

# THE COMMERCIAL FISHES OF THANLWIN RIVER MOUTH AND ADJACENT WATERS, MON STATE, MYANMAR

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## Abstract

A study on the commercial fishes from Thanlwin River Mouth and Adjacent Waters, Mon State, Myanmar was conducted in 2009 and 2014. A total of 96 species of commercial fishes was recorded. Of which, 29 species (9 species of fresh water and 20 species of marine fishes), 30.2%, were exported to foreign countries and other regions. The classification system, the station wise species distribution and the compositions of the species compared with the previous record, the family-wise composition of commercial species, their role of economic importance and the main trend of commercial fish distribution channels were presented. Among the commercial species, the species of Thread fin (Polynemidae), Croaker (Sciaenidae), Hilsa (Clupeidae), Bombay duck (Harpadontidae) and Anchovy (Engraulididae) were the most economically important species. The Thread fin, Croaker and Hilsa were more abundant at the Mouth of Thanlwin River (Mawlamyine, Moattama, Bilugyun). Bombay duck and Anchovy (especially *Coilia dussumieri*) were more abundant at Setse` and Kyaikkhami. The highest abundant (by weight) commercial species from the catch of offshore fishing vessels were *Congresox* spp., *Ilisha* spp., *Polynemus* spp., *Pampus argenteus*, *Chirocentrus nudus*, *Arius* spp., *Tenualosa* spp., *Chrysochir aureus*, *Cynoglossus* spp. and *Lepturacanthus* spp., respectively. The IUCN assessed Red List species (LR/nt), *Scoliodon laticudus* (spadenose shark), was recorded and observed this species was more abundant at Setse` and Kyaikkhami.

**Keywords:** Commercial fishes, distribution, IUCN Red List species, *Scoliodon laticudus*, Thanlwin River Mouth, Myanmar.

## Introduction

The Thanlwin River, also called the Salween River, is one of the main rivers of Myanmar, lies between 15° and 16 ° 30' N and 97 ° 21' to 97 ° 36' E. It is the world's 26<sup>th</sup> longest river (with a length of nearly 3,000 km) and

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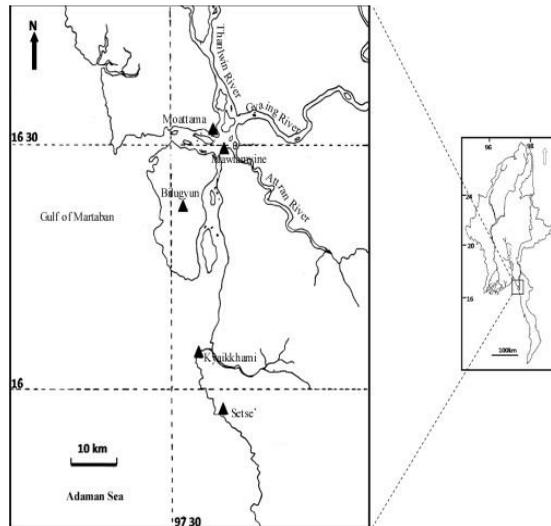
Southeast Asia's last great river to remain free-flowing (<http://www.Wikipedia.org/wiki/Salween-River>). There are also a number of smaller rivers discharging a freshwater load into the Gulf of Martaban. The southwest monsoon brings rain from the Bay of Bengal and the rainy season in Myanmar (June-October). As a consequence, this is a good for support freshwater, brackish and marine fisheries. Some species of fishes migrate to find good breeding-ground into the Thanlwin River such as the species of Thread fin, Croaker, Hilsa and Anchovy. The array of ichthyofauna met in its upper, middle and lower reaches present an interesting variety of fish species (Myint Myint Than, 1983).

Mon state in Myanmar is one of the regions famous for its inland, inshore and offshore fisheries. The major account responsible for this is the Thanlwin River, its associated estuaries and Adjacent Waters. It receives many torrential streams, water-falls and tributaries of rugged mountains and receives the larger tributaries such as the Attaran, Gyaing Rivers, etc.

Studies on the ichthyofauna of the Thanlwin River Mouth was formerly reported in 1983 by Myint Myint Than and recorded 50 species of commercial and zoological value of the fish species. Although many local researchers were presented on the value of the Thanlwin River . At the regional conference on "Value of Thanlwin/Salween River", focusing on the information and research on the commercial fish species of Thanlwin River Mouth were still rare. So, the present study attempted to find out the commercially important fish species of Thanlwin River Mouth and Adjacent Waters, to know their species distribution and to record the most commercially important species of the study area. The study also expects to become a base line data providing for further study.

## **Materials and Methods**

The specimens identified in the study were collected from five stations of Thanlwin River Mouth and Adjacent Waters; Mawlamyine (Lat.16° 29' N, Long. 97° 37' E), Moattama (Lat.16° 31' N, Long. 97° 36' E), Bilugyun, lied between (Lat.16° 12' and 16° 32' N, Long. 79° 35' and 79° 52' E), Kyaikkhami (Lat. 16° 03' N, Long. 97° 33' E) and Setse` (Lat. 15° 56' N, Long. 97° 37' E), Mon State, Myanmar in 2009 and 2014. In the study, the commercial fishes from both the fresh water and marine species were analyzed because the water from Thanlwin River Mouth not only relates with the Gulf of Moattama (Martaban), but also with some fresh water rivers, mainly Gyaing and Attran Rivers (Fig.1). The total catch of fishes from offshore fishing vessels was calculated on the data form the May 2009 to April 2010. Identifications were largely based upon their distinctive morphology. The classifications system of fresh water species were mainly followed to Munro (1955), Jayaram (1981), Mohsin and Azmi (1983) and for marine species were mainly followed to Day (1878) and Carpenter, *et al.* (1999).The role of economic importance (highly commercial, commercial and minor in commercial) and economic species were considered in terms of local demand, usage, value, abundance, and exportable potential of the species informed by the Department of Fishery, Mon State and also followed to Mya Than Tun, (2001), Sann Aung (2003) and Hla Win, *et al.*, (2008).



