COMMERCIAL FISHES AND FISHERY OF THAE-CHAUNG AREA, SITTWE TOWNSHIP, RAKHINE STATE

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Abstract

A total of 21 species (18 genera) belonging to 15 families, and 6 orders of collected commercial fishes were identified from fish landing sites of Thae-Chaung Area, Sittwe Township, Rakhine State from October 2022 to September 2023. The order of Perciformes was abundant possessing families, genus and species. Among them, the seabass, *Lates calcarifer* is exported to foreign countries. The species *Stolephorus commersonnii* (Nga-ni-tu) is a very popular dry fish species in Myanmar. The most widely used gears in the study area include cast nets, drift gill nets, bag nets, trammel nets, seine nets, man push nets, upright fish traps and lone line. Gill nets were larger in size and mesh size and higher in price and catch composition than other gears such as traps, surrounding nets, and hooks and lines. Thae-Chaung has an economy based on catching fish and producing dry fish.

Keywords: Diversity, Fishes, Fishing gears, Rakhine State, Sittwe Township, Thae-Chaung area, Uses.

Introduction

Myanmar is endowed with natural resources including rich and various aquatic fauna and flora due to its diversified and favourable climate, topography and habitats in the region (Hla Win *et al.* 2008). Fishes occur in lakes, streams, estuaries and oceans throughout the world. In most species of fish, all individuals live entirely either in fresh or in marine waters. Over 225 species are diadromous, regularly living part of their lives in lakes and rivers and part in oceans (Nelson *et al*. 2016). Many freshwater and marine species are also common in brackish water estuaries. In the oceans, the vast majority of fish are coastal or littoral. Fisheries and fishery resources for a country or region should be managed taking account of the social and ecological characteristics of the region or country. A unique characteristic of Rakhine fisheries is the high variety of fishery resources being exploited by wide-ranging fishing methods. This diversity shows that the country is bestowed with good natural resources and is rich in traditionally developed fishing gear. On the other hand, diversity is a major cause of complications in management and adjustment. Management measures produce different effects depending on the social and ecological characteristics of each fishing sector or area. A measure that has produced excellent results in one area can cause a negative impact on another area. Fine-tuned research on the impact of a measure is necessary. This study examined the status of fisheries and identified the commercial fishes of Thae-Chaung Area, Sittwe Township, Rakhine State.

Materials and Methods

Fish specimens were collected in fish landing sites of Sittwe environs, Rakhine State from October 2022 to September 2023. The location of the study area is shown in Figure 1. Color patterns and measurements of the specimens were recorded immediately after collection. For later studies, the fresh and intact specimens were carefully chosen to take photographs using a digital camera. Some samples were preserved in 10% formaldehyde seawater solution for identification and carried out in the laboratory, Department of Marine Science, Sittway University. The field visit was undertaken for a year and relevant data was obtained from a random sample of 20 fishermen and owners which interviewed in the study area. Interviews

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contained questions on a day fishing activity, time and duration of fishing trip, characteristics of fishing method, catch size and composition, consumption and sale of fish etc. The identification was mainly based on FAO identification sheets and catalogues for fishery purposes. The classification system of sampled species was adopted by Carpenter (1988), Cohen *et al.* (1990), Collette and Cornelia (1983), Day *et al.* (1878), De Burin *et al.* (1995), Fischer and Whitehead (1981), Hla Win *et al.* (2008), Jayaram (1984), Khin Maung Aye *et al.* (2006), Lal Mohan (1984), Mckay (1992), Motomura (2004), Mya Than Tun (2001), Rainboth (1996), Russell (1990), Saski (2001), Su Su Hlaing (2010), Tint Swe (2011) and Ye and Kevern (2011).

Results and Discussion

Commercial fishes of Thae-Chaung Area, Sittwe Township, Rakhine State

A total of 21 species (18 genera) belonging to 15 families, and 6 orders of commercial fishes collected from Thae-Chaung Area, Sittween Township, Rakhine State have been recorded. The percentages of the orde-rwise in the study area are shown in Figure 4. The order of Perciformes is abundant and the second is the Scombriformes.

