



Study on Marine Water Food Fish Biodiversity Across the Fish Market in Jabalpur City, Madhya Pradesh, Central India

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ABSTRACT: Marine fishes are good source of essential macro- and micronutrients and major food items not only in coastal areas of the country but also different parts of the country. The present study was conducted at Jabalpur Fish Market, Madhya Pradesh & attempts this study to investigate the availability of Marine water food fish species across the fish market. The present survey was carried out over one year duration 2022 to 2024. A total of 34 species, 27 genera belonging to 18 families and 09 orders of Marine water food fishes were recorded from the Fish Market of Jabalpur during the study period. The study reveals order Perciformes dominant with (12 species), followed by Scombriformes (9 species), Clupeiformes (5 species), Carcharhiniformes and Pleuronectiformes (2 species each), Anguilliformes, Aulopiformes, Carangiformes and Gonorynchiformes (one species each) were recorded. The Orders Perciformes were made up to 36% with 8 families and 12 species followed by Scombriformes 27% with 2 families and 9 species, Clupeiformes 15% with 2 families and 5 species, Pleuronectiformes and Carcharhiniformes 5.88% with 2 species and 2 families. The other orders Carangiformes Aulopiformes Anguilliformes and Gonorynchiformes 2.94% were one species. The IUCN Status of different variety of marine edible fishes was also discussed in the paper. The study revealed that there were noteworthy variations found in the Marine ichthyofaunal diversity in the Fish market of Jabalpur, Madhya Pradesh.

Keywords: Marine water, Food Fishes, Fish Biodiversity, Fish market, Jabalpur, Madhya Pradesh.

INTRODUCTION

Seafood is widely recognized as healthy food. The UN Food and Agriculture Organization (FAO) reports, “Fish is a food of excellent nutritional value, providing high quality protein and a wide variety of vitamins and minerals, including vitamins A and D, phosphorus, magnesium, selenium and iodine”. Often referred to as “rich food for poor people,” fish provides essential nourishment, especially quality proteins and fats (macronutrients), vitamins and minerals (micronutrients). Marine water fishes are a rich source of essential amino acids, polyunsaturated fatty acids, essential vitamins and minerals. The essential nutrients found in marine fish species are bioavailable and is easily absorbed by the body (FAO, 2020).

India is one among 12 mega-biodiversity countries and 25 hotspots of the richest and highly endangered ecoregions of the world. In terms of marine environment, India has a coastline of about 8000 km, an Exclusive Economic Zone of 2.02 million km² (Venkataraman and Raghunathan 2015). Fish known from the fresh and marine waters of India comprise 3231 valid species constituting 9.7 percent of the total number of about 33,059 species of fish known from the world, of which

the marine fish diversity alone accounts for 7.4 percent. Of the total fish diversity known from India, the marine fishes constitute 75.6 percent, comprising of 2443 species belonging to 927 genera, under 230 families of 40 orders (Gopi and Mishra 2015).

In India, the fish eating population is increasing the study, Fish consumption in India unveiled by the Indian Council of Agricultural Research, Ministry of Agriculture and Farmers’ Welfare, Government of India and World Fish also found that 72.1% of the Indian populations, equivalent to 967 million individuals, incorporate fish into their diet. Growing awareness of the nutritive value of fish and the subsequent shift in the dietary pattern has increased the demand for fish in the local markets (Sathiadhas *et al.*, 2011; Sujatha, *et al.*, 2014; Shyam *et al.*, 2020). With the introduction of refrigerated containers and development of infrastructural facilities like roads and acceptance of iced fish by domestic consumers has improved the internal marketing system, which is far away from the shore. Usually fresh fish is transported from different states after washing with water and icing (Shyam *et al.*, 2021).

Most of the fish production and capture are sold in the local markets of India (Narayanakumar and Sathiadhas

2005; Kumar *et al.*, 2008). Diversity in the species complex, typical of tropical waters and co-existence of different fish and shellfish species in the same ground are important features of Indian Marine Biodiversity (Joshi, 2015). The fisheries sector plays an important role in Indian economy and its contribution to the GDP is about one percent (Paunikar *et al.*, 2012; Sathianandan, 2013; Avik Bhanja *et al.*, 2023). Marine fishes play a significant role in human economies worldwide. They are a vital source of food, support fishing industries (Chakraborty *et al.*, 2013; Palanikumar *et al.*, 2014; Ali *et al.*, 2020).

