



## Comparative study of the traditional and modern fishing crafts and gears used by the people living in the periphery of the Loktak lake, Manipur, India

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### Abstract

A great change has been observed in the fishing crafts and gears used by the people living in the periphery of the Loktak lake over the years. The present study was taken up in five selected villages located around the Loktak lake namely Komlakhong, Khordak, Laphupat Tera, Thanga and Ithing to make a comparative assessment of the traditional and their replacement (modern) fishing crafts and gears used by the people living in the periphery of Loktak lake using a questionnaire survey. It was observed that in Komlakhong village 6 types of traditional crafts and gears used by the people were replaced by 6 other new modern crafts and gears, in Khordak 17 traditional crafts and gears were replaced by 14 modern crafts and gears, in Laphupat Tera 10 traditional crafts and gears were replaced by 10 modern crafts and gears, in Thanga 14 traditional crafts and gears were replaced by 14 modern crafts and gears and in Ithing village 10 types of traditional crafts and gears were replaced by 8 modern crafts and gears. With the development of new technology the traditional crafts and gears were replaced by modern ones. Still many people are relying on the primitive traditional crafts and gears. Though traditional crafts and gears were found declining but they are cheap, made up of locally easily available materials and does not degrade the lake ecosystem. Hence, the traditional crafts and gears need to be revived, documented and upgraded using modern scientific technology.

**Keywords:** Village, tools, replaced, documented, cheap.

### Introduction

Fishing is the occupation of the people residing in and around the Loktak lake. Indian fishery is one of the major areas of India's food production which offers job opportunities to millions of skilled and unskilled rural people<sup>1</sup>. The development of fishing gear came from early ages when fishermen became concerned about the methods of catching fish. Fishing gear refers to devices which are used for catching fish world-wide. It includes nets, simple hook, traps, lines, alluring fish device and wounding gears<sup>2</sup>. Fishing gear is any form of equipment, implement, tool or mechanical device used to catch, collect or harvest fish on the other hand crafts are used to carry the fishermen and gears to fishing grounds. Fishing nets and gears are refers to those devices having different shapes and sizes and used in the aquatic bodies to capture different sizes of fish species.

For scientific and judicious exploitation and management of fishery resources a knowledge of fishing gear, crafts and fishing methods is very essential<sup>3</sup>. Various types of materials are used to make fishing gears which include netting, twine, plastic structural and fasteners, clips and swivels, ropes, steel wire ropes, combination wire ropes, purse rings, polyester, polyethylene, nylon, cotton, polypropylene, mixed fibers, floats and sinkers, bamboo, wood etc.<sup>4</sup>

The Loktak lake is situated in the valley district of Bishnupur and Imphal West of Manipur. The lake is the largest fresh water lake in North East India covering an area of 340km<sup>2</sup> in 1970 which has increased to 469 km<sup>2</sup> in 2002<sup>5</sup>, after the construction of Ithai barrage and at present 246.72 km<sup>2</sup> <sup>6</sup>. Loktak is located between 93°46'-93°55' E and 24°25' - 24°42' N and occupies about 2.84% of the total state area. The shape of the Lake is an oval with a maximum length of 32km and 13km width. The depth varies from 0.5m to 4.6m with an average depth of 2.7m. About 16 hillocks are found in varying sizes and height in the wetland and the prominent are Sendra, Ithing and Thanga islands. Loktak lake can be considered as a sub-basin of the Manipur River basin. It has a direct catchment area of 980 sq.km and indirect catchment area of 7157sq.km. Loktak Lake is considered as the lifeline of the people of Manipur due to its importance in their socio-economic and cultural life. It is the largest natural freshwater lake in the northeastern region and plays an important role in providing ecological and economic security to the region. A large population living in and around the lake depends upon its resources for their sustenance. The lake is rich in biodiversity and has been designated as a Wetland of International Importance under Ramsar Convention in 1990<sup>5</sup>. The annual rainfall varies from 982.21mm to 1980.8mm and the study area falls under sub-tropical monsoon climate. The area experiences rainy season mostly from April to September. In the month of July the maximum rainfall is recorded. The mean daily

