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Research Paper

Fish trade, price realization and species diversification across markets in Maharashtra

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ABSTRACT : The study was conducted in 22 well-structured fish markets across Maharashtra state including landing centres, retail and wholesale markets to assess the trade of commercially important fishes. The field survey was conducted during the period of August 2019- March 2020 using a structure field survey tool-Fish Market Prices (FMP). During the survey period, total of 97 species of fish fauna was traded which included 61 marine species, 21 fresh water species and 15 brackish water species. It has been observed that among the total species traded/ available across different markets of Maharashtra, inland species (Catla, Rohu, Tilapia, Asian Seabass, Common carp, Grass carp, Silver carp) were the most prominent compared to other fishes. As the theory goes the price and demand of a fish is influenced by market structure, seasonal abundance and origin of species, size and quality. Fish demand was sensitive to the price changes and their availability. The study revealed that the share of Maharashtra to total marine fish production of India has been slackening. The major reason behind the devolution of marine sector is the extreme bad weather events which adversely affected the marine fisheries during 2018. Inaddition lower catch per unit effort and non-availability of fish also resulted towards the decline of marine fish landings. The study also offers scope for the Government to intervene in the fish markets so that more fish species become available, accessible and affordable to consumers. Creation of infrastructure and provision of infrastructure seems to be the buzz word towards improved marketing efficiency.

KEY WORDS : Diversity Index, Species diversity, Market diversity

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INTRODUCTION :

Fisheries and aquaculture sector play important roles in providing food and income in many developing countries, either as a stand-alone activity or in association with crop agriculture and livestock rearing (Allison, 2011). India is the second largest fish producer in the world with a total production of 13.7 million metric tonnes in 2018-19 of which 65 per cent was from inland sector. Almost 50 per cent of inland fish production is from culture fisheries, which constitutes 6.5 per cent of global fish production. Fishery sector in India has been showing a steady growth in the total gross value added and accounts for 5.23 per cent share of agricultural GDP of our country (Economic Times newspaper 2019). Thus fishery sector plays a predominant strategic role in the economic activity

and food security of our country by its contribution to national income, foreign exchange, food and employment (Shyam *et al.,* 2019). Growth of fish production and development of fisheries sector depends largely on an efficient marketing system.

India has very rich diversity in the marine fisheries resources with more than 1000 species reported in the landings. The total marine fish landings from the main land of India in the year 2019 was 3.56 million tonnes compared to 3.49 million tonnes in 2018, showing a marginal increase of about 73,770 tonnes (2.1%). The landing records in 2019 indicated Tamil Nadu as the major contributor with 7.75 lakh tonnes followed by Gujarat (7.49), Kerala (5.44), Karnataka (5.01) and Andhra Pradesh (2.59).The states such as West Bengal (55%), Andhra Pradesh (34%), Odisha (14.5%), Karnataka (11%) and Tamil Nadu (10.4%) recorded increase in the landings, the marine fish catch decreased in Maharashtra (32%), Goa (44%) and Kerala (15.4%) (CMFRI Annual report 2019).

The Maharashtra State holds a prominent position among Indian states with one of the major coastal states in India with long coastline stretching nearly 720 km along the Arabian Sea. It is the third largest state in the country both in terms of size and population. It comprises of five coastal districts namely, Thane, Greater Bombay, Raigad, Ratnagiri and Sindhudurg. It ranks seventh in the contribution to the marine fish landings of the country which contributes 5.38 per cent of country's fish production (FRAD, 2017). The total fish production showed commendable growth from 1.48 lakh tonnes in 1962-63 to 5.67 lakh tonnes in 2018-19. The fisheries production in terms of value tremendously accelerated from 5.27 crore in 1962- 63 to 7735.10 crore in 2017-18 (Commissioner of Fisheries, 2018-19).

Objective:

The overall objective of the proposed study is to assess the species diversity across the major markets of Maharashtra. However the specific objectives are to