Madhya Pradesh state is one of the most important state and pronounced “Central Province”; abbreviated (M.P), often called the “Heart of India” is a state in central India, is the second largest state by area. The state possesses one of the oldest mountain ranges the Vindhyas (1,400 million years old) and the Satpuras (1,000 million years old) other than Himalayas⁷, which are the mother source of great river basins. The state is landlocked.

Jabalpur is the one of the important city of Madhya Pradesh state and it is situated almost at heart of India, Central India and gets a very good facility for its topographical position. The place is nationally and internationally renowned due to Ordnance factories, several Government and State Research Institute and other several Governments and NGO offices. Due to largest railway establishment in Jabalpur town, an influx of population is always here from different states. Therefore, their food preference and cultural practices is different. Present survey is relevant to depicts fish diversity different market place of Jabalpur preference of the town dwellers and socio-economic status of market associated people. The communication facilities on road and railways are well connected and fish markets are situated near the Jabalpur Railway Station and also at the side of national and state highways. To transport marine fish over larger distances from other states like Andhra Pradesh, Gujarat, Maharashtra and West Bengal and also from other states are well connected by road and railways. Several studies on species diversity of edible fishes of the fish market of the country, but no information of species diversity of edible marine water fishes in Jabalpur fish market except workout on edible freshwater fishes in the fish market of the Jabalpur.

The fish marketing survey is revealed to explore marine fish diversity of different market places of Jabalpur preference for the city dwellers and socio-economic status of market associated people and preference for the people of the city to enjoy different variety of marine fishes and include in diet for healthy life.

MATERIALS AND METHODS

The study was carried out indifferent fish vendors in the fish markets of Jabalpur city such as Delight area (Main Fish Market), 23.16520 N, 79.95070 E, Near Railway station of Central Jabalpur. The study was guided for a period for more than a year from 2022 to 2024. The data have been collected from 2022 to 2024 thoroughly from 4 to 6 fish vendors, who exclusively keep marine

fishes. The study areas were regularly visited for fish species supply on the day and relevant marketing information like transportation of which places, common name, supply and demand and price/ cost of different fish species.

The different marine fish species collected from the market from the different vendors. The 5 to 10 specimens of each species of marine food fishes brought in the Ichthyology laboratory of Central Zone Regional Centre, Zoological Survey of India, Jabalpur and preserved in 10% formaldehyde and the each specimen were identified with various suitable field guides and literatures. The morpho-meristic identifying system was followed by Talwar and Jhingran (1991); Jayaram (1999) and also the www.fishbase.org. Illustrations of marine fishes by Talwar and Kacker (1994); Talwar *et al.* (1992); Jhingran (1991) helped in the identification of the collected fishes. Conservation status of the identified species was presented in this study as per the IUCN-Red Data List (IUCN, 2022).web-based keys, Fish Base (www.fishbase.in), and Wikipedia). Fish Base (2022). Conservation status of every species was recorded as per the IUCN report (IUCN, 2022) and World Register of Marine Species (www.marinespecies.org) (WoRMS, 2022).

RESULT AND DISCUSSION

The present study revealed of 34 marine fish species, belonging to 27 genera, 17 families under 09 orders from the fish market of Jabalpur city and The IUCN status, price/kg and demand of the fishes were presented in (Table 1). The orders Perciformes 12 species followed by Scombriformes 9 species, Clupeiformes 05 species, Pleuronectiformes 2 species, Carangiformes Carcharhiniformes, Aulopiformes Pleuronectiformes, Anguilliformes and Gonorynchiformes one species each. The orders Perciformes were dominate with 12 species 9 genera under 8 families, followed by Scombriformes 9 species with 6 genera under two family Clupeiformes 05 species, with 5 genera under 2 families, Pleuronectiformes and Carcharhiniformes, 2 species with one genus under one family and other orders Carangiformes Aulopiformes Pleuronectiformes, Anguilliformes and Gonorynchiformes were one species, one genus under one family (Fig. 1&2).

The results of the present study show order Perciformes dominant group in the assemblage composition contributing (35.29%), Scombriformes contribute (26.47%) followed by Clupeiformes (14.70%), Pleuronectiformes and Carcharhiniformes, (5.88%) and orders Carangiformes Aulopiformes Pleuronectiformes, Anguilliformes and Gonorynchiformes (1 species, 2.94%, each) respectively.

