Availability and Marketing System of Fish and Crustaceans in an Urban Fish Market: A Study on Retail Practices

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ABSTRACT. The marketing system and structure significantly impact the socio-economic conditions and production systems of local communities. Hence, this study aimed to explore the diversity of fish and crustacean species and the marketing system in the urban fish market known as Alexander Fish Market in Lakshmipur. During the study, 32 fish species and 3 crustaceans were identified, representing 35 genera, 21 families, and 11 orders. The majority of species belonged to the orders Cypriniformes (family Cyprinidae) and Siluriformes (families Bagridae and Ailiidae). Among the recorded species, a total of 3 species have been reported as Endangered (EN), 3 as Vulnerable (VU), 4 as Not Listed (NL), 6 as Not Threatened (NT), and 19 as Least Concern (LC). The fish distribution chain involved intermediaries such as beparies, aratders, wholesalers, and retailers. Three types of marketing channels were identified in the study. The average marketing cost, income, and profit for retailers were BDT 97.14/ day, BDT 792.71/day, and BDT 695.57/day, respectively. Fish pricing depended mainly on market structure, species quality, size, weight, and season. The average prices per kg for different fish species were recorded as follows: Ilish (BDT 1200 ± 17.89), Ayre (BDT 915 ± 8.64), Bacha (BDT 847 ± 8.24), Ghagra (BDT 816 ± 7.94), Khorsula (BDT 830 ± 5.63), Golda Chingri (BDT 855 ± 8.45), Bagdha Chingri (BDT 712 ± 7.11), Chiring (BDT 715 ± 6.15), and Gang Tengra (BDT 725 ± 8.25). Major challenges in fish marketing included the use of unhygienic ice, lack of financial support from the government and NGOs, and poor knowledge of fish handling and transportation. Organizational and government support, along with extension services on fish preservation, handling, icing, and curing, are crucial for enhancing fish marketing and improving fish quality.

Keywords: Fish Market, Marketing channels, Fish diversity, Income, Profit Margin

1. Introduction

Fish and fisheries resources play a vital role in the socio-economic development of Bangladesh. The fisheries sector contributes 3.00% of the total export earnings, 3.74% to GDP, and 22.23% to the agricultural sector (DoF, 2011). The country is rich in aquatic biodiversity, with 260 species of freshwater finfish, 475 species of marine fish, 63 species of palaemonid and penaeid prawns, 36 species of shrimp, 50 species of reptiles, 24 species of aquatic mammals, 19 species of amphibians, 25 species of tortoises and turtles, and 17 species of crabs, freshwater mussels, and snails (Rahman, 2005; Hossain et al., 2008). However, due to overexploitation and high consumption, fish stocks,

particularly in inland open water areas, have progressively declined. The IUCN Red List (IUCN, 2000) identified 54 threatened freshwater species in Bangladesh, of which 12 are critically endangered, 28 are endangered, and 14 are vulnerable.

The marketing system and structure significantly impact the socio-economic conditions of local communities and the production systems of any area. It involves a complex chain of systems linking the production sector to the consumer sector. Since fish and fishery products are highly traded commodities, fish production is an essential part of the marketing process (Alam et al., 2010). In Bangladesh, fish marketing is predominantly managed by the private sector. The distribution channel for small indigenous fish species includes three

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market levels: primary, secondary/higher secondary, and final consuming markets. Fish collectors, known as mahajans or aratdars, procure fish from catchers with the help of local brokers who receive a profit margin or commission. However, remote communities face significant marketing challenges due to inadequate transport, lack of ice, poor road facilities, and a weak bargaining position of farmers relative to intermediaries (Rahman, 1997). In addition, middlemen have established a new marketing chain that exploits fish farming communities by enforcing an artificial pricing policy through multiple intermediaries. This results in high marketing margins and prices, causing dissatisfaction among consumers, farmers, fishermen, and small traders (Rahman et al., 2009).

Lakshmipur is recognized as one of the most important fisheries zones in the country and lays a crucial role in the growth of fish production and culture. Various types of fish species (freshwater, brackish, and marine) are available in the Alexander Fish Market. However, the availability of fish species and the marketing channels for this market have received little attention until now. Detailed long-term studies specifically focusing on fish species availability and marketing channels in this market have not yet been published. Therefore, the current study aims to identify the existing marketing system and the availability of fish species in the Alexander Fish Market, Lakshmipur.