**Figure 1.** Mapshowing the sample collection sites

## Results

In the study, a total of 96 species of commercial fishes belonging to 71 genera of 48 families from 17 orders under 2 classes were identified (Table 1). Of which, 3 species (*Scoliodon laticaudus*, *Dasyatis imbricatus* and *Narcine brunnea*) were cartilaginous and the rest 93 were bony fishes. Among the recorded species, 20 (20.8%) were fresh water species and 76 (79.2%) were marine species (Figure.3).

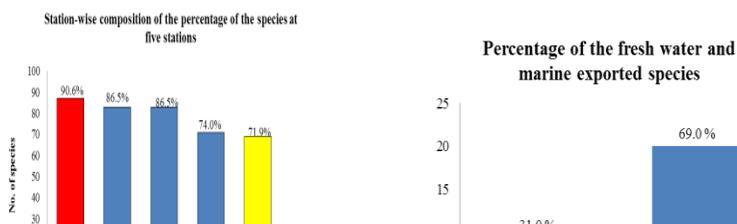
The station wise species distribution and the compositions of the species compared with the previous record by Myint Myint Than, 1983 were reported in Table 2. The number of species collected from five stations were not significantly differ; Mawlamyine; 87, Moattama; 83; Bilugyun; 83, Kyaikkhami; 71 and Setse` ; 69, respectively (Table 2 and figure 2). The highest number of species composition was found at station Mawlamyine (87 species) and the lowest was at Stations Setse` (69 species).

The family-wise species composition of the commercial fish species from Thanlwin River Mouth and Adjacent Waters was depicted in figure 8. The highest number of species composition was found at the families, Engraulidae (13 species), then followed Sciaenidae (7 species), Clupeidae (5 species) and Polynemidae (5 species), respectively.

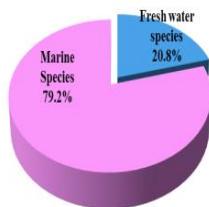
Besides all species were locally consumed, 29 species (30.2%) were exported to other regions and foreign countries (Table 3). Among the exported species, 9 species (31.0%) were fresh water species and 20 species (69.0%) were marine species. The role of economic important exhibiting highly commercial, commercial and minor in commercial species together with local consumption and/or exported species were highlighted in the Table 3 and figure 5.

Figure 9 represents the total catch of all landed fishes caught from offshore fishing vessels during May 2009 to April 2010. The most abundance caught species from offshore fishing vessels were *Congresox* spp., *Ilisha* spp., *Polynemus* spp., *Pampus argenteus*, *Chirocentrus nudus*, *Arius* spp., *Tenuialosa* spp., *Chrysochir aureus*, *Cynoglossus* spp. and *Lepturacanthus* spp., respectively.

Figure 10 pointed the main trend of fish distribution channels caught from Thanlwin River Mouth and Adjacent Waters landed to Mawlamyine District.

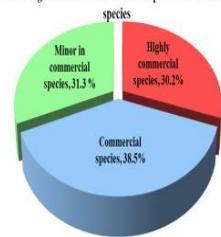


Percentage of the composition of fresh water species and marine species



**Figure 3.** Percentage of the composition of fresh and marine species of commercial fishes from Thanlwin River Mouth and Adjacent Waters

Percentage of the role of economic importance of the fish species



**Figure 5.** Percentage of the role of economic important species from Thanlwin River Mouth and Adjacent Waters

Table 1. Classify list of the collected commercial fish species of the Thanlwin River Mouth and Adjacent Waters during the study