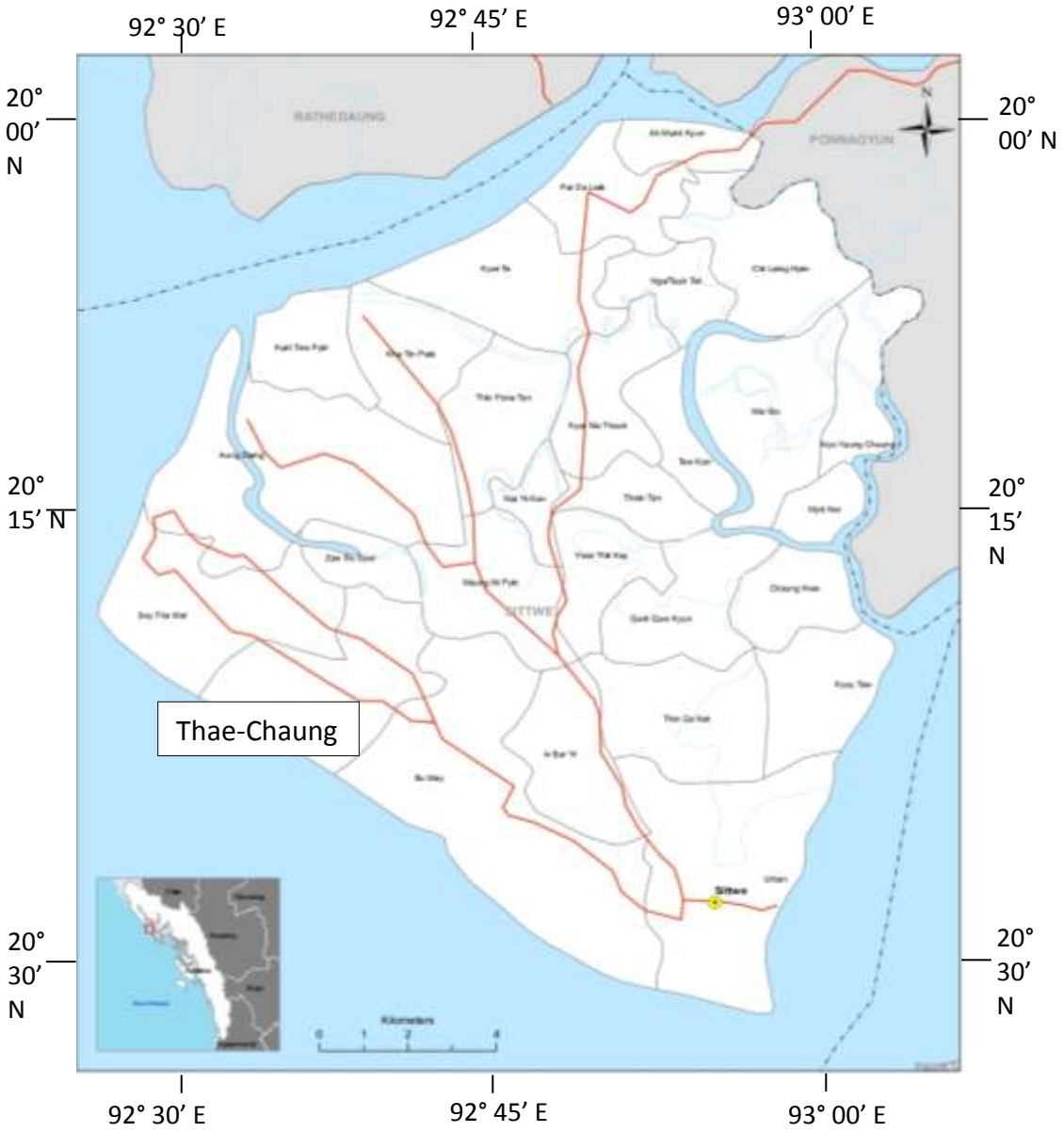

Figure.1. Map showing the sample collection sites of the study area.

Descriptions of commercial marine fishes in Thae-Chaung Area, Sittwe Township, Rakhine State

***Congresox talabon* (Cuvier, 1829) (Fig. 2A)**

Diagnostic Features: Body robust and eel-shaped; mouth very large, with gape reaching well beyond eye; dorsal fin inserted before gill-openings, pectoral fins relatively small, about 4 times in head length; lateral line pores before level of anus 41 or 42; dorsal fin rays before anus 70-75; dorsal fin inserted gill-openings; body is silver or yellow colour.

***Congresox talabonoides* (Bleeker, 1853) (Fig. 2B)**

Diagnostic Features: Body robust and eel-shaped; mouth very large, with gape reaching well beyond eye; dorsal fin inserted before gill-openings, pectoral fins relatively small, about 4 times in head length; lateral line pores before level of anus 41 or 42.

