



Indigenous Resource Management System in Selected Backwater Stake net Fisheries of Kerala

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Abstract

Application of indigenous knowledge is common among the traditional fishers operating indigenous fishing systems. Stake net is an important gear operated along the backwaters of Kerala. Stake net fishers follow many traditions in the fabrication, operation and maintenance of the fishing unit. Lunar periodicity based fishing operation and *paadu* systems envisage resource conservation through control of fishing effort. The fishing canoe and the gear are protected against biodegradation using eco-friendly natural protective coatings thereby protecting the biota from the ill-effects of synthetic dyes and chemical preservatives.

Keywords: Stake net, lunar phase, paadu system, natural preservatives, conservation

Introduction

The time tested indigenous knowledge in fisheries has evolved over centuries to suit the local culture, environment, resources and practices and system followed, helped to prefect and sustain fisheries in a big way. Traditional knowledge associated with the fishing system has been gained through life long experience passed from one generation to another and has its own unique set of operational procedures.

The stake net, a traditional fishing gear, is a set bag net *viz.*, a stationary filtering device set in moving water, filtering out prawns and fishes which are swept more or less passively by the current and retained by the force of the current. The net, conical in shape, set against tides and currents in the

backwaters and sea is extensively operated in all coastal districts of Kerala and is locally called '*oonnivala*' (Thomas et al., 2008). These nets are operated in the downstream areas of Astamudi and Vembanad backwaters and in areas where the tidal currents are strong.

The documentation of indigenous knowledge in fisheries though very essential is poorly implemented (Nirmale et al., 2007; Nightingale et al., 2013). The stake net fishing system follows many traditional customs and procedures for fabrication/ installation, operation and maintenance. The indigenous knowledge system followed by stake net fishers for resource conservation and for protection of the craft and gear are discussed in this communication.

Materials and Methods

The study covered two major stake net fishing centres in Kerala *viz.*, Aroor in Alappuzha district and Azheekal in Ernakulam district. Twenty stake net units were randomly selected from each centre for the study. The data on traditional knowledge associated with different aspects of the fishery was collected directly from fifty respondents representing owners as well as employees of the units selected. From the units owned by non-fishers, only the employee was selected as the respondent. Information such as licensing system, craft, gear, rigging pattern, maintenance of craft and gear and operational details were collected through personal interview using a pre-tested questionnaire. The interview with the respondents was made either at the landing centre or at their houses.

Results and Discussion

Originally fishermen communities started stake net operation as a subsistence fishing. Subsequently licensing system was introduced by State Fisheries Department as the number of units increased

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drastically (Thomas et al., 2008). A sizable number of nets were owned by non-fishers who enjoy good economic and social status while the fishers who actually operate the nets are in the lower economic strata of the society. As per the late 1990 statistics, 17724 stake nets are in operation of which only 70% are licensed and the rest are illegally operated (Vijayan et al., 2000). Due to proliferation of nets and ensuring conflicts between legal and illegal operators, Department stopped issuing licenses from 1983 onwards (Thomas et al., 2008).

The net, conical in shape having 7 to 17 m length and mouth diameter of 20 m are made of polyethylene and polyamide knotted and knotless netting (Fig. 1).

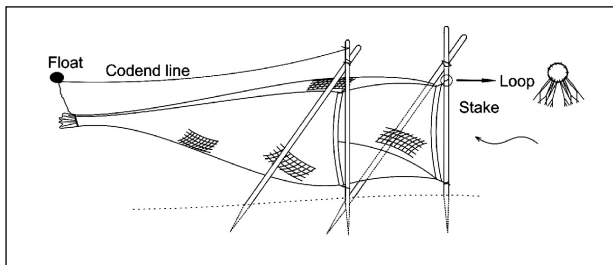


Fig. 1. Pictorial representation of stake net rigged to stakes

Initially the net was made of cotton fibres and coir ropes. With the availability of synthetic fibres in late 1950s the cotton was replaced by polyamide multifilament and high density polyethylene while coir rope was replaced by polypropylene ropes. The net is set in stakes erected in the bottom *viz.*, base system which forms an integral part of the stake net. Depending on the force of current, size of net and nature of the ground three different types of stable base system were evolved (Fig. 2).

Two main vertical stakes of larger diameter termed as *thaimaram* and auxiliary stakes of smaller diameter called *charu*, *kaikutti* or *thangukutti* necessary for the support of each net are driven into the mud. Generally coconut and areca nut tree trunks are used as stakes. The stakes are installed at the assigned fishing ground by six to seven fishermen operating from two canoes (Pauly, 1991). In dol nets, a type of set bag nets operated in Gujarat coast, steel poles are used (Personal communication). The nets are arranged in a line as sets or series known as 'oonnipaadu' (Fig. 3).

