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Check List of Fish Species of Loktak Lake Bishnupur District

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ABSTRACT: Biodiversity as a concept and conservation issue is currently common concern for all. Biodiversity is the total variability within all living organisms and environmental complexes they inhabit which includes diversity of form right from molecular level through individuals, populations, communities, ecosystem, landscapes and biosphere. Manipur the "Jewel of India or Switzerland of the East" has peculiar features like endemic plants, animals and scenic beauties. Our Loktak Lake is one of them. The cultural and traditional aspects of Manipuris will never completed without relating to this Lake, which also witnessing the whole history of Manipuris civilization. Lake is very important in terms of its socio-economic value, environment, cultural, tourism, habitat of various plants, animals, fishes and potential natural resources etc. The Lake is only freshwater body in entire North-East India which is also commonly called as floating Lake in the world due to its floating *Phumdis* (heterogeneous mass of vegetation, soil and organic matters at various stages of decomposition) on it, is located near Moirang. This region represents an important part of the Indo-Myanmar biodiversity hotspot, one of the 34 global biodiversity hotspots recognized currently. But today the condition of the Lake is very worse in the field of various features like plants, animals, fish resources in present context. Our research work is trying to high light the check list of fish species of Loktak Lake in present scenario and its management and conservation aspect. During our investigation we had come across 48 different species of fishes under 5 order 17 family 33 genera. Out of these 28 fish species are available throughout the year and 20 fish species are available during rainy season only. A fish species called as *Esomus altus* (Lameithanbi or Belunpaibi in local language) is very rare and new record from India. One important finding during our research is that a fish species called as *Channa punctatus* (locally called as Ngamu Bogra) were disappeared during 1990s due to Epizootic Ulceric Disease Syndrome. But today this species is readily available in the Lake again. The present paper also shows a huge declining in species abundance as compared to earlier days, may be due to physicochemical properties of water, human civilization etc. it is right time to make proper policies and needful action as well as implementation so that the next generation could get the fish lively on the globe rather than Google, photographs, and on the literature of any paper or books.

Key Words: Loktak Lake, Phumdis, EUDS, Physicochemical properties, Hotspot, Biodiversity

INTRODUCTION

Biodiversity is the total variability within all living organisms and environmental complexes they inhabit which includes diversity of form right from molecular level through individuals, populations, communities, ecosystem, landscapes and biosphere. Manipur the "Jewel of India or Switzerland of the East" has peculiar features like endemic plants, animals and scenic beauties. Our Loktak Lake is one of them. The state of Manipur having an area of 22,327 square km, occupies the eastern frontier of India. The major portion of the state consists of ranges of hills. In the centre of the state lies the oval-shaped "Imphal Valley" which occupies an area of about 1545 km. The Loktak Lake is the largest natural wetland (commonly called Loktak Lake) in eastern India is located about 48 km from Imphal in Manipur state. Loktak Lake is the largest freshwater Lake in the natural freshwater Lake in northeastern region of India and also known for its charming beauty.

It is considered to be the lifeline for the people of Manipur due to its importance in socio-economic and cultural life, besides influencing the climate of the state (Tombi Singh and Shyamananda Singh, 1994). It has an area of 26000 ha at FSL with a catchments area of more than 98000 ha It is situated between 93046′E - 93055′ E and 24025′N - 24042′ N. The Lake stretches from downstream of Iril confluence near Lilong to Khuga confluence of Ithai. The maximum depth of the lake is 4.58m and the average depth is 2.07m. The unique feature of the Loktak Lake is the floating swamps or mats, locally called Phumdi. The major share of water input in the lake is from a number of rivers and streams. The main rivers are Nambol, Nambul, Thongjaorok, Merakhong, Khujairok etc. Different varieties of fishes both indigenous as well as exotic have been reported from the lake. Most of the fishes sold in the market of Imphal come from this wetland. Fishes are cold blooded vertebrates having an aquatic mode of habitat. An understanding of aquatic health has to start with the relationship between fish and their environment, and a basic understanding of how they have adapted to the problems posed by life in water. It is important to understand that even though they are solid and covered with skin and scales, they are not isolated from the water they live in. A fish is exposed to the open environment. As such, they are under the influence of and are affected by almost every change in the environment, i.e., water. Fish is an important source of human food particularly in terms of high quality proteins. Fishes are the one of the important elements in the health and economy of many countries as they have been a staple item of diet of many people in the world. They constitute slightly more than half of the total number approximately 54,711 recognized living vertebrate species; there are descriptions of estimated 27,977 valid species of fishes. (S.E. Shinde *et al.* 2009). Singh, M.P. (1996) works on Ecology of Loktak Lake with special reference to fish and fisheries of the Lake. He has reported 55 different fish species. A considerable proportion of rural people in Assam, belonging to landless and economically backward section meeting their own requirement of fish by own catch. (Binky and Kar, 2011). (Singh, *et al.* 2013) make a detail study on the fish diversity of Pumlen Lake, Thoubal Manipur. (Devi *et al.* 2014) made an extensive study on Ichthyo-faunal diversity of Utra Lake in Manipur.

