Species Composition and Abundance of Fish Fauna from Kinda Reservoir, Mandalay Region

Thi Thi Naing*, Mon Htwe Lwin**

Abstract

The Kinda Reservoir, about 21 miles from south east of Kume, Mandalay Region was chosen as the study area. The present research was conducted to assess the species composition and abundance of fish species. A total of 22 species belonging to 11 families under seven orders were identified and recorded. The highest number of species composition was found in order Cypriniformes (36.36%) followed by Perciformes (31.82%), Synbrachiformes, Siluriformes (9.09%), Beloniformes and Tetraodontiformes (4.55%) respectively. According to monthly occurrence data, the maximum occurrence of fish species was found in July and the minimum in December and January. Based on their relative abundance, 6 species were considered uncommon, 9 species were common and 7 species were very common.

Key word: Kinda Reservoir, species composition, abundance

Introduction

Fish is the world's largest wild food harvest and provides a vital source of protein and fetch sustainable income for many families in the developing countries (Pereira, 2000).

Freshwater ecosystem–rivers, lakes, canals, reservoirs and wetlands provide vital ecosystem services, including the support of important fisheries and the provision of drinking water, among others. The maintenance of biodiversity is one of the important keys to the retention of these ecosystem services. Diverse assemblages of species may be able to use resources more efficiently and thus generate more productive ecosystems (Palmer *et al.*, 2000).

Fishes are the most primitive vertebrate group and may be found in several types of environments. In developing countries such as Bangladesh, Myanmar, Nepal, Pakistan and Siri Lanka, fish constitutes one of the main food items of substance for many people. Fish provides a staple diet and protein supplement and the abundant water resources support a good harvest. Improved cultural practices also tend to increase the yield in respect of species choice and quantity. Freshwater fishing is a common avocation for many people in the villages and town (Jayaram, 2013).

* Lecturer, Dr., Department of Zoology, Yadanabon University

** Lecturer, Dr., Department of Zoology, Yadanabon University

Myanmar is one of the largest and ecologically highly diverse countries in Southeast Asia. It is rich in highly valuable flora and fauna. Several studies on occurrence and species composition of freshwater fish in Mandalay Region have been conducted. However, there has been no evaluation on the important fish parameters featuring in the Kinda reservoir so far.

Kinda reservoir is located about twenty one miles from southeast of Kume, Myittha Township, Mandalay region. It is built on Pan Laung river. It is located in the gorge where water from streams and beaks flow in from Shan Mountains. This water flow provides water year–round. The water storage capacity of the reservoir is about 873580 acres. The area is about 8900 acres. This reservoir is mainly used for generating electricity and irrigation. This reservoir also provides the water for hydroelectric power.

Mainly, various sizes of fish species from small fish species of *Lepidocephalichthys* spp. *Mastacembelus* spp. to large fish species of *Notopterus notopterus, Sperata aor, Hemibagrus microphthalmus* inhabit in the area of this reservoir.

The paucity of this information propelled this research which is aimed to provide useful information for the management of this reservoir fishery. Taking the chances of this need, this work has been conducted with the following objectives.

- to identify and record the occurrence of fish species and their abundance
- to determine the species composition

Materials and Methods

Study area

Kinda reservoir is situated in Myittha Township, Mandalay Region. It lies at intersection of Latitude of 21º09'43'' N and 96º18'34'' E (Fig. 1)

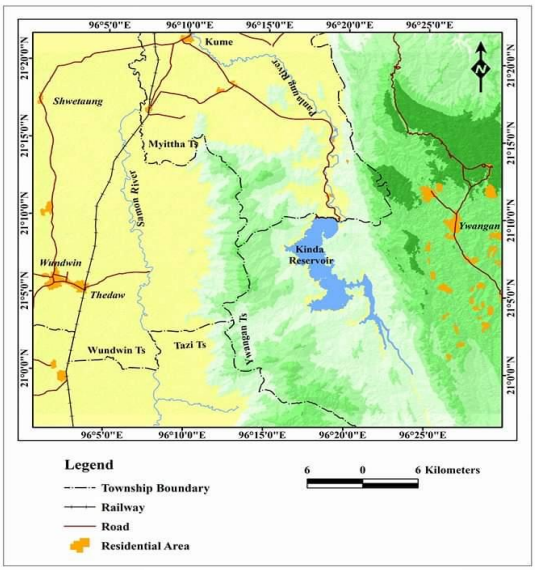

Fig. 1 Map of study

Study period

The study period is from December 2018 to July 2019.