Order	Family	Genus	Sr. No	Species	Local Name
Carcharhiniformes Rajiformes Torpediniformes Anguilliformes Aulopiformes Batrachoidiformes Channiformes Clupeiformes  Cypriniformes  Elopiformes	Carcharhinidae	<i>Scoliodon</i>	1	<i>Scoliodon laticaudus</i> Müller & Henle, 1838	Nga-mann
	Dasyatidae	<i>Dasyatis</i>	2	<i>Dasyatis imbricatus</i> (Bloch & Schneider, 1801)	Nga-lake-kyauk
	Narcinidae	<i>Narcine</i>	3	<i>Narcine brunnea</i> Amandale, 1909	Nga-latt-htone
	Muraenesocidae	<i>Congresox</i>	4	<i>Congresox talabonoides</i> (Bleeker, 1853)	Nga-shwe
	Synodontidae	<i>Saurida</i>	5	<i>Saurida undosquamis</i> (Richardson, 1848)	Nga-pa-lway
	Batrachoididae	<i>Batrachihyis</i>	6	<i>Batrachihyis grunniens</i> (Linnaeus, 1758)	Nga-oat-pher
	Channidae	<i>Channa</i>	7	<i>Channa striata</i> (Bloch, 1793)	Nga-yant
	Chirocentridae	<i>Chirocentrus</i>	8	<i>Chirocentrus natus</i> Swainson, 1839	Nga-da-lwel
	Clupeidae	<i>Anodontostoma</i>	9	<i>Anodontostoma chacunda</i> (Hamilton, 1822)	Nga-wun-pu, Bar-thi
		<i>Escualosa</i>	10	<i>Escualosa thoracata</i> (Valenciennes, 1847)	Yae-Kyi-ngar
		<i>Sardinella</i>	11	<i>Sardinella gibbosa</i> (Bleeker, 1849)	Nga-kown-nyo
		<i>Tenualosa</i>	12	<i>Tenualosa ilisha</i> (Hamilton, 1822)	Nga-tha-lauk
			13	<i>T. toil</i> (Valenciennes, 1847)	Nga-tha-lauk-yout-pha
	Pistigasteridae	<i>pellona</i>	14	<i>Pellona ditcheia</i> Valenciennes, 1847	Nga-zin-pyer, Myat-san-kyal
	Engraulididae	<i>Raconda</i>	15	<i>Raconda russeliana</i> Gray, 1831	Nga-da-lar
		<i>Coilia</i>	16	<i>Coilia dussumieri</i> Valenciennes, 1848	Mee-tan-thwe, Nga-kyan-ywat
			17	<i>C. ramcarati</i> (Hamilton, 1822)	Mee-tan-thwe, Nga-kyam-ywuat
			18	<i>C. reynaldi</i> Valenciennes, 1848	Mee-tan-thwe, Nga-kyam-ywuat
		<i>Setipinna</i>	19	<i>Setipinna taty</i> (Valenciennes, 1848)	Nga-byar
			20	<i>S. tenuifilis</i> (Valenciennes, 1848)	Nga-byar, Nga-pa-sharr
			21	<i>S. wheeleri</i> Wongratana, 1983	Nga-byar, Nga-taung-pyar
		<i>Stolephorus</i>	22	<i>Stolephorus bogoranis</i> Hardenberg, 1933	Nga-ni-tu
			23	<i>S. commersonii</i> Lacepede, 1803	Nga-ni-tu
			24	<i>S. indicus</i> (van Hasselt, 1823)	Nga-ni-tu
		<i>Thryssa</i>	25	<i>Thryssa dussumieri</i> (Valenciennes, 1848)	Nga-byar
			26	<i>T. kammalensis</i> (Bleeker, 1849)	Nga-byar
			27	<i>T. mystax</i> (Bloch & Schneider, 1801)	Nga-byar
			28	<i>T. stenosoma</i> Wongratana, 1983	Nga-ae-book, nga-phout-hume
		<i>Labeo</i>	29	<i>Labeo calbasu</i> (Hamilton, 1822)	Nga-net-pyar
		<i>Osteobrama</i>	30	<i>Osteobrama alfredianus</i> (Valenciennes, 1844)	Nga-phan-ma
	<i>Megalops</i>	31	<i>Megalops cyprinoides</i> (Broussonet, 1782)	Ka-lor-lae'	

Order	Family	Genus	Sr. No	Species	Local Name
		<i>Otolithoides</i>	64	<i>Otolithoides pama</i> (Hamilton, 1822)	Nga-poat-thain, Nga-byat
		<i>Pennahia</i>	65	<i>Pennahia anea</i> (Bloch, 1793)	Nga-byat
		<i>Pterotolithus</i>	66	<i>Pterotolithus maculatus</i> (Cuvier, 1830)	Nat-ga-daw
		<i>Rastrelliger</i>	67	<i>Rastrelliger kanagurta</i> (Cuvier, 1816)	Pa-lar-tu
		<i>Scomberomorus</i>	68	<i>Scomberomorus commerson</i> (Lacépède, 1800)	Nga-kon-shat
			69	<i>S. guttatus</i> (Bloch & Schneider, 1801)	Nga-kon-shat
		<i>Siganus</i>	70	<i>Siganus canaliculatus</i> (Park, 1797)	Mal-taw-lat-thae
		<i>Sillago</i>	71	<i>Sillago sihama</i> (Forsskål, 1775)	Nga-pal-lway
		<i>Pampus</i>	72	<i>Pampus argenteus</i> (Euphrasen, 1788)	Nga-moat-phyu
		<i>Therapon</i>	73	<i>Therapon jarbua</i> (Forsskål, 1775)	Nga-goan-kyarr
			74	<i>Therapon pua</i> Cuvier, 1829	Nga-goan-kyarr
		<i>Trichurus</i>	75	<i>Lepturacanthus savala</i> (Cuvier, 1829)	Nga-ta-khon
		<i>Paraplagusia</i>	76	<i>Paraplagusia blochi</i> (Bleeker, 1851)	Nga-kway-shar
		<i>Euryglossa</i>	77	<i>Euryglossa harmandi</i> (Sauvage, 1878)	Nga-kway-shar
		<i>Platycephalus</i>	78	<i>Platycephalus indicus</i> (Linnaeus, 1758)	Nga-sin-nain
		<i>Arius</i>	79	<i>Arius burmanicus</i> (Day, 1870)	Nga-yaung, Nga-yaung-kyar
			80	<i>A. caelatus</i> Valenciennes, 1840	Nga-yaung, Shwe-nga-yaung
			81	<i>A. maculatus</i> (Thunberg, 1792)	Nga-yaung
		<i>Aorichthys</i>	82	<i>Aorichthys seenghala</i> (Sykes, 1839)	Nga-goung
		<i>Mystus</i>	83	<i>Mystus vittatus</i> (Bloch, 1794)	Nga-zin-yaine
			84	<i>M. wolffii</i> (Bleeker, 1851)	Nga-zin-yaine
		<i>Clarias</i>	85	<i>Clarias batrachus</i> (Linnaeus, 1758)	Nga-khu
		<i>Plotosus</i>	86	<i>Plotosus canius</i> Hamilton, 1822	Ka-byaown, Pin-lail-nga-khu
		<i>Silonia</i>	87	<i>Silonia silonia</i> (Hamilton, 1822)	Nga-myuin
		<i>Ompok</i>	88	<i>Ompok bimaculatus</i> (Bloch, 1794)	Nga-nau-thann
		<i>Wallago</i>	89	<i>Wallago attu</i> (Bloch & Schneider, 1801)	Nga-bat
		<i>Macroganathus</i>	90	<i>Macroganathus siamensis</i> (Günther, 1861)	Nga-mway-htoe
			91	<i>M. zebrinus</i> (Blyth, 1858)	Nga-mway-htoe
		<i>Monopterus</i>	92	<i>Monopterus albus</i> (Zuiew, 1793)	Nga-shint-ne
			93	<i>M.uchia</i> (Hamilton, 1822)	Nga-shint-mawe
		<i>Lagocephalus</i>	94	<i>Lagocephalus lunaris</i> (Bloch & Schneider, 1801)	Nga-pu-tinn
		<i>Monotretus</i>	95	<i>Monotretus cutcutia</i> (Hamilton-Buchanan, 1822)	Nga-pu-tinn
		<i>Xenopretus</i>	96	<i>Xenopretus nazitus</i> (Richardson, 1848)	Nga-nu-tinn

