



Longphongtook – an Indigenous Tribal Fishing Technique in Fast Flowing Rivers of Arunachal Pradesh, India

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Abstract

Longphongtook an indigenous fish aggregating method practised along the Namsang stream by *Nocte* tribe of Tirap district of Arunachal Pradesh has been described in the present study. In this practice, fishes were caught by attracting them to a circular structure (diameter 2.5 to 2.75 m) made up of boulders and pebbles of the river bed. The study revealed that thigmotaxis behaviour of fish was effectively and efficiently utilised by the fisher folk in this fishing technique. The catch mostly comprised of migratory hill stream fishes.

Keywords: Indigenous fishing technique, Namsang stream, Tirap district, Arunachal Pradesh

Introduction

The hill states of North East India are home to many ethnic tribes. These people employ many indigenous fishing techniques for catching fishes from fast flowing hill streams, where fishing with conventional fishing gears is difficult and ineffective because of large volume of water, strong water current and uneven bottom topography. Design and operation of different fish catching devices operated in inland waters of India have been described by Hornell (1923; 1937), Job & Pantulu (1953), Krishnamurthy & Rao (1970), George (1971; 2002), Banerjee & Chakravarty (1972), Dutta (1973), Khan et al. (1991) and Ramesan & Ramachandran (2005; 2008). Indigenous technical knowledge related to fish harvesting of North Eastern region of India have

been documented by different workers (Yadava et al., 1981; Yadava & Choudhury, 1986; Goswami et al., 1994; Kar et al., 2007; Dutta & Bhattacharjya, 2009; Pravin et al., 2009; Barua et al., 2010; Sharma et al., 2015; Saha et al., 2015). However, information on indigenous fishing methods of Arunachal Pradesh is scanty owing to difficult terrain and remoteness of this predominantly hilly state (Dutta & Bhattacharjya, 2008; Dutta & Dutta, 2013; Yumnam & Tripathi, 2013; Hussain et al., 2016). Tribal people of the state are very efficient in fishing from fast flowing hilly streams employing indigenous fishing techniques which are found to be very effective compared to conventional fishing methods. Tirap district of Arunachal Pradesh located in the southernmost part of the state covers an area of 2362 km² (Fig. 1). It lies between the latitudes 26° 38' N and 27° 47' N and the longitudes 96° 16' E and 95° 40' E. The district derived its name from the River Tirap which originates from a high peak in Laju Circle. Tirap shares a state border with Nagaland and Assam, an international border with Myanmar and a district border with Changlang and Longding Districts of Arunachal Pradesh. Namsang and other small rivers passing through the district are quite rich in fish fauna and the local tribal people employ a number of unique fishing methods based on indigenous knowledge system passed on by their ancestors to catch these fishes for food. *Nocte* is the main tribe of Tirap district. In the present communication, an attempt has been made to scientifically document a traditional fishing technique of *Nocte* tribe locally known as *Longphongtook*.

Materials and Methods

The present study was conducted in river Namsang in Tirap district (Longitude of 95° 28' E, Latitude 27° 13' N) of Arunachal Pradesh for a period of 4 months

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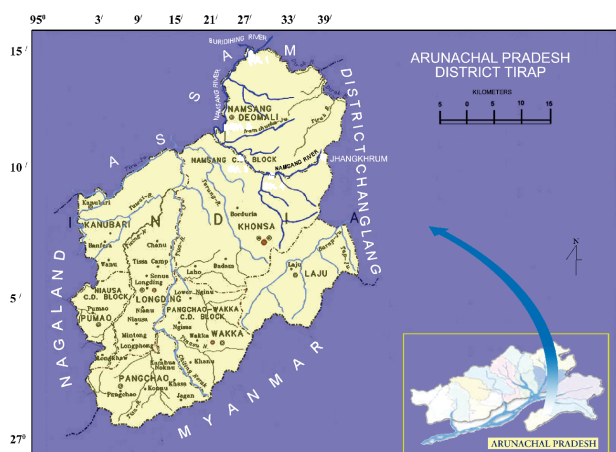