Collection of specimens

The fish specimens were collected weekly from local fishermen using various types of fishing gears. Scaled photographs were taken immediately after collecting the specimens to obtain their natural color and also noted their local name and some

relevant data from local fishermen. Specimens were preserved in 5% to 10% formalin according to their sizes and brought back to the laboratory for further identification.

Identification and classification

Identification was done to species level by external morphological characteristics including fin position and fin count. Identification, classification and diagnostic characters were followed by Talwar and Jhingran (1991), and Jayaram (2013).

Data analysis

Relative abundance was calculated using by Bisht (2004).

$$\text{Relative abundance} = \frac{\text{Total number of individuals of the species}}{\text{Total number of individuals of all species in a particular site recorded}}$$

The average relative abundance

(uC) = having relative abundance less than 0.0100

(C) = having relative abundance of 0.0100 and above but less than 0.0500

(vC) = having relative abundance of 0.0500 and above

Species compositions were calculated after Thursfield, 1995

$$\text{Species composition} = \frac{\text{Number of species in each order/family}}{\text{Total number of species recorded}} \times 100\%$$

Results

A total of 22 species, 17 genera belonging to 11 families under seven orders were recorded during the study period from (December 2018 to July 2019) (Table 1).

Species composition and abundance of fish species

Based on monthly recorded data, a total of 36333 individuals were collected during the study period in Kinda reservoir. The highest fish composition was found in order Cypriniformes (36.36%), followed by Perciformes (31.82%), Silurformes and Synbranchiformes (9.09%), Osteoglossiformes, Beloniformes and Tetraodontiformes (4.55%) respectively (Table 2, Fig 2). Among the 22 species, seven species (31.82%) in family Cyprinidae, four species (18.18%) in family Channidae, two species (9.09%) in each family Bagridae, and Mastacembelidae, and one species (4.55%) in each family Notopteridae, Cobitidae, Belonidae, Ambassidae, Cichlidae, Gobiidae and Tetraodontidae were evaluated in the study period (Table 2, Fig 3).

In the present study, the highest number of species was found in July (22 species) and the lowest in December and January (16 species). The highest number of individuals were recorded in May (5956) and the lowest in February (2741). In the present study, six

species were considered uncommon (uC), 9 species common (C) and seven species very common (vC) based on their relative abundance (Table 3).

Table 1. List of recorded fish species from Kinda R during Study period

No.	Order	Family	Scientific Name	Common–name	Local name
1.	Osteoglossiformes	Notopteridae	*Notopterus notopterus*	Featherback	Nga–phe
2.	Cypriniformes	Cyprinidae	*Labeo calabasu*	Calbasu balck rohee	Nga–net–pyar
			Labeo rohita	Rohu	Nga–gyi–mayt–san–ni
			Osteobrama cunma	Cunma osteobrama	Nga–lay–daunt
			Puntius chola	Swamp barb	Nga–Khone–ma–myi–ni
			Puntius sophore	Spot–fin swamp barb	Nga–khone–ma–mee–kwet
			Amblypharyngodon mola	Mola carplet	Nga–byet.
			Raiamas guttatus	Burmese trout	Nga–la–war
		Cobitidae	*Lepidocephalichthys thermalis*	Spiny loach	Nga–the–le–doe
3.	Siluriformes	Bagridae	*Sperata aor*	Long whiskered cutfish	Nga–gyaung
			Hemibagrus microphthalmus	Catfish	Nga–yway
4.	Beloniformes	Belonidae	*Xenentodon cancila*	Freshwater garfish	Nga–phaung–yoe
5.	Synbraniformes	Mastacembelidae	*Macrognathus zebrinus*	Tire–track Burmese spinyeel	Nga–mway–doh–kyan–sit
			Mastacembelus armatus	Spiny eel	Nga–mway–ngar
6.	Perciformes	Ambassidae	*Pseudambassi ranga*	Indian glassy fish	Nga–zin–zat
		Cichlidae	*Orechromis spp.*	Tilapia	Japan–nga
		Gobiidae	*Glossogobius giuris*	Tank goby	Nylon–nga
		Channidae	*Channa marulius*	Giant snakehead	Nga–yant–daing
			Channa orientalis	Asiatic snakehead	Nga–yant–gaung–toe
			Channa punctatus	spotted snakehead	Nga–yant–panaw
7.	Tetraodontiformes	Tetraodontidae	*Channa striata*	striped sankehead	Nga–yant–auk
			Tetraodon cutcutia	Ocellated puffer	Nga–pu–si

