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Case Study

A study on the design and operation of a traditional winch in fishery technology

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Abstract

Majority of the non-mechanized craft in Karnataka are wooden and they are operated mainly in beach landing centers which hardly have any berthing facility. These boats are operating on daily basis and are hauled on to the beach after the operation to protect it from fouling organisms. The fishermen of Karnataka came up with the idea of wooden winch/ capstan named "Dhowr" for hauling the boat on shore. The following paper documents and report for the first time, the use of such unique, eco-friendly wooden capstan, "Dhowr" which is in operation in traditional beach landing fishing village of Karnataka.

Keywords: Eco-friendly, beach landing, wooden capstan, Uttar Kannada.

Introduction

The maritime State of Karnataka has a coastline of 300 km stretching from Majali (Karwar) in the north to Thalapady (Mangalore) in the south covering the three coastal districts *viz* Uttar Kannada (160 km), Udupi (98 km) and Dakshina Kannada (42 km)[1]. This area is encrusted between the Western Ghats in the east and Arabian Sea in the west. The State has a continental shelf area of 27000 sq km and 87000 sq km area of Exclusive Economic Zone which is rich in pelagic fishes like sardines and mackerels and so Karnataka Coast is traditionally known as "Mackerel Coast"[2]. In Karnataka there are 14,023 crafts in the fishery of which only 16 percent (3,643) are mechanized, the rest 84 percent forms the non-mechanized craft consisting of motorized (53.6%) and non-motorized (20.4%). About 80 percent of non-mechanized craft in Karnataka are wooden[3].

Traditionally, the fishing crafts are manually hauled on to the beach after the fishing cruise. Even now many of the beach-landing centers use manpower for hauling the boats. But the change in beach profile due to changing weather condition makes it extremely cumbersome for hauling the boat using manpower alone. Moreover, the labour force has also been getting scarce in many fishing villages. To overcome this problem, it was believed that simple low-cost manual hauling devices would prove useful and acceptable to the fisher folk. A wooden winch was already in use by the fishermen of Konkan-Malabar Coast, many decades back. These winches were used in boat building and repair yards. Though the device was accepted, it was not much popularized for use in beach landing centres of this region. The fishermen in Keni Village of Uttar Kannada District worked on this insight and came out with a modified manually working wooden winch/ capstan and named "*Dhowr*". The use of such devices would reduce the manpower while making the operations easier and less time-consuming. This device was widely accepted and number of units came up in most of the beach landing fishing villages of Uttar Kannada. With this background, it was felt necessary that a detailed study be conducted to document and report the construction and operation of unique and eco-friendly wooden capstan, "*Dhowr*" along with the benefits to the fishermen.

Methodology

Study area: Marine fishing villages of *Ankola* Taluk (*Aggargona, Shediguli, Belse, Harwada, Keni* and *Gabitwada*) and *Kumta* Taluk (*Shashital, Aganashini, Gudeangadi, Belihittala, Lukkeri* and *Betkuli*) in Uttara Kannada District were selected for survey as the "*Dhowr*" winches are common in these taluks.

Data collection: The details of the materials used and cost of construction was collected from the carpenters who are involved in the construction of "*Dhowr*" in the Keni Village. Dimensions of the capstan were taken from two "*Dhowrs*" each from the selected fishing villages in the *Kumta* and *Ankola* taluk. Local fishermen who uses this traditional winch/ capstan were interviewed at random in each taluk (N=40). Prior informed consent was taken from two fishermen (Nagaraj Navugar, aged 35, Kumar Subhrai Ambika, aged 34) and single fishermen (Bhoothai, aged 57) in Ankola Taluk, and Kumta Taluk respectively, for their co-operation in documenting the data pertaining to "*Dhowr*". The exploratory case study design was used where a systemic semi-structured approach that uses a combination of methods to assess and understand a situation was used with the help of local people to document the details of the winch. Semi-structured interviews were used to document the details of the winch[4].

Economic analysis: In order to analyze the economic benefit of using a '*Dhowr*', a survey was conducted in the beach landing fishing village, *Abhithoda Keni*. Details on the number of craft operating from the beach, number of '*Dhowr*, number of craft hauled up by single '*Dhowr* and labour expenditure if '*Dhowr* is not used; were collected.