***Tenualosa toli* (Valenciennes, 1847) (Fig. 2C)**

Diagnostic features: Body fusiform; belly with fairly sharply keeled scutes. Dorsal fin origin a little before midpoint of body. Pelvic fins below anterior part of dorsal fin. Upper jaw with distinct medium notch when see from front: maxilla reaching to vertical from eye center or beyond. Gill rakers fine and numerous. Top of head without frontoparietal areas. Caudal fin larger than head. The back of the body greenish blue, flanks silvery.

***Sardinella gibbosa* (Bleeker, 1849) (Fig .2D)**

Diagnostic Features: Total number scutes 32 to 34. Vertical striae on scales not meeting at center, numerous small perforations on hind part of scale. A golden mid-lateral line down flank; dorsal and caudal fin margins dusky; a dark spot at dorsal fin origin. Lower gill rakers 45 to 59.

***Stolephorus commersonnii* Lacepede, 1803 (Fig. 2E)**

Diagnostic Features: Belly slightly rounded with 0-5 small needle-like pre-pelvic scutes. Maxilla tip pointed, reaching to or a little beyond hind border of pre-operculum, the latter convex, rounded. Small teeth on hyoid bones. Isthmus muscle tapering evenly forward. Body light transparent fleshy brown with a pair of dark patches behind occiput, followed by a pair of lines to dorsal fin origin. Bears a silver stripe on flanks.

***Mugil cephalus* Linnaeus, 1758 (Fig. 2F)**

Diagnostic features: Body rather stout, head broad and flattened on top. Adipose tissue cover eye; Lower lip very thin; a large symphysial knot front of lower jaw. First dorsal fin originated nearer snout tip than tail base. Dorsal, pectoral and pelvic fins had distinct axillary scale. Caudal fin forked. All soft rays are branched and segmented. Dark green on dorsal and silvery on lateral and ventral.

***Scomberoides tala* (Cuvier, 1832) (Fig. 2G)**

Diagnostic Features: Body oblong to elliptical, strongly compressed; snout pointed and nape slightly concave. Mouth large; eyes with well-developed adipose lid; teeth in jaw small. Two dorsal fins not widely separated; pectoral fin laced high; caudal fin deeply fork. Body bluish dorsally, white ventrally; vertically oblong black blotches, distal half of dorsal fin lobe abruptly and heavily pigmented; anal fin lobe usually immaculate.

***Drepane punctata* (Linnaeus, 1758) (Fig. 2H)**

Diagnostic Features: Color generally silvery with greenish tinge above. Pectoral fins long and pointed and having 4-11 vertical gray spots on the upper half of the sides and generally 8 dorsal spines.

Harpadon nehereus (Hamilton, 1822) (Fig. 2I)

Diagnostic features: Body elongate and compressed. Eyes small, mouth very wide armed with slender, recurved and pointed teeth. Lower jaw longer than upper jaw. Dorsal fin followed by a conspicuous adipose fin; pelvic fins are very long. Caudal fin trilobed, scales restricted to posterior half of the body. Lateral line extending into pointed medium lobe of caudal fin. Head, back and sides, light grayish.

Lates calcarifer (Bloch, 1970) (Fig. 2J)

Diagnostic Features: Body elongated or oblong, compressed, usually with concave dorsal profile with a deep caudal peduncle. Mouth is moderate or large, jaws equal or with lower longer than upper. Dorsal fin is either partly or wholly separated having a very deep notch almost dividing spiny from soft part of fin; pectoral fin short and rounded; anal fins are rounded and caudal are fork.

Lethrinus miniatus (Linnaeus, 1758) (Fig. 2K)

Diagnostic Features: Body moderately deep, its depth 2.4-2.8 times in standard length; head length 0.9-1 times in body length; dorsal profile near eye slightly convex; snout moderately long; its dorsal profile slightly concave snout angle relative to upper jaw between 50° and 65°; interorbital space convex to flat; posterior nostril an oblong longitudinal opening, closer to orbit than anterior nostril; eye situated close to dorsal profile; lateral teeth in jaws conical; pelvic-fin membranes between rays closest to body usually with dense melanophores; no scales on cheek; Colour of body silvery or yellowish, base of scales often black; base of pectoral fin red; 2 red spots often on upper rim of eye; lips reddish; fin pale or reddish.

Lutjanus johnii (Bloch, 1792) (Fig. 3A)

Diagnostic Features: Dorsal profile of head steeply sloped. Preorbital width equal to eye diameter or larger. Preoperculuar notch and knob poorly developed. Scale rows on back parallel to lateral line. Center of each scale often with a reddish-brown spot, giving an overall appearance of series of horizontal lines on side of body. Generally yellow with a bronze to silvery sheen, shading to silvery white on belly and underside of the head. A large black blotch mainly above the lateral line below the anterior dorsal-fin rays.