A. Study Site: Loktak Lake, Manipur

The Loktak Lake is the largest natural wetland (commonly called Loktak Lake) in eastern India is located about 48 km from Imphal in Manipur state. It has an area of 26000 ha at FSL with a catchments area of more than 98000 ha It is situated between 93046′E - 93055′ E and 24025′N - 24042′ N.

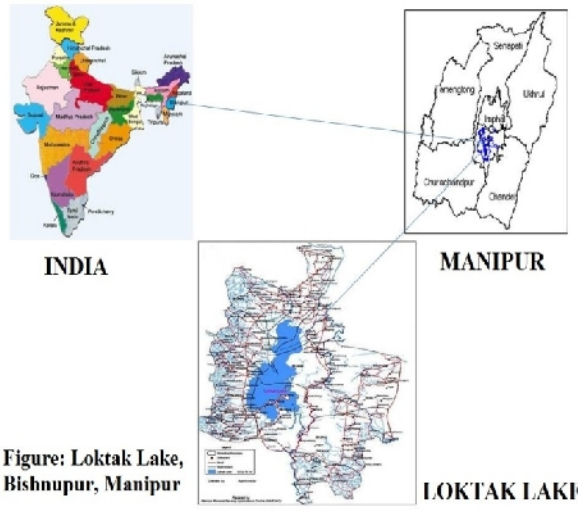

Figure: Loktak Lake, Bishnupur, Manipur

MATERIAL AND METHODS

General survey of fish diversity was done using standard procedure (Armontrout, 1990). Also NBFGR Manual (2000) was consulted for studying the habitat parameters headwater to down water studies was also based on River continuum concept (Vannote, et. *al*, 1980).

Fish were collected experimental fishing gears like gill nets (Vertical height 2.0m) cast nets (diameter 3.7m, 3.1m, and 1.cm), triangular scoop nets (Vertical height 1.0m-1.5m; length 100m-150m) and variety of traps. Fish have been preserved at first in the concentrated formaldehyde in the field itself and then 4% formalin.

They are brought to the laboratory in plastic container. In the laboratory, the fishes were indentified with the help of standard taxonomic literature (Day, 1878, 1889; Menon, 1999; Talwar and Jhigran, 1991; Jayaram (1999, 2010) and (Vishwanath, 2000).

Table 1: Morphometric Data of Loktak Lake (Sources: Trisal and Manihar 2004).

Parameter	**Measurements**
Maximum Length (Km)	32km
Maximum Breadth (Km)	13km
Maximum depth (m)	4.6m
Mean depth (m)	2.7m
Open water area (sq.km)	43.9 sq.km
Phumdis area (sq.km)	134.6 sq.km
Fish farm cum agricultural area (sq. km)	106.5 sq.km
Island (sq. km)	2.0 sq.km
Surface area (sq. km)	287.0 sq.km
Total volume (M cum)	519 M cum
Western catchment area directly draining into the Lake (sq. km)	1046 sq.km
Shape	Oval

RESULT

Table: 1 Check List of Fish Species of Loktak Lake during 2013-2014.