2. Materials and methods

Study area and study period. The study was conducted over a period of 7 months, from June 2022 to December 2022, at the Alexander Fish Market in Lakshmipur (Fig. 1). This market, located in Ramgati Upazila, Lakshmipur, Bangladesh, is geographically positioned at 22.6547036°N latitude and 90.908538°E longitude. The site was selected due to its significance as the primary landing center in Lakshmipur. Various activities were carried out using different survey tools and specific methodologies to assess the biodiversity status of the fish market.

Data collection. The study was conducted using a survey method, with data collected directly from

wholesalers (aratders) and retailers through on-the-spot interviews. For the questionnaire interviews, 20-25 fish retailers and 10 aratders were randomly selected from the study area using a simple random sampling technique. Data collection focused on the species diversity of fish, including information on species availability, abundance, distribution, and their IUCN status. The activities aimed to understand biodiversity and the marketing channels involved in the entire process.

Primary data were obtained from local people through structured questionnaires designed to meet the study's objectives. Information such as local names, distribution, and species availability was collected at the study sites. Additionally, relevant published and unpublished documents were gathered from various sources for secondary data collection. Research papers on the fish fauna of Bangladesh were also reviewed to compile historical data on species abundance and availability for biodiversity assessment.

After data collection, the information was cross-checked with key informants, including the Upazila Fisheries Officer (UFO), District Fisheries Officers (DFO), and NGO workers. The data were then entered into a database system using Microsoft Excel. All collected information was analyzed using MS Excel and presented in textual, tabular, and graphical forms.

3. Results
3.1. Fish and Crustaceans Diversity

During the study period, a total of 32 fish species and 3 crustaceans were recorded, representing 35 genera, 21 families, and 11 orders. Detailed information on the recorded fish and crustacean species, including specimen collection dates, along with their total length, availability, economic importance, distribution, and IUCN conservation status, is provided in Table 1 and 2. Morphometric and meristic analyses revealed that the order Siluriformes and Cypriniformes contributed the most (11 species of each order), followed by Perciformes and Decapoda (3), Gobiiformes (1), Mugiliformes (1), Aulopiformes (1), Scombriformes (1), Pleuronectiformes (1), Cichliformes (1), and Anabantiformes (1) (Table 1).
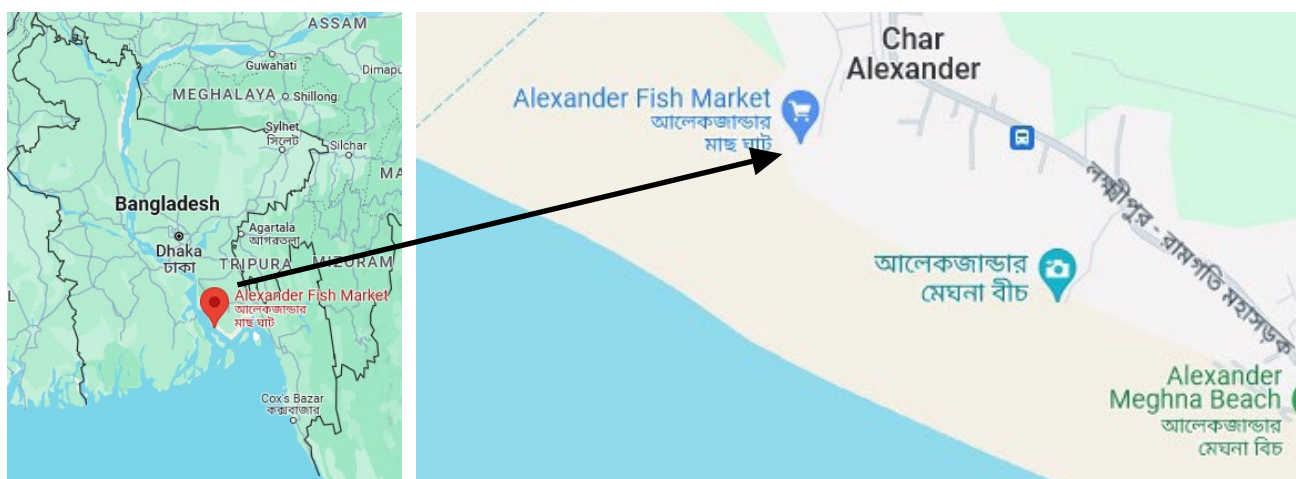

Fig.1. Geographical location of the study area (google map).

