Lipum—An ITK of Fishing Practiced for Sustainable Livelihood in Siang Belt of Arunachal Pradesh

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Investigations were carried out to study the method of fishing by using stones and boulders present in the river beds of small tributaries of Siang River of East Siang and West Siang District, Arunachal Pradesh. It is an eco friendly fishing technique locally known as ‘Lipum’ and practiced by the ‘Adi’ and ‘Galo’ communities of the district. The capture of fishes ranges from 4–10 kg per Lipum and one person can make 3–4 numbers of this type of Lipum per day. Lipum is prepared during winter season (in the month of November and December) and harvesting of fish is done during January and February. While preparing the Lipum, stones are placed in a circle with a diameter ranges from 1.5 m to 2.3 m and placed such a way to get around 0.7 m to 1.2 m height depending upon the water depth. Care is taken so that the Lipum remains submerged in water throughout the winter season. It is an eco friendly fish collection method and got significance for sustainable livelihood of the tribal community in Siang belt of Arunachal Pradesh.

Key words: Lipum, Traditional Fishing, Adi, Galo, Siang

INTRODUCTION

Siang belt is featured with hillocks, hills, small to big river including the mighty Siang commonly known as the Brahmaputra in Assam. There are number of tribes and sub-tribes having their own dialects, culture, beliefs, dress and food habit living in mutual harmony in the region. Among them ‘Adi’ and ‘Galo’ are the major communities. Rice and fish happens to be the prime source of nutrition to these tribal people since long spell of rainy season (Table 1) in the hilly terrain supports cultivation of paddy as well as harvest of different species of fishes in traditional method.

Fisheries sector in Arunachal Pradesh has acquired a special significance not only because of its contribution to food resources but also for contribution to quality of diet. A network of numerous rivers, streams, natural ponds provide vast scope for fisheries activity in the Siang belt of the state. Besides, fishing is a common hobby of people of the district. Catching fishes by deploying traps in their path of movement is a common fishing method used by traditional fishers all over the world (Brandt, 1984). Siang and other small rivers passing through East Siang and West Siang Districts are quite rich in fish fauna and the local tribal people employ a number of unique fishing methods based on their very own indigenous traditional knowledge to catch these fishes for their daily diet. They use different types of fish trapping device, out of which Lipum is one of the oldest and tradition technique used for catching riverine fishes. It is also known as ‘Engo Lingkum’ in Adi dialect (‘Engo’ means fish and ‘lingkum’ means house of stone). Present study is an attempt to describe the details of this method of catching fish, its scientific rational, sustainability and socio-economic implication among the tribal community of these districts.

MATERIALS AND METHODS

Arunachal Pradesh is the largest state in North East India. Out of the 17 districts in the state, Siang belt is situated in the south eastern side adjoining Assam. East Siang district is located between 27.300° to 29.420° North latitude and 94.240° to 95.350° East longitude with an altitude of 133m in Ruksin to 752m in Riga. Whereas, West Siang district is located between 28.150° to 29.150° North latitude and 94.000° to 95.000° East longitude with an altitude of 100m in foothills of Likabali to 2000m in Mechuka and Monigong Blocks. The surveys were conducted in...
different locations of Koyu river, Sille river, Sido-Dobung river and Ledum rivers of East Siang district and Ego, Kidi, Heei, Heipu and Siyum rivers of West Siang District. Five Lipums from each river were observed to study the catching efficiency. The locations have humid sub-tropical climate characterized by very hot and humid summer and very cold winter. All the relevant data and information about the Lipum fishing method were collected through the field survey and personal interview of local tribal people belong to Adi and Galo community. The study was conducted during November, 2012 to February, 2013. Standard Participatory Rural Appraisal (PRA) methodology (Schonhut and Kilveltiz, 1994) was adopted to collect information about the Lipum fishing method. A total number of 43 managers of Lipum and 43 Gaonburah (village elder people) were involved in the information generation and documentation of this traditional technology. The Prior Informed Consent (PIC) was obtained from community leaders of respective villages for publishing the data and information on Lipum fishing.