Sl No.	**Scientific Name**	**Common Name**	**Local Name**	**Present Status**	**Season of Occurrence**
1	*Amblypharyngodon mola* (Hamilton)	INDIAN CARPLET MOLA	MUKANGA	**C**	**TY**
2	*Anabas testudineus* (Bloch)	CLIMBING PERCH	NGASAMJET OR UKABI	**C**	**TY**
3	*Barilius gatensis* (Valenciennes)	RIVER CARP BARIL	NGAWA	**R**	**RS**
4	*Botia dario* (Hamilton)	BENGAL LOACH	SARENG KHOIBI	**R**	**RS**
5	*Cirrhinus mrigala* (Hamilton)	MRIGAL	MRIGAL	**C**	**TY**
6	*Catla catla* (Hamilton)	CATLA	BAO OR CATLA	**C**	**TY**
7	*Chanda nama* (Hamilton)	GLASSY PERCH	NGAMHAI	**R**	**RS**
8	*Channa punctatus* (Bloch)	GREEN SNAKE HEAD	NGAMU BOGRA	**C**	**TY**
9	*Channa striatus* (Bloch)	STRIPED SNAKE HEAD	NGAMU POROM	**C**	**TY**
10	*Channa orientalis* (Bloch Schneider)	ASIANTIC SNAKE HEAD	MEITEI NGAMU	**R**	**RS**
11	*Clarias batrachus* (Linnaeus)	MAGUR	NGAKRA	**R**	**RS**
12	*Ctenopharyngodon idella* (Valenciennes)	GRASS CARP	NAPICHABI	**C**	**TY**

13	*Cyprinus carpio* (Linnaeus)	SCALE CARP	PUKLAOBI	**C**	**TY**
14	*Cyprinus carpio specularis* (Lecepede)	MIRROR CARP	PUKLAOBI	**C**	**TY**
15	*Esomus altus* (Blyth)	BURMESE FLYING BARB	LAMEITHANBI	**C**	**RS**
16	*Esomus danricus* (Hamilton)	FLYING BARB	BELUNPAIBI	**C**	**TY**
17	*Eutropiichthys vacha* (Hamilton)	VACHA	NGAHEI	**R**	**RS**
18	*Glossogobius giuris* (Hamilton)	BAR EYED GODY	NAILON NGA OR NGAMU	**C**	**TY**
19	*Heteropneutes fossilis* (Bloch)	STINGING CATFISH	NGACHIK	**C**	**TY**
20	*Hypophthalmichthys molitrix* (Valenciennes)	SILVER CARP	SILVER	**C**	**TY**
21	*Lepidocephalichthys guntea* (Hamilton)	GUNTEA LOACH	NGAKIJOU	**C**	**TY**
22	*Lepidocephalichthys irrorata* , Hora	LOKTAL LOACH	NGANAP NAKUPPI	**R**	**RS**
23	*Labeo calbasu* (Hamilton)	CALBASU	NGATHI	**R**	**RS**
24	*Labeo dero* (Hamilton)	KALABANS	NGATON OR KHABAK	**R**	**RS**
25	*Labeo gonius* (Hamilton)	GONIUS	KURI	**C**	**TY**
26	*Labeo rohita* (Hamilton)	ROHU	ROU	**C**	**TY**
27	*Mastacembelus armantus* (Lacepède)	SPINY EEL	NGARIL	**C**	**TY**
28	*Monopterus albus* (Zuiew)	FRESH WATER EEL	NGAPRUM	**C**	**TY**
29	*Mystus cavasius* (Hamilton)	GANGETIC MYSTUS	NGASEP	**R**	**TY**
30	*Mystus bleekeri* (Day)	DAY'S MYSTUS	NGASEP	**C**	**TY**
31	*Notopterus notopterus* (Pallas)	KANDALA	NGAPAI	**C**	**TY**
32	*Oreochromis mossambicus* (Peters)	TILAPIA	TUNGHANBI	**C**	**TY**
33	*Ompok bimaculatus* (Bloch)	BUTTER CATFISH	NGATEN	**R**	**RS**
34	*Ompok pabda* (Hamilton)	PABDAH CATFISH	NGATEN	**R**	**RS**
35	*Osteobrama belangeri* (Valenciennes)	MANIPUR OSTEOBRAMA	THARAK OR PENGBA	**R**	**RS**
36	*Osteobrama cotio cotio* (Hamilton)	COTIO	NGASEKSHA	**R**	**RS**
37	*Pangia pangia* (Hamilton)	PANGIA COOLIE LOACH	NGANAP	**R**	**RS**
38	*Parambassis ranga* (Hamilton)	INDIAN GLASS FISH	NGAMHAI	**C**	**TY**
39	*Pethia ticto* (Hamilton)	TICTO BARB	NGAKHA	**R**	**RS**
40	*Pethia conchonius* (Hamilton)	ROSY BARB	NGAKHA MEINGANGBI	**R**	**RS**
41	*Puntius sophore* (Hamilton)	COMMON BARB	PHABOUNGA	**C**	**TY**
42	*Pethia chola* (Hamilton)	CHOLA BARB	PHABOUNGA	**C**	**TY**
43	*Raiamas bola* (Hamilton)	INDIAN TROUT	NGAWA	**R**	**RS**
44	*Systomas rubripinnis* (Valenciennes)	JAVAEN BARB	NGAHOU	**R**	**RS**
45	*Systomus sarana* (Hamilton)	OLIVE BARB	NGAHOU	**R**	**RS**
46	*Trichogaster fasciata* (Bloch & Schneider)	COLISA	NGAPEMMA	**C**	**TY**
47	*Trichogaster lalious* (Hamilton)	DWAFT GOURAMI	TOBEMMA OR PHETTIN	**C**	**TY**
48	*Wallago attu* (Schneider)	FRESH WATER SHARK	SARENG	**R**	**RS**