Table 1. Fish and Crustaceans diversity in the Alexander Fish Market, Ramgati, Lakshmipur.

Order	Family	Local Name	Scientific Name	Collection date (2022)
Cypriniformes	Cyprinidae	Rohu	*Labeo rohita* (Hamilton, 1822)	6th June
		Catla	*Labeo catla* (Hamilton, 1822)	6th June
		Mrigal	*Cirrhinus cirrhosus* (Bloch. 1795)	10th June
		Bata	*Labeo bata* (Hamilton, 1822)	10th June
		Puti	*Puntius sophore* (Hamilton, 1822)	6th July
		Sarputi	*Systomus sarana* (Hamilton, 1822)	6th July
		Gonia	*Labeo boggut* (Sykes, 1839)	12th July
	Xenocyprididae	Silver carp	*Hypophthalmichthys molitrix* (Valenciennes, 1844)	12th July
		Chapila	*Gudusia chapra* (Hamilton, 1822)	23rd July
		Ilish	*Tenualosa ilisha* (Hamilton, 1822)	23rd July
	Engrauliidae	Olua	*Coilia dussumieri* (Valenciennes, 1844)	2nd August
Siluriformes	Bagridae	Tengra	*Batasio batasio* (Hamilton, 1822)	10th August
		Gang Tengra	*Hemibagrus menoda* (Hamilton, 1822)	10th August
		Nuna Tengra	*Mystus gulio* (Hamilton, 1822)	3rd September
		Ayre	*Sperata aor* (Hamilton, 1822)	3rd September
		Rita	*Rita rita* (Hamilton, 1822)	10thSeptember
	Clariidae	Magur	*Clarias batrachus* (Linnaeus, 1758)	10th September
	Ailiidae	Gagra	*Clupisoma garua* (Hamilton, 1822)	14thSeptember
		Baspata	*Ailia coila* (Hamilton, 1822)	14th September
	Schilbeidae	Bacha	*Eutropiichthys vacha* (Hamilton, 1822)	20thSeptember
	Pangasiidae	Pangas	*Pangasius pangasius* (Hamilton, 1822)	20thSeptember
	Ariidae	Ghagra	*Arius gagora* (Hamilton, 1822)	8th October
Gobiiformes	Oxudercidae	Chiring	*Apocryptes bato* (Hamilton, 1822)	8th October
Mugiliformes	Mugilidae	Khorsula	*Rhinomugil corsula* (Hamilton, 1822)	15thOctober
Perciformes	Sillaginidae	Tulardandi	*Sillaginopsispanijus* (Hamilton, 1822)	15thOctober
	Polynemidae	Taposi	*Polynemus paradiseus* (Linnaeus, 1758)	22th October
	Sciaenidae	Poa	*Otolithoides pama* (Hamilton, 1822)	22th October

Order	Family	Local Name	Scientific Name	Collection date (2022)
Scombriformes	Trichiuridae	Chhuri	*Trichiurus lepturus* Linnaeus, 1758	22th October
Aulopiformes	Synodontidae	Loittya	*Harpodon nehereus* (Hamilton, 1822)	27th November
Cichliformes	Cichlidae	Tilapia	*Oreochromis mossambicus* (Peters, 1852)	27th November
Anabantiformes	Anabantidae	Koi	*Anabas testudineus* (Bloch, 1792)	27th November
Pleuronectiformes	Cynoglossidae	Kukur Jeeb	*Cynoglossus cynoglossus* (Hamilton, 1822)	6th December
Decapoda	Palaemonida	Golda Chingri	*Macrobrachium rosenbergii* (De Man, 1879)	6th December
		Goda Chingri	*Macrobrachium dolichodactylus* (Hilgendorf, 1879)	26th December
	Penaeidae	Bagda Chingri	*Penaeus monodon* (Fabricius, 1798)	26th December

All the species collected from the study area were primarily used as food fish, with the exception of *Clupisoma garua* and *Europlichthys vacha*, which were also caught as sport fish. Among these species, 10 were found rarely, 3 species (*Gudusia chapra, Mystus gulio,* and *Rhinomugil corsula*) were found moderately, and the remaining species were recorded most commonly (Table 2). The national biodiversity status (Red Book, IUCN, 2000 and 2015) classified the species into various categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Not Threatened (NT), Data Deficient (DD), Least Concern (LC) and Not Listed (NL).