Lutjanus malabaricus (Bloch & Schneider, 1801) (Fig. 3B)

Diagnostic Features: Body compressed, additionally head length is two-thirds of body length. Snout lacrimal, and lower jaws naked. Mouth is terminal and fairly large having thick jaws. Dorsal fins single extending towards the caudal peduncle. The first part of dorsal is spines and the latter is soft rays. Pectoral fins are falcate and longer than pelvic fins. Color is dusky grayish and all fins with golden yellow.

Eleuthronema tetradactylum (Shaw, 1804) (Fig.3. C)

Diagnostic Features: Scale rows above lateral line 9-12, below 13-15; vomer with deciduous tooth plates on both sides except in juveniles; posterior part of maxilla deep, 3-4% of standard length; short tooth plate extension onto lateral surface of lower kaw, 7-9% of SL. Colour of upper sides of head and trunk with slight darkish silver tinge, becoming lighter in lower sides; anterior margins of first and second dorsal fins blackish, remaining parts translucent and slightly blackish respectively.

***Johnius coitor* (Ham, Buch, 1822) (Fig. 3D)**

Diagnostic Features: Body elongated and moderately compressed. Snout is swollen. Mouth is superior. Upper jaw is reaching to below the middle of eye. Swimbladder is hammer-shaped with 13 pairs of arborescent appendages. Dorsal fin is long divided by notch. Pectoral fin moderate. Caudal fin is rhomboid. Scales are cycloid. Light golden yellow with a purplish sheen. Soft part of dorsal, anal and caudal fins is grey borders.

***Auxis thazard* (Lacepede, 1800) (Fig. 3E)**

Diagnostic Features: Robusted body, elongated and rounded; teeth small and conical, in a single series; pectoral fins short, but reaching past vertical line from anterior margin of scales area above corselet; a large single-pointed (interpelvic process) between pelvic fins; which is well developed and narrow in its posterior part; a strong central keel on each side of caudal fin base between 2 smaller keels. Colour of back bluish, turning to deep purple or almost black on the head; a pattern of 15 or more narrow, oblique to nearly horizontal, dark wavy lines in scales area above lateral line; belly white; pectoral and pelvic fins purple, inner sides black.

***Scomberomorus guttatus* (Bloch & Schneider, 1801) (Fig. 3F)**

Diagnostic Features: Body elongated and strongly compressed. Snout pointed; mouth rather large; teeth present; lancet-shaped, laterally compressed. Bluish on back and silvery sides with several longitudinal rows of round dark brownish spots; first dorsal fin membrane black and posteriorly white. Two dorsal fins not widely separated; pectoral fins placed high; caudal fins deeply forked; lateral line almost straight to below middle of second dorsal fin and gently bent to the middle of caudal peduncle; finlets present.

***Rastrelliger faughni* (Matsui, 1967) (Fig. 3G)**

Diagnostic Features: Body oblong slightly compressed and deep. Snout pointed; eyes with broad anterior and posterior lids; lower jaw slightly the longer; bluish green back, and silvery sides and below; dorsal fin yellow tipped with black; some longitudinal black strips on body. Two widely separated dorsal fins; dorsal spines weak and receivable into a groove; pectoral fins placed high; caudal fins deeply forked; finlets present behind second dorsal and anal fins; two small keels present on each side of caudal peduncle.

***Rastrelliger kanagurta* (Cuvier, 1817) (Fig. 3H)**

Diagnostic Features: Body elongated, deep, and slightly compressed. Snout pointed. Eyes with broad anterior and posterior lids. Mouth rather large. Two widely separated dorsal fins. dorsal spines weak and receivable into a groove; pectoral fins placed high; caudal fins deeply forked; finlets are behind second dorsal and anal fins. Two small keels on each side of caudal peduncle. Lateral line very slightly curved. Colour bluish green back and silvery sides and below. Dorsal fin yellow tipped with black, caudal stained with black at its extremely, pectoral yellow.

***Pampus argenteus* (Euphrasen, 1788) (Fig. 3I)**

Diagnostic Features: Body very deep, oval and compressed. Head short. Mouth terminal. Eyes are large. Operculum absent. Dorsal and anal fins much elevated anteriorly with concave external margins. Pectoral fins rather pointed. No pelvic fins. Caudal fin deeply forked. Scales are small. Colour grey above and merging it silvery white to belly. Dorsal and anal grayish minutely dotted with black. Caudal and pectoral yellowish white also minutely dotted with black.