minimum temperature recorded was 1°C and maximum temperature recorded was 29°C<sup>7</sup>. There are two types of soil found in Loktak lake and its surrounding areas. They are the Residual poor sandy soil and Transported alluvial soil<sup>8</sup>. There are 55 rural and urban settlements around the lake with a total population of 100,000<sup>9</sup>. The communities living around the Loktak lake depend on the lake for drinking and domestic purposes, generation of hydro-electricity power, irrigation, biodiversity, recreation etc. and the communities were involved in fishing, fish farming, fish marketing, agriculture and ferrying, weaving products of the lake etc<sup>10</sup>.

The construction of Ithai barrage which was started in 1971 in the downstream of Manipur river (Imphal river) as a part of the National Loktak Multipurpose Hydro-Electric Project, to maintain sufficient water volume in the Loktak Lake by making it a reservoir for maintenance of the project became a controversial structure. The commissioning of Ithai barrage in 1983 results in the inundations of several hectares of land surrounding the Loktak lake and has brought about enormous changes in the availability of fishes and related resources and methods of fishing in the Loktak lake. Trisal and Manihar<sup>5</sup> reported that inundation of large areas of agricultural land after construction of Ithai barrage has led to shifting of a large population of agricultural farmers to fisheries as the main source of income. High level of water maintained by Ithai dam in the Loktak lake is flooding the surrounding area. It inundated agricultural land more than twice the area it proposed to irrigate and uprooted and deprived about 10,000 people of their livelihood<sup>11</sup>. High level of water maintained after the construction of Ithai barrage also led to the changes in the types of fishing crafts and gears used in the Loktak lake.

Singh and Singh<sup>12</sup> observed that the main fishing crafts and gears in the Loktak lake include primitive canoes made up from a single log of tree such as *Artocarpus chaplasa*, *Cedrella tuna* and *Phoebe* spp. and are still in use. Gurumayum and Chaudhary<sup>13</sup> studied the existing fishing methods in the rivers of Northeast India. Hooks and lines, maze/barricade, encircling gear, entangling gear, impaling gear, scooping gear, groping, impoundment, indigenous trap, noose fishing, dynamiting, poisoning etc. were found to be the existing fishing methods. Obande *et al.*<sup>14</sup> investigated the checklist and assessment of efficiency of some traditional gears and crafts used on river Benue, Nigeria. Adikant *et al.*<sup>15</sup> in their study on traditional fishing techniques of tribes in Bastar region of Chhattisgarh found that during rainy season the tribes uses many types of fishing crafts and gears and used traditional knowledge they possessed in processing and storage of fishes. Ahmed *et al.*<sup>16</sup> found that *Hodi*, an outrigger dugout canoe was the traditional fishing craft commonly used by the *Nicobarese* tribes in Car Nicobar and the traditional fishing gears used by them included spears, hook and line, trolling line, bow and arrow. Chourey *et al.*<sup>17</sup> investigated the traditional fishing nets and gears that used by professional fishermen in Bhopal district for commercial fish culture practices. Rajeswari *et al.*<sup>18</sup> noted the crafts and gears

operated for exploitation of fishery resources in Tandava reservoir, Visakhapatnam district of Andhra Pradesh. Bhat and Singh<sup>19</sup> recorded the fishery related technological knowledge specially fishing gears and crafts used in Punjab region. Sultana and Islam<sup>20</sup> observed the fishing crafts in Chalan Beel Area, Bangladesh and found six types of fishing crafts such as Jailanauka, Vedinauka, Bhotnauka, Koshanauka, Donga and Vela were used in the area. Malik *et al.*<sup>21</sup> studied about the indigenous fish bait, gears and storage used by the fishers along with the scope for introducing the new technology. Niloy *et al.*<sup>22</sup> estimated the gear used in the Payra River, Bangladesh and species composition with this gear. Sakib *et al.*<sup>23</sup> described the traditional fishing gears and crafts available at Gumti river of Muradnagar upazila in Cumilla district, Bangladesh. Petetta *et al.*<sup>24</sup> studied about pots as an alternative and sustainable fishing gears in the Mediterranean Sea.