Merging with the IUCN (2000) report for the collected fishes, 5 species (*Systomus sarana, Rita rita, C. garua, E. vacha,* and *Pangasius pangasius*) were recorded as CR, 5 species (*Mystus gulio, Labeo boggut, Macrobrachium rosenbergii, Macrobrachium dolichodactylus, Penaeus monodon*) as DD, 1 species (*Sperata aor*) as VU, 1 species (*Labeo bata*) as EN, and the remaining 23 species as NT (Table 2). On the other hand, according to Red Book, IUCN (2015), there were few variations reported over time as 19 species LC, 6 species NT, 3 species VU, 4 species NL and 3 species EN.

In this investigation, the dominant order were Cypriniformes and Siluriformes, comprising 62% of all recorded fish species. The next most dominant orders were Perciformes and Decapoda (18%), and the rest of the orders contributed 3% of each (Fig. 2).

When fish species were grouped into families, Cyprinidae constituted the largest share at 20%, followed by Bagridae 14%, Xenocyprididae 9%, Ailiidae 6% and the rest of the families contributed 3% of each (Fig. 3).
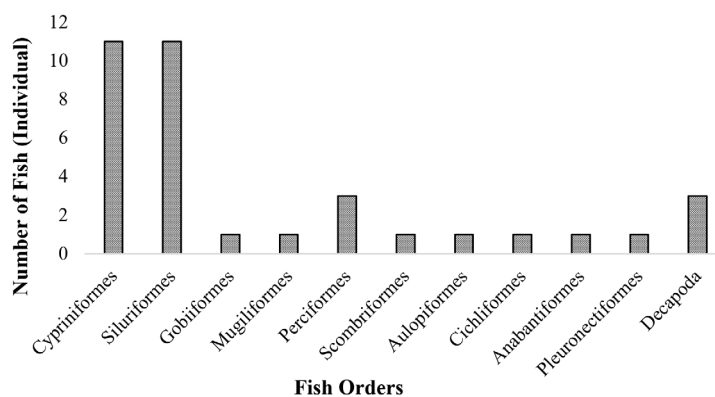

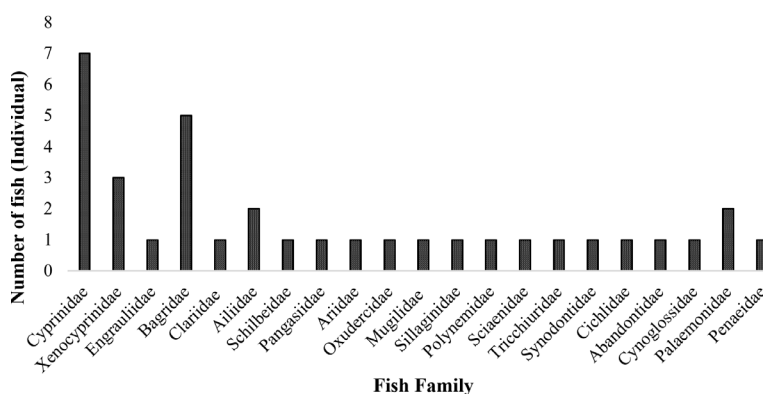**Fig.2.** Diagram representing the number of Fish and Crustaceans species contribution of each order in the study area.

Fig.3. Diagram representing the percentage contribution of each family in the study area.

Table 2. Fish and Crustaceans diversity in the Alexander Fish Market, Ramgati, Lakshmipur.

