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Cover: *Raillietina echinobothrida* from the intestine of local fowl, *Gallus domesticus*. Photo: K. Lalchhandama

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Traditional fishing methods in rivers and streams of Mizoram, north-east India

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ABSTRACT

The Mizo tribes of north east India developed and practiced different types of fishing methods since time immemorial. Some methods can be considered as traditional as well as non-traditional since they are well known in some other parts of the country with some variation. This paper described fifteen traditional fishing methods. The study reveals that the people of Mizoram used locally available materials and apply indigenous ideas and skills (indigenous technical knowledge, ITK) for fishing. Various fishing techniques depend on various behavioural pattern and microhabitat type of fishes. Thirteen species of plants and plant products are used for fishing.

Key words: Fish; fishing methods; Mizoram; rivers; streams; traditional.

INTRODUCTION

Mizoram, having an area of 21,081 sq. km., and located in north-eastern India, lies between 21°56'N and 24°31'N latitude, and 92°16'E and 93°26'E longitude. The state has international borders with Bangladesh in the west (318 km) and Myanmar in the east and south (404 km). The north eastern region of India has been ranked sixth among the top 25 biodiversity hot spots in the world. Riverine fisheries resources of north eastern states comprise 19,150 km of streams and rivers, which are blessed with diversified fish fauna having both torrential and

plain forms, but still the old traditional methods of fishing are prevalent and most of the practices followed are primitive and outdated as there is no new and reliable technology available.¹

In Mizoram, there are 21 rivers which along with their tributaries run into 1700 km.¹ The riverine system of Mizoram comprises of several major rivers and their tributaries (Fig. 1) which flow either in north or south directions creating deep gorges between the hills.² The major rivers of Mizoram are the Tlawng, Tuirial, Chhimituipui (Kolodyne), Tuichawng, Tuirini, Tut, Tuivai, Mat, Teirei, Tuivawl, Khawtlang tuipui (Karnafuli) and Serlui. Since Mizoram is a hilly state, some of the fishing techniques applied in other parts of the country is not suitable in the hilly rivers and streams;

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therefore, the Mizo natives have developed several indigenous fishing methods to suit the unique riverine system.

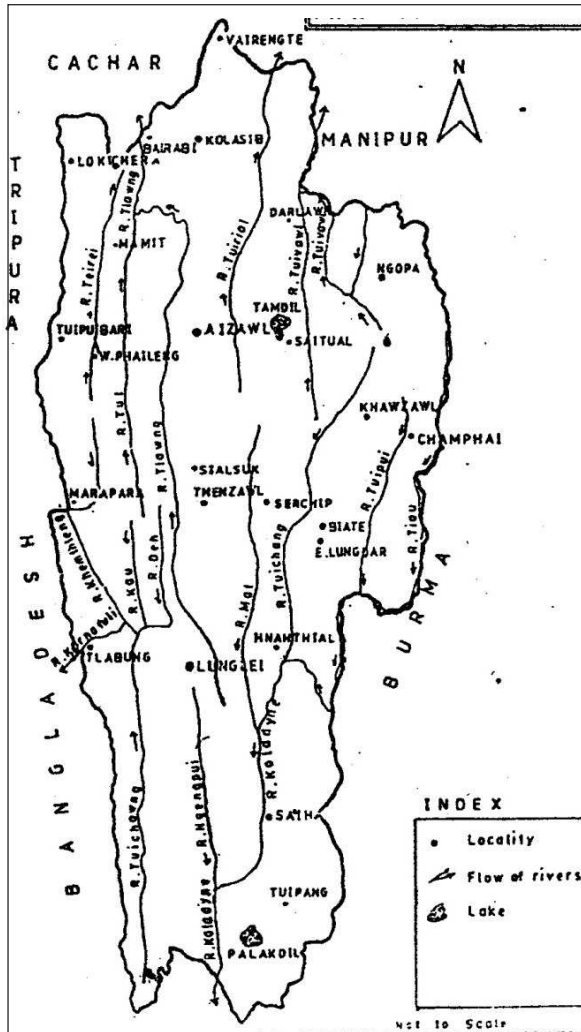


Figure 1. Riverine system of Mizoram.