Table 2. Composition of fish species in different orders, families and genera from Kinda Reservoir during study period

No.	Order	Composition(%)	Family	Composition(%)	Genus	Composition(%)
1.	Osteoglossiformes	4.55 (1 species)	1. Notopteridae	4.55 (1 species)	1. *Notopterus*	4.55 (1 species

2.	Cypriniformes	36.36 (7 species)	2. Cyprinidae	31.82 (7 species)	2. *Labeo*	9.09 (2 species)
			3. Cobitidae	4.55 (1 species)	3. *Osteobrama*	4.55 (1 species)
					4. *Puntius*	9.09 (2 species)
					5. *Amblypharyngodon*	4.55 (1 species)
					6. *Raiamas*	4.55 (1 species)
					7. *Lepidocephalichthys*	4.55 (1 species)
3.	Siluriformes	9.09 (2 species)	4. Bagridae	9.09 (2 species)	8. *Sperata*	4.55 (1 species)
					9. *Hemibagrus*	4.55 (1 species)
4.	Beloniformes	4.55 (1 species)	5. Belonidae	4.55 (1 species)	10. *Xenentodon*	4.55 (1 species)
5.	Synbraniformes	9.09 (2 species)	6. Mastacembelidae	9.09 (2 species)	11. *Macrognathus*	4.55 (1 species)
					12. *Mastacembelus*	4.55 (1 species)
6.	Perciformes	31.82 (7 species)	7. Ambassidae	4.55 (1 species)	13. *Pseudambassis*	4.55 (1 species)
			8. Cichlidae	4.55 (1 species)	14. *Oreochromis*	4.55 (1 specie)
			9. Gobiidae	4.55 (1 species)	15. *Glossogobius*	4.55 (1 species)
			10. Channidae	18.20 (4 species)	16. *Channa*	18.20 (4 species)
7.	Tetraodontiformes	4.55 (1 species)	11. Tetraodontidae	4.55 (1 species)	17. *Tetraodon*	4.55 (1 species)

Table 3. Monthly abundance of fish species from Kinda Reservoir during Study period

Sr. No	Species	Dec	Jan	Feb	Mar	April	May	Jun	July	Total	Relative abundance	Average relative abundance
1.	*Notopterus notopterus*	1658	975	1499	1495	3389	3570	1597	2049	16232	0.45	vC
2.	*Labeo Calbasu*	10	0	5	0	0	105	200	200	520	0.01	C
3.	*Labeo rohita*	18	0	36	655	0	274	567	420	1970	0.05	vC
4.	*Osteobrama cunma*	115	207	80	275	149	117	515	272	1730	0.05	vC
5.	*Puntius chola*	0	16	0	0	0	12	0	22	50	0.001	uC
6.	*Puntius sophore*	0	30	15	5	10	20	0	50	130	0.004	uC
7.	*Amplypharyngodon mola*	0	0	0	19	20	0	0	10	49	0.001	uC
8.	*Raiamas guttatus*	50	0	46	93	14	0	72	35	310	0.009	uC
9.	*Lepidocephalichthys thermalis*	260	0	155	810	125	0	220	165	1735	0.05	vC
10.	*Sperata aor*	218	363	141	89	420	357	327	423	2338	0.06	vC
11.	*Mystus gulio*	150	450	80	100	350	260	300	425	2115	0.06	vC
12.	*Xenentodon cancila*	69	124	38	130	89	106	306	163	1025	0.03	C
13.	*Macrognathus zebrinus*	36	66	28	99	47	56	164	87	583	0.02	C
14.	*Mastacebelus armatus*	30	36	15	70	20	45	120	45	381	0.01	C
15.	*Pseudambassis ranga*	100	135	105	150	207	150	210	160	1217	0.03	C
16.	*Oreochromis spp.*	0	48	12	6	0	30	0	60	156	0.004	uC
17.	*Glossogobius giuris*	0	240	260	360	310	280	0	206	1656	0.05	vC
18.	*Channa marulius*	153	312	41	109	331	250	170	159	1525	0.04	C
19.	*Channna orientialis*	50	91	35	121	65	78	226	119	785	0.02	C
20.	*Channa punctatus*	30	55	20	95	30	46	205	105	586	0.02	C
21.	*Channa striata*	120	175	130	90	150	200	145	190	1200	0.03	C
22.	*Tetraodon cutcutia*	0	0	0	0	0	0	15	25	40	0.001	uC
	Total individual	3067	3323	2741	4771	5726	5956	5359	5390	36333		
	Total number of species	16	16	19	19	17	18	17	22			