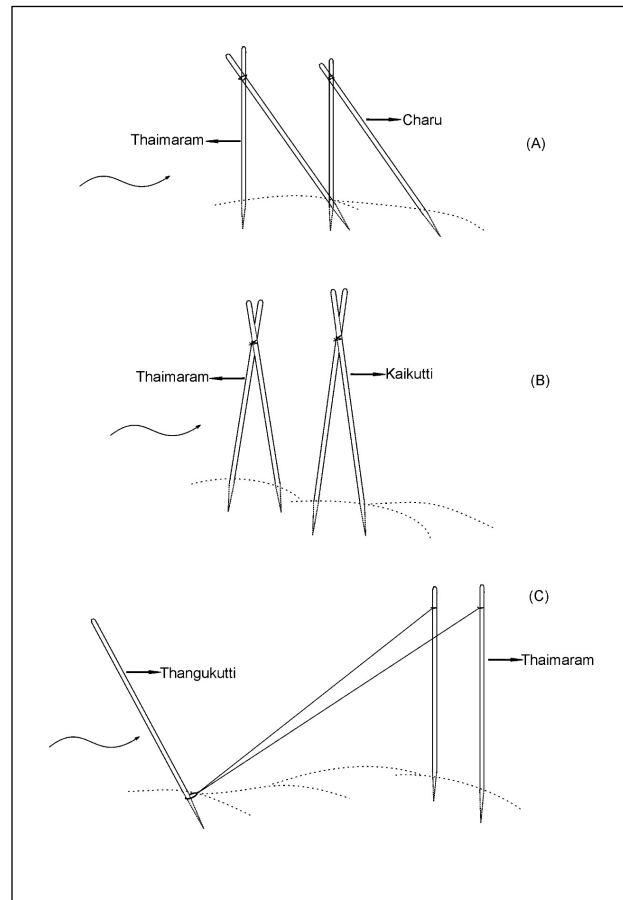


Fig. 2. Different base systems used for stake nets



Fig. 3. A row of stake nets (Oonnipaadu)

The net is set using non-motorized wooden plank built canoe of 5.5 to 7.6 m LOA. Fishers keep the net ready for setting by closing the extreme lower portion called codend with the codend line. The net

is set soon after the flood tide turns and begins to ebb. Fishers reach the ground in canoe and slip the ring attached to the two lower corners of the mouth of the net over the top of the stakes. With the aid of a pole, forked at the end, the rings are pushed down to the bottom. Two loops at the upper corners are afterwards slipped on to the poles and tied at a height sufficient to extend the sides of the net to their full extent. When the ebb tide begins to relax, the fishers return to the ground and lift the net into the canoe. After returning to the shore, the codend is untied and the catch emptied into baskets. The catch which is transferred into baskets is washed to remove the mud. Women and children of the respective household do the sorting of the catch. After sorting, the catch is sold to the merchants and vendors directly by the fishers. In this fishing, the practice of engaging middle men or commission agents for sale of the catch does not exist.

The operation is carried out mostly in the evenings, extending into the early hours of the night or at day break. Usually the duration varies from 5 to 7 h. Sometimes nets are set twice during the 24 h period. On some days, when there is good catch and when tides are favourable, fishing may be done both in the evening and early morning of the same day named respectively as 'anthikettu' and 'pularchakkettu'.

The fishery is mainly supported by three prawn species, *Metapenaeus dobsoni*, *Penaeus indicus* and *Metapenaeus monoceros*. The gear is non selective and catch enormous quantity of juveniles thereby threatening the sustenance of the fishery (Kurup et al., 1993; George et al., 1998; Thomas et al., 1999; 2008). In the nets operated at Vypeen, Cochin, 90% of *M. dobsoni*, 95% of *P. indicus* and 88% of *M. monoceros* caught in 10 mm mesh cod end were immature (Thomas et al., 1999; 2008).

Operation of the net is carried out according to the lunar phase. There is pronounced influence of lunar periodicity on the behaviour, abundance and migration of prawns (Subramanyam, 1965; George et al., 1998; Thomas et al., 1999; 2008). Two fishing periods of 6-8 days occur in each lunar month viz., both during full moon and new moon phase of the month.

Fishing commences on *dashami* / *ekadashi* and ending on *chathurthy* viz. tenth / eleventh and fourth day after both the new moon and full moon respectively. The fishing period is called 'pakkam' or 'thakkam'

while the non-fishing days are called 'pakkasheshippu' during which the tides apparently are not quite favourable for fishing. The off days are used for cleaning and maintenance of craft and gear. After every operation, the nets are cleaned and kept onboard the vessel itself. After one *thakkam* (14 days) the net is thoroughly cleaned, dried and kept ready onboard the canoe till the next *thakkam*. The restriction of stake net operations to lunar phase (2 fishing periods of 6 to 8 days per month restricted to half a month) ensures natural conservation of resources through control of fishing effort.