MATERIALS AND METHODS

Information on fishing methods is collected through intensive field survey and interaction with local fishermen and prominent citizens from different parts of the state. The information collected is compared with the available

existing information in the literature. For some methods information is available from literature with some variation. This slight variation is needed to suit the available materials, topography, and fish behaviour, nature of rivers and style of living. But for some methods, no information existed at all. Nath and Dey (2000)³ is followed for identification of fish. Sawmliana (2009)⁴ is followed in identification of plants.

RESULTS

All kinds of traditional fishing methods are found to be applicable during dry season (from October to May) only. Some of the fishing methods, mostly indigenous, are as follows:

1. Sangha-tlang-vuak (community herbal fishing)

This method involves members of the whole village community. They collect materials which can be used as a bait or toxic for fishes, including the leaf of *Juglans regia* Linnaeus (walnut/khawkherh; Juglandaceae), bark of *Schima wallichii* (DC) Korth (needle wood/khianzo; Theaceae), roots of *Linostoma decandrum* Wallich ex Endlicher (ngaihhih; Thymelaeaceae), leaf of *Spilanthes oleraceae* Linnaeus (para cress/ansapui; Asteraceae), and various types of barks of *Acacia* spp. (khang-khangngo/khangpawl/hlingkhang/khangding; Mimosaceae), roots of *Millettia pachycarpa* Benthams (rulei; Fabaceae), *Polygonum chinense* Linnaeus (Chinese knotweed/taham; Polygonaceae), fruits of *Diospyros pilosula* Wallich ex Hiern (ruthei; Fabaceae), *Sapindus mukorossi* Gaerten (soap-nut tree/hlingsi; Sapindaceae), bark of *Albizia procera* (Roxburgh) Benthams (white siris/kangtek; Fabaceae), fruits and bark of *Gynocardia odorata* R. Brown (saithei; Flacourtiaceae) and fruits of *Croton wallichii* Müller Argoviensis (kawmru; Euphorbiaceae). Some of these are used in small rivers or streams. The roots of *M. pachycarpa* are the most commonly used materials for sangha-

tlang-vuak. *L. decandrum* can induce allergic response to human and the symptom is inflammation and swelling of the infected part especially the soft skin.

These plant products are first well grinded at home the day before use and thereafter introduced in to the source of running water. In some other parts of the state like Khawrihnim, fruits of *D. pilosula* is commonly used where each house is suppose to have at least one tin of it. It was supposed that 80-100 tins are enough for sangha-tlang-vuak. The fruits are then packed in a container made of stitched bamboo slice called “pa-te” it was then grinded inside the running water. The juice of the fruits that spreads in the water can stupefy fishes or any other aquatic fauna (Lalliantawna *in litt.*, 2010). Sometimes, these plant products are well mixed with the mud to make the stream water turbid. The fruit of *C. wallichii* is mainly used to treat the caves. Fishes are driven together towards caves and simultaneously apply the fruits of *C. wallichii*. This is found to be very sensitive to skin and commonly used in western Mizoram around Bukpui village. Sometimes fruits of *Zanthoxylum armatum* DC (toothache tree/ar-hrikreh; Rutaceae) are also used by the end of rainy season (Kalkhama *in litt.*). All these plant/herbal products, the bark, roots, leaves or fruits which can be used to stupefy fish are sometimes collectively termed as “ru”.

After herbal application/herbal treatment, the fishes come to the surface and exhibit some abnormal behaviour. The fainted fishes are collected by the fishermen by using one’s hand, scooping gear or cast net. Biggest fish species collected by this method is *Glyptothorax* sp. (thaichhawninu; Sisoridae). Any edible aquatic fauna like prawn, crabs, snails etc. are also collected.

