

Indigenous Technical Knowledge (ITK) in Fisheries

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Abstract

This paper examines Indigenous Technical Knowledge (ITK) relating to fisheries. being practiced in Manipur. The ITKs studied, include fishing methods, fish aggregating devices, fish processing and storage, fish health management, preservation of gears and nets, use of fish waste as manure etc. The study suggests that this indigenous knowledge could serve as an entry point to sustainable utilization and management of natural resources, through the exploration and integration of the knowledge into modern technologies. There is need for a suitable linkage mechanism and for documentation and proper utilization of ITKs.

Indigenous technical knowledge (ITK) in fisheries is considered to be the backbone of sustainable fisheries development, developed by the people based on their experiences, continuous observations, evaluation and improvement over a period of time by trial and error. They use this traditional wisdom to solve many of their problems. It plays an important role directly or indirectly in the protection of the heritage and life of the fishermen. ITK provides valuable insight for sustainable fisheries and aquaculture, because it passes through considerable adaptation, upgradation and modification over a period of time and is carried on from one generation to another. Greenfeldt (1991) suggested that for reasons of environmental conservation as well as institutional stability, indigenous system should be intelligently assisted rather than simply replaced. Further, traditional ecological knowledge systems and institutions could serve as entry points into the sustainable utilization and management of natural resources, (Rai 2007).

Manipur is one of the rich states in terms of fisheries resources, and fisheries form a gainful occupation for a large number of people in the state. Very little effort has been made so far to study the ITKs of the state. Therefore, the present investigation was undertaken to study indigenous technical knowledge being practiced in four districts of the central valley of Manipur (namely Imphal West, Imphal East, Bishnupur and Thoubal districts), relating to fisheries activities through survey, interviews, site-observations and also from the secondary sources available.

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Methodology

The present study was carried out in the Central Valley region of Manipur state which comprises of four districts, Imphal west, Imphal east, Bishnupur and Thoubal. Keeping in view the availability of resources and in consultation with the fisheries extension officers of the Department of Fisheries, two fishing villages from each selected district were chosen randomly for the purpose of collecting data for the study. A semi-structured interview schedule prepared by incorporating all aspects of fisheries on which data and information were required, served as the major tool and means for collection of data. Apart from personal interviews, personal visits were made to the work places, rivers and lakes along with the respondents to observe the ITK methods, practices, equipments and document vital information. Focus group discussions were also organized in each of the selected villages along with the heads of the villages and communities and the respondents in a healthy rural environment to gather more detailed and concrete ITK practices of their villages. During the course of data collection, discussions with different experts and fisheries officers of the department of fisheries were also held to collect all available ITKs in the study area. Photographs were also taken for systematic documentation of the collected ITKs. However, secondary data from different sources such as researchers, fisheries department and NGOs served as major tools to obtain the required data.

Results and Discussion

The ITKs presently being used by the fishermen and collected are broadly categorized and presented under the following sub-headings.

1. Fishing Methods
2. Fish Aggregating Devices
3. Fish Processing and Storage
4. Fish Health Management
5. Preservation of Gears and Nets
6. Fish Waste as Manure for Fruit Plants
7. Rituals, Beliefs and Customs based on Fish

1. Fishing Methods

i. Nupi il / lift net

"Nupi" means woman and "il" means net in Manipuri. It is mainly operated by women. The net is supported by two bamboo frames each of about 3 - 3.5m

length. These two bamboo frames join together in the middle using cane strips so that it gives out four tips. On each of the tips of the bamboo a round cut mark is made for proper fastening of the net. The four tips of the net are fastened into the tips of bamboo. The net is mainly made of nylon; previously cotton net was also used. A bamboo pole locally known as "*poura*" supports the whole structure by means of a fulcrum in the middle of the bamboo frames. It helps to haul the whole net especially with the help of a hauling rope of about 7m length. It is operated either from the bank of lakes, rivers and ponds or even from a constructed platform or from the deck of a boat. The net thus lifts up from the water and the catch is collected by hand. This is practiced throughout the year.