Since long time the people of the study villages mainly depended on the Loktak lake for fishing using different fishing crafts and gears apart from depending on the lake for other bioresources. Various traditionally designed nets, basket, hook, traps, spears were used in catching of fishes in past for fishing in the Loktak lake but at present the traditionally designed crafts and gears have been replaced by modern crafts and gears because of development of new technology. In this paper an attempt has been made to study various traditional crafts and gears used by the people residing in the periphery of the Loktak lake and their modern replacement. The aim of this study is to make a comparison of the traditional and modern fishing crafts and gears used by the people living in the periphery of Loktak lake, Manipur and also to document the purpose of using the traditional crafts and gears, their modern replacement and the reason for the replacement by modern crafts and gears.

## Materials and methods

**Study area and selection of villages:** The study involved five villages located in and around Loktak lake i.e. Komlakhong, Khordak, Laphupat Tera, Thanga and Ithing. The five villages were selected purposively for the study following purposive sampling technique keeping in mind the aim and objective of the study and also the accessibility of the villages. The study was conducted in the five selected villages by interviewing with 50 elderly persons (above 60 years of age) comprising of 10 respondents from each village which were selected purposively and interviewed using a questionnaire to assess the traditional fishing crafts and gears used in the Loktak lake, the purpose of using them, their modern replacement and the reason for the replacement.

**Data collection:** The present study was mainly based on primary data and information collected through household questionnaire survey from 50 selected respondents residing in and around the Loktak lake. The questionnaire used in this study was prepared referring<sup>25-27</sup> and in consultation with other relevant literatures. Focus group interviews with knowledgeable

persons of the villages were then conducted and the information collected was verified with the published literatures<sup>12,5</sup>.

### Results and discussion

Crafts and gear used in fishery are the results of collective experiences gained over generations. Local communities have a unique pattern of crafts and gears for fishing according to the nature of the water body they have. The crafts and gears use in different places of the world differ from place to place. There

has been a change in the traditional fishing crafts and gears used at past and modern fishing crafts and gears used at present by the people residing in and around the Loktak lake. Documentation of fishing crafts and gears have been studied by various workers<sup>13,28-30-32</sup>. The result of the traditional crafts and gears used, the purpose of using them, their modern replacements and the reason for replacement in the five study villages are presented from Table-1 to Table-5.

**Table-1:** Traditional and modern fishing crafts and gears used, purpose, their modern replacements and the reason for replacement in Komlakhong village.

Name of the traditional fishing tool	Purpose	Replaced by (name of the modern fishing tool)	Reason for replacement
<i>Kabo loo</i> (a type of trap)	To trap fishes	<i>Ngamu loo</i> (a type of trap)	More fishes are caught and light in weight.
<i>Moirang lang</i> (a type of net)	For netting fishes	<i>Terachutlang</i> (a type of net)	More fishes are caught and light in weight.
<i>Samjet lang</i> (a type of net)	For netting fishes	<i>Terachutlang</i> (a type of net)	More fishes are caught and light in weight.
<i>Ngapema</i> (a type of net)	For netting fishes	<i>Terachutlang</i> (a type of net)	More fishes are caught and light in weight.
<i>Longthrai</i> (a type of scoop net made up of thread)	For netting fishes	<i>Longthrai</i> made up of <i>happa</i>	More fishes are caught and light in weight.
<i>Upum hee</i> (dug out boat)	For transportation	<i>Hee</i> (jointed planks boat)	Easy in navigation

**Table-2:** Traditional and modern fishing crafts and gears used, purpose, their modern replacements and the reason for replacement in Khordak village.