The length of the river covered by this method depends on the amount of fishing materials (ru) they have. Towards the bottom the river about two consecutive bamboo fencing known as ‘khar’ are made across the river to

block the dead or fainted fishes. Fishes are mainly collected from these fencings (khar). Usually big rivers are selected for Sangha sangha-tlang-vuak and the whole process requires 1-4 days. The collected items can reach upto 2-3 quintals or more and are equally distributed to all family. A group of 4/5 men also used to cover a stream by this method and this is simply known as ‘sangha vuak’.

2. Ngawidawh (arial trap)

This is the largest animal trap made by the Mizos that is meant for fish. By this method of fishing, migratory fishes are caught on their way (both spawning and feeding migration). According to local fishermen, fishes of big rivers escapes the flooded river in the rainy season and moves up to the smaller tributaries and return back by the end of rainy season usually in the month of October. This method is performed by a group of men. An obstacle across the river was prepared for 1 or 2 days in the selected river or stream. The obstacle or wall made of a number of two bamboos erected aslant, crosses at the top (this is called “ngar”) supported by a huge amount of boulders or stones. A door was open at a suitable point; at the opening of this door a trap was placed. When the fish face the obstacle, they move out through the door along with water and fall in the traps. The trap may be in the form of pit or bamboo stock knitted with some kind of jungle rope/treads kept in the way which is called ‘ngawi var pui’. Sometimes a smaller door or big hole was made near the door. At the opening of this, a cage made of bamboo sliced was put in order to trap the fishes. This is also called ‘bawngdawh’ (C. Rokhuma *in litt.*, 2010).

The trapped fishes are collected everyday or after an interval of one day for about 1 – 3 months. The one who master mind the whole process is called “ngawipu”, he made an arrangement for collector and distribution of fishes. The pool above or below the site was

booked known as “ngawi li” which was un-touchable by others. There is a report of barking deer and Indian bison trapped in ngawidawh (C. Rokhuma *in litt.*, 2010).

3. *Bawngdawh (maze/barricade)*

This is a bamboo trap of various designs. The principle of the method is to trap the fish in a cage made generally of split bamboo. Sometimes to lure fish foods are generally kept inside the trap. This method is very common as it does not need to guard the traps; the fishermen simply put the trap in a specific location and pull out after sometimes or days. There are various shapes and size of bamboo maze used and their names varies with different locations. The shape may be of conical, cylindrical or basket type.

4. *Len den (cast net)*

This method is the main tool for catching fish in rivers and streams by the Mizos. Two types of fishing net are used based on the size of river. The fishing net used in big river is called ‘len-pui’ which means big fishing net and the smaller one that is used in small river or stream is called ‘len-fâng’. The shape of the net is more or less a pyramid shape. Hundreds of small block of lead or metallic sinkers (which totally weigh about 2.5 Kg.) is tied at the tip of the net and a main rope called ‘len hnuk’ is at one end which is used for holding the net by using one hand of each choice. The net is placed between the two elbows and are thrown to the water bodies. The trapped fishes are caught by using one’s hand.

Net Fishing can be considered as traditional method. Before the nylon thread net was introduced in the state, the fishing net was locally prepared from cotton. The Mizos have three or four kinds of threads prepared from cotton. These specially designed and prepared threads are very strong and fit for used as fishing net material (Lalliantawna, Kalkhama, Tlungchina,

Lalhluna, *in litt.*).

5. *Hawlhrawk (poking net)*

In this method, two sticks are tied at the two ends of the 2-4ft.wide net which is about the size of a sieve. It was then pushed between the stones/rocks inside the water bodies. Fishes that are trapped in the net are collected by hand. This method is mainly applied in streams where cast net (len-den) is not applicable. (Lalfela & Lalenga *in litt.*, 2009)

6. *Lungtuk (hammering)*

The upland stream fishes use the boulders as one of its hiding covers. When a strong blow is given on the boulders using a hammer or a bat, the fishes hiding beneath it are injured. The injured fishes, including the large to small sized fishes are collected (Lalfela & Lalenga *in litt.*, 2009).