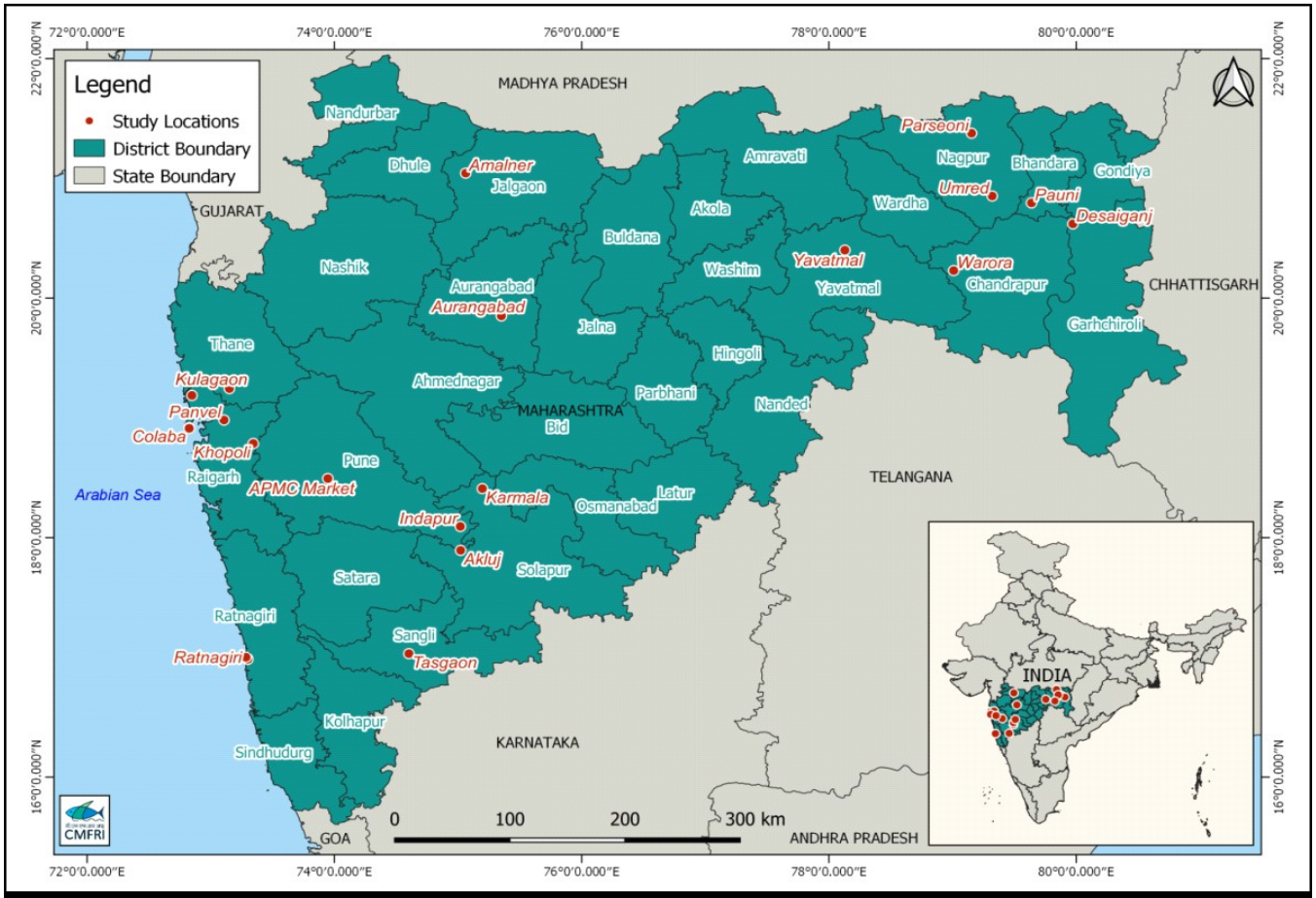


Fig. A : Study area

estimate the species and market diversity in fish trade in Maharashtra and to analyse the price realization of the varied species across the major fish markets of Maharashtra.

MATERIALS AND METHODS :

The present study covered 22 well-structured fish markets across Maharashtra state including landing centres, retail and wholesale markets. The survey was done during the period of August 2019- March 2020. A structured survey schedule tool, Fish Market Price (FMP) was developed for the study. The primary data were collected through regular and systematic weekly (twice or thrice) with the help of trained enumerator mostly from the fisher community. For better clarity of analysis the prices of commercially traded fishes were categorized as weekly prices across size ranges *viz*., small, medium and large. As there were fishes from diverse ecosystem, the selected fishes were categorized as marine and inland.

The average prices and price behaviour of each species (small, medium and large sizes) were identified respectively in the different fish markets across the time period. The max-min prices of the respective markets were also estimated with respect to the different sizes of the species to understand the efficiency of the selected fish markets across the time period. Price structure in the fish markets varied with different factors such as species, size, quality, season etc. The statistical and econometric tools such as diversity index, price analysis, price covariance analysis etc. were utilized for analysing the data. Table A represents the market locations of Maharashtra.

Table A: Study locations

Market	District
Panvel fish market	Raigad
Pauni fish market	Bhandhara
Agashi Market	Palghar
2 fish markets at Ratnagiri city	Ratnagiri
Akluj fish market	Solapur
Amalner fish market	Jalgaon
Colaba fish market	Mumbai
Tasgonfish market	Sangli
Hygienic wholesale fish market	Ratnagiri
Indapur main fish market	Pune
Malad fish market	Mumbai
Parseoni fish market	Nagpur
Aurangabad fish market	Aurangabad
Desaiganj fish market	Gadchiroli
Karmala fish market	Solapur
Umred fish market	Nagpur
Warora fish market	Chandrapur
Kulgaon fish market	Thane
Sassoon dock fish market	Mumbai

Analytical tools:

Species - Market price analytics (*SMP*):

The diversification of market as well as species with respect to the periods have been measured using the simpson index of diversity (SID). Simpson index is commonly used for measurement of diversity, with value ranging 0 to 1. The index ranges between 0-1, tend towards zero when there is specialization and towards one when there is complete diversification. The simpson index of diversity is calculated using the following eq.

SID = 1-i=1n Wi² and W_i= Xii=1n Xi,

where X_i = Value of i^{th} species/ market

W_i = Proportionate value of i^{th} species/ market out of total species/ market.

Price covariance analysis:

The fluctuations of prices were estimated by measuring co-efficient of variation (CV) of marine fish prices using the following formula.

Price covariance = Standard deviation mean*100

RESULTS AND DATA ANALYSIS :

The study areas are highly diversified with fish fauna including both marine and fresh water species. The divergence was quantified for both species wise and market wise using species/market diversity index.

Diversity assessment was derived based on the availability of species across and within markets. Therefore, market diversity designate the number of species available/ traded in a particular market and it ranges from 0 to 1. Likewise the spatial distribution of a particular species across markets denotes the species diversity, which ranges from 0 to 1. More market diversity index indicates that high abundance of fish species are traded within a market and similarly more species diversity index indicates that the spatial spread of a particular

species across markets.

Market and species diversity:

The market diversity assesses (Table 1) results indicates that the average market diversity index of Maharashtra was found to be 0.38 which means that of the 97 species traded 38 per cent of them are available in the different markets of Maharashtra. Of the 22 markets selected high market diversity index were found in Colaba, Desaiganj, Umred, APMC wholesale, Agashi, Pauni, Sassoon dock and Amalner fish markets. Colaba fish market has the highest diversity of 0.49 which indicated that among the 97 species traded 49 per cent are available and accessible in Colaba fish market.

Likewise species diversity encompass of variety of species and abundance of species. The average species diversity of the different markets of Maharashtra was found to be 0.38.Of the 97 species traded across the

Table 1 : Market diversity –Maharashtra

Market	Diversity index	Market	Diversity index
Panvel fish market	0.38	Aurangabad fish market	0.40
Pauni fish market	0.41	Desaiganj fish market	0.46
Agashi Market	0.43	Karmala fish market	0.31
2 fish markets at Ratnagiri city	0.38	Umred fish market	0.46
Akluj fish market	0.29	Warora fish market	0.33
Amalner fish market	0.40	Kulgaon fish market	0.26
Colaba fish market	0.49	Sassoon dock fish market	0.41
Tasgon fish market	0.37	APMC wholesale fish Market	0.45
Hygienic Wholesale Fish Market	0.36	Khopoli wholesale fish Market	0.34
Indapur main fish market	0.37	Yavatmal wholesale fish Market	0.23
Malad fish market	0.36		
Parseoni fish market	0.38		