Results and discussion

"*Dhowr*" are traditional winches which are operated in beach landing centers of Uttar Kannada District, mainly for hauling wooden fishing crafts. But, now a day, fibre boats are also hauled up using these winches. The wooden crafts mainly include the large and heavy out-trigger crafts locally known as "*Rampani* Boats"[5]. These crafts are generally large sized (15m x 3m) with narrow keel and body planks more spread out. They are usually weighing between 1.5 to 2 tonnes[6]. These wooden fishing crafts are built out of local timber like Jungle Jack (*Artocarpus hirsuta)* locally known as Aini and are usually not coated with antifouling paints nor are they sheathed to protect the timber from attacks by marine borers[7]. In order to protect the timber, these fishing crafts are hauled on to the beach after each fishing cruise. The fishing craft are hauled using the rope attached to the stern and the sides of the craft. Seasoned timber logs are used for the craft to slide on and to prevent it from sinking in the sand. Depending on the size and weight of the boat, 20-25 men are engaged each time a boat has to be hauled ashore.

Description of the "*Dhowr*": "*Dhowr*" consist of the following parts (Figure-6): i. A central pivot, which is free to rotate, is a cylindrical timber of varying diameter (a) Upper and lower part with smaller diameter (b) Middle portion with bigger diameter, ii. Vertical corner poles (4 numbers), iii. Horizontal connecting poles (8 numbers-4 each on the upper and lower sides of vertical corner poles), iv. Pivot balancing planks (4 numbers- 2 each on the upper and lower sides of Pivot.), v. Rope regulating planks (2 numbers attached to the middle of vertical corner poles which faces the sea), vi. A handle or the lever for rotating the pivot, vii. Towing rope which is wound around the pivot.

The winch is positioned on the flat portion of the beach at a higher level than the craft. During low tide the difference in level between the craft and the winch can be as high as 3 m, in certain beaches. The logs or planks in the vertical corner poles, connecting poles, pivot balancing pole and rope regulating plank has a length varying 100 to 120 cm. The pivot, comprising of cylindrical timber ranges from 150 to 180 cm in length. The middle portion of the pivot, with the wider diameter is the area where the hauling rope is wound. The four vertical corner poles are buried in the sand 30-45 cm deep. The horizontal connecting poles on the upper and lower portion of the winch are nailed and tied to these vertical corner poles to make the winch sturdy. The two balancing planks, each in the upper and lower portion of the winch are grooved for the smooth passage of the pivot. The movement of the boat hauling rope in the winch is restricted by the two planks kept in the seaward side of the winch. The upper portion of the pivot is provided with a hole, so that a long slender pole of 180-240 cm can pass through it. This pole acts as a handle for rotating the pivot, which ultimately winds the rope attached to the boat, for hauling the fishing craft to beach.

Material and Construction: The respondents opined that the traditional winches can be made from locally available timbers like Neem, Jack, Mango, Mahagony and others. But the fishers prefer Babul, *Acacia nilotica* for the construction of '*Dhowr*'. Out of the forty fishers interviewed, 85% of the fishers preferred Babul. The preference was mainly because of the easily availability, low cost and durability of the wood to withstand harsh environmental condition. The towing rope is usually Polypropylene ropes with diameter not less than 20mm. The length of the rope depends on the distance the boat has to be pulled up from the surf zone to the craft berthing area on the beach.

Operation of winch: The operation of winch occurs only in beach landing centers, where there is no proper jetty to land the boat. When the fishing craft returns after fishing, the rope which is wound on the "*Dhowr"* winch is released and tied to the stern of the fishing boat (Figure-1 and 2). The craft is dragged to the beach by the winch with the keel sliding directly on the sand. But pulling the wooden boat directly on the sand can be very difficult as the keel of the wooden boat gets sink in the sand. Besides, the wooden boats are also likely to become abraded by being hauled over sand and stones. The required pulling power can be drastically reduced by using wooden plank between the keel of the craft and the sand. The handle or the lever of the winch which is parallel to the ground is rotated manually. The fishermen would co-ordinate their rhythmic movement by singing a preferred song as they move around the capstan holding the lever in clockwise direction (Figure-3). The towing rope which was connected to the boat is wound several turns around the central pivot until the craft is hauled upon the berthing area on the beach (Figure-4). After the boat is berthed properly, the nets are taken out to remove the catches (Figure-5). A single "*Dhowr*" is aligned to operate a minimum of three fishing crafts on the beach.

