

## Fish Species Assemblages in Segment of Ayeyawady River, Nga-zun Township, Mandalay Region

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### Abstract

Investigation on the assemblages of fish fauna was carried out in Ayeyawady River segment, Nga-zun Township, Mandalay Region from July to December 2019. A total number of 34 freshwater fish species belonging to 27 genera confined to 17 families under eight orders were identified during the study period. During the study period, species composition of order Cypriniformes was highest with (47.06 %), followed by Siluriformes (20.59 %), Perciformes (14.71%) and Synbranchiformes (5.88%). The lowest species composition was recorded in order Osteoglossiformes, Clupeiformes, Beloniformes and Tetraodontiformes (2.94% each). Based on the occurrence frequency, 11 species were as frequent, 10 species as occasional, eight species as common and five species as abundance were recorded.

Key words: Occurrence, Composition, Fish species, Ayeyawady River

### Introduction

In the world, according to their statistics, there are 28,900 species of fresh and salt – water fishes, out of these 13,000 are freshwater species 12,513 genera and 170 families. They live in lakes and rivers that cover only 1%, while the remaining 16,000 species live in salt-water that cover 70% of the earth surface (Leveque *et al.*, 2008). Myanmar possesses an extraordinary abundance and diversity of natural resources, but it is often acknowledged that the benefits of their exploitation are in the hands of few individuals. Fish hold a central place in the national economy and the life of Myanmar people, accounting for half of their animal sources food consumed and being only second to rice in terms of household's expenditure on food items. Traditionally, the extensive networks of rivers and floodplains have provided the bulk of fish for domestic consumption (Tezzo *et al.*, 2017).

Inland fisheries and their value chains also represent a substantial source of livelihood, providing job opportunities for an estimated 1.6 million Burmese people. Composition of the fish community can be a good indicator of fish habitat quality, as fish population in degraded habitats is usually dominated by one or few very tolerant species (Morrow and Fischenich, 2000). Nutritional foods are essential for the ever increasing population in the world. Since population density of people is too large, food products are produced in various ways to supply them. Fish is the valuable source of animal protein.

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In Myanmar, there are many natural habitats for the spawning, breeding and rearing of fish (Patra and Datta, 2010). Species which use this region as a nursery ground include both prawns and fish, those which migrate down from the upstream stretches of the river (Talwar and Jhingran, 1991).

The Ayeyawady River flows from north to south through the center of Myanmar. It is the country's largest river and Myanmar's most important commercial waterway. The Ayeyawady River and its flood plains are important aquatic resources in Myanmar. Myanmar's Ayeyawady River is both unique and special. It is one of the largest free-flowing rivers in Southeast Asia. The Ayeyawady is the engine of the Myanmar economy. It provides goods and services to enable a majority of economic and social activities to take place within Myanmar. Without these services of Ayeyawady River, the economy of Myanmar would not be the same (WWF, 2018). The objective of the present research is to identify the fish species from Ayeyawady River segment, Nga-zun Township and to investigate the abundance of fish fauna.

## Materials and Methods

### Study Area

In the present study, the Ayeyawady River segment, Nga-zun Township, Mandalay Region was selected as study area. It lies at Latitude  $21^{\circ}47' 40.59''$  N and Longitude  $95^{\circ}26'28.51''$  E (Fig.1).

### Study Period

The present study was undertaken from July to December, 2019.



Fig. 1 Map of Study Area  
(Source from Google Earth)

### Specimen Collection and Preservation

Fishes were collected from Ayeyawady River segment, Nga-zun Township. Coloured photographs were taken soon after capturing the fish, while the fish were still alive. The external morphological characters were also recorded on sample fishes to aid the identification processes. The local name was also noted down. The fish were preserved in different formalin percentage solution according to size of specimens for the further identification.

### Identification and Classification

The species identification was made by Talwar and Jhingran (1991), Ferraris (1998) and Jayaram (2013). The identified fish specimens were assemblage and presented according to classification system by Jayaram (2013).

### Data Analysis

The assign status, the frequency of occurrence of each species was calculated based on the number of occasions the species was collected during the samplings. The status of these fishes determined with the help of standard catch frequency chart as presented by Tamang, *et al.*, 2007 (cited by Patra and Datta, 2010).