**Table 2.** The station-wise species distribution compared with the previous record at Salween (Thanlwin) River Mouth by Myint Myint Than (1983)

Sr No	species	Present record Stations					Previous record*
		Mawlamyine	Moattama	Bilugyun	Kyaikkhami	Setse	Salween River Mouth
1	<i>Scoliodon laticaudus</i>	+	+	+	+	+	+
2	<i>Dasyatis imbricatus</i>	+	+	+	-	-	+
3	<i>Narcine brunnea</i>	+	+	+	+	+	-
4	<i>Congresox talabonoides</i>	+	+	+	+	+	-
5	<i>Saurida undosquamis</i>	+	+	+	+	+	+
6	<i>Batrachthys grunniens</i>	+	+	+	+	+	+
7	<i>Channa striata</i>	+	+	+	+	+	+
8	<i>Chirocentrus nudus</i>	+	+	+	+	+	-
9	<i>Anodontostoma chacunda</i>	+	+	+	+	+	-
10	<i>Escualosa thoracata</i>	+	+	+	+	+	+
11	<i>Sardinella gibbosa</i>	-	-	-	+	-	+
12	<i>Tenualosa ilisha</i>	+	+	+	+	+	-
13	<i>T. toli</i>	+	+	+	+	+	+
14	<i>Pellona ditchela</i>	+	+	+	+	+	-
15	<i>Raconda russeliana</i>	+	+	+	+	+	-
16	<i>Coilia dussumieri</i>	+	+	+	+	+	-
17	<i>C. ramcarati</i>	+	+	+	+	+	+
18	<i>C. reynaldi</i>	+	+	+	-	-	-
19	<i>Setipinna taty</i>	+	+	+	+	+	-
20	<i>S. tenuifilis</i>	-	-	-	+	-	-
21	<i>S. wheeleri</i>	+	+	+	+	+	+
22	<i>Stolephorus baganensis</i>	+	+	+	+	+	+
23	<i>S. commersonii</i>	-	-	-	+	+	-
24	<i>S. indicus</i>	+	+	+	+	+	-
25	<i>Thryssa dussumieri</i>	+	+	+	+	+	+
26	<i>T. kammalensis</i>	+	+	+	+	+	+
27	<i>T. Mystax</i>	+	+	+	+	+	+
28	<i>T. stenosoma</i>	+	+	+	+	+	-
29	<i>Labeo calbasu</i>	-	-	-	+	+	-
30	<i>Osteobrama alfredianus</i>	+	-	-	+	+	-
31	<i>Megalops cyprinoides</i>	+	+	+	+	+	-
32	<i>Notopterus notopterus</i>	-	-	-	+	+	-
33	<i>Anbas testudineus</i>	-	-	-	+	+	+

Sr No	species	Present record Stations					Previous record*
		Mawlamyine	Moattama	Bilugyun	Kyaikkhami	Setse	Salween River Mouth
34	<i>Atropus atropus</i>	+	+	+	+	+	-
35	<i>Megalaspis cordyla</i>	+	+	+	-	-	-
36	<i>Scomberoides tol</i>	+	+	+	-	-	-
37	<i>Selar crumenophthalmus</i>	+	+	+	+	+	-
38	<i>Lates calcarifer</i>	+	+	+	-	-	-
39	<i>Drepane longimana</i>	+	+	+	+	+	-
40	<i>Formio niger</i>	+	+	+	-	-	-
41	<i>Gerres filamentosus</i>	+	+	+	-	-	-
42	<i>Pentaprion longimanus</i>	+	+	+	-	-	-
43	<i>Apocryptes lanceolatus</i>	+	+	+	-	-	-
44	<i>Baleophthalmus boddarti</i>	+	+	+	-	-	-
45	<i>Glossogobius giuris</i>	-	-	-	+	+	+
46	<i>Harpadon nehereus</i>	-	-	-	+	+	+
47	<i>Datnioides quadrifasciatus</i>	+	-	-	+	+	+
48	<i>Rhinomugil corsula</i>	+	+	+	+	+	+
49	<i>Valamugil speigleri</i>	+	+	+	-	-	+
50	<i>Nemipterus japonicus</i>	+	+	+	+	+	-
51	<i>N. nematophorus</i>	+	+	+	+	+	-
52	<i>Eleutheronema tetradactylum</i>	+	+	+	+	+	+
53	<i>Polynemus indicus</i>	+	+	+	+	+	+
54	<i>P. paradise</i>	+	+	+	+	+	+
55	<i>P. plebeius</i>	+	+	+	+	+	-
56	<i>P. sextarius</i>	+	+	+	+	+	-
57	<i>Pomadasys maculatus</i>	+	+	+	+	+	+
58	<i>Rachycentron canadum</i>	-	-	-	+	-	+
59	<i>Scatophagus argus</i>	+	+	+	+	+	-
60	<i>Chrysochir aureus</i>	+	+	+	+	+	+
61	<i>Johnieops vogleri</i>	+	+	+	+	+	-
62	<i>Johinus coitor</i>	+	+	+	+	+	-
63	<i>Nibea soldado</i>	+	+	+	+	+	-
64	<i>Otolithoides pama</i>	+	+	+	+	+	+
65	<i>Pennahia anea</i>	+	+	+	-	-	-
66	<i>Pterotolithus maculatus</i>	+	+	+	+	+	+

