

Seasonal Occurrence of Fish Species and Fishing Gears Utilized in Nat Min Chaung Inn (Lake), Singu Township, Mandalay Region

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Abstract

In the present study, a total of 48 species of 35 genera under 19 families belonging to nine orders were recorded. Among these recorded data, a total of 40 species were occurred in the hot season, 37 species in the rainy season and 46 species in the cold season. Although the highest number of 46 species was recorded the cold season, the highest number of 1,057,608 individuals was recorded the hot season. The lowest number of 37 species with the lowest number of individuals 25,815 was recorded the rainy season. In the present study, four kinds of fishing gears such as Fish Trap (Hmyone), Set Gill Net (Tan-paik), Stationary Bamboo Filter Trap (Myin-wun-sei) and Beach Seine Net (Wun-pu-gyi) were used to catch various target species.

Keywords: Seasonal Occurrence, Fishing Gears, Fish Trap, Set Gill Net, Stationary Bamboo Filter Trap and Beach Seine Net

INTRODUCTION

There are about 34,800 species of fish which are more than the combined total of all other vertebrate species: mammals, amphibians, reptiles and birds (FishBase, 2020). The distribution and composition of the fish species in each habitat were closely associated with various factors such as the availability of food, breeding sites, water current depth, and topography and physico-chemical properties of water (Harris, 1995).

All the river system, natural lakes, reservoirs and seasonal flood plains are inland fisheries waters. Open fisheries consist of all kinds of fishing in streams, rivers, lakes and in all flooded areas (Khin Maung Soe, 2008). The adverse effects of human activities have resulted in degradation of stream and riverine ecosystem which ultimately alters the structure and function of stream biota. For sustained exploitation and simultaneous conservation of fisheries resources, basic scientific information on biodiversity is vital (FAO, 2003).

Fishing gears used in inland fisheries are traditionally developed from small-scale fishing activities. These gears are simple to use. Practically, inland fisheries can fish all year round but the amount of caught may vary from season to season (Khin Maung Aye *et al.*, 2006).

Nat Min Chaung In (Lake) is one of the seasonally flooded areas in Singu Township. It is flooded during the rainy season. The water level recedes at the later part of the season. During this period, fishing activities are carried out in many different ways by using different methods. It is an important source of cheap protein for the people who live near the Inn (Lake). The present study was carried out with the specific objectives:

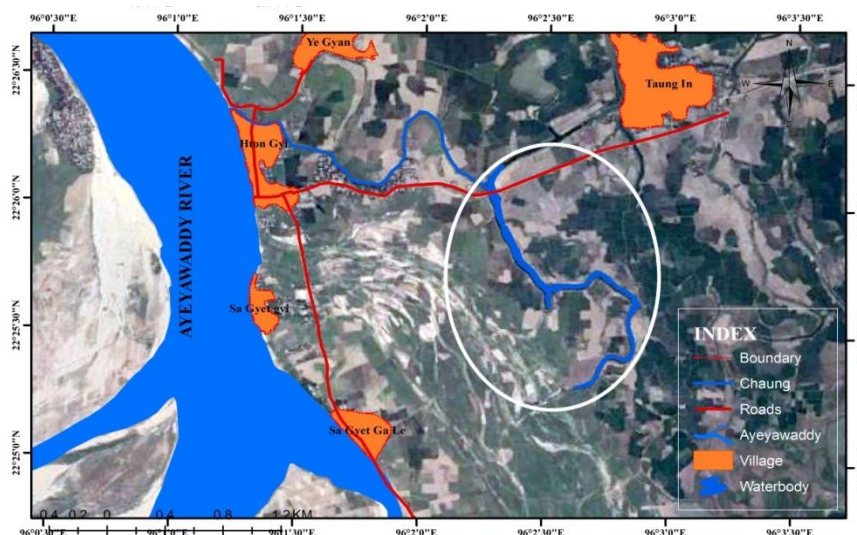
- to identify and record the fish species in the study area
- to determine seasonal occurrence of fish species in the study area and
- to investigate the fishing gears utilized in fishing activities

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MATERIALS AND METHODS

Study area

Nat Min Chaung Inn is situated near Taung Inn village, Southern part of Singu Township, Mandalay Region. It lies at latitude 22° 26' 30" N and longitude 96° 02' 30" E. In the flooded season, it covers about 13.556 km² and it remains as the canal with 0.14089 km² in the dry season. The maximum depth of water was up to 9.144 m during the rainy season and the water level was reduced to minimum 3.657 m in March to May.