CONSTRUCTION OF LIPUM

Fresh water river fishes found in the tributaries of Siang river has characteristics of living under holes of stone during winter i.e. November to February. Due to this feature of fishes, tribal people of the district makes an artificial dwelling place for fishes by stacking up stone in circle of around 2 m diameter and 0.8–1.0 m height (Table 1). At the bottom centre of the Lipum, depression is made with special hollow for suitable dwelling place (known as Likam) for the fishes. Locally available flat to oval shaped stones of 10–30 cm diameter are collected and arranged in a circular fashion in such a way that the bigger stones are placed in base and gradually smaller stones are placed above them. On the top of this structure, bunches of fern plant (known as Ootaka) of around 1 m length are placed and pressed with another layer of stones. This provides partial shade inside the Lipum and improves the eco-system of the structure for fishes. A barrier of boulders is placed at 1–2 m distance in the upstream side of the Lipum to reduce the water current hitting the structure. The structure is left for more than one month to house and acclimatize fishes and harbors maximum number of fishes. One man can prepare 3–4 Lipums per day and one family requires 20–30 such units in a season for their dietary requirement and supplemental livelihood. Success rate of this traditional system mainly depends on the availability of fishes in certain pockets of rivers as well as skill of constructing the Lipum.

PREPARATION OF FISHING GEAR

(FISH TRAP)

Ishir

Ishir (in Galo) is prepared form split bamboo and cane of 1–1.5 cm width, 2–3 mm thickness. Such split bamboo and cane of 8 m and 2 m length respectively are weaved perpendicularly in crisscross manner so that the mesh size remains between 3–5 mm. After weaving, final length and width of Ishir obtained is 8 m and 2 m respectively. It is also called as ‘dhani’ (in Assamese) or ‘tanja’ (in Adi). In some places, tribal people also use a modified ishir called Chirago (Singh and Bag, 2002) (in Galo), which is a big cylindrical basket made up of cane and bamboo, is placed to cover the Lipum from all side during harvesting of fishes.

Edir

Fishing gear or fish trap used during the harvesting of fish from Lipum is locally known as ‘Chepa’ in Assamese and ‘Edir’ in Galo (Fig. 2). It is a conical shaped bamboo sieve basket with a valve, tapering at one end (Riba, 2012). There is an opening at the side of the trap with bamboo stripes extended inwards so that fishes get an easy entry to the trap while extended gill like bamboo stripes (locally known as Dero) prevent them from escaping. The trap is facing the opening against the water current. The diameter of the opening of Edir is 20–30 cm, while, its length varies from 60 to 100 cm.

Method of Fish Harvesting from Lipum

During the time of fish harvest from Lipum, the entire structure is surrounding with Ishir’ with opening in the top. Edir is fixed with Ishir in the bottom in such a way so that no path of escape of fishes remains between them. Gradually the stones are removed form the Lipum and fishes are collected. Tribal people used to dismantle one Lipum per week and harvest 4–10 kg mixed species of fish per Lipum. Generally this is done in the early morning, as fishes used to come out of such shelters during the day time in search of food. Some quantity of harvested fishes are consumed in fresh condition by the family members, while the excess harvest is smoke dried either for their own consumption in a later period or selling in the local market. In a village, 20–30 household prepare 400–500 such Lipums in any river with at least 10 m gap in between. Wide range of fish biodiversity can be seen in the harvest from Lipum prepared in different rivers of Siang belt of Arunachal Pradesh (Fig. 1). Similar fish biodiversity from rivers of Arunachal Pradesh have also been documented earlier (Viswanath et al. 2007).
RESULTS AND DISCUSSION