ii. Khoisang thakpa / Longline

"Khoisang thakpa" means setting of the longline on the water surface. It is made of nylon/cotton twine about 50-100m long, fixed with a series of baited hooks of (about 30-50 numbers) at an interval of 2-3m on the main line which is stretched on the surface of the water. While in operation, one end of the mainline is tied firmly to a fixed pole and setting is continued with successive ties of the mainline to the available weeds until the tail end is again tied to another fixed pole. The most common live bait fishes used are *Punctius sp.*, insects, earthworms, *Esomus dendricus*, *Amblypharyngodon mola*, prawn and sometimes small size *Channa sp.* It is set early in the morning and hauled after 7-8 hours and reset again in the desired region. It is operated mainly during the summer.

iii. Longthrai fishing / Scoop Net

Scoop net is locally known as "*Longthrai*". It is of various shapes viz., cup shaped, triangle shaped, circular or trapezoidal etc. This gear has a netting of nylon or mosquito net mounted on the bamboo frame or jute frame with a long handle attached to the frame. It is operated both from the dyke as well as from the boat in the deeper water or from the margin near the dyke of the pond or lake especially in the weed infested area. It is practiced in all seasons by men, women and also children. It is regarded as the most easy means of catching fish. Species caught are Minnows, prawn, *Channa sp.*, *Anabas testudineus*, *Clarias batrachus*, etc.

iv. Long-ooop fishing / Plunge Cover-basket

This is a bell-shaped basket made of Bamboo strips/ lee having a height of about 50-55cm with foot diameter of 40-50cm and top opening diameter of about 13-15cm. It is operated during the dry season, when the water reduces to its

minimum level. The gear is operated by one man. It serves as compulsory gear for all the fishermen as it is available in all fishermen houses. Species caught are Indian major carps, exotic carps (*Cyprinus carpio*, *Ctenopharyngodon idella* and *Hypophthalmichthys molitrix*), *Notopterus sp.*, *Channa striatus*, etc.

v. Long fishing / Spear

This fishing method is practiced throughout the state and is mainly operated by expert fishermen only. It has 5-9 prongs of steel or bamboo with an iron point at the tips attached to a long bamboo pole of 3-4m. After locating the fish in water by seeing the bubbles or the movement of fish, the spear is thrown from the boat or from the dykes. It is a destructive fishing method. Species caught are *Channa striatus*, *Labeo rohita*, *Cyprinus carpio*, *Ctenopharyngodon idella*, *Wallago attu*, etc.

vi. Khoi choppa / Pole line

This type of fishing method is operated by children to old aged fishermen. It consists of a pole made from a bamboo branch or splits with a length of about 1.5-2 metres or even more as per the convenience of the fishing ground. A nylon or cotton twine of about 2-3 meters length with a hook at one end is tied at the tip of the pole. A reed of around 3-4 cm length is attached in the middle of the twine and acts as a float. This float moves when fishes are hooked. For using this gear in running water a lead weight is attached to the line at about 10-15 cm above the hook in order to avoid the line being drifted away and to maintain proper hanging inside the water. Bait used in the hooks include earthworm, paste made from flour, *hentak*, paste of boiled rice, etc.

vii. Sora-lu / Conical Trap

"Sora-lu" is the biggest among all the traps operated in Manipur. The trap is operated near the river mouth where water currents are mild and also in the paddy fields during rainy season. It consists of two parts; the bigger one is conical shaped tapering with a circular end to which two detachable ropes are tied at opposite directions and the smaller one has a tubular shape with tapering towards the end. The former part serves for congregation/aggregation and the latter acts as the fish collecting cod end. The two parts are joined together by a detachable rope which is tied at the mouth of the smaller one. The trap is fixed by using two poles at opposite directions where two ropes of the trap are to be tied. In the mouth of the second part, the tapering circular end of the first part is inserted and made a continuous one. The rope attached to the trap is again tied to the pole in order to

protect it from being flown away. The operation is carried out during the evening, the trap is kept for the whole night and in the early morning fishes are harvested by detaching the smaller part of the trap. The operation can be continued for the whole day.

According to Bira Singh (1999), some of the commonly accepted norms and procedures by traditional fishermen while setting of traps in the lake are as follows.