Figure-1: Fishing boat coming back from fishing.

Figure-2: Towing rope attached to the stem of the fishing Boat.

Figure-3: Fishermen rotating the pivot using the handle and hauling the boat onto the beach.

Figure-4: Fishing boat reaching the berthing area on the beach.

Figure-5: Fishermen removing the catch from the net after berthing the boat on the beach.

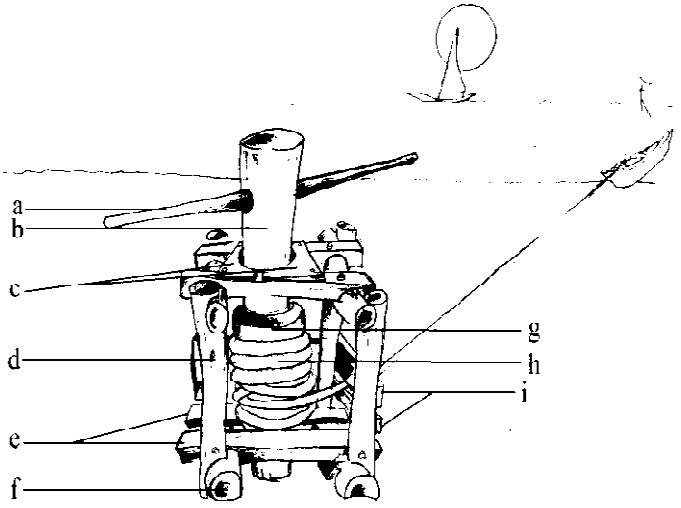

Figure-6: Drawing showing the different parts of "*Dhowr*" (a: Handle or the lever, b: Upper portion of central pivot, c: Pivot balancing planks on the upper side, d: Vertical corner pole, e: Pivot balancing planks on the lower side f: Horizontal connecting poles on the lower side, g: Middle portion of central pivot, h: towing rope wound around the pivot, i: Rope regulating planks) (Picture courtesy: Yogesh Kumar. K).

Socio-economic benefits to fishermen: The winch has been in use for the last few decades in many of the beach landing centers of Karnataka. Economic analysis was done to assess the profitability of using the winch in the *Abhithoda Keni* beach landing centre. The construction of the winch requires 14 man days which includes one day for installation. The construction cost of the winch is INR 3,800 which includes the labour cost for construction, cost of timber and other accessories for joining the planks and poles. The respondents opined that the wooden winch has a minimum life span of 2 years depending on the type of wood used. The cost of winch construction is shared by the fishermen groups or fishermen society. Usually a single winch can be used to haul a minimum of 3 Boats. Before the

introduction of *Dhowr*, each boat owner was charged up to INR 400 per month for hauling the boats ashore. But with the introduction of *Dhowr*, not only the manpower reduced to 5-6 for hauling a boat on to the shore but also the craft hauling charges was waived off. It was found that each boat owner could save INR 3367 each year by using "*Dhowr"*. It is not just the economic benefit that makes this traditional winch acceptable to the fishermen. The villagers as a whole and fishermen in particular, have habitually been involved in the protracted and tough chore of hauling fishing craft on shore. In spite of these hard works, those occasions are enjoyed as public gatherings as well as being treated as cooperative community conscientiousness. The fishers appear to be pleased that this innovation has released them from an arduous and laborious task.

Conclusion

The study has shown light into the design and operation of an eco-friendly boat hauling device which is in operation in the Uttara Kannada District of Karnataka. The documentation of such devices will actually throw light into the innovative ideas of the traditional fishermen, which ultimately encourage the eco-friendly fishery technology which are vital for the green technology development in fisheries sector. These environment friendly and useful interventions need to be promoted and supported by the fishermen society and government undertakings in other beach landing fishing villages where these winches are not yet popularized[8-10].

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