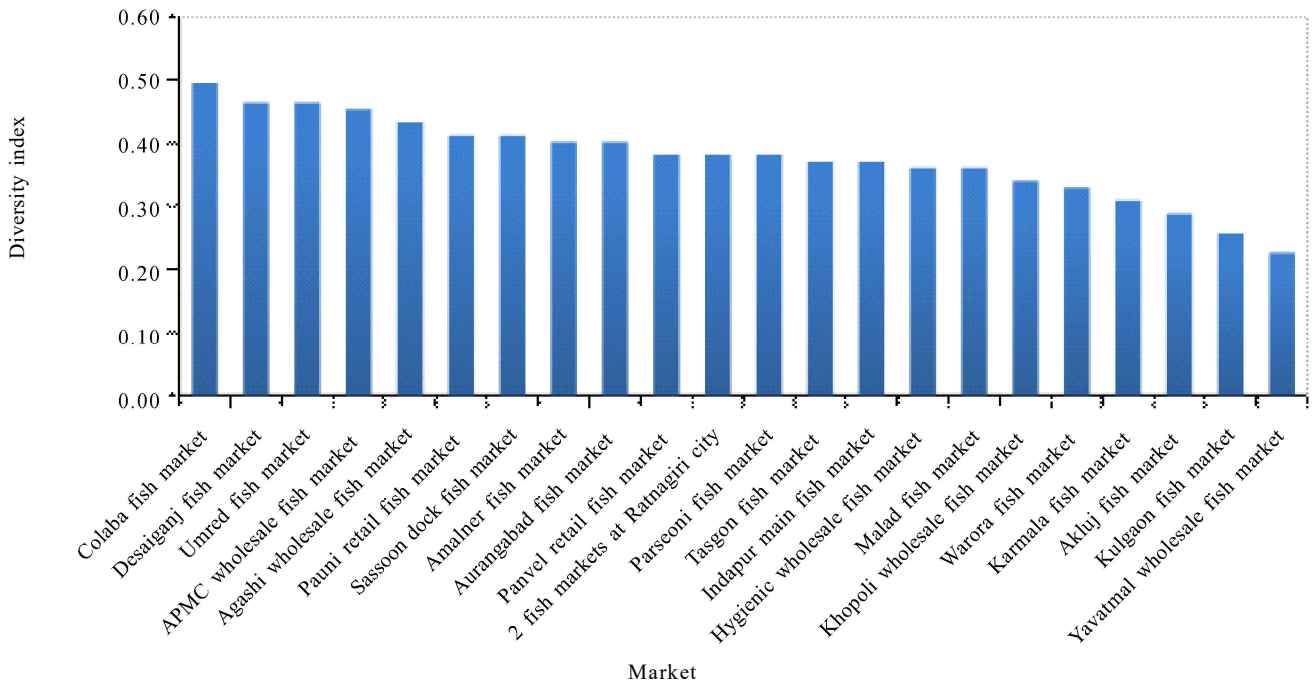


Fig. 1 : Market diversity- Maharashtra

Table 2: Species diversity- Maharashtra

Species	Diversity index	Species	Diversity index
Anchovies	1.00	Magur	0.86
Asian Seabass	0.95	Malabar blood snapper	0.09
Big eye thresher	0.18	Malabar grouper	0.05
Big eye tuna	0.23	Malabar tongue sole	0.05
Black barred half beak	0.09	Mangrove snapper	0.09
Black clam	0.77	Margined Flying Fish	0.18
Black marlin	0.23	Milk Shark	0.23
Black pomfret	0.73	Milkfish	0.91
Black tip reef shark	0.14	Mrigal	0.91
Blue swimmer crab	0.55	Mud crab	0.86
Bombay duck	0.09	Octopus	0.68
Brown mussel	0.73	Oil Sardine	0.95
Bullet tuna	0.09	Oyster	0.64
Catla	1.00	Pacu	0.09
Chinese Pomfret	0.73	*Pangasius*	0.86
Cobia	0.68	Pelagic thresher	0.09
Commerson\'s glassy perchlet	0.14	Pharaoh cuttlefish	0.23
Common carp	0.95	Pompano	0.68
Common dolphin fish	0.05	Rock lobster	0.32
Cross crab	0.32	Rohu	0.95
Flat head mullet	0.05	Short neck clam	0.14
Four finger thread fin	0.05	Silver carp	1.00
Giant guitar fish	0.18	Silver Pomfret	1.00
Giant tiger prawn	0.32	Singhi	0.73
Gold spot mullet	0.05	Slender bamboo shark	0.23
Gold spotted grenadier anchovy	0.14	Small tooth saw fish	0.09
Granulated guitar fish	0.14	Snake head	0.09
Grass carp	1.00	Spade nose shark	0.14
Greasy grouper	0.23	Spiny cheek grouper	0.14
Greater lizard fish	0.05	Splendid pony fish	0.05
Green mussel	0.77	Spotted crab	0.05
Green tiger prawn	0.09	Spotted croaker	0.09
Grey mullet	0.27	Spotted eagle ray	0.05
Hound needle fish	0.05	Sword fish	0.36
Indian butter catfish	0.05	Sword tip squid	0.05
Indian flat head	0.14	Tiger shark	0.36
Indian mackerel	0.91	Tiger shrimp	0.95
Indian scad	0.14	Tilapia	0.95
Indian squid	0.73	Two wing flying fish	0.09
Indian thread fin	0.14	Wahoo	0.05
Indian white shrimp	0.86	Whip tail sting ray	0.09
Indo-pacific sail fish	0.14	White carp	0.68
Indo-pacific seer fish	0.09	Yellow clam	0.73
Jinga prawn / Brown shrimp	0.45	yellow goat fish	0.27
Johns snapper	0.05	Yellow fin tuna	0.45
King seer	0.91	Zebra shark	0.14
Kuruma prawn	0.05		
Lesser tiger tooth croaker	0.05		
Little tuna	0.05		
Long barrel squid	0.05		
Long tail tuna	0.09		