***Arius maculatus* (Thunberg, 1792) (Fig. 3J)**

Diagnostic Features: Head shield somewhat rugose; deep and long median fontanelle groove; Body shape lateral, fusiform; scale embedded or partially/completely absent; caudal fin forked; in addition to closure of the esophagal passage, considerable reduction of the palatine teeth is observed in sexually active males.

Thae-Chaung fishing village, Sittwe Township is situated on the Bay of Bengal in Lat. 20° 09´ N and Long. 92° 50´E. It is with an economy based on catching fish and producing dry fish. Situated on the Bay of Bengal at the mouth of the Kaladan River, Sittwe occupies the eastern side of a hilly ridge affording shelter from the southwest monsoon. Originally s small fishing village, Sittwe was catapulted into modernity when the British moved the capital of Myanmar here in the early 19th Century. Sittwe is at the confluence of the Mayyu, Kaladan and Lemro Rivers, all navigable. The present study was studied for the diversity of commercial marine fishes in Thae-Chaung Area, Sittwe Township, Rakhine State. A total of 21 species (18 genera) belonging to 15 families, 6 orders were identified.

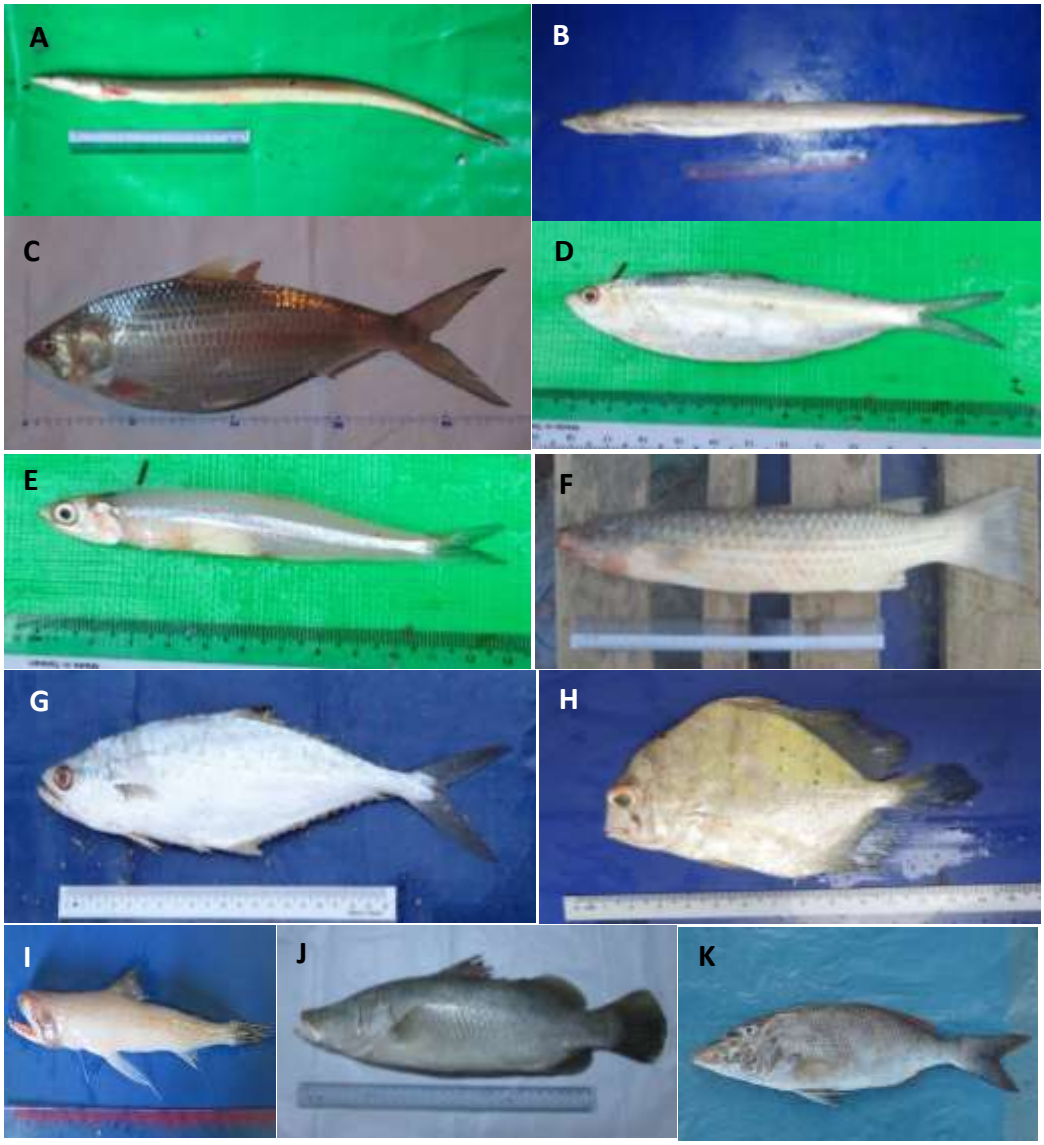

Figure. 2. Commercial fishes of the study area. A) *Congresox talabon*, B) *Congresox talabonoides*, C) *Tenualosa toli*, D) *Sardinella gibbosa*, E) *Stolephorus commersonnii*, F) *Mugil cephalus*, G) *Scomberoides tala*, H) *Drepane punctata*, I) *Harpadon nehereus*, J) *Lates calcarifer*, K) *Lethrinus miniatus*.

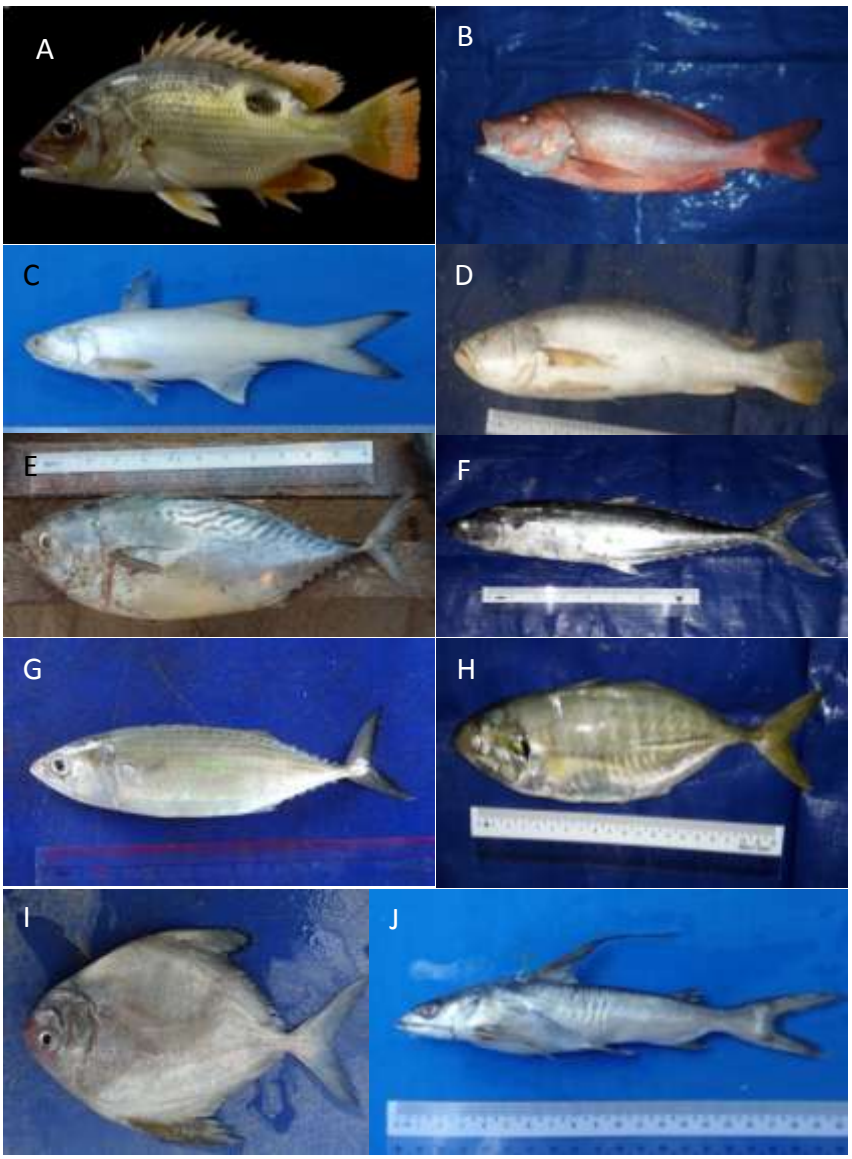

Figure. 3. Commercial fishes found in the study area. A) *Lutjanus johnii*, B) *Lutjanus malabaricus*, C) *Eleuthronema tetradactylum*, D) *Johnius coitor*, E) *Auxius thazard*, F) *Scomberomorus guttatus*, G) *Rastrelliger faughni*, H) *Rastrelliger kanagurta*, I) *Pampus argenteus*, J) *Arius maculatus*.