Scientific Name	Total Length (Average), cm	Economic Importance	Availability in the study area	Distribution	IUCN Status (2000)	IUCN Status (2015)
Labeo rohita	68	Food	Common	Beels, ponds and streams	NT	LC
Labeo catla	70	Food	Common	Rivers, lakes and ponds	NT	LC
Cirrhinus cirrhosus	39	Food	Common	Rivers, lakes and ponds	NT	NT
Labeo bata	61	Food	Common	Ponds, rivers and estuaries	EN	LC
Puntius sophore	08	Food	Common	Rivers, beels and ponds	NT	LC
Systomus sarana	42	Food	Rare	Rivers, lakes and beels	CR	NT
Labeo boggut	29	Food	Common	Rivers	DD	VU
Hypophthalmichthys molitrix	90	Food	Common	Rivers	NT	NL
Gudusia chapra	14	Food	Moderate	Rivers and estuaries	NT	VU
Tenualosa ilisha	23	Food	Common	Marine water	NT	LC
Coilia dussumieri	12	Food	Rare	Estuaries and Bay of Bengal	NT	LC
Batasio batasio	10	Food	Rare	Rivers and canals	NT	NT
Hemibagrus menoda	15	Food	Common	Rivers, tributaries and ponds	NT	NT
Mystus gulio	10	Food	Moderate	Freshwater bodies	DD	NT
Clarias batrachus	51	Food	Rare	Ponds, canals and swamps	NT	LC
Rita rita	60	Food	Rare	Fresh and brackish water	CR	EN
Sperata aor	70	Food	Rare	Canals, lakesand ponds	VU	VU
Clupisoma garua	20	Food, Game	Common	Large freshwater bodies and tidal rivers	CR	EN
Eutropiichthys vacha	20	Food, Game	Common	Tidal rivers and lakes	CR	LC
Pangasius pangasius	15	Food	Common	Rivers and estuaries	CR	EN
Arius gagora	27	Food	Common	Estuaries and tidal rivers	NT	NL
Ailia coila	16	Food	Rare	Rivers	NT	LC
Sillaginopsis panijus	27	Food	Common	River and estuaries	NT	LC
Apocryptes bato	16	Food	Rare	Streams, estuaries and lagoons	NT	LC
Rhinomugil corsula	22	Food	Moderate	Rivers and estuaries	NT	LC
Otolithoides pama	30	Food	Common	Rivers and estuaries	NT	LC
Polynemus paradiseus	23	Food	Common	Sea and rivers	NT	LC
Trichiurus lepturus	198	Food	Rare	Bay of Bengal	NT	NL
Oreochromis mossambicus	32	Food	Common	Lakes, pools and estuaries	NT	NL
Anabas testudineus	10	Food	Rare	Lakes, canals and swamps	NT	LC
Harpodon nehereus	25	Food	Common	Estuaries and coastal water	NT	NT
Cynoglossus Cynoglossus	8.5	Food	Common	Estuaries and tidal rivers	NT	LC
Macrobrachium rosenbergii	30.3	Food	Common	Rivers, estuaries and canals	DD	LC
Macrobrachium dolichodactylus	6.6	Food	Common	Rivers, estuaries and canals	DD	LC
Penaeus monodon	21.9	Food	Common	Estuaries and marine water	DD	LC

Note: EN. Endangered; VU. Vulnerable; CR. Critically endangered; NT: Not threatened, and DD: Data deficient, LC. Least Concern, NL. Not Listed.

3.2. Marketing Chain of fish

The fish marketing chain typically begins with the fish farmer and involves several intermediaries before reaching the end consumer. Three distinct marketing channels were observed in the study area. The first type involves a sequence from fisherman to bepary, then aratdar, wholesalers, retailer, and finally the consumer. The second type includes a route from fisherman to local fish traders, then wholesalers, retailer, and consumer. The third type comprises a direct path from fisherman to retailer, and then to the consumer (Fig. 4). At each stage of the marketing process, the value of fish increases by 5-7%.

3.3. Personnel involved in fish marketing in the landing centre

Intermediaries are fish traders who do not sell fish directly to consumers. Instead, they purchase fish to sell to other traders or intermediaries. There are different intermediaries in the fish marketing system.

Fish harvester group. These groups consist of individuals who harvest fish from ponds, canals, ditches, floodplains, haors, baors, rivers, and other water bodies. Generally, the harvester group earns a 3-5% commission from the market price of fish.

Beparies are professional traders who buy fish from farmers or fishermen and sell them in the wholesale market. They earn profit through the buying and selling process.