Name of the traditional fishing tool	Purpose	Replaced by (name of the modern fishing tool)	Reason for replacement
<i>Kabo loo</i> (a type of trap)	To trap fishes	<i>Ngamu loo</i> (a type of trap)	Because new gears which are more comfortable are made.
<i>Luloo</i> (a type of trap)	To trap fishes	<i>Loo</i> (trap)	Because of high level of water maintained after the construction of Ithai barrage.
<i>Loo</i> (trap made up of cane)	To trap fishes	<i>Loo</i> (trap made up of plastic)	Modernisation and development.
<i>Taothum</i> (a type of trap)	To trap fishes	No replacement	Still in use
<i>Ngapemalang</i> (a type of net made up of <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of high level of water maintained after the construction of Ithai barrage.
<i>Shamu lang</i> (a type of net)	For netting fishes	<i>Morehlang</i> (a type of net)	Because of high level of water maintained after the construction of Ithai barrage.
<i>Terachut foot khai lang</i> (a type of net)	For netting fishes	<i>Morehlang</i> (a type of net)	Because of high level of water maintained after the construction of Ithai barrage.
<i>Samjet lang</i> or <i>Ukabi lang</i> (a type of net)	For netting fishes	<i>Morehlang</i> no. 45 (a type of net)	Because of high level of water maintained after the construction of Ithai barrage.
<i>Lungjam lang</i> (a type of net made up of <i>langjam</i> thread)	For netting fishes	<i>Morehlang</i> (a type of net)	Because of high level of water maintained after the construction of Ithai barrage.
<i>Lungjam lang</i> (a type of net made up of <i>langjam</i> thread)	For netting fishes	<i>Terachut lang</i> (a type of net made up of <i>terachut</i> thread)	Modernisation and development.

<i>Longthrai</i> (a type of scoop net made up of thread)	For netting fishes	<i>Morehlang</i> (a type of net)	Because of high level of water maintained after the construction of Ithai barrage.
<i>Longthrai</i> (a type of scoop net made up of thread)	For netting fishes	<i>Een</i> (dip- net)	Modernisation and development.
<i>Akebe lang</i> (a type of net made of <i>Akebe</i> thread)	For netting fishes	<i>Morehlang</i> (a type of net)	Modernisation and development.
<i>Lungjam een</i> (a type of net made of <i>lungjam</i> thread)	For netting fishes	<i>Morehlang</i> (a type of net made up of nylon)	Less labour and saving of time.
<i>Longhup</i> (a type of basket)	To trap fishes by surrounding	No replacement	Still in use
<i>Long</i> (Spear)	To hit fishes	No replacement	Still in use
<i>Khoyat thabi</i> , hooks made by splitting bamboo	For catching fishes with hooks	<i>Khoi</i> (metal made hooks)	Modernisation and development.

**Table-3:** Traditional and modern fishing crafts and gears used, purpose, their modern replacements and the reason for replacement in Laphupat Tera village.

Name of the traditional fishing tool	Purpose	Replaced by (name of the modern fishing tool)	Reason for replacement
<i>Ngamu loo</i> (a type of trap)	To trap fishes	<i>Merang lang</i> (a type of net)	Not suitable with the present methods of fishing.
<i>Kabo loo</i> (a type of trap)	To trap fishes	<i>Taijep</i> (a type of box trap)	Not suitable with the present methods of fishing.
<i>Ata loo</i> (a type of trap)	To trap fishes	<i>Taijep</i> (a type of box trap)	Decrease of fish population.
<i>Lang</i> ( <i>Akebe</i> , a type of net made up of thread)	For netting fishes	<i>Morehlang</i> (a type of net)	Due to increase in fishermen population the catch with this gear become less.
<i>Shamu lang</i> (a type of net)	For netting fishes	<i>Morehlang</i> (a type of net)	Due to increase in fishermen population the catch with this gear become less.
<i>Kebi lang</i> (a type of net)	For netting fishes	<i>Morehlang</i> (a type of net)	Due to increase in fishermen population the catch with this gear become less.
<i>Longthrai</i> (a type of scoop net made up of thread)	For netting fishes	<i>Longthrai</i> made up of plastics	Due to increase in fishermen population the catch with this gear become less.
<i>Mu</i> (a type of scoop net)	For netting fishes	<i>Morehlang</i> (a type of net)	Due to increase in fishermen population the catch with this gear become less.
<i>Long-up</i> (a type of falling gear)	To catch fishes by covering	<i>Morehlang</i> (a type of net)	Decrease of fish population.
<i>Khoyat thabi</i> , hooks made by splitting bamboo	For catching fishes with hooks	<i>Khoi</i> (metal made hooks)	Due to increase in fishermen population the catch with this gear become less.