(Source: Geography Department, Mandalay University)

Figure 1. Location Map of the study area

Study period

The study period was lasted from September 2017 to August 2018.

Identification

The collected fish species caught by different fishing gears were identified by Talwar and Jhingram (1991), Jayaram (2013) and FishBase 2020.

Collection, Preservation and Identification of the Specimens

Fish samples were collected every fortnight during the study period with the help of skillful local fishermen. The specimens were taken a photograph and recorded the morphological characters of them. And then, the local names of the specimens infromed by the local fishermen were also noted. Four types of fishing gears such as Fish trap (Hmyone), Set Gill Net (Tan-paik), Stationary Bamboo Filter Trap (Myin-wun-sei) and Beach Seine Net (Wun-pu-gyi) were used to catch various target species. The collected specimens were brought to Department of Zoology, Shwebo University for identification and further study. The specimens were identified by morphological characters and by counting their fins. Then the collected specimens were preserved in 10% formalin. The identification was followed by Talwar and Jhingran (1991), Jayaram (2013) and FishBase (2020).

RESULTS

In the present study, a total of 48 fish species of 35 genera under 19 families belonging to nine orders were recorded (Table 1). The order Cypriniformes was the highest in species composition with (41.67%), followed by (18.75%) in Siluriformes, (12.50%) in Perciformes, (10.42%) in Anabantiformes, (6.25%) in Synbranchiformes, (4.17%) in Clupeiformes and

(2.08%) in each order of Osteoglossiformes, Cyprinodontiformes and Tetraodontiformes (Table 2 and Fig 2).

According to the seasonal result, a total of 40 species under 30 genera, 16 families and nine orders were recorded in the hot season, 37 species under 28 genera, 11 families and nine orders were recorded in the rainy season and 46 species under 35 genera, 19 families and nine orders were recorded in the cold season. Among the total number of 1,288,015 individuals recorded, the highest number of 1,057,608 individuals was found in the hot season followed by 204,592 individuals in the cold season and the lowest number of 25,815 individuals was found in the rainy season (Table 3).

Based on the seasonal catchment, the three species such as *Mystus pulcher*, *Amblypharyngodon atkinsonii* and *Parambassis ranga* were found more abundant than other species. Moreover, among the 48 fish species recorded, 33 species were encountered in all the three seasons. In addition, nine species were recorded in the two seasons either during the rainy and the cold or the rainy and the hot season while six species were encountered during a specific season, one in the rainy season, two in the hot season and three species in the cold season (Plate.1 and 2). Among these six species, only a single specimen of *Botia berdmorei* and *Bagarius yarrelli* was encountered once only during the cold season (Table 3).

In the present study, three kinds of passive fishing gears such as Fish Trap (Hmyone), Set Gill Net (Tan-paik) and Stationary Bamboo Filter Trap (Myin-wun-sei) and one kind of active gear, Beach Seine Net (Wun-pu-gyi) were investigated for catching the various target species (Plate 3).

Fish trap is one of the fishing gears with different designs. The fish trap is commonly called "Hmyone". This gear is made of bamboo and rattan. This gear is placed at the shallow water and behind the base of the Myin-wun-sei by putting the twigs inside the trap and closed at the mouth of trap with bamboo stick. This gear is mainly used in rainy season. Target species such as *Labeo calbasu*, *Puntius chola*, *Lepidocephalichthys berdmorei*, *Mystus cavasius*, *Amblypharyngodon atkinsonii*, *Macrognathus aral*, *Macrognathus zebrinus* and *Mastacembalus armatus* were collected by using this gear (Plate 3).

Set gill net is made of nylon filament. This gear is also called Tan-paik. It is a passive gear. Set gill nets or anchored gill nets are firmed to the bottom or at a distance above bottom by means of anchor. This gear is used nearly throughout the year. It was the most employed gear in fishing activities. The head rope is buoyed up by plastic floats and the ground is weighed with rope weights. The fishermen set this net in the evening and collect the entangled fishes in the morning by a boat. Target species were different depending on the mesh size utilized in fishing activities. Fish species such as *Notopterus notopterus*, *Gibelion catala*, *Osteobrama* spp., *Labeo* spp., *Puntius chola*, *Systemus sarana*, *Mystus* spp., *Xenentodon cancila* and *Oreochromis* sp. were caught by using this gear (Plate 3).

