, 4 or 5 size. The rationale behind joining a steel wire to the hook is to prevent the fish from biting the mother line (*thalli thaadu*). The second or the middle *thalli thaadu* is also made up of nylon get/wire of similar gauge of No.70 or No.80; however, the total length of it will be about 70 *baralu* (about 70x6=425 feet). A cotton rope is tied to one end of it for tying around the waist of the fisherman at the time of fishing. At about 60 *baralu* (360 feet) length of the mother line (*thalli thaadu*) of the second or the middle mother line (*thalli thaadu*), an iron stone locally called *budidi* is tied and at the other end of it, a steel wire is jointed with a hook of the same size as attached to the first mother line. The third mother line (*thalli thaadu*) will be about 60 *baralu* in length (about 360 feet), which is made up of 70 or 80 gauge nylon get/wire. One end of it is tied to a *thermocoal* having some nylon get/wire. At about one third length of the mother line (*thalli thaadu*) a knot called *gundi* is made for joining a branch of fishing get/wire called *pilla thaadu*. To one end of the *pilla thaadu*, a steel wire in the form of a ring is fastened to fix a hook of size No.3, 4 or 5 and after eight *baralu* (48 to 50 feet length) of the mother line (*thalli thaadu*), a steel wire and a hook of the size mentioned earlier are jointed. All mother lines (*thalli thaadulu*) and one *pilla thaadu* constitute a set of *konam thaadu*. For operating *konam thaadu*, it is taken far away to a fishing spot in the open sea for about 25 km from the coast on a catamaran (*katla theppa* or *fibre theppa*) with the help of a sail (*therachaapa*) where the depth of the sea is about 30 *baralu*, i.e., about 190 feet to 200 feet. It is informed that the months of February and March is the season for fishing *konamulu*. The mackerals (*kanagadathalu*) are used as baits for fishing *konamulu*. The next season after the month of March is the fishing season for *kommu konamulu*, another species of fish. But for fishing *kommu konamulu*, fishes such as *bontha*, *kanagadathalu* or any other fish is used as bait while fishing by means of *konam thaadu*.

Jami Thadu (jami thread)

This is another type of fishing line being used by the fishermen of NECAP region. This is a very big fishing line. Earlier the mother lining (*thalli thaadu*) was prepared with cotton thread (*noolu thaadu*) by processing which comprises spinning of cotton, *kasatheeyuta*, and making thread of required thickness by way of spindling (*penuta*). Of late, cotton thread is not being used for preparing this variety of fishing line. The total length of this fishing line may be ranging from 2,000 *baralu* (about 6,000 metres to 7000 meters). Of late, the *jami thaadu* is being made from 100 count nylon get/wire, because of its strength and durability when compared with the thread made up of cotton

yarn. At one end of the *Jami thaadu*, a rope called *eddadu* is tied to a wooden anchor called *kalipodu* where the *katta theppa* or *fibre theppa* (catamaran) is anchored.

Conclusion and Observations

Different types of boats are in operation for fishing in the study area. They are grouped into tied, stitched and moulded boats, with a sub classification of traditional and value added by mechanical devices. All these types are fabricated by employing indigenous technologies that they have imbibed from generations together by means of oral and participatory experience. A few of the fishermen have mastered the boat building and moulding mechanisms, and they are the sole suppliers of these boats.

All such boats are of local make without a brand or a standard size, but they maintain ratios in relation to the keel, stem, hull, mast and rudder in order to navigate on open sea. Only a few boats have names, but no boat is numbered for identification. An inquiry into the identification of boat drew the answer 'just as you can identify a cow in a folk we have the knowledge of identifying our boats among many'.

With an exception to the fibreglass boats all the raw materials, such as wood for logs, planks, grass, and coir fibre for stitching used in boat building are local, and they are available in local traditional markets. Plastics and resins for moulding and stitching materials are procured from commercial markets from nearby towns. Sixty-one boat-building yards are found in the study area. None of them is located in any formal building with an exception to a very few fibreglass moulded yards, which are located in sheds. All the remaining yards are located under the shade of a tree or grooves of trees.

The planked stitched boats last for about 25 to 30 years, but every three years they need to be dismantled and repaired. About 9,000 (6296+2760) such boats are in operation in the study area, and in fact the fabrication and their inherent quality of their repair for every three years, is extending employment to the boat builders, who are again fishermen community people only. The study has revealed that the use of traditional boats has interdependent techno-economic nexus between the fabricator and fisher that sustains the peasant fishing over the years.

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