< 5%	= Extremely rare
0 - 14%	= Rare species
15 - 30%	= Sporadic
31 - 59%	= Occasional
60 - 80%	= Frequent
81 - 90%	= Abundance
91 - 100%	= Common

## Results

### Fish Species Recorded from the Study Area

During the study period, a total of 34 fish species confined to 27 genera distributed under 17 families and eight orders were identified and recorded from the study area (Table1). Monthly occurrence of fish species in Ayeyawady River segment, Nga-zun Township were shown in Table 2.

The order Osteoglossiformes is represented by a single species *Notopterus notopterus* confined to the family Notopteridae. Similarly, the order Clupeiformes is represented by a single species *Gudusia variegata* confined to the family Clupeidae. The order Siluriformes is represented by seven species distributed among six genera and five families, namely Bagridae and Siluridae with two genera, family Schilbeidae, Clariidae and Arridae each with only one representative genus. The order Beloniformes is represented by a single species *Xenentodon cancila* confined to family Belonidae. The order

Synbranchiformes is represented by two species confined to family Mastacembelidae. The order Perciformes is represented by five species confined to five families, namely Ambassidae, Cichlidae, Gobiidae, Anabantidae and Channidae each with only one representative genus. Finally, the order Tetraodontiformes is represented by a single species *Tetraodon cutcutia* confined to the family Tetraodontidae (Fig.2).

When the percentage of species composition was evaluated, it was found that the order Cypriniformes is the highest in the percentage with 47.06%, followed by the order Siliuriformes 20.59%, followed by the order Perciformes 14.71% and the order Synbranchiformes 5.88%. The lowest percentage of order Osteoglossiformes, Clupeiformes, Beloniformes and Tetraodontiformes as 2.94% each (Fig. 3).

In the present study, the most dominant genus was *Labeo* with four species, followed by the genus *Osteobrama*, *Puntius*, *Mystus* and *Macrognathus* (two species each) and the rest of all other genera were presented by a single species.

#### Catch Frequency of Fish Species

Based on the catch frequency, 11 species, namely, *Cirrhinus mrigala*, *Labeo stoliczkae*, *Osteobrama belangeri*, *Puntius chola*, *Salmophasia sardinella*, *Amblypharyngodon atkinsonii*, *Raiamas guttatus*, *Lepidocephalus berdmorei*, *Ompok bimaculatus*, *Clupisoma prateri* and *Macrognathus aral* were recorded as frequent. 10 species, namely, *Labeo calbasu*, *Chela laubuca*, *Aspidoparia morar*, *Wallago attu*, *Clarias batrachus*, *Cephalocassis jatia*, *Macrognathus zebrinus*, *Parambassis ranga*, *Anabas testudineus* and *Channa striatus* were considered as occasional. Eight species, namely, *Notopterus notopterus*, *Gudusia variegata*, *Catla catla*, *Labeo rohita*, *Mystus pulcher*, *Oreochromis* sp., *Glossogobius giuris* and *Tetraodon cutcutia* were assumed as common. Five species, namely, *Labeo boga*, *Osteobrama belangeri*, *Puntius sarana*, *Mystus cavasius* and *Xenentodon cancila* were regarded as abundance (Fig. 4).