Aratders act as agents in the wholesale market. They receive a commission from the fish purchased by retailers. This commission is sometimes paid in cash or after the retailers sell the fish to consumers. Approximately 10 aratders were recorded in the Alexander Fish Market.

Auctioneers are responsible for auctioning fish in the wholesale market. When intermediaries bring fish into the wholesale markets from various sources, auctioneers initiate the auction process. They start with a minimum bid and increase the bid until the highest bidder wins the fish. Auctioneers typically receive a fixed amount or 1-2% of the sold price.

Fish retailers. Retailers are those who buy fishes from intermediaries and sell them to ultimate consumers. Their role involves procuring supplies and displaying them in ways that are convenient for consumers. Retailers often buy fish through open auctions and categorize the fish by species or size before selling them.

Local fish traders. Farmers sell their fish to wholesalers through local traders. Local traders are typically based in local markets near the fish farming com-

munities. These traders may have informal agreements with wholesalers to supply specific quantities despite lower profit margins. The fish then reach consumers through retailers. During the study period, about 20-25 retailers were recorded at the Alexander Fish Market, Lakshmipur. Some individuals also worked as day laborers for retailers. No women's participation was recorded in this marketing channel.

3.4. Marketing cost of retailers in fish market

Icing, watering, packaging, and transportation were all included in the marketing costs. The highest marketing cost was recorded in June at BDT 107/day, while the lowest was in December at BDT 89/day. For the other months, the costs were BDT 103/day in July, BDT 98/day in August, BDT 95/day in September, BDT 96/day in October, and BDT 92/day in November. On average, the marketing cost was estimated to be BDT 97.14/day (Fig. 5).

3.5. Income and profit of fish retailers

The income and profit of fish retailers depended on daily fish supply, marketing costs, weather, and various occasions. The average daily income of fish retailers was recorded as follows: BDT 786/day in June, BDT 787/day in July, BDT 805/day in August, BDT 811/day in September, BDT 795/day in October, BDT 783/day in November, and BDT 782/day in December. Notably, the highest average income and profit were observed in September (BDT 811/day and BDT 697/day, respectively), while the lowest were in December (BDT 782/day and BDT 675/day, respectively). Consequently, the overall average daily income of the retailers was calculated to be BDT 792.71/day, with an average daily profit of BDT 695.57/day in the study area (Fig. 6).

3.6. Amount and prices of available fish species

According to the current survey, a fish retailer sold an average of 45 kg of fish daily. The total daily fish supply was approximately 1.8-2.0 metric tons (average 40 retailers × 45 kg). Fish prices were largely influenced by supply and demand. It was observed that the prices of the same fish remained relatively consistent throughout the study period. The average price per kilogram (with ±SD) of all available fish species in the Alexander fish market is listed in Table 3. The average prices per kilogram for Ilish (1200±17.89), Ayre
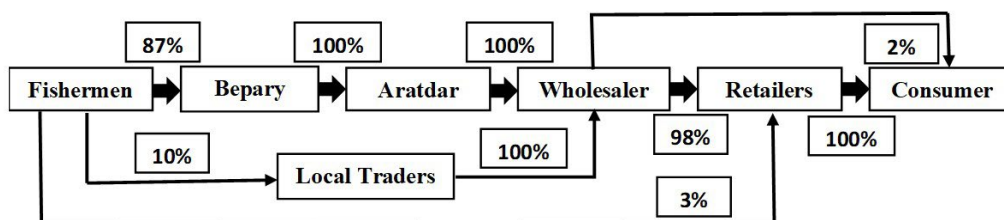

Fig.4. Diagram representing the fish distribution chain from fishermen to consumer.

(915 ± 8.64), Bacha (847 ± 8.24), Ghagra (816 ± 7.94), Khorsula (830 ± 5.63), Golda Chingri (855 ± 8.45), Bagdha Chingri (712 ± 7.11), Chiring (715 ± 6.15), and Gang Tengra (725 ± 8.25) were recorded as higher compared to other fish species (Table 3). However, the supply of carp species was found to be higher than that of other species.