Stationary Bamboo Filter Trap is locally called Myin-wun-sei and it was mainly used during rainy season. The length is about 46-50 m. The Chaung is first closed by wooden column and bamboo mesh work to prevent fish from escaping. However, 2 gaps each 2.3 m wide are left open in the mesh work along the length of Myin-wun-sei mouth. During the present study, all of the collected fish species were caught by using this gear (Plate 3).

The beach seine net was mainly used in the hot season. The construction of this gear is similar to the set gill net but with smaller mesh size. It was hauled in by teams of fishermen from both ends, at equal speed. Fishes are encircled and drag to the edge and onto land and

collected. In the present study, all of the collected fish species were also caught by using this gear (Plate 3).

Table 1 List of fish species recorded from Nat Min Chaung In (Lake) during the study period

Sr. No.	Order	Family	Genus	Scientific Name	Common Name	Local Name
1	Osteoglossiformes	Notopteridae	<i>Notopterus</i>	<i>Notopterus notopterus</i>	Grey feather back	Nga-phe or Nga-byar
2	Clupeiformes	Clupeidae	<i>Gudusia</i>	<i>Gudusia variegata</i>	Burma river shad	Nga-la-bi-bay-kyar
3			<i>Tenualosa</i>	<i>Tenualosa ilisha</i>	Hilsa shad	Nga-tha-lauk
4	Cypriniformes	Cyprinidae	<i>Gibelion</i>	<i>Gibelion catla</i>	Bighead carp	Nga-ohn-don or Nga-thaing-gaung-pwa
5			<i>Cirrhinus</i>	<i>Cirrhinus mrigala</i>	Mrigal	Nga-gyin-phyu
6			<i>Labeo</i>	<i>Labeo angra</i>	Angra labeo	Nga-lu-mie-net
7				<i>L. boga</i>	Boga labeo	Nga-lu-phyu
8				<i>L. calbasu</i>	Black rohu	Nga-net-pyar
9				<i>L. rohita</i>	Rohu	Nga-gyin-myet-san-ni
10				<i>L. stolizkae</i>	Moulmein labeo	Nga-le
11			<i>Osteobrama</i>	<i>Osteobrama belangeri</i>	Manipur osteobrama	Nga-phe-aung or Nga phant-ma
12				<i>O. cunma</i>	Cunma osteobrama	Nga-lay-dount or Sa-lun-phyu
13				<i>O. feae</i>	Burmese osteobrama	Nga-phant
14			<i>Puntius</i>	<i>Puntius chola</i>	Swamp barb	Nga-khone-ma-mie-ni
15			<i>Systomus</i>	<i>Systomus sarana</i>	Olive barb	Nga-khone-ma-toke
16			<i>Salmophasia</i>	<i>Salmophasia sardinella</i>	Sardinella razorbelly minnow	Nga-yin-baung-zar