**Table-4:** Traditional and modern fishing crafts and gears used, purpose, their modern replacements and the reason for replacement in Thanga village.

Name of the traditional fishing tool	Purpose	Replaced by (name of the modern fishing tool)	Reason for replacement
<i>Kabo loo</i> (a type of trap)	To trap fishes	<i>Ngamu loo</i> (a type of trap)	Not suitable with the present fishing techniques.
<i>Khabak lang</i> (a type of net made from <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of loss of those species of fishes which the gear is made.
<i>Ngaton lang</i> (a type of net made from <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of loss of those species of fishes which the gear is made.

<i>Pengba lang</i> (a type of net made from <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of loss of those species of fishes which the gear is made.
<i>Porom lang</i> (a type of net made from <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of new species of fishes available.
<i>Tharak</i> (a type of net made from <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of loss of those species of fishes which the gear is made.
<i>Phabou lang</i> (a type of net made from <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of modernization.
<i>Huru popchoubi lang</i> (a type of net made from <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of loss of those species of fishes which the gear is made.
<i>Huru lang</i> (a type of net made from <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of loss of those species of fishes which the gear is made.
<i>Merang lang</i> (a type of net made from <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of modernization.
<i>Samjet lang</i> (a type of net made from <i>lungjam</i> )	For netting fishes	<i>Morehlang</i> (a type of net)	Because of modernization.
<i>Een</i> (a type of net made of <i>lungjam</i> thread)	For netting fishes	<i>Een</i> (a type of net made of plastic made thread)	Strong and more fishes caught.
<i>Khoyat</i> (hooks made by splitting bamboo)	For catching fishes with hooks	<i>Khoi</i> (metal made hooks)	Strong and more fishes caught.
<i>Sareng Khoi</i> (a type of hook)	For catching fishes with hooks	<i>Khoi</i> (metal made hooks)	Because of loss of those species of fishes which the gear is made.

**Table-5:** Traditional and modern fishing crafts and gears used, purpose, their modern replacements and the reason for replacement in I thing village.

Name of the traditional fishing tool	Purpose	Replaced by (name of the modern fishing tool)	Reason for replacement
<i>Kabo loo</i> (a type of trap)	To trap fishes	No replacement	Still in use
Cane made <i>loos</i> (fishing traps)	To trap fishes	Replaced by plastics made <i>loos</i> .	Strong and more fishes caught.
<i>Samjet lang</i> (a type of net)	For netting fishes	<i>Morehlang</i> (a type of net)	Because of high level of water maintained after the construction of Ithai dam
<i>Shamu lang</i> (a type of net)	For netting fishes	No replacement	Strong and more fishes caught.
<i>Terachut lang</i> (a type of net)	For netting fishes	<i>Morehlang</i> (a type of net)	Strong and more fishes caught.
<i>Akebe lang</i> (a type of net made of <i>Akebe</i> thread)	For netting fishes	<i>Morehlang</i> no.25(a type of net)	Strong and more fishes caught.
<i>Een</i> (a type of net made of <i>lungjam</i> thread)	For netting fishes	<i>Een</i> (a type of net made of plastic made thread)	Strong and more fishes caught.
<i>Tarpaulin</i> (a type of net)	For netting during <i>phum</i> fishing	<i>Happa</i> (a type of net)	Strong and more fishes caught.
<i>Khoyat</i> (hooks made by splitting bamboo)	For catching fishes with hooks	<i>Khoi</i> (metal made hooks)	Strong and more fishes caught.
<i>Khoi ree</i> (thread of hooks made from <i>lungjam</i> )	For catching fishes with hooks	<i>Khoi ree</i> (thread of hooks made from <i>plastics</i> )	Strong and more fishes caught.