C = Common, R = Rare, RS = Rainy Season, TY = Throughout The Year

Table 2: Fish distribution in Order & Family and their IUCN Category as well as Role towards Human.

SL NO.	SCIENTIFIC NAME	ORDER	FAMILY	IUCN LIST	TOWARDS HUMAN
1	*Amblypharyngodon mola* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
2	*Barilius gatensis* (Valenciennes)	Cypriniformes	Cyprinidae	**LC**	**H**
3	*Botia dario* (Hamilton)	Cypriniformes	Cobitidae	**LC**	**H**
4	*Cirrhinus mrigala* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
5	*Catla catla* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
6	*Ctenopharyngodon idella* (Valenciennes)	Cypriniformes	Cyprinidae	**NE**	**PP**
7	*Cyprinus carpio* (Linnaeus)	Cypriniformes	Cyprinidae	**VU**	**PP**
8	*Cyprinus carpio specularis* (Lecepede)	Cypriniformes	Cyprinidae	**VU**	**PP**
9	*Esomus altus* (Blyth)	Cypriniformes	Cyprinidae	**LC**	**H**
10	*Esomus danricus* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
11	*Hypophthalmichthys molitrix* (Valenciennes)	Cypriniformes	Cyprinidae	**NT**	**PP**
12	*Lepidocephalichthys guntea* (Hamilton)	Cypriniformes	Cobitidae	**LC**	**H**
13	*Lepidocephalichthys irrorata* ,Hora	Cypriniformes	Cobitidae	**LC**	**H**
14	*Labeo calbasu* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
15	*Labeo dero* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
16	*Labeo gonius* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
17	*Labeo rohita* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
18	*Osteobrama belangeri* (Valenciennes)	Cypriniformes	Cyprinidae	**NT**	**H**
19	*Osteobrama cotio cotio* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
20	*Pangia pangia* (Hamilton)	Cypriniformes	Cobitidae	**LC**	**H**
21	*Pethia ticto* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
22	*Pethia conchonius* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
23	*Puntius sophore* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
24	*Puntius chola* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
25	*Raiamas bola* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
26	*Systomas rubripinnis* (Valenciennes)	Cypriniformes	Cyprinidae	**DD**	**H**
27	*Systomus sarana* (Hamilton)	Cypriniformes	Cyprinidae	**LC**	**H**
28	*Anabas testudineus* (Bloch)	Perciformes	Anabantidae	**DD**	**H**
29	*Chanda nama* (Hamilton)	Perciformes	Ambassidae	**LC**	**H**
30	*Channa punctatus* (Bloch)	Perciformes	Channidae	**LC**	**H**
31	*Channa striatus* (Bloch)	Perciformes	Channidae	**LC**	**PP**
32	*Channa orientalis* (Bloch Schneider)	Perciformes	Channidae	**NE**	**H**
33	*Glossogobius giuris* (Hamilton)	Perciformes	Gobiidae	**LC**	**H**