Table 1 Continued

Sr. No.	Order	Family	Genus	Scientific Name	Common Name	Local Name
17	Cypriniformes	Cyprinidae	<i>Aspidoparia</i>	<i>Aspidoparia morar</i>	Aspidoparia	Nga-mie-war
18			<i>Amblypharyngodon</i>	<i>Amblypharyngodon atkinsonii</i>	Carplet	Nga-byet
19			<i>Esomus</i>	<i>Esomus altus</i>	Burmese barb	Nga-mawt-tawt
20			<i>Raiamas</i>	<i>Raiamas guttatus</i>	Burmese trout	Nga-la-war
21		Cobitidae	<i>Lepidocephalichthys</i>	<i>Lepidocephalichthys berdmorei</i>	Loach	Nga-tha-le-doh
22			<i>Botia</i>	<i>Botia histrionica</i>	Burmese loach	Nga-sawt-kyar
23				<i>B. berdmorei</i>	Blyth's loach	Nga-sawt
24	Siluriformes	Bagridae	<i>Mystus</i>	<i>Mystus cavasius</i>	Gangetic mystus	Nga-zin-yaing-phyu
25				<i>M. pulcher</i>	Pulcher mystus	Nga-zin-yaing-kyet-chay
26				<i>M. leucophasis</i>	Sittang mystus	Nga-nauk-thwar
27			<i>Hemibagrus</i>	<i>Hemibagrus microphthalmus</i>	Irrawaddy mystus	Nga-ike
28		Siluridae	<i>Ompok</i>	<i>Ompok bimaculatus</i>	Indian butter catfish	Nga-nu-than
29				<i>Wallago</i>	Boal	Nga-butt
30		Sisoridae	<i>Bagarius</i>	<i>Bagarius yarrelli</i>	Goonch	Nga-maung-ma
31		Clariidae	<i>Clarias</i>	<i>Clarias batrachus</i>	Walking catfish	Nga-khu
32		Schilbeidae	<i>Neotropius</i>	<i>Neotropius atherinoides</i>	Indian Potasi	Nga-za-kar

Table 1 Continued

Sr. No.	Order	Family	Genus	Scientific Name	Common Name	Local Name	
33	Cyprinodontiformes	Belontiidae	<i>Xenentodon</i>	<i>Xenentodon cancila</i>	Freshwater gar fish	Nga-phaung-yoe	
34	Perciformes	Ambassidae	<i>Parambassis</i>	<i>Parambassis ranga</i>	Indian glassy fish	Nga-zin-zat	
35		Cichlidae	<i>Oreochromis</i>	<i>Oreochromis</i> sp.	Tilapia	Salabia or Gaw-lan	
36		Mugilidae	<i>Rhinomugil</i>	<i>Rhinomugil corsula</i>	Corsula mullet	Nga-zin-lone	
37		Gobiidae	<i>Glossogobius</i>	<i>Glossogobius giuris</i>	Tank goby	Nylon-nga or Ka-tha-boe	
38		Belontiidae	<i>Colisa</i>	<i>Colisa fasciata</i>	Stripled gourami	Nga-phyin-tha-let	
39			<i>Trichogaster</i>	<i>Trichogaster pectoralis</i>	Snake skin gourami	Salabia	
40	Anabantiformes	Anabantidae	<i>Anabas</i>	<i>Anabas testudineus</i>	Climbing perch	Nga-byay-ma	
41		Channidae	<i>Channa</i>	<i>Channa marulius</i>	Giant snake head	Nga-yant-daing	
42				<i>C. orientalis</i>	Asiatic snake head	Nga-yant-gaung-to	
43				<i>C. punctata</i>	Spotted snake head	Nga-yant-boe or nga-yant-pa-naw	
44				<i>C. striata</i>	Striped snake head	Nga-yant-auk	
45	Synbranchiformes	Mastacembelidae	<i>Macrognathus</i>	<i>Macrognathus aral</i>	One-striped-spiny eel	Nga-mway-ni	
46					<i>M. zebrius</i>	Burmese spiny eel	Nga-mway-htoe-kyan-sit
47					<i>Mastacembelus</i>	<i>Mastacembelus armatus</i>	Tire track eel
48	Tetraodontiformes	Tetraodontidae	<i>Leiodon</i>	<i>Leiodon cutcutia</i>	Ocellated puffer fish	Nga-pu-si	

Table 2. Percentage of fish species composition in the study area

Sr. No.	Order	Family	Genus	Species	Percentage (%)
1	Osteoglossiformes	1	1	1	2.08%
2	Clupeiformes	1	2	2	4.17%
3	Cypriniformes	2	13	20	41.67%
4	Siluriformes	5	7	9	18.75%
5	Cyprinodontiformes	1	1	1	2.08%
6	Perciformes	5	6	6	12.50%
7	Anabantiformes	2	2	5	10.42%
8	Synbranchiformes	1	2	3	6.25%
9	Tetraodontiformes	1	1	1	2.08%
	Total	19	35	48	100%