Sr No	species	Present record Stations					Previous record *
		Mawlamyine	Moattama	Bilugyun	Kyaikkhami	Setse'	Salween River Mouth
67	<i>Rastrelliger kanagurta</i>	+	+	+	+	+	+
68	<i>Scomberomorus commerson</i>	+	+	+	+	+	+
69	<i>S. guttatus</i>	+	+	+	+	+	-
70	<i>Siganus canaliculatus</i>	-	-	-	+	+	-
71	<i>Sillago sihama</i>	+	+	+	+	+	-
72	<i>Pampus argenteus</i>	+	+	+	+	+	+
73	<i>Therapon jarbua</i>	+	+	+	+	+	+
74	<i>Therapon puta</i>	+	+	+	+	+	+
75	<i>Lepturacanthus savala</i>	+	+	+	+	+	-
76	<i>Paraplagusia blochi</i>	-	-	-	+	+	-
77	<i>Euryglossa harmandi</i>	+	-	-	+	+	-
78	<i>Platycephalus indicus</i>	+	+	+	+	+	+
79	<i>Arius burmanicus</i>	-	-	-	+	+	-
80	<i>A. caelatus</i>	-	-	-	+	+	+
81	<i>A. maculatus</i>	+	+	+	+	+	-
82	<i>Aorichtys seenghala</i>	+	+	+	-	-	-
83	<i>Mystus vittatus</i>	+	+	+	-	-	-
84	<i>M.wolffii</i>	+	+	+	+	+	-
85	<i>Clarias batrachus</i>	+	+	+	-	-	-
86	<i>Plotosus canius</i>	+	+	+	+	+	-
87	<i>Silonia silondia</i>	+	+	+	-	-	-
88	<i>Ompok bimaculatus</i>	+	+	+	-	-	-
89	<i>Wallago attu</i>	+	+	+	-	-	-
90	<i>Macrognathus siamensis</i>	+	+	+	-	-	-
91	<i>M. zebrinus</i>	+	+	+	-	-	-
92	<i>Monopterus albus</i>	+	+	+	-	-	-
93	<i>M. cuchia</i>	+	+	+	-	-	-
94	<i>Lagocephalus lunaris</i>	-	-	-	+	+	+
95	<i>Monotretus cutcutia</i>	-	-	-	+	+	+
96	<i>Xenopterus naritus</i>	+	-	-	+	+	+
Total number of species by station		87	83	83	71	69	
Total number of species		06					26

Symbols: +, Presence; -, Absence. \* Source: Myint Myint Than (1983)

**Table 3.** The list of the role of economic importance (local consumption and exported) of fish species from the Thanlwin River Mouth and Adjacent Waters

Sr No	Species	Role of economic importance			
		Highly commercial	Commercial	Minor in commercial	Local consumption/ Exported species
1	<i>Scoliodon laticaudus</i>		½		Local
2	<i>Dasyatis imbricatus</i>		½		Local
3	<i>Narcine brunnea</i>			½	Local
4	<i>Congresox talabonooides</i>	½			Local / Export
5	<i>Saurida undosquamis</i>		½		Local
6	<i>Batrachthys grunniens</i>			½	Local
7	<i>Channa striata</i>	½			Local / Export
8	<i>Chirocentrus nudus</i>	½			Local / Export
9	<i>Anodontostoma chacunda</i>		½		Local
10	<i>Escualosa thoracata</i>			½	Local
11	<i>Sardinella gibbosa</i>		½		Local
12	<i>Tenuialosa ilisha</i>	½			Local / Export
13	<i>T. toli</i>		½		Local
14	<i>Pellona ditchela</i>			½	Local
15	<i>Raconda russeliana</i>			½	Local
16	<i>Coilia dussumieri</i>			½	Local
17	<i>C. ramcarati</i>			½	Local
18	<i>C. reynaldi</i>			½	Local
19	<i>Setipinna taty</i>			½	Local
20	<i>S. tenuifilis</i>			½	Local
21	<i>S. wheeleri</i>			½	Local
22	<i>Stolephorus baganensis</i>			½	Local
23	<i>S. commersonii</i>			½	Local
24	<i>S. indicus</i>			½	Local
25	<i>Thryssa dussumieri</i>			½	Local