uC = uncommon, C = common, vC = very common

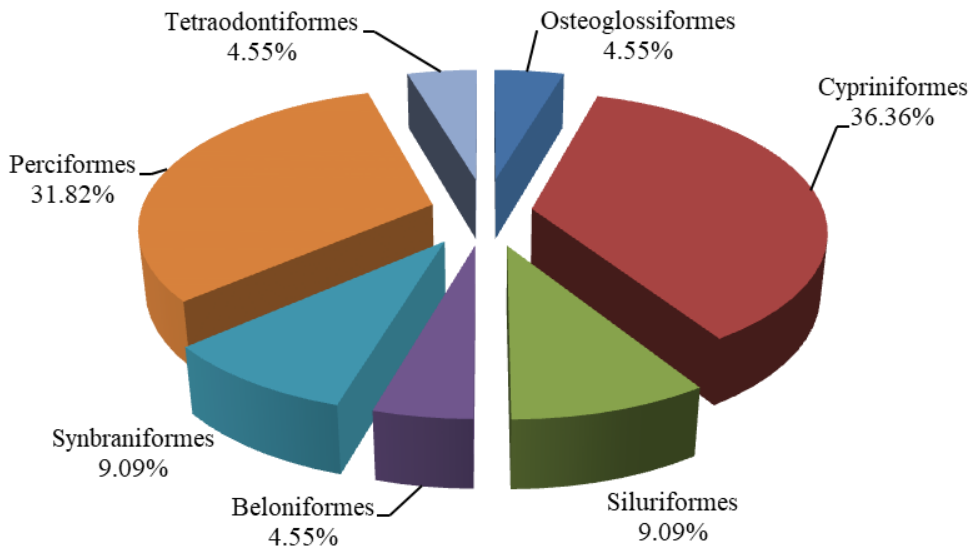

Fig 2. Percentage of fish species composition by orders during study period

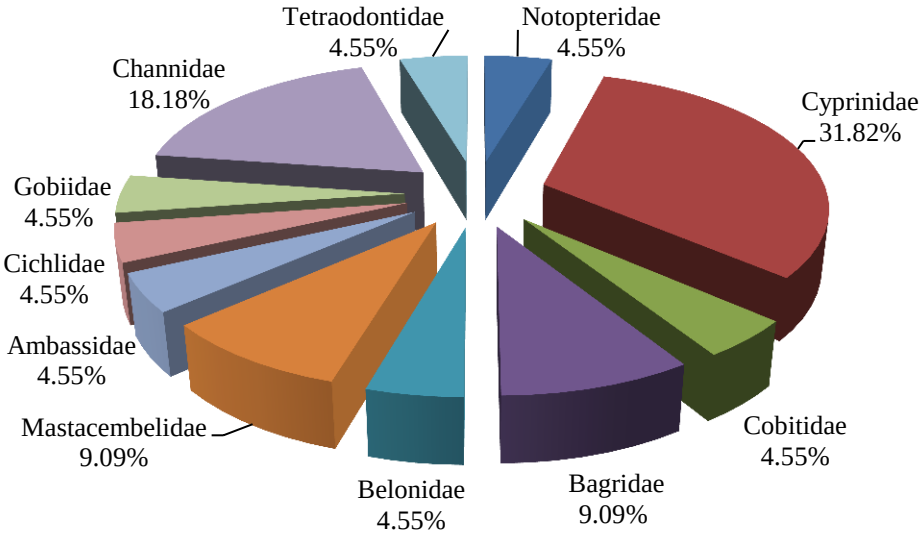

Fig 3. Percentage of fish species composition by families during study period

Discussion

The present research deals with species composition and abundance of fish fauna from Kinda reservoir, Mandalay Region from December 2018 to July 2019. No previous report on fish species of Kinda reservoir is available.

In the present study, 22 species were recorded belonging to seven orders. Of these, order Cypriniformes stood as the largest order with eight species followed by Perciformes with seven species, Siluriformes and Synbranchiforme with two species each while the order Osteoglossiformes, Beloniformes and Tetraodontiformes consisted of the lowest number with one species each, respectively.

Species composition of order Cypriniformes was the most dominant (36.36%) and those of Osteoglossiformes (4.55%), Beloniformes (4.55%) and Tetraodontiformes (4.55%) were the lowest.

Cypriniformes was the largest order of fresh water fish. The family Cyprinidae contains 16 subfamilies and about 3042 species (Eschmeyer *et al,* 2016). Almost all cyprinids are restricted to freshwater habitat only a few species are found in brackish water habitats (Nelson, 2016). The above mentions agree with the present finding.