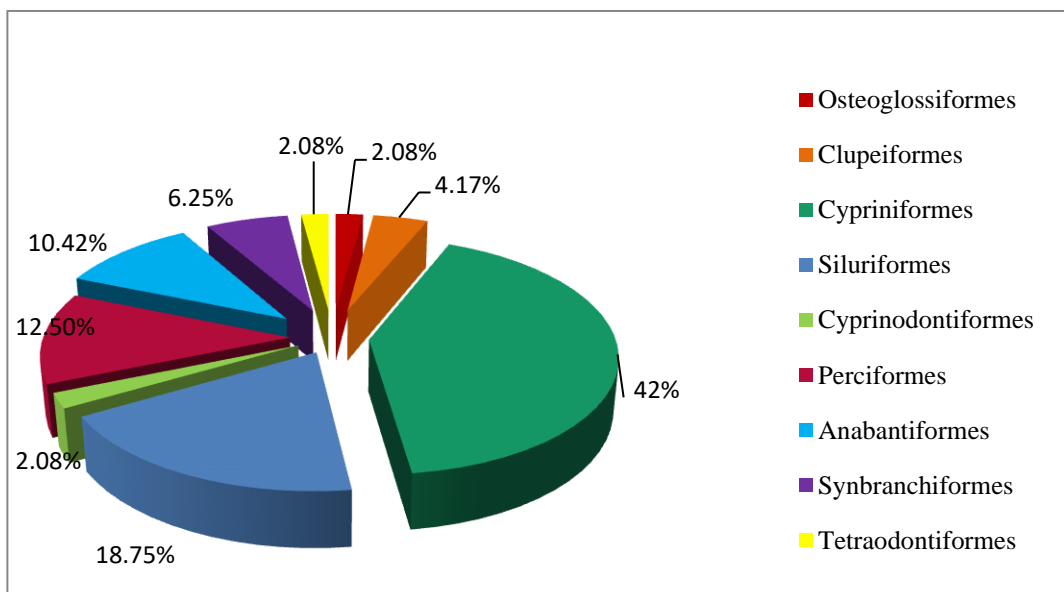


Figure 2. Percentage of fish species by order in the study area

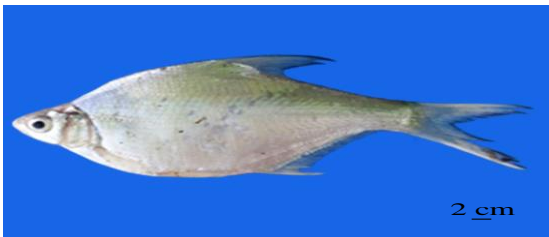
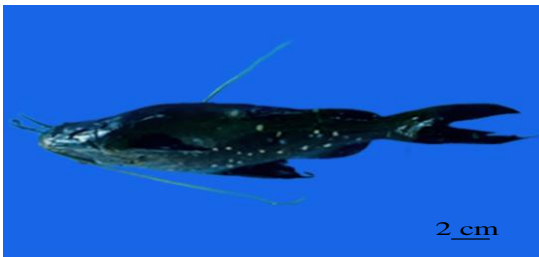
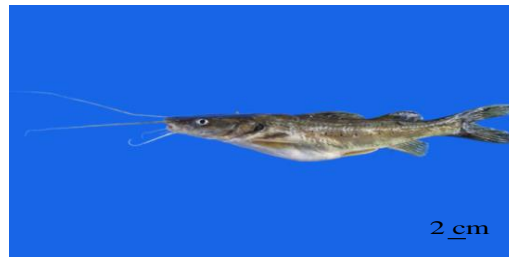
Table 3. Seasonal number of individuals per fish species recorded in the study area

Sr. No.	Scientific Name	Season			Total
		Hot	Rainy	Cold	
1	<i>Notopterus notopterus</i>	133	25	355	513
2	<i>Gudusia variegata</i>	10	145	260	415
3	<i>Tenuaolasa ilisha</i>	7	22	125	154
4	<i>Gibelion catla</i>	116	18	51	185
5	<i>Cirrhinus mrigala</i>	12	5	16	33
6	<i>Labeo angra</i>	5	6	21	32
7	<i>Labeo boga</i>	15	138	149	302
8	<i>Labeo calbasu</i>	15	550	2,090	2,655
9	<i>Labeo rohita</i>	39	13	36	88
10	<i>Labeo stolizkae</i>	103	24	11	138
11	<i>Osteobrama belangeri</i>	1,677	324	13,611	15,612
12	<i>Osteobrama cunma</i>	10	3,555	65	3,630
13	<i>Osteobrama feae</i>	0	5	4	9
14	<i>Puntius chola</i>	3,034	525	2,392	5,951