The family Scombridae was dominant with 7 species under the orders Scombriformes, the other family is Stromateidae with two species. The Orders Perciformes were made up 8 families namely Epinephelidae, Sciaenidae, Nemipteridae and Haemulidae with 2 species each and other families Polynemidae, Lactariidae, Latidae and Sillaginidae with one species each. The family Dorsomatidae was made up with three

species and Engraulidae with 2 species under the order Clupeiformes. The families Carcharhinidae and Cynoglossidae with 2 species each and other families Carangidae, Synodontidae, Anguillidae and Chanidae made up with one species under different orders.

The IUCN status of marine fishes are Least Concern=20, Near Threatened=4, Not Evaluated=1, Vulnerable=4, Endangered=1, Critically Rare=1, DD: Data deficient=3 available in Jabalpur fish market.

The most of the marine fish species price are between 250-400 per kg, but some fish species are high value and between 600-1200 per kg in the fish market of the Jabalpur. The high demand and highest price fish species are *Tenualosa ilisha*, *Scomberomorus commerson*, *Scomberomorus guttatus*, *Pampus chinensis*, *Pampus argenteus*, *Gymnosarda unicolor* and *Parastromaetus niger*.

The survey also indicated that the 13 fish (38.23%) species have high demand whereas, 10(29.41%) species moderate and 11(32.35%) lowest demand.

There is variety of marine water fishes found in the Jabalpur market. The major pelagic fishes include mackerel, tuna, sardine, anchovies, ribbon, carangids etc. and major demersal fishes includes sharks, breams,

rays, soles, groupers, snapper. The different variety of fishes found in different season in the fish market of Jabalpur. The fishes were found here as ice preserved fish in big containers. The marine fishes are transported from the coastal states and district of the country like, Maharashtra (Mumbai), Gujarat (Veraval and others places), Andhra Pradesh (Vishakhapatnam), West Bengal (Kolkata) and Odisha.

The price of fish fluctuates far higher than any other agricultural commodity due to the changes in supply, prices of other marine fish varieties, uncertainty of fish production and perishability. The price of fish is determined by the interaction of demand and supply at both the producing centres and the consuming markets (Sathiadhas, 1997; Sathiadhas *et al.*, 2012). The most of the marine fish consumption low as compared to fresh water fishes in the Jabalpur fish market. The price of the marine fishes are very high as compared to fresh water fishes, so people of the Jabalpur city purchase and consume the low price freshwater fishes. The marine water fishes are most preferred by middle and high society's peoples as compared to low income groups.

Table 1: Marine water fishes identified from the fish market of Jabalpur.

Sr. No.	Orders/ Family	Scientific Name	Common Name	IUCN	Rs./ Kg	Demand
1.	Scombriformes/ Stromateidae	<i>Pampus argenteus</i> (Euphrasen, 1788)	Silver pomfret	VU	700-800/	High
2.		<i>Pampus chinensis</i> (Euphrasen, 1788)	Chinese silver pomfret	NE	600-700	Moderate
3.	Scombriformes/ Scombridae	<i>Gymnosarda unicolor</i> (Ruppell, 1836)	Dogtooth Tuna	LC	600-800	High
4.		<i>Euthynnus affinis</i> (Cantor, 1849)	Tuna Kawakawa	LC	800-1200	High
5.		<i>Scomberomorus commerson</i> (Lacepede, 1800)	Narrow-baardspanish mackerel (Surmai)	NT	700-800	High
6.		<i>Scomberomorus guttatus</i> , Bloch & Schneider, 1801	Indo pacific Spanish king mackerel (Surumai)	DD	700-800	High
7.		<i>Auxis thazard</i> (Lecepede, 1800)	Frigate Tuna	LC	200-300	Moderate
8.		<i>Rastrelliger kanagurta</i> (Cuvier, 1816)	Indian Mackerel	LC	300-400	High
9.		<i>Rastrelliger faughni</i> Mastui, 1967	Island Mackerel	VU	200-350	High
10.	Carangiformes /Carangidae	<i>Parastromaetus niger</i> (Bloch, 1795)	Black Pomfret	LC	600-700	High
11.	Perciformes /Epinephelidae	<i>Epinephelus coioides</i> (Hamilton, 1822)	Orange spotted grouper	LC	250-300	High
12.		<i>Epinephelus longispinis</i> (Kner, 1864)	Longspine Grouper	LC	300-400	High
13.	Perciformes / Sciaenidae	<i>Protonibea diacanthus</i> (Lecepede, 1802)	Black spotted croaker	NT	200-300/	Moderate
14.		<i>Otolithes ruber</i> (Bloch & Schneider, 1801)	Tiger-toothed Croaker	LC	200-250	Low
15.	Perciformes /Polynemidae	<i>Eleutheronema tetradactylum</i> (Shaw, 1804)	Four finger threadfin	EN	250-300	Low
16.	Perciformes /Lactariidae	<i>Lactarius lactarius</i> (Bloch & Schneider, 1801)	False trevally	DD	200-300	Low
17.	Perciformes /Latidae	<i>Lates calcarifer</i> (Bloch, 1790)	Barramundi/ Asian sea bass/Bhetki	LC	200-350	High
18.	Perciformes /Nemipteridae	<i>Nemipterus bipunctatus</i> (Valenciennes, 1830)	Delagoa Threadfin breams	LC	200-250	Moderate
19.		<i>Nemipterus randalli</i> Russell, 1986	Randall's threadfin	LC	300-350	Moderate