34	*Oreochromis mossambicus* (Peters)	Perciformes	Cichlidae	**NT**	**PP**
35	*Parambassis ranga* (Hamilton)	Perciformes	Ambassidae	**LC**	**H**
36	*Trichogaster fasciata* (Bloch & Schneider)	Perciformes	Osphronemidae	**LC**	**H**
37	*Trichogaster lalius* (Hamilton)	Perciformes	Osphronemidae	**LC**	**H**
38	*Clarias batrachus* (Linnaeus)	Siluriformes	Clariidae	**LC**	**PP**
39	*Eutropiichthys vacha* (Hamilton)	Siluriformes	Schibeidae	**LC**	**H**
40	*Heteropneutes fossilis* (Bloch)	Siluriformes	Heteropneussidae	**LC**	**T**
41	*Mystus cavasius* (Hamilton)	Siluriformes	Bagridae	**LC**	**H**
42	*Mystus bleekeri* (Day)	Siluriformes	Bagridae	**LC**	**VN**
43	*Ompok bimaculatus* (Bloch)	Siluriformes	Siluridae	**NT**	**H**
44	*Ompok pabda* (Hamilton)	Siluriformes	Siluridae	**NT**	**H**
45	*Wallago attu* (Schneider)	Siluriformes	Siluridae	**NT**	**T**
46	*Notopterus notopterus* (Pallas)	Osteoglossiformes	Notopteridae	**LC**	**H**
47	*Mastacembelus armantus* (Lacepède)	Synbranchiformes	Mastacembelidae	**LC**	**H**
48	*Monopterus albus* (Zuiew)	Synbranchiformes	Synbranchidae	**LC**	**H**

LC = Least Concern, DD = Data Deficient, NT = Near Threaten, NE = Not Evaluated, PP = Potential Pest, VU = Vulnerable, VN = Venomous, T = Traumatogenic

Table 3: Physico- Chemical Characteristics of the Loktak Lake-2013-2014.

Months	**Water Temperature**	**P^H**	**DO (mg/l)**	**FCO_2 (mg/l)**	**TA (mg/l)**	**Conductivity (µMho)**
September 13	31^0C	6.6	6.9	16	13	130
October 13	28^0C	6.5	6.5	4.2	2.2	154
November 13	25^0C	6.6	3.0	2	12	129
December 13	20^0C	7.1	5.7	4	20	137
January 14	19^0C	6.1	5.0	12	20	121
February 14	23^0C	7.1	4.0	15	18	132
March 14	27^0C	6.6	5.7	20	30	147
April 14	29^0C	7.1	4.7	15	12	158
May 14	30^0C	7.1	1.6	2	15	136
June 14	29^0C	7.1	1.6	1.9	12	151
July 14	30^0C	6.6	4.5	15	12	148
August 14	32^0C	6.7	6	6.2	12	154