3.7. Constraints of Fish Marketing

There is minimal effort to enhance the quality of fish sold in the market due to the persistent high demand surpassing supply. Consequently, fish of any quality are readily sold, despite traders encountering significant issues such as insufficient capital, high transportation costs, prolonged exposure to high temperatures, improper use of ice, rough and unhygienic handling methods, contamination, and a lack of knowledge about quality standards among the involved parties.

4. Discussion

The total number of fish and crustacean species observed at the Alexander Fish Market in Lakshmipur was 32 species and 3 species respectively. Aktar et al. (2013) reported a higher number of fish species compared to our findings, potentially due to their consideration of seven markets. However, Afroz (2007) and Chakraborty (2023) reported a similar number of fish species to our study. Cypriniformes and Siluriformes emerged as the order with the highest number of fish species, followed by Perciformes, Decapoda, Gobiiformes, Mugiliformes, Scombriformes, Cichliformes, Aulopiformes, Anabantiformes, and Pleuronectiformes.

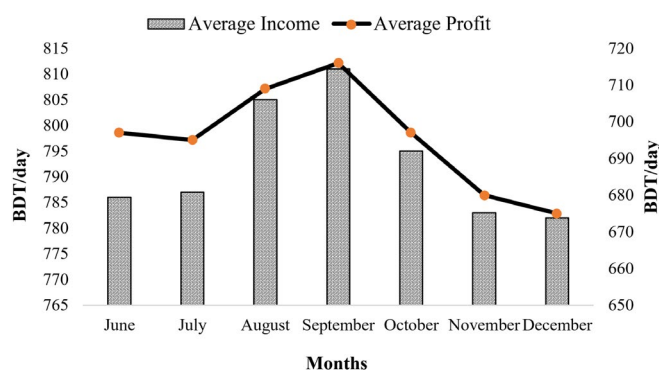**Fig.5.** Marketing cost of retailers in the Alexander fish market.

Fig.6. Average daily income (BDT/day) and average daily profit (BDT/day) of retailers across different months at Alexander fish market, Lakshmipur.

Table 3. Prices of available fish and crustacean species in Alexander Fish Market, Ramgati, Lakshmipur.

Sl. No.	Species (Local Name)	Price (Mean ± SD)	Sl. No.	Species (Local Name)	Price (Mean ± SD)
1.	Rohu	335 ± 5.16	19.	Bacha	847 ± 8.24
2.	Catla	300 ± 4.14	20.	Pangas	180 ± 2.90
3.	Mrigal	237 ± 4.23	21.	Ghagra	816 ± 7.94
4.	Bata	251 ± 8.94	22.	Baspata	627 ± 5.24
5.	Puti	200 ± 3.23	23.	Tulardandi	610 ± 5.63
6.	Sarputi	220 ± 2.89	24.	Chiring	715 ± 6.15
7.	Gonia	358 ± 3.23	25.	Khorsula	830 ± 5.63
8.	Silver carp	204 ± 2.41	26.	Poa	155 ± 2.88
9.	Chapila	180 ± 2.80	27.	Taposi	548 ± 4.39
10.	Ilish	1200 ± 17.89	28.	Chhuri	800 ± 6.45
11.	Olua	110 ± 4.21	29.	Tilapia	180 ± 2.89
12.	Tengra	515 ± 5.63	30.	Koi	619 ± 2.89
13.	Gang Tengra	725 ± 8.25	31.	Loittya	150 ± 3.43
14.	Nuna Tengra	415 ± 4.76	32.	Kukur Jeeb	425 ± 5.63
15.	Magur	522 ± 3.31	33.	Golda Chingri	855 ± 8.45
16.	Rita	790 ± 7.56	34.	Goda Chingri	813 ± 6.55
17.	Ayre	915 ± 8.64	35.	Bagda Chingri	712 ± 7.11
18.	Gagra	758 ± 7.16			

Notably, the Cyprinidae family exhibited the highest species count (7 species) and individual abundance, followed by the Bagridae family exhibited the 2nd highest (5 species), and the Xenocyprinidae family exhibited the 3rd highest species count (3 species) and individual abundance among the observed fish. Out of the recorded species, 5 were classified as Critically Endangered, 5 as Data deficient, 1 as Vulnerable, 1 as Endangered, and the remaining 23 were categorized as Not Threatened, based on IUCN classification (IUCN, 2000). While in the updated list on 2015, a total 19 species were reported as Least Concern, 6 as Not Threatened, 3 as Vulnerable, 4 as Not Listed and 3 as Endangered (IUCN, 2015).