Fig. 1. Map of Tirap district showing the study area

during October, 2014 to January, 2015. The river Namsang, locally known as *Chetju*, traverses a meander course of about 50 km in Tirap district of Arunachal Pradesh before it debouches into the plains near Jaipur Reserve Forest (120 m m.s.l) to join the river Buri Dihing in Assam (Fig. 1). Altogether seven field surveys were conducted in the river stretch passing through Deomali and Khonsa subdivision of the district in 5 different villages namely Namsang, Makat, Subang, Natun Kheti and Kheti for studying operation of the fishing method and its catch composition. These villages are inhabited by *Nocte* tribe, the main tribe of Tirap district. Participatory Rural Appraisal (PRA) methodology was adopted to collect information about this indigenous fishing method (Freudenberger, 2008). Key informants including active fishers as well as village elders were involved during the process of data collection. A total number of 26 fishers and villagers were consulted through one to one interaction for detail documentation of the fishing method. Secondary data on this traditional fishing practice and the knowledge system associated with it were also collected from fishers as well as other villagers through focused group discussions (Townsend, 1993; Schonhut & Kieveltiz, 1994). Efficiency of the fishing method was determined on the basis of catch per haul (Dey, 1981). Triangulation exercise was also done in the study villages to gather unbiased reliable information about this indigenous fishing method. The prior informed consent (PIC) was obtained from community leaders of respective villages as per CBD guidelines in order to use and publish the recorded data on *Longphongtook*, because most of the knowledge associated with this fishing method is in public domain (Singh et al., 2013). The

economics of the fishing method was worked based on field data, using standard procedure (FAO, 1974).

Results and Discussion

The indigenous fish aggregating device (FAD) *Longphongtook* is constructed by the *Noctes* during winter season. With the onset of winter season (last part of October and early November) as the water level of the stream recedes and surface current subsides (water depth 0.5-0.6 m) they practice this fishing method. Generally *Longphongtook* is prepared on shallow parts of the stream with feeble current ($0.46-0.74 \text{ msec}^{-1}$). After selecting the site, it is deepened with the help of bamboo sticks. When the spot is deepened enough, boulders (15-25 cm diameter) and pebbles are arranged in a circular manner (diameter 2.5 to 2.75 m) with one stone placed on the top of another up to a height of about 1 m (Fig. 2). The bigger boulders are placed in the middle to allow fishes to get in. After completion, a sign of ownership is placed on top of the *Longphongtook*. Four to five *Longphongtooks* can be prepared in a day by one person. Some villagers construct it collectively. After construction, the *Longphongtook* is left as such for 35 to 45 days. During winter months, 60-70 *Longphongtooks* can be seen in the entire course of Namsang stream.

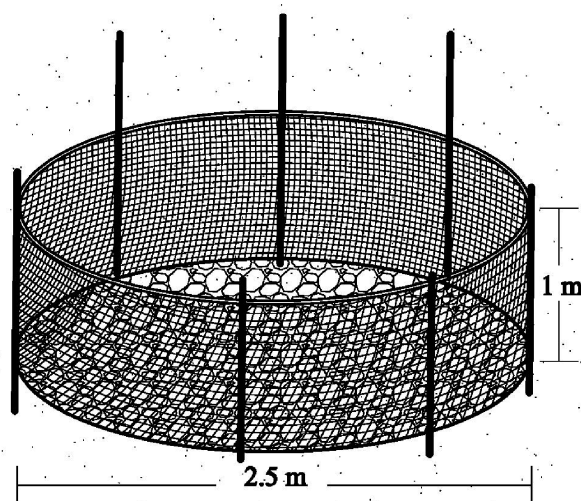


Fig. 2. A *Longphongtook* seen after completion of construction encircled by a net

In the month of December-January, villagers go to the Namsang stream for harvesting fish from *Longphongtook*. Women and children also accompany the males in this work. *Longphongtook* is not

a community fishing but a private affair. This is done before a local festival called *Jaatcha*. Before harvesting, at first 7-8 bamboo sticks were firmly put around the *Longphongtook*. Then a mosquito net/long cloth is spread around the whole structure (Fig. 2). Then pebbles and sand are put at the bottom of the *Longphongtook* covering the whole cloth to prevent the fishes from escaping. After ascertaining that no part of the *Longphongtook* was left unsealed by pebbles and sands, the stones are removed one by one. After removing all the stones the fishes are caught by hand picking or scooping or using plunge baskets. Now a days, fishers also use cast nets for gathering the catch. Complete harvesting of *Longphongtook* requires about an hour. The average catch per haul from a *Longphongtook* from Namsang stream worked out during 2014-15 was 3.25 kg. The catch of *Longphongtook* mainly comprised of fish species like *Labeo pangusia* (Hamilton, 1822), *Tor putitora* (Hamilton, 1822), *Schizothorax richardsonii* (Gray, 1832), *Neolissocheilus hexagonolepis* (McClelland, 1839), *Mastacembalus armatus* (Lacepede, 1800), *Bangana dero* (Hamilton, 1822), *Garra* spp., *Barilius* spp., *Botia* spp., *Glyptothorax* spp., prawns and crabs. Average total length and weight of the fish species harvested from a *Longphongtook* is presented in Table 1. The catch mostly composed of juveniles and adult fishes displaying migratory behaviour. The harvested fishes was generally used for home consumption by the fishers. Details of cost of complete operation of a *Longphongtook* on Namsang stream is provided in Table 2.