Figure- 1: A trap (*Kaboo loo*).



Figure-2: A net (*Shamu lang*).



Figure-3: Scoop net (*Longthrai*).



Figure-4: A trap (*Ngamu loo*).



Figure- 5: Falling gear (*Longhup*).



Figure- 6: Bamboo made hook (*Khoiyat*).



Figure-7: Spear (*Long*).

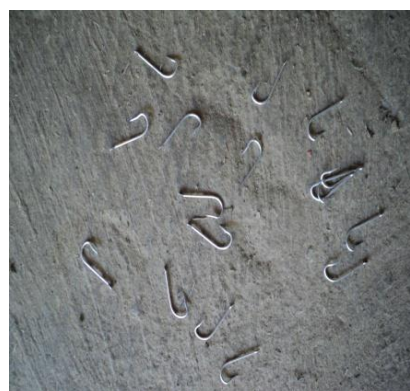


Figure- 8: Metal hooks (*Khoi*).



Figure- 9: Jointed planks boat (*Hee*).



Figure- 10: Dug out boat (*Upum Hee*).

In Komlakhongvillagesix types of traditional crafts and gears were found used for fishing in Loktak lake. These six crafts and gears were found to be replaced by another six new modern crafts and gears. The six types of crafts and gears used were *Kabo loo* (trap) replaced by *Ngamu loo* (trap) andnets such as *Moirang lang*, *Samjet lang* and *Ngapemalang* all replaced by *Terachutlang* (a type of net). *Longthrai* (a scoop net made up of cotton thread) is replaced by modern *Longthrai* (a scoop net made up of nylon) and boat, dug out (*Upum hee*) from whole wood of tree species *Artocarpus chaplasha* (Cham), *Phoebe lanceolata* (Uningthou) or *Toona ciliata* (Tairen) replaced by jointed planks boat (*Hee*) made from the same species of trees. The main reasons for replacement were that the new crafts and gears are light in weight and can catch more fishes. For jointed planks boat it is reported to be easily navigated as compared to dug out boat. Similar study was conducted by Raju *et al.*<sup>26</sup> which indicated that a diverse range of indigenous fishing gears comprising of gill nets, cast nets, traps, etc., have been discussed recorded during the study by the fishermen of Lake Kolleru, Andhra Pradesh, India. Bose *et al.*<sup>27</sup> also reported the used of popular crafts such as ‘Plank-built boat’, ‘Large boat for group fishing’, ‘Wooden frame iron/tin/aluminum sheet

boat’ and gears, such as ‘Gill net’, ‘Cast net’, ‘Scoop net’, ‘Hook and Line’ and ‘Traps’ as traditional fishing crafts and gear by fishers of Madhya Pradesh, India.

In Khordak village seventeen types of traditional crafts and gears were found to be used for fishing. These seventeen crafts and gears were found to be replaced by another fourteen new crafts and gears. They were traps such as *Kabo loo* replaced by *Ngamu loo* (trap), *Luloo* replaced by *Loo* (trap), *Loo* (trap made up of cane) replaced by *Loo* (trap made up of plastic) and Taothum had no replacement. Nets made from cotton thread such as *Ngapemalang*, *Shamu lang*, *Terachut foot khai lang* (a net of ½ feet long) all replaced by *Morehlang* (net made up of plastics). *Samjet lang* (net) is replaced by *Morehlang* no. 45, *Lungjam lang* (net made from cotton thread) replaced by *Morehlang* and *Terachut lang* (net made up of plastics). *Longthrai* (a scoop net made up of cotton thread) is replaced by *Morehlang* and *Een* (dip- net made from plastic), *Akebe lang* (net made up of cotton thread) replaced by *Morehlang* and *Lungjam een* (dip-net made up of cotton thread) replaced by *Morehlang*. Basket such as *Longhup* and *Long* (Spear) both made up of bamboos had no replacement and *Khoyat thabi* (hooks made by splitting bamboo) replaced by *Khoi* (metal made hooks). *Taothum* (a type of trap), *Longhup* (a type of basket), *Long* (Spear) were found to be use till now. The reason that the crafts and gears are being replaced were because of high level of water maintained after the construction of Ithai barrage, modernisation and development. New gears are more comfortable and are made with less labour and in less time. Devi *et al.*<sup>25</sup> noted the used of lift net, hooks, encircling net, drag net, dip net, gill net, scoop net, plunge cover basket, spear, box trap, conical trap and tubular trap as fishing gears in the central valley region of Manipur, India. Haque *et al.*<sup>33</sup> also reported the used of Non-mechanized artisanal fishing boat, Motorized country boats and dingi boats, Wooden Fishing Vessel, Koral jal (Gill net), Behundi jal (Set bag net), Char Ghera jal (Set Barrier net), Tana Ber jal (Shore Seine net), Kukkuru jal (Drag net), Jhaki jal (Cast Net), Thella jal (Push Net) and Hooks and lines in fishing Seabass (*Lates calcarifer*) in Bangladesh. The study is in agreement with Raju *et al.*<sup>26</sup> who studied about fishing methods, use of indigenous knowledge and traditional practices in fisheries management of Lake Kolleru.