- a. No fisherman should set gillnet in front of box traps.
- b. No surrounding nets or gillnets can surround any other fishing gear set by other fishermen.
- c. Fishes which are already hooked, but trapped in the box cannot be taken by other fishermen who are fishing nearby with the same gear.
- d. There should be an identification mark, locally called "looyek", on the trap.

2. Fish Aggregating Devices (FAD)

i. *Phoom namba* / *Phoom* fishing

Phoom namba is a very common practice in *Phoomdis* of Loktak Lake. Here the fishermen transplant the *Phoomdis* (locally known as "*phoom thaba*") in a circular form surrounding the required pre-selected area of water. It is fixed with the help of bamboo stakes in different parts. This is meant to attract the fishes by providing them shelter surrounded by different aquatic weeds mainly with the water hyacinth (*Eicchornia sp.*). The size of the circle may vary. Usually its circumference ranges from 150-200 m. After two months when the fish settle and aggregate under the *phoom*, they are caught (locally known as "*Phoom namba*"). In this, the setting *phoom* is encircled by a long cloth with sinkers at the bottom and the height of the net is adjusted with the depth of the water. Twenty to thirty fishermen churn the whole water with the help of bamboo poles from the dyke as well as from the crafts to make the fish come out. Fish are then caught by using the drag net with repeated netting., The fishermen catch about 800-2000kg of fish in one operation. The peak season of this fishing method is December to March.

ii. *Phoomdao thumba* / FAD for Air Breathing Fishes

The unique feature of "*Phoomdao thumba*" is the use of traps in the *phoomdis* and it catches only air breathing fishes. The selected *phoomdis* are placed fixed with the help of bamboo poles and indigenous pulley system (nylon rope or iron chain) which helps to navigate the *phoomdis* from one place to another. To remain

in one place, the *phoomdis* are anchored to the bottom with the help of heavy stones. In this, holes are made by cutting the *phoomdis* with the help of a sickle with sizes ranging from 5-6 feet long and 2-4 feet wide in different places. The traps are set above the cut out holes vertically or in slanting position. Around 50 traps can be set in a one-hectare area. The air breathing fishes come up in the hole to inhale the atmospheric air and they are entrapped eventually. The entrapment is increased by blowing of strong wind, where the floating weeds are blown towards the *phoomdis*. Normally traps are operated once in a day but sometimes three to five times daily if the water is productive. If the fish catch in the selected region is less, then the *phoomdis* are dragged to other places using the indigenous pulley system called 'Kangdren'.

iii. Kao – Fish Aggregating Device in the River System

This is an indigenous way of catching fish by making a Fish Aggregating Device from locally available materials where the branches and twigs of trees are used. It is locally known as "Kao". It consists of a triangular / dustpan-shaped structure made from bamboo strips. Inside this, branches of trees and twigs are placed which are means for the aggregation of fish. Sometime fish attractants such as an ant nest are also kept under the branches. The gear is operated in small rivers, streams and lakes etc. It is placed inside the water facing the inflow of water current, away from the bank or dyke with a rope/ bamboo tied on it for maintaining its position. It is set in the morning and harvested after 24 hours. Fish are caught after lifting the gear and the branches. Species caught are *Esomus dendricus*, *Channa sp.*, *Clarius batrachus*, *Anabas testudineus*, *Amblypharyngodon mola*, etc.

iv. Fish Aggregating Device – Macrophytes in low lying area

Traditional fishermen used this macrophyte (*Hygoryza sp.*) as fish aggregating device mainly for catching the air-breathing fishes. In this practice, the fishermen grow this macrophyte in low lying area besides *beels* and create an environment, which is favorable for the fish to take shelter. During the rainy season, the fish from the beel or wetland aggregate in this area. They remain there for several months. During the dry season (mainly in the months of November-December), the low lying areas are dewatered. In this process, some fishermen harvest the "Kambong" and some other fishermen/women catch the fish with a small scoop net or by hand locally known as "*khut humba*", simultaneously. This enhances the fish catch as the fishermen stir up the bottom mud in the shallow water which

is locally known as “Nga-neiba” while harvesting the macrophytes, which make the fishes suffocate and hence come up and make the fish easy to catch. The species caught through this practice are air-breathing fish which fetch good prices in the market. Major species caught are *Anabas testudineus*, *H. fossilis*, *Channa sp.*, *Colisa fasciatus*, *Clarius batrachus*, etc.