Table 3. Continued

Sr. No.	Scientific Name	Season			Total
		Hot	Rainy	Cold	
15	<i>Systomus sarana</i>	145	200	163	508
16	<i>Salmophasia sardinella</i>	10,100	665	12,270	23,035
17	<i>Aspidoparia morar</i>	3,445	3,190	820	7,455
18	<i>Amblypharyngodon atkinsonii</i>	768,764	2,449	68,110	839,323
19	<i>Esomus altus</i>	130	0	5	135
20	<i>Raiamas guttatus</i>	0	3	102	105
21	<i>Lepidocephalaichthys bermorei</i>	18,850	0	8,165	2,7015
22	<i>Botia histrionica</i>	3	20	138	161
23	<i>Botia bermorei</i>	0	0	1	1
24	<i>Mystus cavasius</i>	942	9,875	40,950	51,767
25	<i>Mystus pulcher</i>	226,800	2,000	1,120	229,920
26	<i>Mystus leucophasis</i>	0	15	45	60
27	<i>Hemibagrus microphthalmus</i>	0	41	43	84
28	<i>Ompok bimaculatus</i>	80	119	203	402
29	<i>Wallago attu</i>	64	64	185	313
30	<i>Bagarius yarrelli</i>	0	0	1	1
31	<i>Clarias batrachus</i>	0	0	6	6
32	<i>Neotropius atherinoides</i>	125	0	60	185
33	<i>Xenentodon cancila</i>	241	331	2,562	3,134
34	<i>Parambassis ranga</i>	21,100	370	49,330	70,800
35	<i>Oerochromis sp.</i>	68	12	25	105
36	<i>Rhinomugil corsula</i>	0	0	91	91
37	<i>Glossogobius giuris</i>	6	7	7	20
38	<i>Colisa fasciata</i>	417	725	685	1,827
39	<i>Trichogaster pectoralis</i>	15	35	85	135
40	<i>Anabas testudineus</i>	3	0	7	10

41	<i>Channa marulius</i>	4	0	0	4
42	<i>Channa orientalis</i>	9	3	21	33
43	<i>Channa punctata</i>	14	0	0	14
44	<i>Channa striata</i>	27	4	20	51
45	<i>Macrognathus aral</i>	878	317	85	1,280
46	<i>Macrognathus zebrinus</i>	181	0	9	190
47	<i>Mastacembalus armatus</i>	15	7	11	33
48	<i>Leiodon cutcutia</i>	6	8	81	95
Total number of species		40	37	46	
Total number of individuals		1,057,608	25,815	204,592	1,288,015

*Osteobrama feae**Esomus altus**Raiamas guttatus**Lepidocephalichthys berdmorei**Mystus leucophasis**Hemibagrus microphthalmus**Neotropius atherinoides**Anabas testudineus*



Macrognathus zebrinus

Plate 1. Some recorded fish species occurred in only the two seasons from the study area



Botia berdmorei



Bagarius yarrelli



Clarias batrachus



Rhinomugil corsula



Channa marulius



Channa punctata

Plate 2. Some recorded fish species occurred in only one season from the study area



A. Nga-mway-doe-hmyone



B. Hmyone-oak-saung



C. Za-yaite-Hmyone



A. Collecting fishes entangled in Tan-paik



B. Gathering fishes from the Tan-paik



A. Stationary bamboo filter trap (front view)



B. Stationary bamboo filter trap (back view)



A. Encircling the seine net to collect fishes



B. Encircled fishes put onto the sandbank

Plate 3. Different types of fishing gears utilized in the study area

DISCUSSION

In the present study, a total of 48 fish species were recorded from Nat Min Chaung Inn (Lake), Singu Township, Mandalay Region. Mi Mi Lay (1993) recorded 57 fish species and Cho Sin Win (2015) also recorded 54 fish species respectively from this study area. According to the present study, the numbers of fish species are declining from year to year. It may be

assumed that the result is due to illegal fishing activities, over exploitation, and degradation of aquatic environment caused by agricultural land and water use.