Table 1 List of fish species studied from Ayeyawady River segment

Order	Family	Scientific Name
1. Osteoglossiformes	1. Notopteridae	1. <i>Notopterus notopterus</i> (Pallas, 1769)
2. Clupeiformes	2. Clupeidae	2. <i>Gudusia variegata</i> (Day, 1869)
3. Cypriniformes	3. Cyprinidae	3. <i>Salmophasia sardinella</i> (Valenciennes, 1842)
		4. <i>Aspidoparia morar</i> (Ham., & Buch., 1822)
		5. <i>Raiamas guttatus</i> (Day, 1869)
		6. <i>Chela laubuca</i> (Ham., & Buch., 1822)
		7. <i>Amblypharyngodon atkinsonii</i> (Blyth, 1861)
		8. <i>Osteobrama belangeri</i> (Valenciennes,
		9. <i>Osteobrama cunma</i> (Day, 1878)
		10. <i>Puntius chola</i> (Ham., & Buch., 1822)
		11. <i>Puntius sarana</i> (Ham., & Buch., 1822)
		12. <i>Cirrhinus mrigala</i> (Ham., & Buch., 1822)
		13. <i>Catla catla</i> (Ham., & Buch., 1822)
		14. <i>Labeo boga</i> (Ham., & Buch., 1822)
		15. <i>Labeo calbasu</i> (Ham., & Buch., 1822)
		16. <i>Labeo rohita</i> (Ham., & Buch., 1822)
		17. <i>Labeo stoliczkae</i> (Steindachner, 1870)
		18. <i>Lepidocephalus berdmorei</i> (Blyth, 1861)
4. Siluriformes	4. Cobitidae	19. <i>Mystus cavasius</i> (Ham., & Buch., 1822)
	5. Bagridae	20. <i>Mystus pulcher</i> (Chaudhuri, 1911)
		21. <i>Ompok bimaculatus</i> (Bloch, 1797)
	6. Siluridae	22. <i>Wallago attu</i> (Schneider, 1801)
		23. <i>Clupisoma prateri</i> (Hora, 1937)
	7. Schilbeidae	24. <i>Clarias batrachus</i> (Linnaeus, 1758)
	8. Clariidae	25. <i>Cephalocassis jatia</i> (Ham., & Buch., 1822)
	9. Ariidae	26. <i>Xenentodon cancila</i> (Ham., & Buch.,
5. Beloniformes	10. Belonidae	27. <i>Macrōgnathus aral</i> (Bloch
6. Synbranchiformes	11. Mastacembelidae	& Schneider, 1801)
		28. <i>Macrōgnathus zebrinus</i> (Blyth, 1859)
		29. <i>Parambassis ranga</i> (Ham., & Buch., 1822)
7. Perciformes	12. Ambassidae	30. <i>Oreochromis</i> sp. (Gunther, 1885)
	13. Cichlidae	31. <i>Glossogobius giuris</i> (Ham., & Buch., 1822)
	14. Goobiidae	32. <i>Anabas testudineus</i> (Bloch, 1795)
	15. Anabantidae	33. <i>Channa striatus</i> (Bloch, 1793)
	16. Channidae	34. <i>Tetraodon cutcutia</i> (Ham., & Buch., 1822)
8. Tetraodontiformes	17. Tetraodontidae	

Table 2 Monthly occurrences of fish species from Ayeyawady River segment

No	Species Name	Month						Total
		Jul	Aug	S	Oct	Nov	Dec	
1	<i>Notopterus notopterus</i>	+	+	+	+	+	+	6
2	<i>Gudusia variegata</i>	+	+	+	+	+	+	6
3	<i>Salmophasia sardinella</i>	+	+	+	+	+	+	6
4	<i>Aspidoparia morar</i>	-	-	+	+	+	+	4
5	<i>Raiamas guttatus</i>	-	+	+	+	+	+	5
6	<i>Chela laubuca</i>	-	-	+	+	-	+	3
7	<i>Amblypharyngodon atkinsonii</i>	+	+	+	+	+	+	6
8	<i>Osteobrama belangeri</i>	+	-	+	+	-	+	4
9	<i>Osteobrama cunma</i>	-	+	+	-	+	+	4
10	<i>Puntius chola</i>	+	-	+	+	+	+	5
11	<i>Puntius sarana</i>	+	+	+	-	+	-	4
12	<i>Cirrhinus mrigala</i>	+	+	+	+	-	+	5
13	<i>Catla catla</i>	-	-	-	+	+	+	3
14	<i>Labeo boga</i>	+	+	-	-	+	+	4
15	<i>Labeo calbasu</i>	-	-	+	+	+	+	4
16	<i>Labeo rohita</i>	-	+	+	-	-	+	3
17	<i>Labeo stoliczkae</i>	+	+	-	-	+	+	4
18	<i>Lepidocephalus berdmorei</i>	-	+	+	-	+	+	4
19	<i>Mystus cavasius</i>	+	+	+	-	+	+	5
20	<i>Mystus pulcher</i>	+	+	+	+	+	+	6
21	<i>Ompok bimaculatus</i>	-	-	+	+	+	+	4
22	<i>Wallago attu</i>	-	-	-	+	+	+	3
23	<i>Clupisoma prateri</i>	+	+	-	-	+	+	4
24	<i>Clarias batrachus</i>	-	-	-	+	+	+	3
25	<i>Cephalocassis jatia</i>	-	-	+	+	-	-	2
26	<i>Xenentodon cancila</i>	+	+	-	+	+	+	5
27	<i>Macragnathus aral</i>	+	+	-	-	+	+	4
28	<i>Macragnathus zebrinus</i>	-	-	+	+	+	-	3
29	<i>Parambassis ranga</i>	-	+	-	+	-	+	3
30	<i>Oreochromis sp.</i>	+	+	+	+	+	+	6
31	<i>Glossogobius giuris</i>	+	+	+	+	+	+	6
32	<i>Anabas testudineus</i>	-	-	-	+	+	+	3
33	<i>Channa striatus</i>	-	-	+	+	-	+	3
34	<i>Tetraodon cutcutia</i>	+	+	+	+	+	+	6
Total number of species		18	21	2	25	28	31	