‘Lipum’ fishing is practiced more in the perennial rivers viz. Koyu, Sido-Dobung, Ledum, Simang, Ego, Kidi, Heei, Heipu and Siyom flowing over number of villages of East Siang and West Siang Districts. Data recorded on diameter and height of the Lipum surveyed in various rivers at different villages revealed that maximum diameter and height of Lipum constructed in the district was 2.30m and 1.20m respectively in Siyom river flowing over Kabu village, whereas minimum diameter and height was 1.50m and 0.7m respectively in Heei river flowing over Lipunamchi village (Table 1). Likewise, data recorded on fish catches indicated that maximum catch of 10.0 kg per Lipum was obtained from Koyu river flowing over Koyu village of East Siang district (Table 2). The lowest catch of fish to the tune of 4.1 kg per Lipum was recorded from Heei river flowing over Tare village of West Siang District. The result so obtained clearly indicates that the amount of fish catches was found directly proportional to the diameter and height of the Lipum with a positive correlation of \( r = 0.45 \) and \( r = 0.37 \) respectively.

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Fig. 1: Commonly Harvested fish Biodiversity in Lipum of Siang Belt, Arunachal Pradesh. A) Ngotup (Garra spp.), B) Ngolap (Macrognathus spp.), C) Orpu (Barilius spp.), D) Ringum (Acanthocobitis spp.), E) Reibo (Aborichthys spp.), F) Ngopi (Labeo Dero), G) Kadan, Ngori (Schizothorax spp.), H) Ngocho (Tor spp.), I) Orche (Semiplotus spp.), J) Ribo (Schistura spp.), K) Ngopeeh (Garra spp.), L) Tayek (Amblyceps spp.)
Table 2: Fish Catches (Kg per Unit) in the Lipum Surveyed in Different Rivers of East Siang District

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<th>Average</th>
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Fig. 2: Photographs of Activities Related to Lipum. A) Constructed Lipum, B) Locally Prepared Eye-piece Used during Construction of Lipum, C) Edir, D) Mixed Haul of Fishes Harvested from Lipum, E) Traditional Chullah Used for Smoke Treatment for Fish Drying, F) Selling of Smoked Dried Fish in Local Market

Scientific Rationality of the Structure
The chief factor for success of ‘Lipum’ fishing is the increase in water temperature inside the structure in winter season. Although, reduced flow of water in these hilly streams in the dry season commencing from October month favours Lipum activities, but fishes get attracted to this structure only from the month of November, when there is drastic reduction in ambient and water temperature. Besides, reduction of water current of hilly rivers considerably influences the typical characteristics of fish fauna. Fishes develop adhesive organs to get stuck to the stones and withstand the rapid flow of water (Das and Nag, 2008). Rapid flow of water in the hilly streams with stone beds aerates the water and increases the dissolved oxygen of water (Johnson and Arunachalam, 2009), which while flowing downstream, favours the micro-ecosystem of the Lipum structure attracting fish dwelling (Ojha and Singh, 1992). Moreover, Lipum also harbours the growth of algae and houses of several water insects which is lucrative fish feed (Kanwal and Pathami, 2012).

Socio Economic Importance of Lipum
For preparation of Lipum, no effective cost is involved as it requires only locally available stones and no labour is engaged rather involvement of family members are sufficient. After dismantling one
Lipum, same stock of flat stones can be utilized to prepare one more in the nearby area. Some quantities of harvested fishes from Lipum are consumed in fresh condition by the family members of the tribal people. While, rest stock of fishes are sold in the local market either in fresh condition @ Rs. 120-80 per kg or in traditionally smoke dried condition @ Rs. 400-500 per kg (Fig. 2). As such, Lipum has become not only an integral part of the dietary need of the Adi and Galo community but also plays a pivotal role in their livelihood. Besides, engagement of local people in activities related to Lipum is securing generation of employment at the village level and it also promotes their ancestral hobby of fishing in traditional technique.

The indigenous technology Lipum practiced by the tribal community of the East Siang district of Arunachal Pradesh is quite feasible in perennial tributaries and rivulets of Siang river where depth of the river is less during the winter season. The method is also eco-friendly and involves less labour and practically no investment. Lipum is one of the simplest and common fishing technique providing nutritional security of Adi and Galo tribal families of the district.

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