			bream			
20.	Perciformes/ Haemulidae	<i>Pomadasys furcatus</i> (Bloch & Schneider, 1801)	Banded Grunter	LC	200-250	Low
21.		<i>Pomadasys kaakan</i> (Cuvier, 1830)	Javelin Grunter	LC	200-250	Low
22.	Perciformes/ Sillaginidae	<i>Sillago sihama</i> (Forsskal, 1775)	Silver sillago	LC	200-250	Low
23.	Clupeiformes/ Dorsomatidae	<i>Sardinella gibbosa</i> (Bleeker, 1849)	Goldstripe sardinella	LC	200-250	High
24.		<i>Tenualosa ilisha</i> (Hamilton, 1822)	Hilsha Shad	LC	800-1200	High
25.		<i>Anodontostoma chakunda</i> (Hamilton, 1822)	Chakunda gizzard shad	LC	200-250	Low
26.	Clupeiformes/ Engraulidae	<i>Stolephorus indicus</i> (van Hasselt, 1823)	Indian anchovy	LC	160-180	Low
27.		<i>Coilia dussumieri</i> Valenciennes, 1848	Gold spotted Anchovy	LC	200-250	Low
28.	Carcharhiniformes /Carcharhinidae	<i>Scoliodon laticaudus</i> Muller & Henle, 1838	Indian Dog Shark	NT	300-400	Moderate
29.		<i>Rhizoprionodon acutus</i> (Rüppell, 1837)	Milk Dog Shark	VU	300-400	Moderate
30.	Aulopiformes / Synodontidae	<i>Harpadon nehereus</i> (Hamilton, 1822)	Bombay Duck	NT	200-300	Moderate
31.	Pleuronectiformes / Cynoglossidae	<i>Cynoglossus macrolepidotus</i> (Bleeker, 1851)	Sole	DD	200-300	Moderate
32.		<i>Cynoglossus macrostomus</i> , Norman, 1928	Malabar tongue sole	VU	300-400	Low
33.	Anguilliformes /Anguillidae	<i>Anguilla Anguilla</i> Linnaeus, 1758)	European eel	CR	300-400	Low
34.	Gonorynchiformes/Chanidae	<i>Chanos chanos</i> Forsskal, 1775	Milkfish	LC	300-400	Moderate

LC: Least Concern, NT: Near Threatened, NE: Not Evaluated, VU: Vulnerable, EN: Endangered, NT: Near Threatened, DD: Data deficient



Fig. 1. The different Orders with Species of Marine fish diversity in Fish Market of Jabalpur.

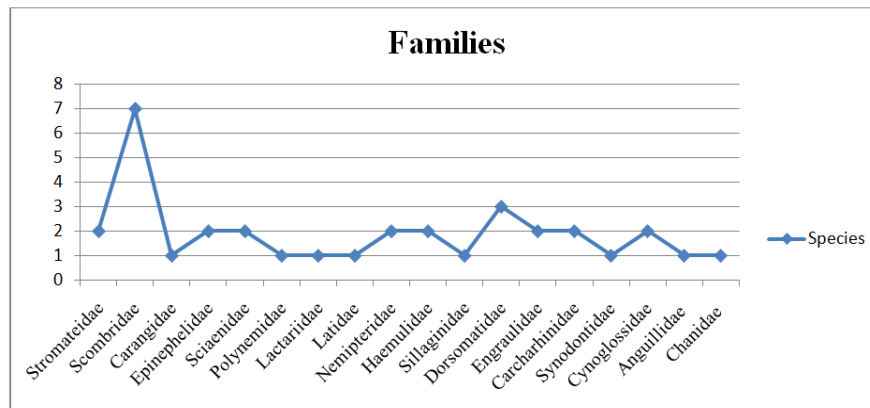
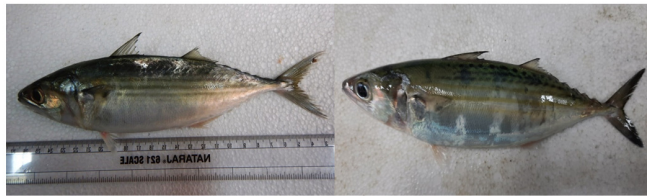


Fig. 2. The different Families with Species of Marine fish diversity in Fish Market of Jabalpur.