+ = present, - = absent

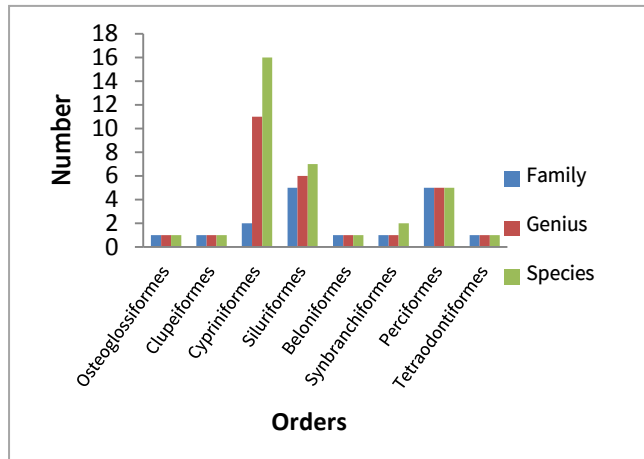


Fig. 2 Fish composition in different orders from Ayeyawady River segment

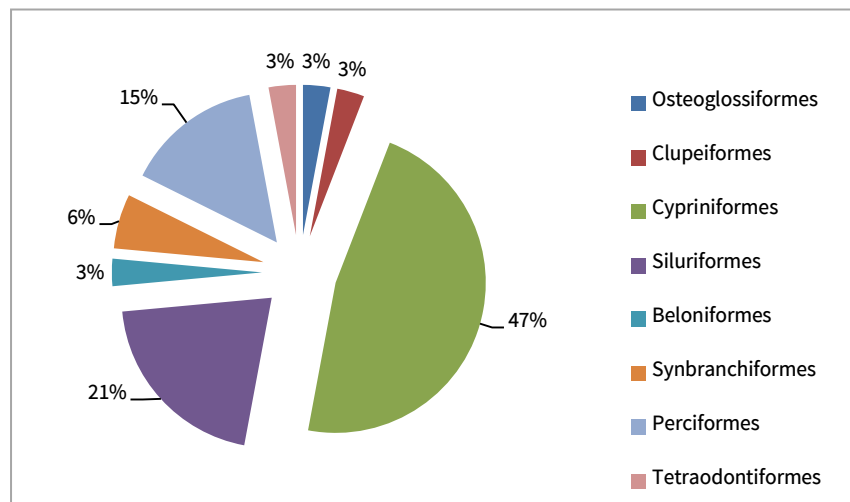
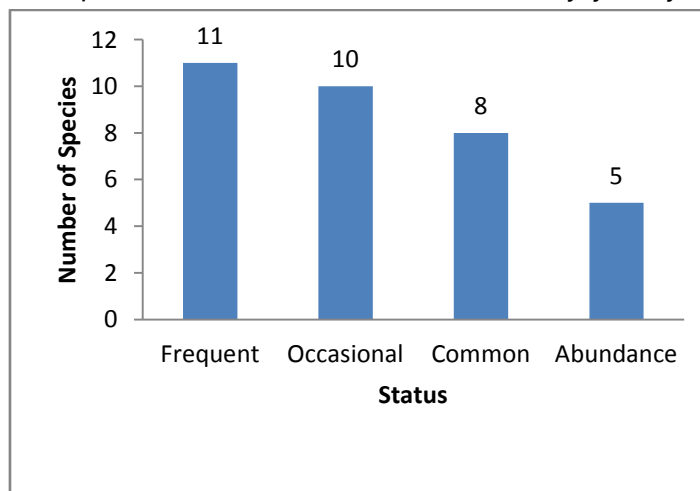