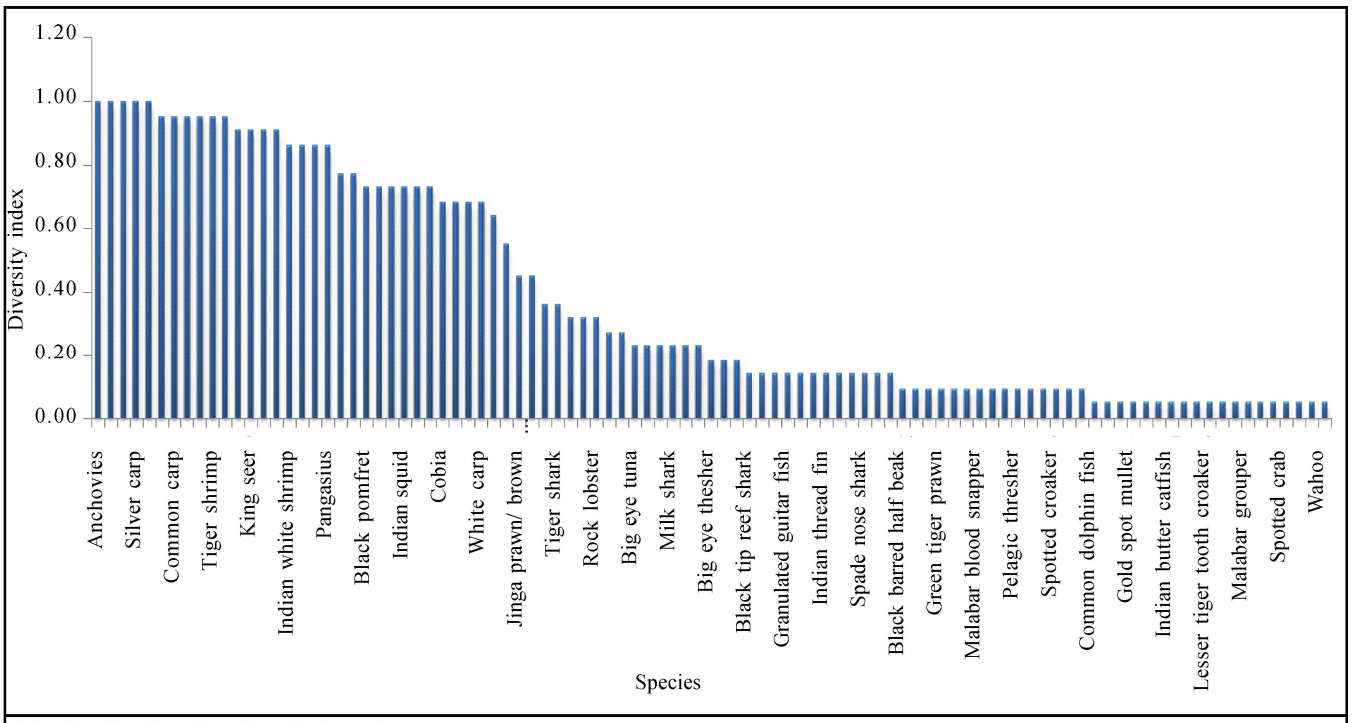


Fig. 2 : Species diversity- Maharashtra

different markets are Anchovies, Asian Seabass, Catla, Common carp, Grass carp, Oil Sardine, Rohu, Silver carp, Silver Pomfret, Tiger shrimp and Tilapia has the highest species diversity index of 1.00. It indicates that among the 22 markets selected these eleven species are the most available and accessible species across the markets, which has huge trading opportunities (Table 2).

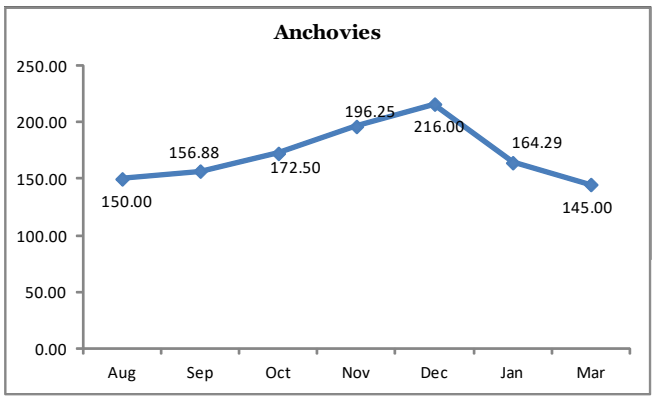
Price realization of different species:

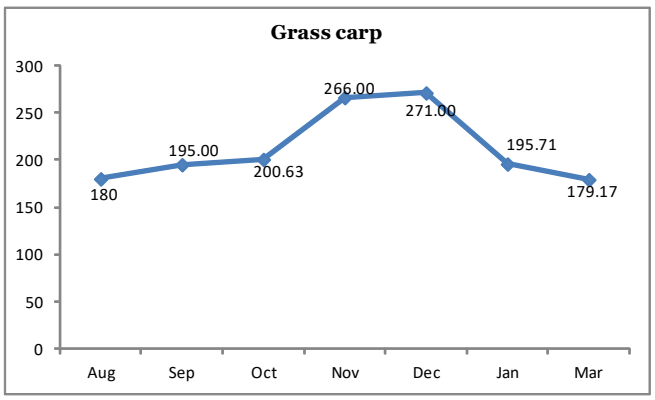
The price of species varies considerable depending upon the availability, freshness and condition of the species being sold. The price structure of major species sold in selected fish markets (Table 3).

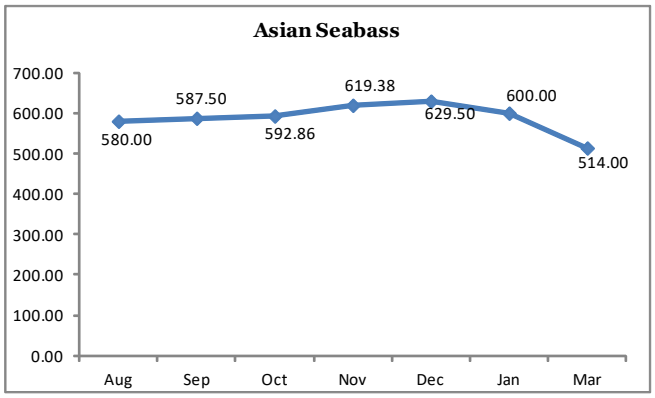
The present survey from the study area recorded a total of 97 species of fish fauna was traded in which 21 species was fresh water sources, 61 species were marine habitat and rest 15 species were both inland and marine habitat. Most of the fresh water species are derived from culture fisheries and all the marine species from capture fisheries. The species diversity of Maharashtra market indicated that Anchovies, Asian Seabass, Catla, Common carp, Grass carp, Oil sardine, Rohu, Silver carp, Silver Pomfret, Tiger shrimp and Tilapia registered species diversity index of 1.00 which indicated that these particular

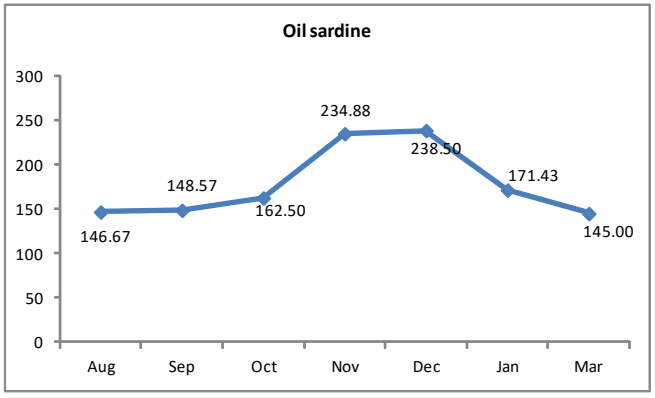
Table 3 : Price realization across fish markets in Maharashtra for the major traded species