3. Fish Processing

i. “Hentak”/ Fermented Fish Product

“Hentak” is a unique fermented fish cuisine of Manipur. It is prepared by the local people in an indigenous way as and when required. Moreover, the product can be stored in an air tight container for about one year. The fish used for making Hentak is *Esomus dendricus* (Ngasang). Fish are fully dried by spreading above the net which is kept fixed, above the ground, on poles. The petioles of Hongyu (*Alocasia microrrhiza*) plant are the main ingredient for making the product. It is said that it helps in hastening the degradation process and acts as a binder. This is cut into small pieces and along with fish it is crushed in “Shungban” (locally made wooden crusher) and paste made out of it. For making the paste more sticky, mustard oil is added.

ii. Ngari / Semi Fermented Fish

Ngari is a semi-fermented fish product prepared from *Puntius sp.* It is consumed in any form and treated as a necessary food item for daily consumption. The important characteristic of the product is that it can be stored for more than a year. It is said that the “Older the product, the better is its taste”. Therefore, the commercial preparation of this product is carried out throughout the central valley of the state. The fermentation process is carried out in a round bottomed and narrow necked earthen pot. If the pot is a new one, in order to make it impermeable to air, mustard oil is smeared on the inner surface and remains exposed to the sun for several days until it becomes fully saturated with oil. Therefore, old earthen pot is preferred as it absorbs less oil as compared to a new one and hence the cost of production is less. The capacity may range from 10-40 kg. For sealing purpose, during the fermentation process, lids are prepared from the paste of mud and sometimes fresh cow-dung is used in order to avoid cracking in the mud. It is tightly wrapped with a plastic cover. In order to keep the pot fixed vertically and avoid cracking due to the packing pressure on it, a pit is dug in the ground upto the height of its neck. The product is ready for use after 6 months.

iii. Nga-yaiba – Smoked Fish

‘Nga-yaiba’ is the process of smoking of fishes. Not only are fresh fish used for making smoked fish but the fish which remain unsold in the market are also used for preparation of Nga-yaiba. In this practice, smoke of husk, straw and wood is allowed to pass through the fish under the indigenous *chullas*. In this way, the process of smoking helps to enhance the shelf life of the fish. Further there are different types of *chullas* which are made according to the condition of the region. They maintain the *chulla* in a rake system so that the finished smoked fish can be kept above it to retain its original texture and crispness.

iv. Enhancement of the Color of Smoked Fish

The color of the smoked product shows the quality of the product as well as enhances its acceptability by the people. The most favorable color of the smoked fish is golden yellow. So in order to acquire this color, people use smoke of fern (*Microlepia strigosa*). The fume or the smoke of this fern is passed through the finished smoked fish for a few minutes. The resultant color is very good.

4. Fish Health Management

i. Turmeric Powder with Salt to prevent EUS

Turmeric powder and salt are mixed together with water and sprinkled in the fish pond. This serves as a preventive measure for Epizootic Ulcerative Syndrome (EUS). It is a well known fact that turmeric has a remedial property of healing abrasion. Now-a-days, fishermen have become very conscious about fish health, hence, they sprinkle the mixture even if the disease is not seen, as a preventive step in fish culture.

ii. Ash for treatment of EUS

Use of ash for treatment of EUS is very familiar and used by more or less all the respondent fishermen who culture fish in their ponds. Ash produced through the burning of fuel wood materials and other waste material is used for aquaculture. However, some fishermen use and consider the ash of paddy straw as the best, for the treatment of EUS.