The identification of fishes is based on morphological distinctive characteristics because the morphological characteristics were adjustable in different species. Especially, the classification of species was based on distinctive characteristics such as body shape, counting spine and rays of fins and color pigmentation pattern.

The order of Siluriformes has only one family, 1 genus and 1 species. Most members of Perciformes are marine fish (Nelson, 2006). The family Scombridae (4 species) is most commonly found in the study area. All these species are very commercial species in this area and Myanmar. Among them, the seabass, *Lates calcarifer* is exported to foreign countries.

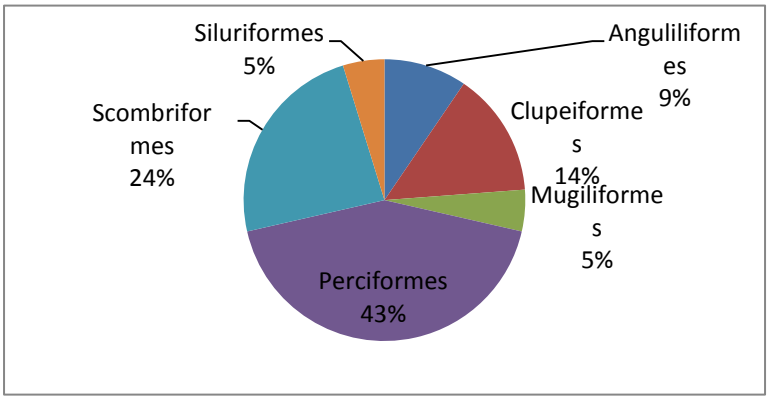

Figure 4. Percentages of the orderwise in the study area.

The meats of *Auxis thazard*, *Scomberoides tala* and *Scomberomorus guttatus* fishes are commonly taken for dry products in this area. The fishes of *Lates calcarifer*, *Lutjanus malabaricus*, *Johnius coitor*, and *Pampus argenteus* are commonly frozen species for restaurants in our country. The species *Stolephorus commersonnii* (Nga-ni-tu) is a very popular dry fish in Myanmar.

Different types of fishing gear were used in different seasons for fishing of the study area. The most widely used gears in the study area include cast nets, drift gill nets, bag nets, trammel nets, seine nets, man push nets, upright fish traps and long line. Gill nets were larger in size and mesh size and higher in price and catch composition than other gears such as traps, surrounding nets and hooks and lines (Table. 1). Among them, gill nets, seine nets, long line and surrounding nets are commonly used for commercial fishing and man push net and upright fish trap for subsistence fishing.

Gear also includes harvesting organisms when no particular gear or boat is involved. Fishing gears and methods is based on the principles of how the fish or prey are captured and to a lesser extent, on the gear construction or gear materials used (Nedelec, 1990).

Nyein Aye Hsan (2020) studied that the assessment of fish species availability and fishing gear used in Sittway environs. She examined 49 species of fish and 19 types of fishing gear during her study period. She found that the most dominant species of fish was 18 species in order Perciformes and gill net was the dominant gear in this area.

Table. 1. Various types of Fishing gear in Thae-Chaung Area, Sittwe Township

Sr No.	Common Name	Local Name
1.	Cast net	Kun
2.	Drift gill nets	Ah-nu-myu-pike/ Pin-lal-tan-pike/ Nga-tha-lauk-pike/ Yu-za-narr-pike
3.	Bag nets	Arr-htauk-pike (small/large)/ Wine-pike
4.	Trammel nets	Thone-htat-pike
5.	Seine nets	Kan-nar-swel-pike
6.	Man push nets	Yinn-tann
7.	Upright fish trap	Nga-zin-yine-pone
8.	Long Line	Nga-myar-chite

Win Cho Cho Tun (2022) also studied 58 species of marine fish in Myoma Market, Sittway Township. She described the two species of cartilaginous fishes and 56 species of bony fishes in the study period. She also found the order of Perciformes was the largest group in the study site.

Conclusion

This information will serve as baseline data for carrying out further study on ecology, conservation, sustainability and management of marine fisheries resources of Rakhine Coastal Water. Fishery management is important among citizens, fishers, fisheries processing and distribution sectors, administration and scientists. It will enable all stakeholders to fully understand not only the unique characteristics of the fishery resources and the regime shift but also the need for appropriate resources management.

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References

Carpenter, K.E. 1988. FAO Species Catalogue. Vol. 8. Fishes of the world. FAO Fisheries Synopsis No. 125. Food and Agriculture Organization of the United Nations Rome, 1988.