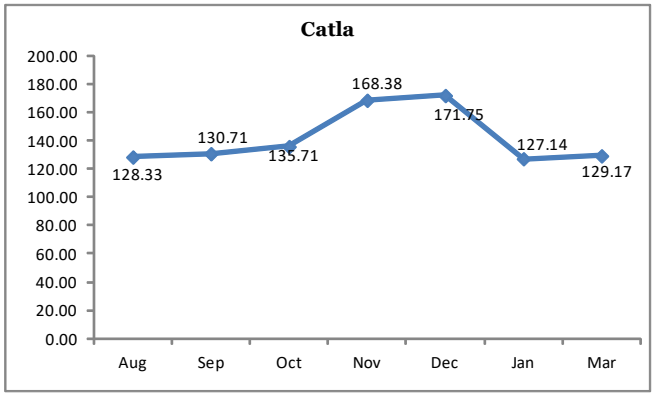
Month	Anchovies	Asian seabass	Catla	Common carp	Grass carp	Oil sardine	Rohu	Silver carp	Silver pomfret	Tiger shrimp	Tilapia
Aug.	150	580.00	128.3	128.33	180	146.67	154.17	196.67	562.50	712.50	184
Sep.	156.88	587.50	130.1	134.29	195	148.57	154.8	202.6	568.75	750	184.38
Oct.	172.50	592.86	135.71	143.75	200.3	162.50	165.3	207	600	750	198.75
Nov.	196.25	619.38	168.8	172.25	266	234.88	189.3	231.25	633.50	802.50	224.38
Dec.	216	629.50	171.5	180.00	271	238.50	191.75	235.8	641.38	817.50	231.63
Jan.	164.29	600.00	127.14	142.86	195.71	171.43	160.1	195.71	571.43	742.86	200
Mar.	145.00	514.00	129.17	129.50	179.17	145.00	150.3	187.3	560.75	553.00	180.40
Mean	171.56	589.03	141.53	147.28	212.45	178.22	166.53	208.05	591.19	732.62	200.51
CV	15.10	6.35	13.96	14.05	18.42	23.04	10.26	8.89	5.79	11.88	10.14

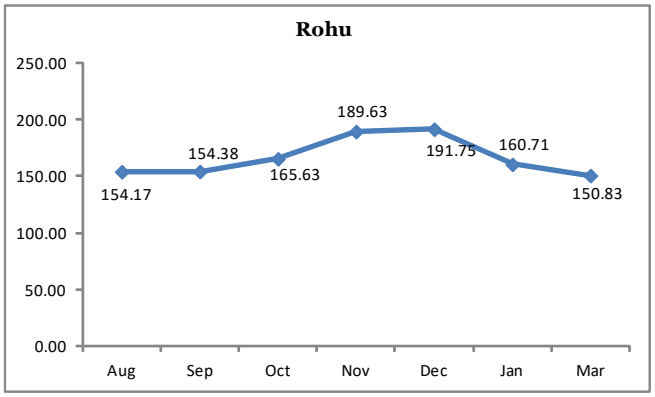

Anchovies
250.00
200.00
150.00
100.00
50.00
0.00
150.00
156.88
172.50
196.25
216.00
164.29
145.00
Aug
Sep
Oct
Nov
Dec
Jan
Mar

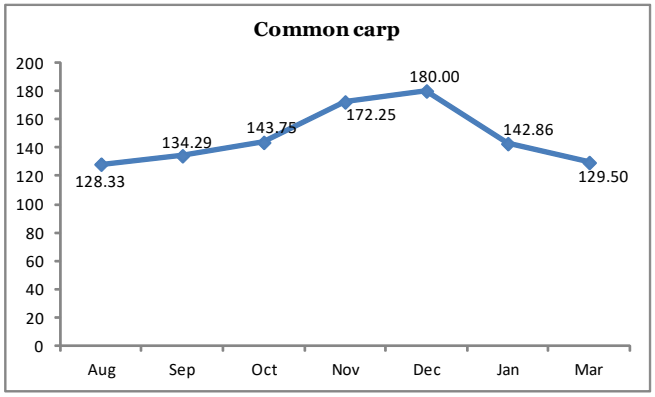

Grass carp
300
250
200
150
100
50
0
180
195.00
200.63
266.00
271.00
195.71
179.17
Aug
Sep
Oct
Nov
Dec
Jan
Mar


Asian Seabass
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
580.00
587.50
592.86
619.38
629.50
600.00
514.00
Aug
Sep
Oct
Nov
Dec
Jan
Mar


Oil sardine
300
250
200
150
100
50
0
146.67
148.57
162.50
234.88
238.50
171.43
145.00
Aug
Sep
Oct
Nov
Dec
Jan
Mar


Catla
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
128.33
130.71
135.71
168.38
171.75
127.14
129.17
Aug
Sep
Oct
Nov
Dec
Jan
Mar


Rohu
250.00
200.00
150.00
100.00
50.00
0.00
154.17
154.38
165.63
189.63
191.75
160.71
150.83
Aug
Sep
Oct
Nov
Dec
Jan
Mar


Common carp
200
180
160
140
120
100
80
60
40
20
0
128.33
134.29
143.75
172.25
180.00
142.86
129.50
Aug
Sep
Oct
Nov
Dec
Jan
Mar

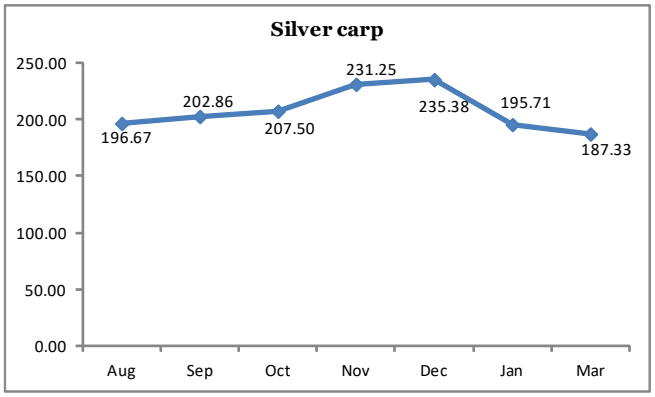

Silver carp
250.00
200.00
150.00
100.00
50.00
0.00
196.67
202.86
207.50
231.25
235.38
195.71
187.33
Aug
Sep
Oct
Nov
Dec
Jan
Mar

Fig. 3: Contd.....