5. Preservation of Gears and Nets

i. Preservation of Traps

Traps are used for a long duration and are stored for future use during the off season. Fish farmers use some preservative measures like burning of the bamboo

splits before making which serves as a good means for preservation as it protects traps from fungal and insect infestation. For storage of traps, traps are kept either on a bamboo/ wooden rack or kept hanging underneath, above a fire place which exposes them to the smoke (locally known as “*Leikang okpa*”). This helps in maintaining the strength of the gear by preventing them from fungal infection and attack by harmful insects and termites without being disturbed in its structure. Fishermen believe that the black colour also helps to increase the efficiency of the gear. The traps are also kept immersed in a thick liquid mixture of “*leikang*” (dusty particles from smoked areas) and cow dung for about one and half hours. This also helps in maintaining the strength of the traps.

ii. Net Preservation

After fishing, nets are treated with various types of locally available preservatives. Barks and leaves of various trees such as *Kuhi* (*O. serrata*) and *Heikru* (*Phyllanthus emblica*) are extensively used as preservatives. The barks and leaves are properly crushed and soaked in water for 2-3 days until the water turns into black colour. Then, the nets are dipped in this liquid for a day and exposed to sunlight for proper drying before storage.

6. Fish Waste as Manure for Fruit Plants

The intestines and other discarded parts of fish which are not used for eating are used as manure for fruits plant (mainly grapes). The fishermen dump the wastes of fish near the roots of the plants. It is said to increase fruit-bearing of plants and also prevents infestation by insects by increasing their resistance to insects.

7. Rituals, Beliefs and Customs based on Fish

In Manipur, fish constitute an important part not only in the dietary aspect but is also considered an unavoidable component related to rituals, beliefs and customs of the Meitei community. *Channa orientalis* is used compulsorily during weddings and child birth and also during pregnancy. The state fish *Pengba* (*Osteobrama belangirii*) is offered to the God of rice “*Ema Emoinu*” which indicates richness in its value. Besides this, on the first Saturday of March, children are made to bathe their head using the water which contains the slime from the skin of eel (*Monopterusuchia*), as they believe that it will protect them from evil. Some of the most widely used fish during important occasions in the state are *Channa orientalis*, *Wallago attu*, *Acanthopthalmus pangia*, *Osteobrama belangirii*, and *Monopterusuchia*, etc.

Conclusion

It is observed that fishermen and fisherwomen have Indigenous Technical Knowledge of practices and methods, starting from 'when and how to catch the fish' to 'fish processing and preservation methods' and use them both individually and co-operatively for their livelihood. This indigenous knowledge could serve as an entry point into the sustainable utilization and management of natural resources. This could be achieved through the exploration of the indigenous technical knowledge of the local people and integrating useful aspects into modern technologies. Involving indigenous experts in collective problem-solving endeavours would also be a good step towards successful sustainability planning. Moreover, earlier research studies have reported that there are no readymade technical solutions to the problems faced by farming communities from the modern scientific knowledge system, which can be disseminated to and adopted by the poor farmers. On the other hand, solutions for many such problems come from the people themselves over a period of time. Therefore, we need to encourage such a mechanism where the knowledge base of the indigenous people would improve and subsequently use this knowledge base along with the scientific knowledge.

It is noteworthy to mention here that the present attitude of the educated and scientific masses needs a one hundred and eighty degree turn to realize the potentialities and rationalities of ITKs. The documented indigenous technologies are also not made available to the fishing community in a form they can make use of to improve their production. This is due to lack of linkage between the fishermen, researchers, scientists, policy makers and government functionaries. There is need for a suitable linkage mechanism and for documentation and proper utilization of ITKs to extend the benefits to all needy.

References

- Bira Singh, O. 1999. Fishing technique used for Air-Breathing fishes with special reference to Phoomdi (floating mass) of Loktak lake of Manipur. M.F.Sc Dissertation, CIFE, Mumbai.
- Greenfeldt, D. 1991. Building on tradition: Indigenous irrigation knowledge and sustainable development in Asia. *Agriculture and Human Values*, 8(1/2): 114-120.
- Mundy, P. and Compton, J. L. 1991. Indigenous communication and indigenous knowledge development communication. Report 3, 7(4): 1-4.
- Rai, S.C. 2007. Traditional Ecological Knowledge and Community-based natural Resource Management in Northeast India. *Journal of Mountain Science*, 4(3):248-258.