Sr	Species	Role of economic importance
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	<b>Highly commercial</b>	<b>Commercial</b>	<b>Minor in commercial</b>	<b>Local consumption/ Exported species</b>
26	<i>T. kammalensis</i>		½	Local
27	<i>T. Mystax</i>		½	Local
28	<i>T. stenosoma</i>		½	Local
29	<i>Labeo calbasu</i>	½		Local / Export
30	<i>Osteobrama alfredianus</i>	½		Local
31	<i>Megalops cyprinoides</i>		½	Local
32	<i>Notopterus notopterus</i>	½		Local / Export
33	<i>Anbas testudineus</i>		½	Local
34	<i>Atropus atropus</i>		½	Local
35	<i>Megalaspis cordyla</i>	½		Local/ Export
36	<i>Scomberoides tol</i>	½		Local/ Export
37	<i>Selar crumenophthalmus</i>		½	Local
38	<i>Lates calcarifer</i>	½		Local / Export
39	<i>Drepane longimana</i>		½	Local
40	<i>Formio niger</i>	½		Local / Export
41	<i>Gerres filamentosus</i>		½	Local
42	<i>Pentaprion longimanus</i>		½	Local
43	<i>Apocryptes lanceolatus</i>		½	Local
44	<i>Baleophthalmus boddarti</i>		½	Local
45	<i>Glossogobius giuris</i>		½	Local
46	<i>Harpadon nehereus</i>		½	Local
47	<i>Datnioides quadrifasciatus</i>		½	Local
48	<i>Rhinomugil corsula</i>		½	Local
49	<i>Valamugil speigleri</i>		½	Local
50	<i>Nemipterus japonicus</i>		½	Local
51	<i>N. nematophorus</i>		½	Local
52	<i>Eleutheronema tetradactylum</i>	½		Local/ Export
53	<i>Polynemus indicus</i>	½		Local / Export
54	<i>P. paradise</i>	½		Local / Export

Sr No	Species	Role of economic importance			Local consumption/ Exported species
		Highly commercial	Commercial	Minor in commercial	
55	<i>P. plebeius</i>	½			Local / Export
56	<i>P. sextarius</i>		½		Local
57	<i>Pomadasys maculatus</i>			½	Local
58	<i>Rachycentron canadum</i>	½			Local / Export
59	<i>Scatophagus argus</i>			½	Local
60	<i>Chrysochir aureus</i>	½			Local/ Export
61	<i>Johnieops vogleri</i>	½			Local/ Export
62	<i>Johinus coitor</i>		½		Local
63	<i>Nibea soldado</i>		½		Local
64	<i>Otolithoides pama</i>	½			Local/ Export
65	<i>Pennahia anea</i>	½			Local/ Export
66	<i>Pterotolithus maculatus</i>	½			Local/ Export
67	<i>Rastrelliger kanagurta</i>	½			Local/ Export
68	<i>Scomberomorus commerson</i>	½			Local/ Export
69	<i>S. guttatus</i>	½			Local/ Export
70	<i>Siganus canaliculatus</i>		½		Local
71	<i>Sillago sihama</i>		½		Local
72	<i>Pampus argenteus</i>	½			Local/ Export
73	<i>Therapon jarbua</i>		½		Local
74	<i>Therapon puta</i>		½		Local
75	<i>Lepturacanthus savala</i>		½		Local
76	<i>Paraplagusia blochi</i>			½	Local
77	<i>Euryglossa harmandi</i>			½	Local

(Source: Indicative Price of Export Fish and Fishery Products, Fish Inspection Quality Control Division, and Department of Fisheries, Mon State, 2009-2010)

Sr No	Species	Role of economic importance			Local consumption/ Exported species
		Highly commercial	Commercial	Minor in commercial	
78	<i>Platycephalus indicus</i>		½		Local
79	<i>Arius burmanicus</i>			½	Local
80	<i>A. caelatus</i>		½		Local
81	<i>A. maculatus</i>	½			Local/ Export
82	<i>Aorichtys seenghala</i>		½		Local
83	<i>Mystus vittatus</i>		½		Local
84	<i>M.wolffii</i>		½		Local
85	<i>Clarias batrachus</i>	½			Local/ Export
86	<i>Plotosus canius</i>		½		Local
87	<i>Silonia silondia</i>	½			Local/ Export
88	<i>Ompok bimaculatus</i>		½		Local
89	<i>Wallago attu</i>		½		Local
90	<i>Macrognathus siamensis</i>		½		Local
91	<i>M. zebrinus</i>		½		Local
92	<i>Monopterus albus</i>	½			Local/ Export
93	<i>M. cuchia</i>	½			Local/ Export
94	<i>Lagocephalus lunaris</i>			½	Local
95	<i>Monotretus cutcutia</i>			½	Local
96	<i>Xenopterus naritus</i>		½		Local
<b>Total</b>		<b>29</b>	<b>37</b>	<b>30</b>	<b>96/29</b>

(Source: Indicative Price of Export Fish and Fishery Products, Fish Inspection Quality Control Division, and Department of Fisheries, Mon State, 2009-2010)

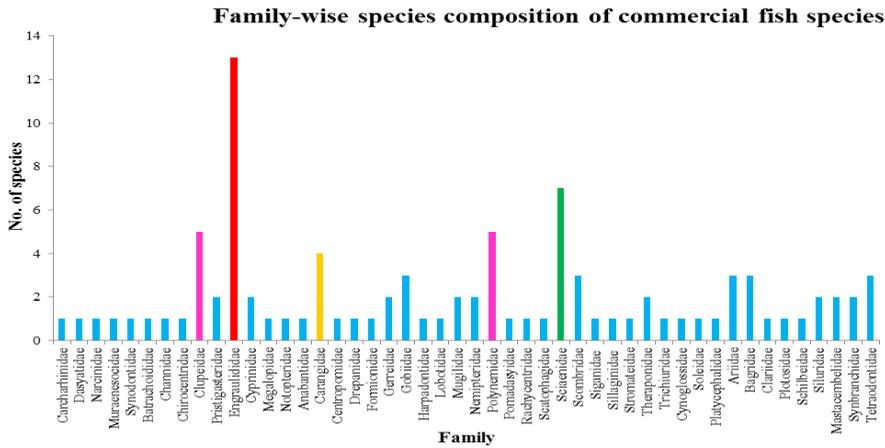


Figure 8. Family-wise species composition of the commercial fish species from Thanlwin River Mouth and Adjacent Waters