Cohen, D.M, Lnada, T, Iwamoto, T and Scialabba, N. 1990. FAO Species Catalogue. Vol. 8. Fishes of the world, (Order Gadiformes). Fisheries Synopsis No. 125.

Collette, B.B and Cornelia, E.N. 1983. FAO Species Catalogue, Vol.2 Scombrids of the world. Food and Agriculture Organization of the United Nations Rome, 1983.

Day, F, F.L.S and F.Z.S. 1878. The fishes of India; Being a Natural History of the Fishes, Published by Bernard Quaiutcii, 15 Piccadilly.

DE Bruin, G.H.P, Russell, B.C and Bogusch, A. 1995. FAO species identification guide for fishery purposes. The marine fishery resources of Sri Lanka. Rome, FAO. 400 pp.

Fischer, W and P.J.P, Whitehead. 1981. FAO Species Identification Sheets for Fishery Purposes. Vol. 1. Eastern Central Atlantic (fishing areas 34, 47). Food Agriculture Organization of the United Nation by the Department of Fisheries and Ocean, Canada.

Hla Win, Swe Thwin, Myint Pe and Maung Myint. 2008. *Commercial fishes of Myanmar*. Myanmar Fishery Products Processors and Exporters Association. 261 pp.

Jayaram, K.C, 1984. Arridae. FAO species identification sheets for fishery purposes. Western Indian Ocean fishing area 51. Vol.1 FAO, Rome.

Khin Maung Aye, Win Ko Ko and Somboon Siriraksophon. 2006. *Inland Fishing Gear and Methods in Southeast Asia: Myanmar*. Southeast Asia Fisheries Development Center, Training Department, 184 pp.

Lal Mohan, R. S, 1984. .Sciaenidae. FAO species identification sheets for fishery purposes. Western Indian Ocean (Fishing Area 51) Vol. 4. FAO, Rome.

Mckay, RJ,1992. FAO species Catalogue Vol.14. Sillaginid fishes of the world (Family Sillaginadae). An annotated and illustrated catalogue of the sillago, smelt or Indo-Pacific whiling species known to date Rome FAO. FAO Fish, Synop. **125** (iv):87p.

Motomura, H. 2004. Threadfins of the world (Family Polynemidae). FAO Species Catalogue for Fishery Purpose No. 3. Food and Agriculture Organization of the United Nations Rome, 2004.

Mya Than Tun. 2001. *Marine Fishes of Myanmar (Pelagic and Demersal*). Marine Fisheries Resources Survey Unit, Department of Fisheries, Yangon, Myanmar. 276 pp.

Nedelec, C.J. 1990. Definition and Classification of Fishing Gear Categories. *FAO Fisheries Technical Paper 222.*

Nelson, J.S., Grande, T and Wilson, M.V.H. 2016. *Fishes of the world*. John Wiley & Sons. 752 pp.

Nyein Aye Hasn. 2020. Assessment of fish species availability and fishing gears used in Sittway environs, Rakhine State. Unpublished MSc Thesis. Departrment of Zoology. Sittway University. 92 pp.

Rainboth, W. J. 1996. Fishes of the Cambodian Mekong. FAO species identification field guide for fishery purposes.FAO, Rome, 265p.

Russell, B.C. 1990. FAO Species Catalogue Vol. 12. Nemipterid Fishes of the World. Food and Agriculture organization of the United Nations. FAO Fisheries Synopsis No. 125.

Saski, K. 2001. Sciaendae. FAO species identification guide for fishy purposes. The living marine resources of the western Central Pacific Volume.6. .Bonyfishes part 3 (Marine to Pomacentridae). Rome. FAO. 2791-3380.

Su Su Hlaing, 2010. Commercially important ichthyological fauna of the Thanlwin River mouth and Adjacent Sea. Unpublished MRes Thesis, Department of Marine Science, Mawlamyine University, Myanmar.

Tint Swe. 2011. Biology and economics of fishery resources caught by stationary bagnets along the coast of Mon State. Unpublished PhD Dissertation, Department of Marine Science, Mawlamyine University.

Win Cho Cho Tun. 2022. Species occurrence and composition of marine fish species from Myoma Market, Sittway, Rakhine State. Unpublished MSc Thesis. Departrment of Zoology. Sittway University. 43 pp.

Ye, Y and Kevern, C. 2011. *FAO Review of the State of World Marine Fishery Resources.* Food and Agriculture organization of the United Nations. FAO Fisheries and Aquacultural Technical Paper No. 569. Rome, FAO. 2011. 334 pp.