Fig. 3 Species composition of fishes in different orders from Ayeyawady River segment



< 5% = Extremely rare, 0 -14% = Rare species, 15-30% = Sporadic, 31 -59% = Occasional, 60 - 80% = Frequent, 81 - 90% = Abundance, 91 - 100% = Common

Fig.4 Status of fish species from Ayeyawady River segment

### Discussion

Ayeyawady River is the largest river in Myanmar. Ayeyawady River has a rich variety of fish fauna which support to food sources for local peoples. The present work was conducted from July to December 2019. The recorded species in this study belong to eight orders, Cypriniformes (16 species), Siluriformes (seven species), Perciformes (five species), Synbranchiformes (two species), Osteoglossiformes, Clupeiformes, Beloniformes and Tetraodontiformes (one species each). Thus, the order Cypriniformes, Siluriformes and Perciformes in terms of the species, genera and also in number of families outnumbered the remaining orders of fishes in study area.

Talwar and Jhingran, 1991 stated that Cypriniformes was the largest of all fish orders. In the present study, the order Cypriniformes was the most dominant orders compared to other orders. Similar results were also shown by previous local workers, working on different localities. Myint Myint Win (2010) reported the occurrence of 48 fish species confined to nine orders, 24 families and 43 genera in Bodagon In a segment of Ayeyawady River in Pakokku Township. The maximum number of fish species in percentage was recorded in order Cypriniformes. Ya Min Hlaing (2019) described 60 species confined to eight orders, 21 families and 43 genera were recorded from Ayeyawady River segment between Innwa bridge and Thazin Hla village, Sagaing Region. The fish species composition was the highest in Cypriniformes, followed by Siluriformes and Perciformes.

In the present study, the composition of fish species was the highest 47.06% for the order Cypriniformes followed by the order Siluriformes 20.59% and order Perciformes 14.71%. So, it appeared the Ayeyawady River is rich in cyprinid, silurid and percoid fishes and it is assumed as natural, since these orders constitute a large number of species.

During the study period, the family Cyprinidae was predominated by 15 species. UNEP-WCMC (2008) also reported that the Cyprinidae family as an important family of freshwater fishes. Similarly, local previous workers, Thidar Win(1998), Ma Ohn (2000) and Zin Mar Phy (2018) also reported that the family Cyprinidae was the most dominance family in Ayeyawady river. Thus, some species were common to all the study area and some species were not found in some study area. This is probably due to different spatial, temporal factors and climate changes.

In the present study, economically important species were *Notopterus notopterus*, *Catla catla*, *Cirrihinus mrigala*, *Labeo calbasu*, *L.rohita*, *L.stoliczkae*, *Osteobrama belangeri*, *Ompok bimaculatus*, *Cephalocassis jatia*, *Oreochromis* sp. and *Channa striatus*. Moreover, among these species, *Notopterus notopterus* is regarded as medium sized fish of high economic important food fish in Southeast Asia. *Wallago attu* is also important as an export species of Myanmar ( Vidthayanon *et al.*, 2005).



Among the study species, some fish species were recorded monthly but some species were not. Based on the occurrence frequency, 11 species were as frequent, 10 species as occasional, eight species as common and five species as abundance.

Based on the data of present work, it may be concluded that the study area provides an ecosystem for sustainable freshwater fish stock and maintenance of its biodiversity of fishes. Further investigation on economic importance of fish species and their future sustainable resource management strategies could be promoted.