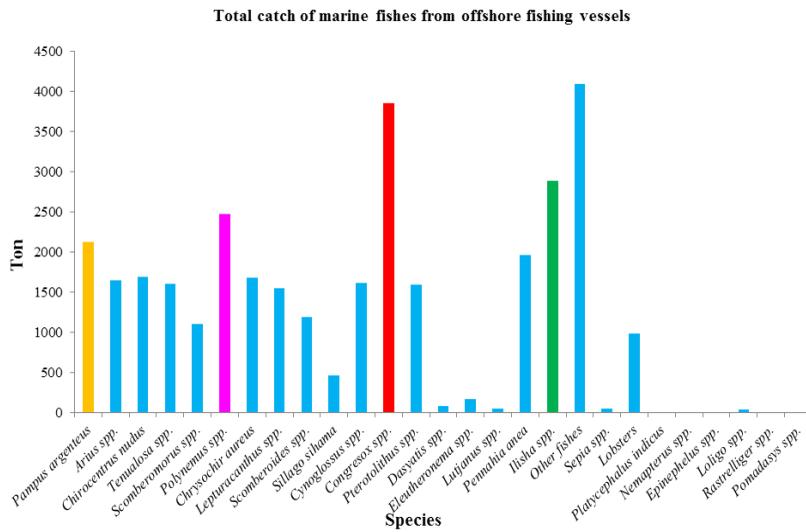
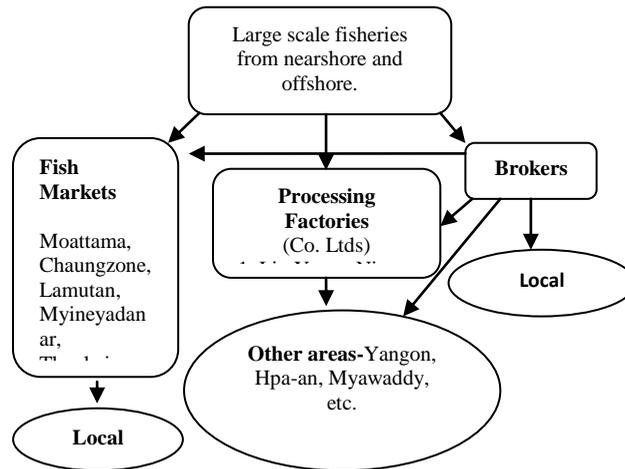


Figure 9. The total catch of fishes from offshore fishing vessels (Source: Department of Fishery, Mon State, 2010)



**Figure 10.** Flowing chart showing the main trend of commercial fish distribution channels caught from Thanlwin River mouth and Adjacent Waters landed to Mawlamyine District (Source: Department of Fishery, Mon State)

### Discussion

Myanmar possesses a long coastline approximately 2,832 km, a continental shelf of 228,781 km<sup>2</sup> and Exclusive Economic Zone (EEZ) of 486,000 km<sup>2</sup>, 8.1 million ha of inland freshwater bodies, many rivers, creeks, streams, natural ponds, lakes and puddles (Khin Maung Aye *et al.* 2006). The extensive river systems and the monsoon rainfall contribute the richness of inland fisheries and its long coastal regions have great variety of aquatic life. Marine fishes account for about 75 % of the total fish production in Myanmar, and 25 % coming from fresh water (Ministry of Livestock and Fisheries, 2009). Fish and shrimp constitute higher groups of aquatic animals, having great commercial value (Sann Aung, 2003).

Fish is one of the most important main animal protein resources in Myanmar. They can be utilized as food in many ways such as dried, salted, smoked, paste, sauce, fresh state for locally and also export to many other

countries to earn foreign currency. Fishery sector is considered as the most important one after the agriculture sector to fulfill the protein requirement of the people of Myanmar and to provide the food security as well as to get the opportunity for the employment to a large number of fishry communities and rural dwellers. Fishes with high protein contents are available with more or less reasonable price and hence they are of great demand by most people of Myanmar. Economically, the fish constitute a very important group of animals (Department of fisheries, Myanmar, 2009).

The early reports on the fresh water fishes of Myanmar was by Major Berdmore who made a fairly representative collection of fishes from the Sittaung River System and published by Blyth in 1860; fishes from the Kachin Hills, especially the tributary streams of the Malikha River was published by Mukerji in 1933-1934 and the upper Chindwin collection of the American Museum of Natural History was reported in part by Hora and Misra in 1940. Research on marine resources of Myanmar was first carried out by Ba Kyaw in 1965, followed by Hilda and Pereya in 1969 and Druzhinin in 1972 (as cited in Mya Than Tun 2001). The systematic survey undertaken in Myanmar was "Marine Fishery Resources Survey and Exploratory Fishing Project" with the assistance of Food and Agriculture Organization of the United Nations during 1979 to 1983. The classification of fishes by economic class was reported by Stromme, *et al.*, in 1981 at the survey "the marine fish resources of Burma" with Dr. Fridtjof Nansen ship (Sann Aung, 2003). Sea Fishery Resource Survey and Research Unit, Department of Fishery sureyed on the commercial marine fishes of 58 species in 1999, Mya Than Tun (2001) reported 351 species of the pelagic and demersal marine fishes of Myanmar, Sann Aung (2003) exhibits economically important 70 species of fishes from Myanmar Seas and Hla Win *et al.*, (2008) exhibited commercial fishes form Myanmar Water including of 40 fresh water and 172 marine species.