Htay Htay Sein (2010) recorded the maximum number of fish population in (Lay-In-Su-Let-Kyar Inn) during the cold season while lowest in hot season. It may be assumed that the different types of habitats and fishing gears were utilized in fishing activities. However, Ni Ni Aye (2013) and Myint Myint Win (2010) stated that the highest number of species was recorded in cold season and lowest in rainy season. The present result was agreed with the two local workers mention above.

Ni Ni Aye (2013) also observed that, *Amblypharyngodon atkinsonii* was collected as the highest number of individuals throughout her study period. Similarly, in the present study, *Amblypharyngodon atkinsonii* was collected as the highest number of individuals. It was suggested that the present study area was suitable for this kind of fish to live and reproduce. However, the species namely *Botia berdmorei* and *Bagarius yarrelli* were found in less number during the study period. It may be assumed that, the less number of species entered from Ayeyawady River into the In (Lake) during flooded season or may not able to reproduce in the study area.

In the present study, four types of fishing gears were used during the study period. The fish traps were mainly used at the start of the rainy season. The Set gill net (Tan-Paik) with different mesh sizes was used throughout the year. Depending on the mesh sizes and using plastic bottles, the collected species were different. The stationary bamboo filter trap (Myin-wun-sei) was mainly used from the rainy season to the cold season. The beach seine net (Wun-pu-gyi) was used when the water receded from March to May. Thus, the fishery of Nat Min Chaung In (Lake) plays an important role in supplying natural resources for local people, and thus a need for constant monitoring in order to ensure the sustainability of fish fauna in this Inn (Lake).

CONCLUSION

Although the total number of species recorded during the study period was not relatively high, catch ability in terms of number of individuals was rather very promising so that there is a need to implement long term management program to maintain the fish species in the study area and to maintain maximum sustainable yield. Effective implementation of the regulations on mesh size and fishing gears is greatly needed to prevent over exploitation. Strict management measures with large scale public awareness would be essential to preserve the fish fauna of this Inn (Lake).

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References

- Cho Sin Win, 2015. Fisheries in Nat Min Chaung Eing, Singu Township. *MSc Thesis*, Department of Zoology, Yadanabon University.
- FAO, 2003. *Inland Fisheries*. Food and Agriculture Organization of the United Nations, Rome. 14 pp.
- FishBase, 2020. Available at: <http://www.fishbase.org/search.php>.
- Harris, J.H., 1995. The use of fish in ecological assessments. *Australian Journal of Ecology*, 20: 65-80.

- Htay Htay Sein, 2010. Diversity of fish fauna in Lay-Ein-Su-Let-Kyar In (Lake) in Myingyan Township, Mandalay Division. *PhD Dissertation*, Department of Zoology, University of Mandalay.
- Jayaram, K.C. 2013. *The freshwater fishes of the Indian Region*. Corrected 2nd Edition, Zoology Survey of India. 616 pp.
- Khin Maung Aye, Win Ko Ko and Siriraksophon, S., 2006. *Inland fishing gears and methods in Southeast Asia*. Myanmar Department of Fisheries, Myanmar. 184pp.
- Khin Maung Soe, 2008. *Trends of development of Myanmar Fisheries: With references to Japanese experiences*. V.R.F. Series No 433. February 2008. Institute of Developing Economies, Japan External Trade Organization, 3-2-2- Wakaba, Mimhama-ku, Chiba-Shi, Chiba 261-8545.
- Mi Mi Lay, 1993. Taxonomic study of some fishes of Tazeik-Pay Eing, Singu Township. *MSc Thesis*, Department of Zoology, University of Mandalay.
- Myint Myint Win, 2010. Seasonal occurrence of ichthyo fauna and the yield in Bodagon In (River Fishery), A segment of Ayeyawady River in Pakkou Township. *PhD Dissertation*, Department of Zoology, University of Mandalay.
- Ni Ni Aye, 2013. Species diversity and seasonal occurrence of fish fauna at Sunye In (Lake), Sintkaing Township. *PhD Dissertation*, Department of Zoology, University of Mandalay.
- Talwar, P.K. and Jhingram, A.G. 1991. *Inland fishes of India and adjacent countries*. Vol I, II, IBH publishing Co., Ltd., New Delhi, Bombay Calcutta.