In Laphupat Tera village ten types of traditional crafts and gears were found used. These crafts and gears were found to be replaced by another ten new crafts and gears. They were traps such as *Ngamu loo* replaced by *Merang lang* (net), *Kabo loo* and *Ata loo* both replaced by *Taijep* (a type of box trap). Nets such as *Akebe lang*, *Shamu lang*, *Kebi lang* all replaced by *Morehlang*. *Longthrai* (scoop net made up of thread) replaced by *Longthrai* (made up of plastics) and *Mu* (a type of scoop net) replaced by *Morehlang*. *Longhup* (a type of falling gear) replaced by *Morehlang* and *Khoyat thabi* (hooks made by splitting bamboo) replaced by *Khoi* (metal made hook). The reasons for replacement were less fishes are caught with old

crafts and gears, the old crafts and gears is not suitable with the present methods of fishing. The study is in line with Suresh<sup>34</sup> who reported the fishery practices followed in Loktak lake were predominantly capture oriented and traditional, fishing crafts used in the lake were dugout canoes, about 2800 of them, in three variations (*Lukai Hi*, *Injing Hi*, and *Hijas*). Fishing gears employed were wounding gears (Barbed and non barbed), spears, pole and line, traps, cast nets, drag nets, gill nets, encircling nets and lift nets. Ahmed *et al.*<sup>16</sup> in the investigation on traditional fishing crafts and gears used by the *Nicobari* tribes in Car Nicobar, India showed that Hodi, an outrigger dugout canoe was the traditional fishing craft commonly used by the Nicobarese and the traditional fishing gears used by them include spears, hook and line, trolling line and bow and arrow and it was also observed that these tribes also use a few modern fishing gears.

In Thanga village fourteen types of traditional crafts and gears were found used. These fifteen crafts and gears were found to be replaced by another fourteen new crafts and gears. They were trap such as *Kabo loo* replaced by *Ngamu loo* (trap). Nets made from cotton such as *Khabak lang*, *Ngaton lang*, *Pengba lang*, *Porom lang*, *Tharak lang*, *Phabou lang*, *Huru popchoubi lang*, *Huru lang*, *Merang lang*, *Samjet lang* all replaced by *Morehlang* and *Een* (made up of cottonthread) replaced by *Een* (made up of plastics). Hooks such as *Khoyat* (hooks made by splitting bamboo) and *Sareng Khoi* (a type of hook) both replaced by *Khoi* (metal made hooks). The reasons for replacement of these crafts and gears were because of loss of those species of fishes which the gear is made, because of modernization in fishing crafts and gears and old crafts and gears are not suitable with the present fishing techniques. Chanu and Singh<sup>35</sup> also found the common indigenous fishing methods followed mainly by the people of Thanga village in Loktak lake were net fishing about 50% of the fishers like *el chingba* (dip net), *lang thaba* (drag net), traps locally known as *lu thumba*, spear fishing (about 5%) (*longna thinba*), hooks and lines (*khoi thaba*), *longthrai khonba* (scoop net), etc. Obande *et al.*<sup>14</sup> observed the commonest crafts used on river Benue, Nigeria were spear, knife, machete, planked canoe, dugout canoe and calabash.