Fish behaviour is one of the most important aspects to be considered for successful deployment of any fishing method/device. Fish exhibit definite and varied reactions to various fishing gears and devices. Here the tendency of fish to be close to a solid object is the guiding principle behind the use of this Fish Aggregating Device. This behavioural phenomenon of fish is known as "Thigmotropism". Thigmotropism in fish has been exploited by

Table 1. Average Total length and weight of fish species harvested from Longphongtook of Namsang stream

Name of the Species	Avg. Total Length $\pm$ SE (cm)	Avg. Weight $\pm$ SE (cm)
<i>Labeo pangusia</i>	14 $\pm$ 0.125	10 $\pm$ 0.097
<i>Tor putitora</i>	16 $\pm$ 0.096	50 $\pm$ 0.088
<i>Schizothorax richardsonii</i>	10 $\pm$ 0.116	55 $\pm$ 0.076
<i>Neolissocheilus hexagonolepis</i>	12 $\pm$ 0.113	60 $\pm$ 0.086
<i>Mastacembalus armatus</i>	43 $\pm$ 0.056	60 $\pm$ 0.092
<i>Bangana dero</i>	12 $\pm$ 0.122	80 $\pm$ 0.111
<i>Garra</i> spp	9 $\pm$ 0.094	30 $\pm$ 0.091
<i>Barilius</i> spp	10 $\pm$ 0.119	50 $\pm$ 0.080
<i>Botia</i> spp	7 $\pm$ 0.061	25 $\pm$ 0.080
<i>Glyptothorax</i> spp	9 $\pm$ 0.069	25 $\pm$ 0.075

fishermen in many seas (Yabe & Mori, 1950; Kojima, 1956; Galea, 1961; Kihara, 1981). The aggregating behaviour is a consequence of many factors acting on the individuals, and several mechanisms have been suggested to explain the association of fishes with floating objects (Deudero et al., 1999). Four of the accepted mechanisms are: shelter from predators, food supply, schooling companions and substrate for species undergoing a change from a pelagic to other modes of existence (Gooding & Magnuson, 1967; Hunter & Mitchell, 1967; Wickham et al., 1973; Wickham & Russel, 1974; Matsumoto et al., 1981; Brock, 1985; Rountree, 1989). Knowledge of this behaviour of fish is taken advantage of by using various objects that function as a shelter or even good supporter of primary and secondary production. A Fish Aggregating Device (FAD) is any method, object or construction used for the purpose of facilitating aggregation of fish by attraction enabling harvest in a predetermined area. In hill streams, the main primary producer is periphyton

Table 2. Approximate cost of complete operation of a *Longphongtook* on Namsang stream

Sl. No.	Material	Rate (Rs.)	Quantity	Cost (Rs.)
1.	Mosquito net	350/piece	1 no.	350.00
2.	Fishing gear/plunge basket	100/gear	2 nos.	200.00
3.	Labour	300/day	1/2 day	150.00
	Total			700.00

and most of the hill stream fishes feeds on them. During the retention period of 45 days of *Longphongtook*, healthy growth of periphyton takes place on the surfaces of the boulders and thereby attract the fishes for food along with shelter. A similar fish aggregating technique used by *Adi* and *Galo* communities of Arunachal Pradesh on the river Siang was reported by Hussain et al. (2016).

The thigmotropism behaviour of hill stream fishes has been effectively utilised by the *Nocte* fisher folks in *Longphongtook* for aggregating them using readily available resources and little drudgery. Such innovative fishing methods ensure good fish catch from hill streams, where fishing with conventional fishing nets is ineffective. *Longphongtook* practised by *Nocte* tribe of Tirap district based on the indigenous knowledge systems passed on from generations was found to be very efficient in catching fishes from fast flowing hill streams. This fishing method has become an integral part of the cultural heritage of the *Nocte* tribe of Tirap district. In recent years, in some portions of the Namsang stream fishers have started using some destructive fishing methods like dynamiting, agricultural pesticide, chemicals etc. for catching fishes. These fishing practices are posing a great threat to the ichthyofaunal diversity and ecology of the stream as they kill both target and non target species along with their eggs and young ones. These destructive fishing practices should be strongly discouraged and responsible ecofriendly indigenous fishing techniques like *Longphongtook* should be promoted in order to ensure sustainable utilization of the fishery resources of these hill streams. By greater scientific intervention, the efficiency of these type of fishing methods needed to be enhanced for livelihood improvement of the rural fisherfolks.

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