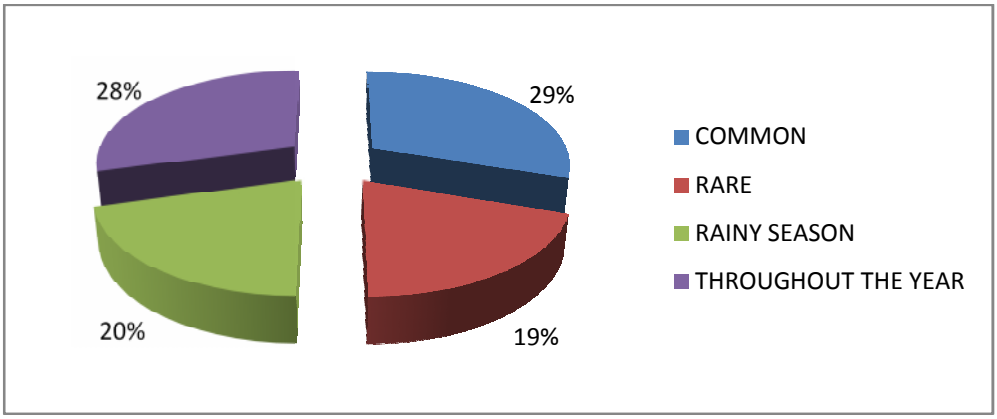

Fig. 1. Showing the Percentage Composition Of The Fishes Of Loktak Lake.

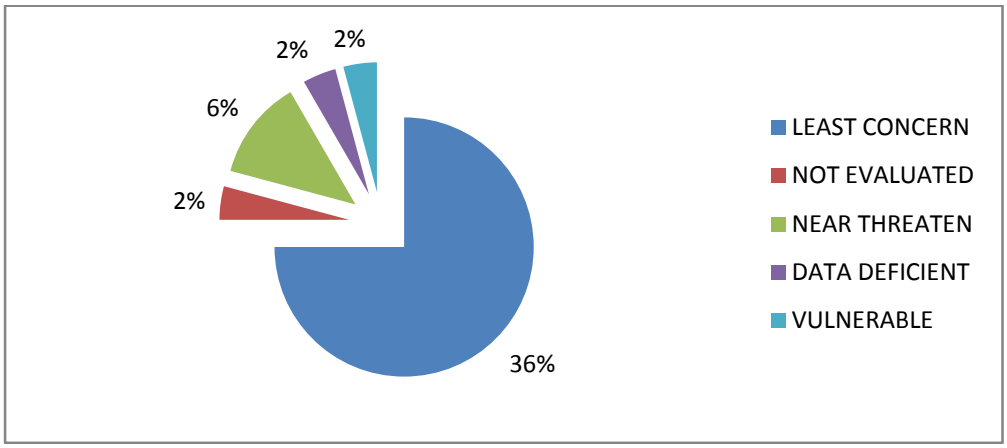

Fig. 2. Showing Threat Status of Fish Fauna of Loktak Lake As Per (2012) IUCN.

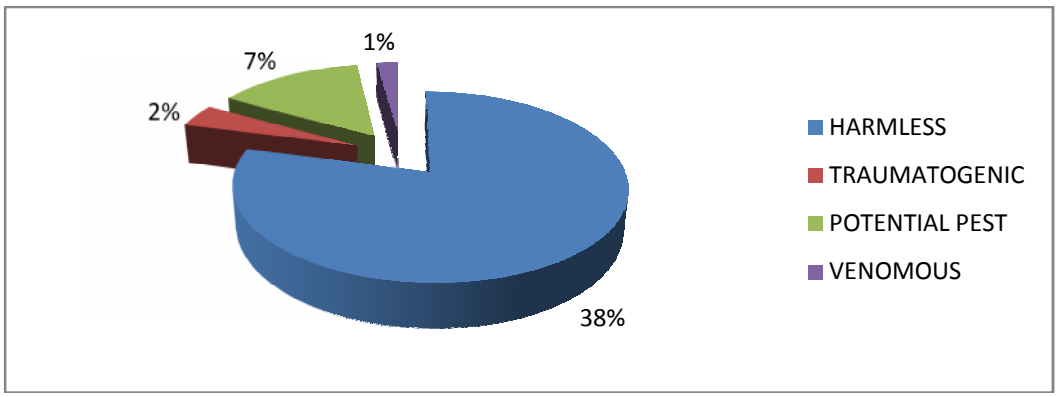

Fig. 3. Showing Percentage Composition Fishes Roles Towards Human Being.