In Ithing village ten types of traditional crafts and gears were found used in fishing in Loktak lake. These crafts and gears have been replaced by another eight modern new crafts and gears. They were traps such as *Kabo loo* had no replacement and *loos* (cane made trap) replaced by *loos* made up of plastic. Nets such as *Samjet lang* replaced by *Morehlang*, *Shamu lang* had no replacement, *Terachut lang* replaced by *Morehlang*, *Akebe lang* replaced by *Morehlang* no.25, *Een* (made of cottonthread) replaced by *Een* (made of plastic thread) and *Tarpaulin* (a type of net) replaced by *Happa* (a type of net). Hooks such as *Khoyat* (hooks made by splitting bamboo) replaced by *Khoi* (hooks made up of metal) and *Khoi ree* (string of hooks made from cotton thread) replaced by *Khoi ree* (string of hooks made from plastics). *Kabo loo* (a type of trap) and *Shamu lang* (a type of

net) were not replaced by any new crafts and gears and are used till now. The reasons for replacement of traditional crafts and gears were because new crafts and gears are strong and more fishes are caught, because of high level of water maintained after the construction of Ithai dam and no place for using the old crafts and gears in the present fishing condition etc. Inaotombi and Mahanta<sup>36</sup> also documented the uses of traps and nets by Meitei community in Manipur state in North East India with reference to fisheries. Sakib *et al.*<sup>23</sup> found the use of Cast net, Seine net, Lift net, Push net, Gill net, Traps and boats constructed from woods and bamboos used as fishing gears and crafts in Gumti river of Muradnagar upazila, Bangladesh. The study is in line with Adeleke *et al.*<sup>37</sup> who assessed fishing gear and crafts utilized by fishermen in Eleyele Lake, Ibadan, Oyo State, Nigeria. Simliar study was conducted by Chourey *et al.*<sup>17</sup>; Sultana *et al.*<sup>38</sup>; Reddy *et al.*<sup>39</sup>; Jambale<sup>40</sup>; Petetta *et al.*<sup>24</sup>.

The respondents felt that the traditional crafts and gears used in fishing is declining now mainly because of impact of modernization. The use of modern crafts and gears in fishing is more convenient than the traditional ones as they save time, have higher accuracy, are light in weight, comfortable to use as well as labour cost is comparatively less. Modern gears are also more efficient, strong and varieties are available. However, some respondents felt that traditional crafts and gears were more economical, useful and does not degrade the surrounding environment. Obande *et al.*<sup>14</sup> also noted that the traditional gears and crafts were cheaper than the imported ones therefore easily affordable by the local fisher folks. The traditional fishing gears are eco friendly and low energy gears made from locally available materials<sup>39</sup>. There are some traditional crafts and gears which are not replaced by any modern fishing tools and still in use. In recent years hazardous fishing method using pesticides, insecticides and explosives have been reported as an easy methods of fishing which destroy the ecosystem of the lake and causes serious health hazard to the people. Hence, both traditional and modern crafts and gears can be used according to the convenient of the individuals as long as they are safe and does not disturb the lake ecosystem.

## Conclusion

In the present study it is found that great changes in the uses of traditional fishing crafts and gears has been observed. The reasons for changes were mainly due to modernization and development. It is also noted that some traditional crafts and gears are being still used by the people as they were not replaced by any modern craft and gears. Another reason for changes in the uses of traditional fishing crafts and gears was high level of water maintained after the construction of Ithai barrage. The traditional crafts and gears are less expensive and constructed using locally available raw materials. Application of these crafts and gears are not hazardous for the lake ecosystem or human health. Hence, the traditional crafts and gears need to be revived, documented and upgraded using modern scientific technology.



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