Fig. 3: Contd.....

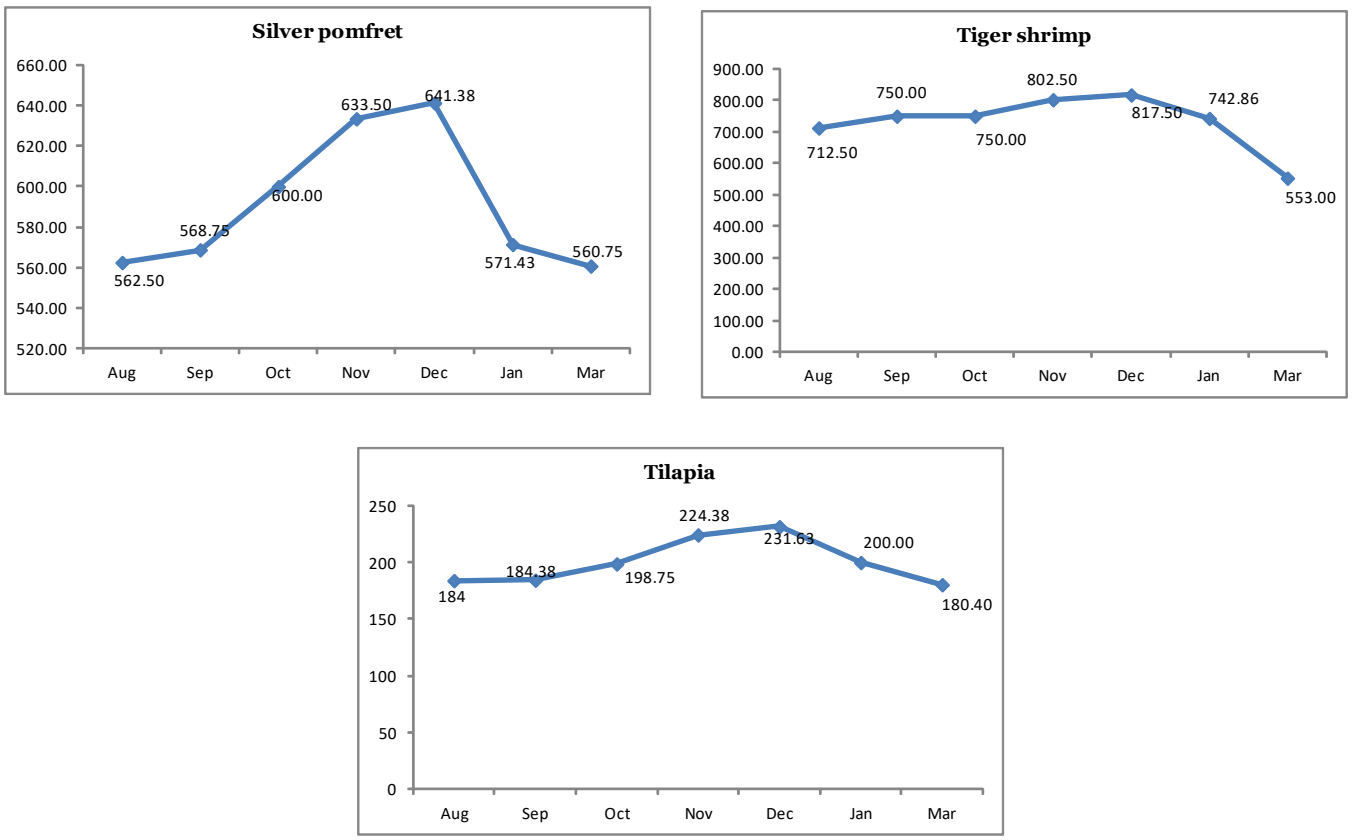


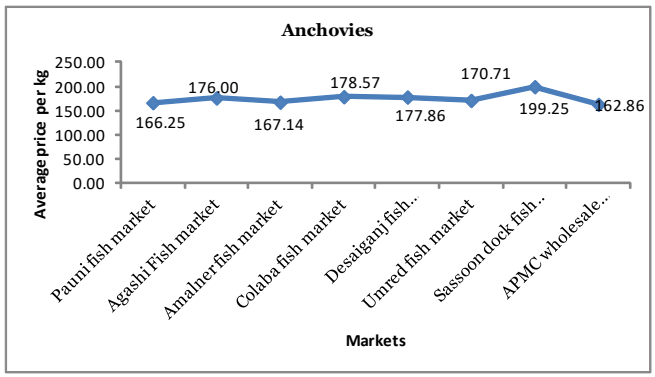
Fig. 3 : Price realization across fish markets in Maharashtra for the major traded species

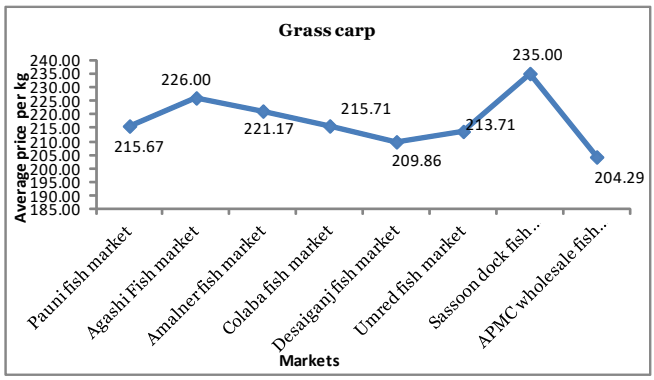
species are available across all the markets of Maharashtra including the landing centres, wholesale markets as well as retail markets. Thus, it stipulates the demand for these species across the locations of Maharashtra. During the study of fish markets in Hingoli district, Maharashtra, Carps were found to be major species constituted part with 68 per cent to 73 per cent share in total species sold (Markad *et al.,* 2019).