7. *Lungbuk (stone piling)*

An appropriate pool site was selected in the river where stones or boulders of about 3-10 kg are piled up or arrange in tier. The site was left for 3/4 nights, or in some places a lure item was put in between the boulder as attractant, after that it was then covered with cast net. In this way net casting was performed repeatedly after an interval of time (Kalkhama *in litt.*, 2010).

8. *Lensuah (scooping)*

Such nets are usually operated in the shallow waters for capturing small fishes. The net is usually made of cotton or indigenous fiber. This method is mostly used for domestic consumption and is practiced in the shallow pool area of the streams where the fishermen can easily move around. Lensuah is also used to collect fainted fishes in Sanghavuak (Herbal process).

9. *Lui thliar/thliar leh (water diversion)*

In this method, a stream is diverted into a small channel by blocking with mud, boulders and plants, so that the water from the stream is bailed out and the fishes are caught easily. This method is also practiced where more than one streams is found within a channel. The water in one of the secondary streams is diverted to the other by blocking one stream with mud, boulders, plants or any available materials. Thereafter, the fishes are collected from the stream. This method is practiced in fast moving water habitat of the stream. Most of the fish collected include small sized bottom dwelling fishes like *Garra* sp. (nghalim; Cyprinidae), *Noemacheilus* sp. (dawn\ial; Balitoridae) and *Mastacembelus* sp. (nghaler; Mastacembelidae). In some parts of the state this method was named as “suar mum” (Kalkhama *in litt.*, 2010).

10. *Suar dan (temporary water blockage)*

In this method both herbal products and temporary water blocking are applied at a shallow place of river obstructed by stones called ‘suar’. Any available cloths and banana leaves used as fencing to block the running water so as to make a sort of temporary pool. The pool was then immediately treated with herbal products (ru) like roots of *M. pachycarpa* or bark of *A. procera*. The whole process requires a rapid action because the materials used for fencing last only for a short duration (Kalkhama *in litt.*, 2010). In other places, shallow stone and boulders obstructed river was blocked as described above. Just after the blocking, the remaining river of little water was given a herbal (ru) treatment, any type of aquatic edible animals are collected before the water overflowed the pool or sweep away the fencing (C. Rokhuma *in litt.*, 2010).

11. *Lui hung (pool fencing)*

A suitable pool where the water is more or

less stand or slow running, with an average depth of about 4 ft. in the river or stream is selected. A bamboo fencing having one small door for fish entry was made during day time. Inside this fencing a good smell fish food are spreads as a lure. At night when an adequate number of fishes are attracted inside the fencing, the door is closed and the fishes are trapped by cast net. This method is commonly practiced in northwest part of the state (Lalhluna & C. Rokhuma *in litt.*).

12. *Chawnzial (cave fencing)*

A suitable cave where fishes are abundant is selected. The water surrounding the cave was separated by making bamboo fencing. The herbal product (ru) is applied just as in sanghvuak (Kalkhama & C. Rokhuma *in litt.*).

13. *Bel chiah (pot immersion)*

Sometimes smaller fishes used to swim near the bank of a river. A small kitchen pot or vessel containing rice or any other food items is covered with thin cotton having a small hole at the centre. The pot is then placed inside the water body near the bank and fishes are attracted by the lure item. After sometime, fishes enter the pot and thereafter the hole is covered with palm or finger and the pot was taken out of the river. This method of fishing is mostly practiced by woman and children and live fishes of small sizes are usually caught (Lalhluna & C. Rokhuma *in litt.*).

14. *Tui theh kang (water bailing)*

During dry season, small stream and canyon which harbour fishes and prawns are identified. Then the water source is diverted and the water content of the pool or canyon is bailed/draind in all possible ways. After the water is poured out or when the water quantity is reduced to minimum level, mostly completely, fishes are easily picked up with bare hand or

with any other devices.

15. *Lui tea sangha lut lo dan (intercept process)*

Some fishes swim out of main river to smaller tributaries at late afternoon. These fishes return to the river at night. In order to catch these fishes, a temporary fencing is prepared with bamboo, banana leaves, cloths and twigs, etc., at a suitable place of its tributaries. The returning fishes are easily caught by net casting. By this method big river fishes can be caught in small river or stream (Kalkhama *in litt.*, 2010).