Edible Marine Fish diversity in Fish Market of Jabalpur, Madhya Pradesh



Rastrelliger kanagurta (Cuvier, 1816)

Rastrelliger faughni Mastui, 1967



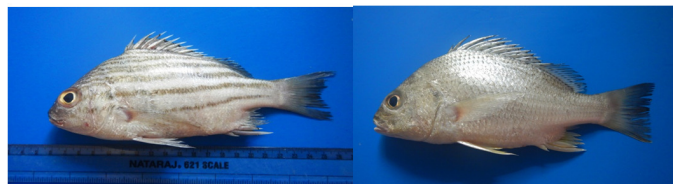
Sardinella gibbosa (Bleeker, 1849)

Sillago sihama (Forsskal, 1775)



Anodontostoma chakunda (Hamilton, 1822)

Stolephorus indicus (van Hasselt, 1823)



Pomadasys furcatus (Bloch & Schneider, 1801)

Pomadasys kaakan (Cuvier, 1830)



Chanos chanos Forsskal, 1775

Coilia dussumieri Valenciennes, 1848



Scoliodon laticaudus Müller & Henle, 1838

Pampus argenteus (Euphrasen, 1788)



Lactarius lactarius (Bloch & Schneider, 1801)

Nemipterus bipunctatus (Valenciennes, 1830)



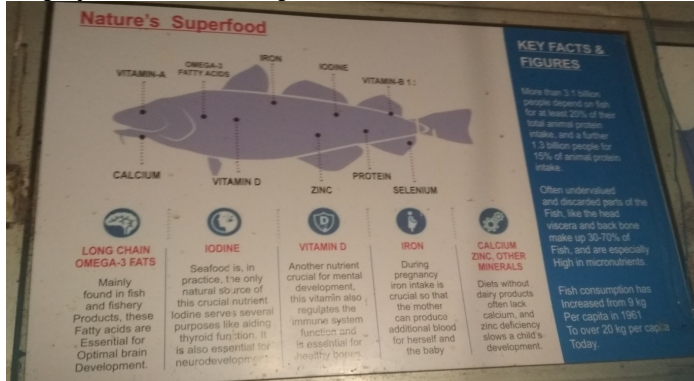
Gymnosarda unicolor (Ruppell, 1836)

Otolithes ruber (Bloch & Schneider, 1801)

Different Marine Fishes kept in ice for selling in fish market of Jabalpur



Board display the Economic Importance of Fishes in Fish Market of Jabalpur



CONCLUSIONS

According to our survey, 34 species, 27 genera belonging to 18 families and 09 orders of Marine water food fishes were recorded from the fish market of Jabalpur city. The results showed the present study order Perciformes dominant group in the assemblage composition contributing (35.29%), Scombriformes contribute (26.47%) followed by Clupeiformes (14.70%), Pleuronectiformes and Carcharhiniformes, (5.88%) and orders Carangiformes Aulopiformes Pleuronectiformes, Anguilliformes and Gonorynchiformes (1 species, 2.94%, each) respectively.

Marine food fishes play important role in the economy of the country. The fish market where the different varieties of marine and fresh water fishes found and

peoples of the different section purchase and consume. The Marine food fishes are the integral part of diet of human beings in the different parts of the country, which can be consumed by peoples for their requirement of proteins and other essential elements to become healthy.

FUTURE SCOPE

The article based on the survey study to explore biodiversity of Marine water food fishes available in the fish market of Jabalpur city, Madhya Pradesh. Since there are no previous information regarding studies on biodiversity of Marine food fish availability at this fish market of important of city of central India, other researchers can collect a lot of information based on the study of that place later on. This research will serve as a

point of observation to examine the availability of fish and the status of the Marine fish diversity in other fish market of the country.

It can be further study on the biodiversity of Marine food fishes in different markets places of the states and country. It will be helpful for future generation for further study to assess the Marine fish biodiversity in various market place of the country.

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Conflict of Interest. None.

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