Various workers presented the similar results in their study area in Myanmar and also in adjacent country. Bakalial *et al.,* (2004) also reported the similar result in lower Subansiri River, India. Concerned with the studies of fishes, Phyu Phyu Khin (2015), May Thu Chit (2016), Phyu Thet Wai (2017) and Zin Wai Phyo (2018) reported that the order Cypriniformes was the highest percentage of species in their study area.

In the present study, relatively higher number of species was found in July while the lowest in December and January. The result showed slightly variation from previous work. This is probably due to different study sites, study times, climate changes and the use of various fishing gears. In Kinda reservoir, out of 22 species, three kinds of fish species *N.notopterus, S. aor* and *H. microphthalmus* were mostly abundant and most of them are commercially important.

In conclusion, Kinda reservoir supports a large number of fresh water fish species and provides livelihood for the fishers from the villages around the reservoir. Kinda reservoir holds the huge amount of water and is important for many fresh water organisms, including fish species, as a breeding ground as well as feeding ground supporting their survival and maximum growth. Some fish species recorded such as *N. notopterus,O.cunma,S.aor, C. marulius, C. orientalis, C. punctatus, C. striata* and *H. microphthalmus* are commercially important because of demand from local markets as well as from abroad. Therefore, continuous monitoring and promotion of awareness on conservation of fish species diversity were needed to sustain the aquatic ecosystem of the Kinda reservoir.

The recorded data in this work enrich the information on fish fauna of Myanmar. The results of the study will serve as an important reference for future studies as well as addressing conservation measures and management of fish resources in this area.

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References

Bakalial, B., Biswas, S.P., Borah and Baruah, D., 2014. Checklist of fishes of lower Subansiri river drianabe, Northeast India. Scolars research Library. *Annals of Biological Research,* 5(2): 55–56.

Bisht, M.S., Kukreti, M. and Shantikhuson, 2004. Relative abundance and distribution of bird fauna of Garhwal Himalaya. Eco.Env & Cons; 10(4): 451–460.

Eschmeyer, W.N., Fricke, R. and Van der Loan, R. (eds) 2016. Catalog of fishes electronic version. http://researcharchive. Calacademy. org/research/ ichthyology/ catalog/ fishcatmainasp). Shakhare, V.B. 2001. Ichthyofauna of Jawalgaon reservoir in Solapur district of Maharashtra. J. Aqua. Biol. 16 (1) : 31–33.

Jayaram, K.C., 2013. The freshwater fishes of India, Pakistan, Bangladesh, Burma, and Srilanka, Aurobindo Press, Calcutta.

May Thu Chit, 2016. Catchability and selectivity gillnet in Kaung–Hmu–Daw In (Lake), Sagaing Township. *M Res Thesis*, Department of Zoology, University of Mandalay.

Nelson, J.S., 2016. *Fishes of the World*. Fifth edition, Willey, New York. P752.

Palmer, M.A., Covich, A.P., Lake, S., Biro, P., Brooks, J.J., Cole, J., Dahm, C., Gilbert, J., Goedkoop, W., Martens, K., Verhoeven, J. and Van de Bund, W.J., 2000. Linkages between aquatic sediment biota and life above sediments as potential drivers of biodiersity and ecological proecesses. Bioscience, 50: 1062–1068.

Pereira, G., 2000. Women and fishery in Latin America. Available from: https://www.iied.org/does/sart/sust

Phyu Phyu Khin, 2015. Species composition and seasonal occurrence of fishes from Ayeyarwady River at Singu Environs, Mandalay Region, *Ph.D Dissertation,* Department of Zoology, University of Mandalay.

Phyu Thet Wai, 2017, Occurrence of some fish species on Sinbaungwe Area. *M.Sc Thesis*, Department of Zoology, University of Magway.

Talwar, P, K. and Jhingran, A.G., 1991. Inland fishes of India and adjecent countries. Vol I and II. Oxford and IB + 1 publishing Co. pvt. Ltd., New delhi, Bombay, Calcutta. 1158 pp.

Thursfield, M., 1995. Sources of data. In: Veterinary epidemiology. 2nd ed. Blackwell Science, Oxford. Pp. 143–150.

Zin Wai Phyo, 2018. Diversity of fish assemblages in Kot–Ku In, Madaya Segment, Ayeyarwady River. *M.Sc Thesis,* Department of Zoology, University of Yadanabon.