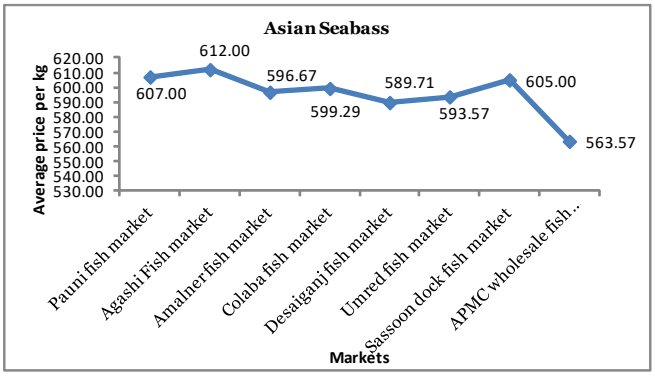
Diversity assessment showed that the diversity index of fresh water species is high where diversity index of marine species are less. Colaba fish market traded maximum number of species; most of them are fresh

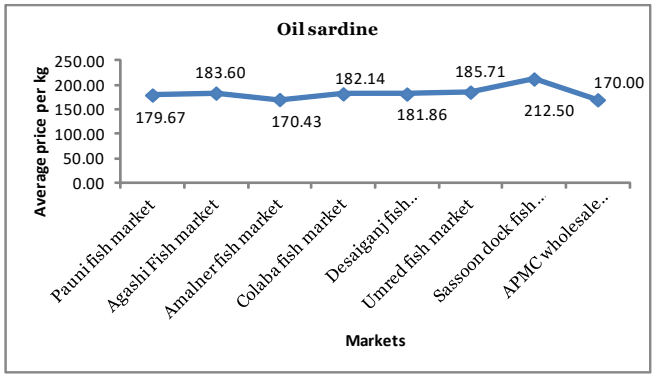
Table 4: Price realization of major fishes traded across the major markets of Maharashtra

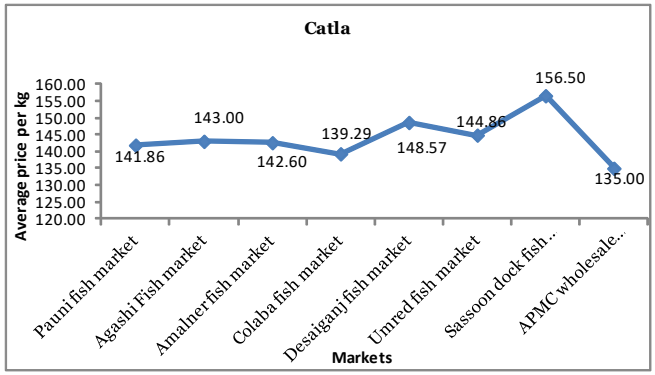
Markets	Anchovies	Asian Seabass	Catla	Common carp	Grass carp	Oil sardine	Rohu	Silver carp	Silver Pomfret	Tiger shrimp	Tilapia
Pauni fish market	166.25	607.00	141.86	144.00	215.67	179.67	162.86	206.67	616.00	752.50	212.00
Agashi fish market	176.00	612.00	143.00	150.00	226.00	183.60	166.20	213.00	592.00	735.83	211.00
Amalner fish market	167.14	596.67	142.60	151.17	221.17	170.43	165.71	205.71	561.86	760.71	205.00
Colaba fish market	178.57	599.29	139.29	150.00	215.71	182.14	173.29	216.14	592.60	757.86	200.00
Desaiganj fish market	177.86	589.71	148.57	146.43	209.86	181.86	172.57	205.57	605.14	752.14	199.29
Umred fish market	170.71	593.57	144.86	152.14	213.71	185.71	170.57	223.57	606.43	700.00	202.14
Sassoon dock fish market	199.25	605.00	156.50	165.00	235.00	212.50	180.00	222.50	637.50	792.00	210.00
APMC wholesale fish market	162.86	563.57	135.00	141.43	204.29	170.00	157.14	190.71	582.14	705.71	190.71
Mean	174.83	595.85	143.96	150.02	217.68	183.24	168.54	210.48	599.21	744.59	203.77
CV	6.54	2.51	4.46	4.73	4.41	7.20	4.20	5.10	3.79	4.05	3.56

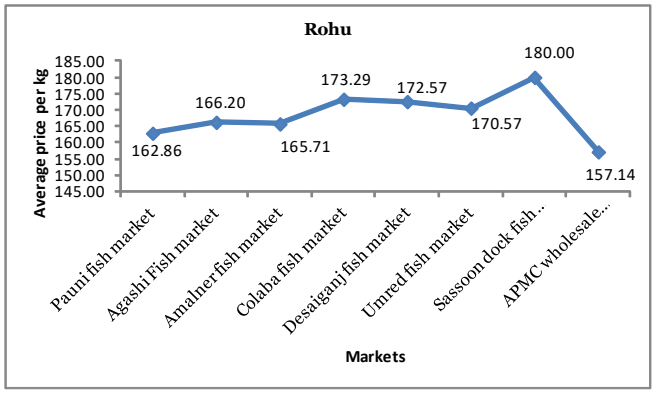

Anchovies
Average price per kg
250.00
200.00
150.00
100.00
50.00
0.00
166.25
176.00
167.14
178.57
177.86
170.71
199.25
162.86
Pauni fish market
Agashi Fish market
Amalner fish market
Colaba fish market
Desaiganj fish..
Umred fish market
Sassoon dock fish..
APMC wholesale...
Markets

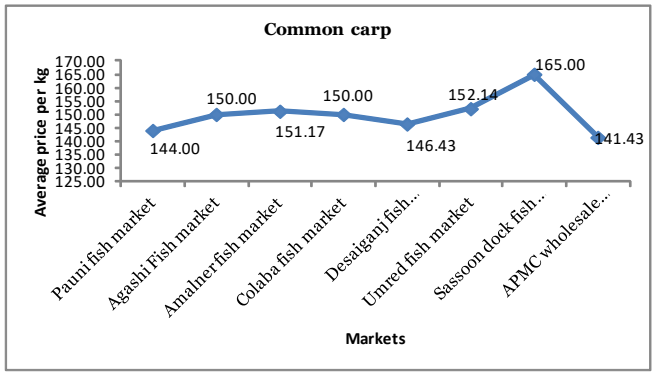

Grass carp
Average price per kg
240.00
235.00
230.00
225.00
220.00
215.00
210.00
205.00
200.00
195.00
190.00
185.00
215.67
226.00
221.17
215.71
209.86
213.71
235.00
204.29
Pauni fish market
Agashi Fish market
Amalner fish market
Colaba fish market
Desaiganj fish market
Umred fish market
Sassoon dock fish..
APMC wholesale fish..
Markets