In fisheries, open access often leads to overfishing. Unlike other fishery systems in coastal waters and backwaters, stake net fishing is managed by a number of traditionally followed practices. The community-based resource management addresses the problem of open access to some extent through devices of exclusion of people other than members of a defined group.

In both Aroor and Azheekal centres, traditional community-based resource management system was followed on a very strict basis. Initially, when the stake net fishing comprised of only legally approved units, the *paadu* system was strictly followed and was very successful. The *paadu* or rotation system is a traditional system of fishing management in the backwaters and estuaries. It is the system of giving right to eligible member of a particular community in certain designated fishing grounds. However, later when illegal units started operating, this system lost its importance. Such rotation system is followed in many fisheries around the world and is a very successful strategy in controlling fishing effort (Amarasinghe et al., 1997; Lobe & Berkes, 2004). Jayawardane & Perera (2003) presented the community-based management followed in the stake net fishery in the Negombo Lagoon, Sri Lanka as a successful model which can be applied for management of the other fisheries.

The erstwhile traditional preservation system for cotton nets based on eco-friendly natural preservatives (Kuriyan & Nayar, 1961) is still followed for nets made of synthetic webbing now used. Earlier, extract from bark of kalasu (*Lannea coromandelica*) or seed extract of panachikka (*Diospyros malabarica*) was used for treating nets (Miyamoto, 1959; Kuriyan & Nayar, 1961; 1963). Nowadays, extract of tamarind seed (*Tamarindus indica*,) is commonly used owing to ease of treatment.

Colouring of net: one kg of tamarind seed powder is boiled in 20 l water and the net is immersed in the solution for 24 h when treating for the first time. On subsequent treatment, 4-5 h immersion is enough. The treatment is repeated after every 2-3 months fishing. Fishers believe that colouring helps in better catch and makes the netting stronger.

The canoes are treated with natural protective coatings *viz.*, sardine oil and cashew nut shell liquid (CNSL) as a means of protection from biodeterioration. Every six months or annually the canoe is thoroughly cleaned by removing foulers if any attached to the hull and repairs attended. This is followed by applying 2-3 coats of sardine oil or CNSL. Canoes of Maharashtra operating dol nets are protected by treatment with chandrus and oil (Nirmale et al., 2017). Now most of the canoes are sheathed with fibreglass reinforced plastic (FRP).

The respondents opined that the stake net operation is associated with many traditional rituals and customs followed since centuries. The owner of the fishing unit observe '*vratham*' for a lunar period *viz.*, daily worship in the local temple, avoiding non-vegetarian food, alcohol, smoking etc. and also avoiding martial relationship for 14 days. In earlier days, ladies during their menstrual period were not allowed to touch the net or to sort the catch. The auspicious day for launching new unit by installing the stakes is determined by the local astronomer called '*kaniyan*'. A new unit/*oonni* is introduced on any day between '*ekadhashi*' (11th day after the lunar day) and '*chathurthi*' (4th day after the lunar day).

All the respondents responded that the net is operated strictly according to the lunar cycle. Fishers have been following the lunar phase dependent operation. Lunar cycle and tides play a key role in the operation of stake net in Ratnagiri coast (Uskelwar et al., 2017). Many scientific investigations have come out with evidences to the effect that there is pronounced influence of lunar phase on the behavior, abundance, molting, breeding and spawning migration of penaeid prawns (Subramanyam, 1965; George et al., 1998; Thomas et al., 1999; 2008; Menon & Raman, 1961).

Fishers generally believe that rainfall influences the prawn fishery. Reports also are available on the positive correlation between rainfall and prawn catch (George, 1969; George et al., 1998). The heavy rainfall cause extensive river flood which induce

young prawns to bury into estuarine mud. With continuous rainfall, the salinity decrease results in mass migration of nearly all age groups of prawns towards the ocean, enabling good catch in the stake nets.

Stake net (*oonnivala*) is a traditional fishing gear widely operated in estuaries and seas. Fishermen observe '*pakkashshipu*' which is an indigenous way of resource conservation by controlling fishing effort. *Paadu* system followed by certain communities ensures control of fishing effort. Indigenous method of protection of canoes and nets ensures eco friendly preservation *in lieu of* using synthetic dyes and chemical preservatives. Thus, the tide and lunar phase based operation of the gear as well as *paadu* system enable natural regulation of fishing effort. The continued practice of traditional protection measures for fishing canoe and net, based on natural preservatives; and following of rituals on various occasions show passing of traditional knowledge in this fishery through generations for sustainable management of resources.

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