### **Conclusions**

The Ayeyawady River provided variety of fishes as protein source of food for local consumption and livelihood. It is also natural habitat for many fish species. The flood plain of Ayeyawady River supports diverse and abundance of freshwater fishes in Myanmar. So, the Ayeyawady River and its flood plain provide significant contribution to animal proteins requirement in the local populace. So, there is a need to maintain the eco-friendly nature of the Ayeyawady River and also to safeguard the sustainability of the fish fauna that thrive in the Ayeyawady River for future generation. Most of the economically important fish species were recorded in the segment of Ayeyawady River, Nga-zun Township. Therefore, the study area becomes to play an important role for economy and various nutrients.

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## References

- Ferraris, C.J., 1998. *Identification Guide to the commercial Inland fishes of Myanmar*, FAO, T.C.P/MYA/4553-57pp.
- Jayaram, K.C., 2013. *The Freshwater Fish of India, Bangladesh, Myanmar, Nepal, Pakistan and Sri Lanka*, Zoological Survey of India Channel. 616pp
- Leveque, C., Oberdorff, T., Paugy, D., Stiassny, M.L. and Tedesco, P.A., 2008. Global diversity of fish in freshwater. *Hydrobiol.* 595: 545-567.
- Ma Ohn, 2000. Taxonomic study on some fishes of Ayeyarwaddy River between Sinbaungwe and Magway Townships. *MSc. Thesis*, Zoology Department, University of Yangon.
- Morrow, J.V. and Fischenich, C., 2000. Habitat Requirement for Freshwater Fish, *ERDC TN-EMRRP-SR*, 6:1-11
- Myint Myint Win, 2010. Seasonal Occurrence of Ichthyofauna and Yield in Bodagon In (River Fishery), A Segment of Ayeyawady River in Pakokku Township, Magway Region. *PhD Dissertation*. Department of Zoology, Mandalay University. 85 pp.
- Patra, A.K. and Datta, T., 2010. Diversity of Cypriniformes Fish Fauna in Karala River. A Tributary of Teesta River at Jalpaiguri District of West Bengal, India. *Research Journal of Biological Sciences*, 5:106-107 pp.
- Rathore, V. and Dutta, S.P.S., 2015. Fish Fauna of river Ujh, an important tributary of the river Ravi, District Ka Thua Jammu. *Environment Conservation Journal*, 16(1682): 81-86.
- Talwar, P.K. and Jhingran, A. G., 1991. *Inland fishes of India and Adjacent countries*. Oxford and IBH publishing Co., PVT., Ltd., Calcutta. 1158pp.
- Tezzo X., Kura, Y., Baran, E. and Zi Za Wah., 2017. Individual tenure and commercial management of Myanmar's inland fish resources. *TBTI Publication Series E-01/2017 Too Big To Ignore-WorldFish*. St. John's, Canada.
- Thidar Win, 1998. A Taxonomic study on fishes from Katha District. *MSc. Thesis*, Zoology Department, University of Mandalay.
- UNEP-WCMC, 2008. *Conculation Process on Monitoring of International trade in Ornamental Fish*. European Commission. 40 pp.
- Vidthayanon, C., Termvidchakorn, A. and Myint Pe, 2005. *Inland Fishes of Myanmar*. Department of Fisheries, Myanmar. Department of Fisheries, Thailand, Southeast Asian Fisheries Department Centre. 160 pp.
- WWF, 2018. The Ayeyarwady River and Economy of Myanmar: Risks and opportunities from the perspective of people living and working in the basin. Vol.1: 40 pp.
- Ya Min Hlaing, 2019. Occurrence and Species Composition of Some Fishes from Ayeyarwady River Segment between Innwa Bridge and Thazin Hla Village, Sagaing Region. *M.Sc Thesis*. Department of Zoology, Yadanabon University Myanmar.
- Zin Wai Phyoo, 2018. Diversity of Fish Assemblages in Kote-Ku-In, Madaya Segment, Ayeyawady River. *M.Sc Thesis*. Department of Zoology, Yadanabon University Myanmar.