16. *Lenkhangzar (entangling gear), nghakuai chiah (fishing rod/hooks) and sangha chhun (spear/harpoon)*

These methods, *viz.*, lenkhangzar, nghakuai chiah and sangha chhun are widely used throughout traditional practices of the world. Though the method and materials used by the Mizos are different from those found in other traditions, the basic technique is the same and may not be purely indigenous methods. Therefore, they might have been copied from neighbouring states or introduced by visitors (C. Rokhuma and Kalkhama *in litt.*, 2010).

DISCUSSION AND SUGGESTIONS

Selection of fishing methods and gear are influenced by various factors such as physiography of the water body, nature of fish stock, characteristics of the material from which gear are fabricated and standard of living.¹ Therefore, variation in application of gear can be observed in different rivers, which have characteristic of their own due to unique nature of the water resources of the region.

The success of these fishing techniques depends on various factors like selection of site, time, efficiency of materials used and availability of fish, etc. For successful fishing some at-

tractant as a lure is popularly employed in other parts of the country.^{5,6} Some sub-tribe of Mizo like Pawi, Hmar, Lai, Mara, etc., have their own methods of fishing which are usually specially modified methods of the existing one, e.g., nghahringdawh by Pawi (Tlungchina *in litt.*, 2010). The methods that are common in northern part may not be practiced in the southern part and vice versa. *G. odorata* is found to be specifically sensitive for prawns and *Glyptothorax* sp. and *M. pachycarpa* is also particularly sensitive to eel (ngharul; Anguillidae) and *Channa* sp. (nghavawk; Channidae) (Kalkhama *in litt.*, 2010). The fishes that are caught by herbal products (ru) are consumed by man without any problem and are found to be safe for human consumption. This might be due to the nervous breakdown or lack of dissolved oxygen caused by the plant materials, and no effect on alimentary canal. Modern (destructive) methods of fishing like using dynamite, chemicals poisoning and electro-fishing might have been introduced in the state after 1950's, 1960's and 1980's onwards, respectively (C. Rokhuma *in litt.*, 2010). Fishing for food is the only reason for fishing among the Mizos.

Though, Mizoram lies in the biodiversity hotspot region, due to anthropogenic activities a number of fish species appears to decline at an alarming rate. Very little research has been done from outside the state and no intensive study from the natives. A report on fish diversity of Mizoram is scanty. Ramanujam and Harit (2002)² reported 7 species of fish from Tiau and Tuipui rivers both flows from north to south. Kar and Sen (2007)⁷ reported 42 species of fish in river Tuirial, 42 species in Chhimtuipui river, 31 species in river Khawthlang Tuipui, 25 species in river Mat, 36 species in Tlawng river, 9 species in river Tuirini, 14 species in river Serlui and 23 species in river Tuivai. This report includes 6 threatened species from Mizoram.

Instead of modifying and improving the existing traditional methods, destructive methods

of fishing like chemical poisoning, dynamiting, electro-fishing, etc., become very popular although preventive measures are being taken by the state government. The destructive methods has imbalanced the river and stream biota damaging not only the fishes but also the fish food organism (macrobenthos, periphyton, etc.) and other aquatic fauna. So it is a high time to divert research attention on ichthyofaunal study and for developing appropriate fishing gear in order to exploit the fishery resources in a proper and judicious manner.

In view of the above points, the following suggestions should be given due consideration:

- a) A total ban on poisoning, dynamiting and electro-fishing should be enforced immediately.
- b) The existing fishing methods should be modified and improved.
- c) New methods of eco-friendly fishing method should be developed.
- d) Anthropogenic activities should be regulated in order to conserve the fish diversity in the rivers and streams.
- e) A seminar programme should be organized on the merits and demerits of different indigenous fishing methods to select the most appropriate method and the importance of fish diversity conservation vis-a-vis socio-economic upliftment of the native fishermen.
- f) Research programme on ichthyofaunal diversity study and improvement of indigenous method of fishing should be initiated immediately.

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