In this study, 96 species of fresh water and marine fishes inhabiting vicinity of Thanlwin River Mouth and Adjacent Sea were identified. Although

many records and systematic of both fresh water and marine fisheries were made by various ichthyologists of the Academic Departments of Universities and Colleges, and also occasionally in the Fishery Departments and other Research Centers, there have been relatively few or very little ichthyological studies on Thanlwin River Mouth, although a report on the fishes of the Salween (Thanlwin) River Mouth was surveyed by Myint Myint Than in 1983. She surveyed the ichthyofauna of the Salween River (Thanlwin River) Mouth, recorded 50 species of commercial and zoological value of fishes. In comparing with her observation, 26 species (27.1%) of the samples were same with her recorded species. This might be due to the differences of the stations, sample collection time, and the species that she omitted to report. She only selectively exhibited commercially and zoologically valuable species from her collected species (about 100 species). Her eight sampling sites are the largest fishing centers; Amherst, Kadonpaw, Kyauktan, Martaban, Kalwe, Ahlat, Seplar, and Kamake. From which, only two stations are the same with the present study; the Martaban (Moattama) and Kyauktan (included in Mawlamyine station).

The number of species collected from five stations was slightly variation. The highest number of species composition was found at Mawlamyine and the lowest was at Setse.

The rarest species of the specimens collected were only one or two or less than five in number, during sampling (except *Arius burmanicus*). These species were *Narcine brunnea*, *Megalops cyprinoides*, *Pentaprion longimanus*, *Datnioides quadrifasciatus*, *Pomadasys maculatus*, *Nibe soldado*, *Pterotolithus maculatus*, *Euryglossa harmandi*, *A. burmanicus* and *Aorichtys seenghala*. The exceptional species *A. burmanicus*, called Nga-yaung-kyar in Myanmar name, was only recorded at Stations Setse` and Kyaikkhami, but not in the rest three stations, and *Lagocephalus lunaris*, *Monotretus cutcutia* and *Xenopterus naritus* are more abundance at stations Setse` and Kyaikkhami.

Among the commercial species, the species of Thread fin (Polynemidae), Croaker (Sciaenidae), Hilsa (Clupeidae), Bombay duck (Harpadontidae) and Anchovy (Engraulidae) were the most economically important species. The Thread fin, Croaker and Hilsa were more abundance at the Mouth of Thanlwin River (Mawlamyine, Moattama, Bilugyun). Bombay duck and Anchovy (especially *Coilia dussumieri*) were more abundance at the station Setse`and Kyaikkhami.

*Scoliodon laticudus*, was more abundance at Setse` and Kyaikkhami. The International Union for Conservation of Nature (IUCN) has assessed this species as Red List of threatened species; Lower Risk, Near Threatened (LR/nt) species.

In the study area, the fishes are utilized as food in various ways such as fresh, dried, salted, smoked, and even some trash fishes can be made as fish paste (Nga-pi) and fish sauce (Ngan-pyar-yae). So, classified the samples as the three grades based upon their locally demand, usage, value, abundance, and exportable potential. Twenty nine species were highly in commercial, 37 were commercial species and 30 were minor in commercial species.

According to the observations, Thread fin (Family- Polynemidae), Croaker (Family-Sciaenidae), Hilsa (Family-Clupeidae), Bombay duck (Family-Harpadontidae) and Anchovy (Family-Engraulidae) were represented as the most important among the commercial species in the study area. These findings are well agreed with the findings of Tint Swe (2011), Khine Myat Myat Htwe, (2012), Mi Mya Mya Thet (2013) and Ohmar min (2013). Tint Swe (2011) reported that the Bombay duck, anchovies, croakers, ribbon fish and small shrimps were major resources and economically important along the coast of Mon State. Fishery and biology of herring fishes were studied along the Mon State Coastal Waters and its adjacent waters by Khine Myat Myat Htwe (2012), and she described the two species of *Tenualosa*, *T. ilisha* and *T. toil*, are economically important and this result is similar in the present study. Ohmar min (2013) studied the fishery and biology

of sciaenid fish and she stated that the two species, *Chrysochir aureus* and *Otolithoides pama*, are economically important along Mon Coastal Waters. It was found that the two species of polynemid fishes, *Polynemus paradiseus* and *P. indicus* are economically important and commonly found along the Mon State Coastal Waters and its adjacent waters by Mi Mya Mya Thet (2013).

In the present study, Bombay duck and Anchovy were more abundance at the stations Kyaikkhami and Setse`. Among the anchovies species, *Coilia dussumieri* was the most abundant species in the catches of bag net fishery and popularly consumed in Mon State and also exported to other regions as dried item. Thread fin, Croaker and Hilsa species were more abundant at Mawlamyine, Moattama and Bilugyun.

### **Conclusion**

In the study, a total of 96 species of commercial fishes were recorded from Thanlwin River Mouth and Adjacent Waters. The IUCN assessed Red List species (LR/nt), *Scoliodon laticudus* (spadenose shark), was recorded at all stations. The number of species collected from five stations did not vary very much. Besides 29 species were exported to other regions and foreign countries, all of the fishes were popularly consumed by local people. Among the commercial species, the species of Thread fin (Polynemidae), Croaker (Sciaenidae), Hilsa (Clupeidae), Bombay duck (Harpadontidae) and Anchovy (Engraulididae) were the most economically important species. During the study, diverse species of commercial fishes were observed. They are not only important for local people as food but also support finance by exporting them to other areas and foreign countries. The economic and livelihood of many local people relies upon the commercial fishes of the Thanlwin River Mouth and Adjacent Waters. Thus, further studies are still needed and this should be made to know their biology, fishery, ecology and economical studies to support the socioeconomic development for the local people.

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