4.1. Fish Marketing Systems

In the study area, three distinct marketing channels were identified. Similar observations were made by Mia (1996) in the Mymensingh district, while Khan (2004) reported four types of marketing channels in the Jessore district. At the Alexander Fish Market, wholesalers typically procure fish from araders or beparies, who directly obtain fish from fish farmers or fishermen. These fish are then sold to wholesalers with the assistance of commission agents. Wholesalers, in the next stage, auction off their fish to retailers, who, in turn, sell them to local consumers. Occasionally, local retailers directly purchase fish from fishermen and sell them to consumers. Suppliers typically employ vans, boats, buses, trucks, tempos, pickups, or even rickshaws to transport fish to wholesalers.

4.2. Average marketing cost, income and profit of retailers

In the current study, the average daily marketing cost for retailers was estimated at BDT 97.14, with the highest value recorded in July (BDT 107) and the lowest in December (BDT 89). Aktar et al. (2013) reported a higher average cost (BDT 141.2) in the Noakhali district, possibly due to their inclusion of seven markets, which might have influenced the higher value. However, the average daily income and profit for fish retailers were higher in the present study, recorded at BDT 792.71 and BDT 695.57 respectively, compared to Aktar et al. (2013) in Noakhali and Rashid (2006) in Mymensingh. This discrepancy could be attributed to variations in consumer purchasing power and population density across different regions.

4.3. Amount and prices of available fish and crustacean species

Based on the findings of the present study, the daily fish supply was approximately 1.8-2.0 metric tons, calculated from an average of 40 retailers each selling 45 kg of fish. Certain fish species, including Ilish, Ayre, Bacha, Ghagra, Khorsula, Golda Chingri, Bagdha Chingri, Chiring, and Gang Tengra, commanded higher prices compared to others. Rashid (2006) reported higher daily fish supplies in municipal markets and

Maijdee bazar, estimated at 3-3.2 metric tons and 1-1.1 metric tons, respectively. These variations in supply might be attributed to differences in location.

4.4. Constraints of Fish Marketing

During the survey, fish retailers highlighted several constraints in fish marketing. These include insufficient capital, elevated transportation costs, prolonged exposure to high temperatures, improper ice usage, rough handling practices leading to contamination, and inadequate knowledge regarding quality standards among stakeholders. Similar challenges in fish marketing were also observed by Mia (1996) and Rokeya et al. (1997). The involvement of numerous intermediaries in the marketing chain often leads to higher prices for consumers, while fishers themselves may not receive fair prices for their products, with the majority of profits going to intermediaries (Alam et al., 2010).

5. Conclusions

Throughout the study period, a total of 32 fish and 3 crustacean species were recorded, representing 35 genera, 21 families and 11 orders. Present study found that the order Cypriniformes (11 species) and Siluriformes (11) and the family Cyprinidae had the highest contributions, followed by the orders, Perciformes (3) and several others. A total of 3 species were recorded as EN, 3 as VU, 4 as NL, 6 as NT, and 16 as LC (IUCN, 2015). The dominant order, Cypriniformes and Siluriformes, comprised the highest percentage of fish species, followed by the orders, Perciformes, and others. These fish typically inhabit estuaries, rivers, canals, and the Bay of Bengal. Fish availability varies seasonally. The primary causes of the decline in fish populations include overfishing, river siltation, the reckless use of agrochemicals, and the introduction of foreign species, all of which negatively impact fish populations by increasing mortality, spreading diseases, and reducing fertility. In the current study area, three categories of marketing channels were identified. The basic pattern involves intermediaries, known locally as aratdars, who purchase fish from farmers and fishermen, bring it to market, and sell it to wholesalers, known as beparies. Retailers bid at auction to purchase fish from wholesalers, then transport the fish to specific markets where they sell it to consumers. The main issues identified in the Alexander Fish Market were inadequate funding, unsanitary handling practices, contamination, and poor icing facilities. Therefore, further research and understanding of fish marketing, along with government support, institutional and organizational support, and extension services, are necessary.

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Conflict of interest

The authors declare no conflicts of interest.

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