DISCUSSION

Table 1 shows that the study period in which the survey started from September 2013 to August 2014 total of 48 fish species under 17 family, 5 order and 33 genera in which order Cypriniformes contribute 27 different fish species under family like Cyprinidae (23 fish species), Cobitidae (4 fish species), order Perciformes have 10 different fish species under family Anabantidae (1 fish species), Ambassidae (2 fish species), Osphronemidae (2 fish species), Gobiidae (1 fish species), Cichlidae (1 fish species) Channidae (3 fish species) order Siluriformes have also 8 different fish species under family like Claridae (1 fish species), Siluridae (3 fish species), Bagridae (2 fish species), Schilbeidae (1 fish species), Heteropneustidae (1 fish species), order Synbranchiformes have also 2 different fish species under family like Mastacembelidae (1 fish species), Synbranchidae (1 fish species), order Osteoglossiformes has got 1 fish species under family like Notopteridae (1 fish species).

Table 2 shows IUCN 2012 category their threat to humankind out of 48 collected and identified fish species 36 fish species are under LC (Least concern) category but fish species like *Channa striata, Hypophthalmichthys molitrix, Cyprinus carpio, Cyprinus carpio specularis,* and *Oreochronis mossambicus* are potential pest for human, *Wallago attu, Heteropneutes fossilis* are Traumatogenic to human and *Mystus cavasius* is venomous to human being. 6 fish species under NT (Near Threaten) category, 2 fish species under not evaluated category, 2 fish species under DD (Data deficient) category and 2 fish species is VU (Vulnerable) category.

Table 3 shows the physico-chemical properties of the Lake during survey was recorded as follows temperature was maximum at August with 32^0c and minimum at 19^0c in the month of January, pH ranges from 6.1 to 7.1, DO ranges from 1.6 to 6.0 mg/L, FCO_2 ranges from 1.9 to 20 mg/L, TA ranges from 2.2 to 30 mg/L and conductivity was recorded 121 to 158 (µMho). Figure 1: shows the percentage composition of the fishes of Loktak Lake during 2013-2014 29% of the total fish species are in common category, 19% are in rare category, on the basis of availability 20% were reported only on rainy season and 28% were reported throughout the year. Figure 2: shows the threat status of the Lake according as IUCN (2012) 36% under least concern category, 6% under near threaten category, and remaining 2% each falls under not evaluated category, data deficient category, vulnerable category etc. Figure 3: shows percentage composition of the fish and their roles towards human being 38% are harmless in nature, 7% are potential pest, 2% are Traumatogenic in nature and 1% is venomous in nature. According to Singh, M.P. (1996) recorded 55 different fish species belonging to 30 genera, 16 families and 7 orders from Loktak Lake. Of these 84.2% belonging to freshwater group, while the rest to peripheral class.

CONCLUSION

During our investigation we had come across 48 different species of fishes under 5 order 17 family 33 genera. Out of these 28 fish species are available throughout the year and 20 fish species are available during rainy season only. A fish species called as *Esomus altus* (Lameithanbi or Belunpaibi in local language) is very rare and new record from India. One important finding during our research is that a fish species called as *Channa punctatus* (locally called as Ngamu Bogra) were disappeared during 1990s due to Epizootic Ulceric Disease Syndrome. But today this species is readily available in the Lake again.

The present fish diversity of Loktak Lake, Manipur facing very critical stage. Around 1980s onwards till now, there were massive changes on availability of fishes as declining fish production as well as fish species diversity in fresh water. Loktak Lake is not only important to the indigenous Meitei and other communities living in its catchments for their livelihood and also play important role in the economy of Manipur. The hydrology of the Lake is complex and for formulating sound strategies for water management a thorough investigation is a prerequisite. Loktak Lake is very much needed for conservation for fish diversity and providing sustained benefits to fisherman community by ensuring regenerative capacity of fish stock. Proper planning and execution of resource based integrated approach where capture fishery, culture fishery, agricultural farms, eco tourism which will provide a golden change to generate income by local community and have greater food security. So, it will be quite helpful to take necessary action in time with a suitable step to save and protect the diverse fish fauna of Loktak Lake. In the light of present piece of work on the study of Loktak Lake (only freshwater lake in entire North-East India), it is right time to make proper policies and needful action as well as implementation so that the next generation could get the fish lively on the globe rather than Google, photographs, and on the literature of any paper or books.

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