Asian Seabass
Average price per kg
620.00
610.00
600.00
590.00
580.00
570.00
560.00
550.00
540.00
530.00
607.00
612.00
596.67
599.29
589.71
593.57
605.00
563.57
Pauni fish market
Agashi Fish market
Amalner fish market
Colaba fish market
Desaiganj fish market
Umred fish market
Sassoon dock fish market
APMC wholesale fish..
Markets


Oil sardine
Average price per kg
250.00
200.00
150.00
100.00
50.00
0.00
179.67
183.60
170.43
182.14
181.86
185.71
212.50
170.00
Pauni fish market
Agashi Fish market
Amalner fish market
Colaba fish market
Desaiganj fish..
Umred fish market
Sassoon dock fish..
APMC wholesale...
Markets


Catla
Average price per kg
160.00
155.00
150.00
145.00
140.00
135.00
130.00
125.00
120.00
141.86
143.00
142.60
139.29
148.57
144.86
156.50
135.00
Pauni fish market
Agashi Fish market
Amalner fish market
Colaba fish market
Desaiganj fish market
Umred fish market
Sassoon dock fish..
APMC wholesale...
Markets


Rohu
Average price per kg
185.00
180.00
175.00
170.00
165.00
160.00
155.00
150.00
145.00
162.86
166.20
165.71
173.29
172.57
170.57
180.00
157.14
Pauni fish market
Agashi Fish market
Amalner fish market
Colaba fish market
Desaiganj fish market
Umred fish market
Sassoon dock fish..
APMC wholesale...
Markets


Common carp
Average price per kg
170.00
165.00
160.00
155.00
150.00
145.00
140.00
135.00
130.00
125.00
144.00
150.00
151.17
150.00
146.43
152.14
165.00
141.43
Pauni fish market
Agashi Fish market
Amalner fish market
Colaba fish market
Desaiganj fish..
Umred fish market
Sassoon dock fish..
APMC wholesale...
Markets

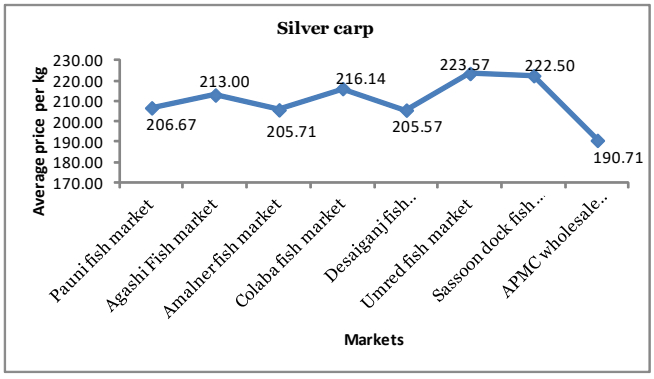
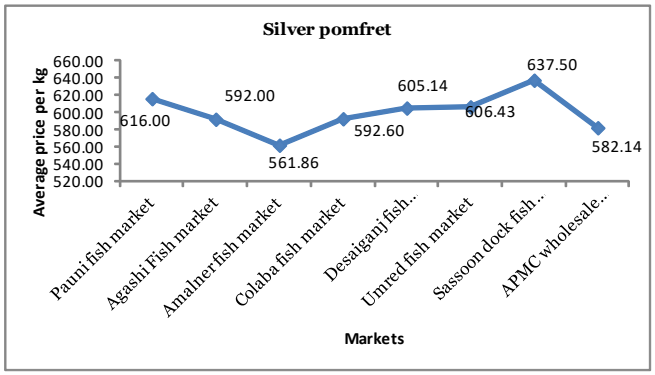
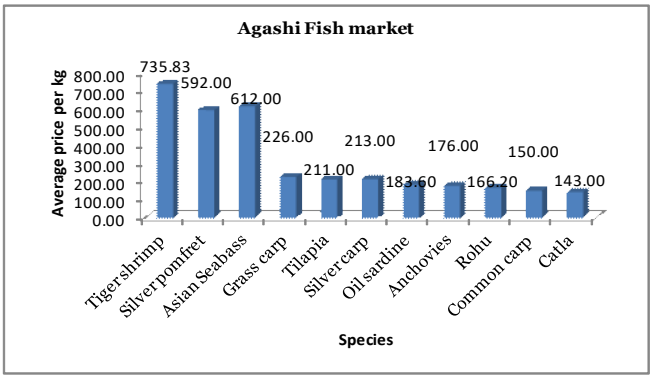
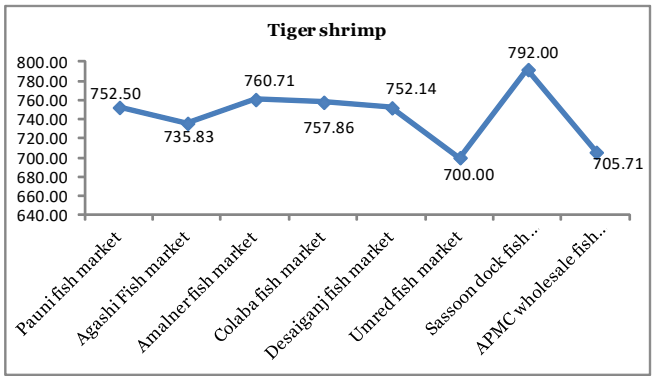

Silver carp
Average price per kg
230.00
220.00
210.00
200.00
190.00
180.00
170.00
206.67
213.00
205.71
216.14
205.57
223.57
222.50
190.71
Pauni fish market
Agashi Fish market
Amalner fish market
Colaba fish market
Desaiganj fish..
Umred fish market
Sassoon dock fish..
APMC wholesale...
Markets

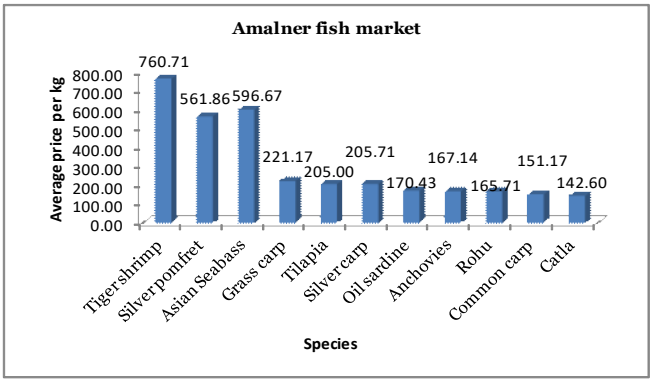
Fig. 4: Contd.....

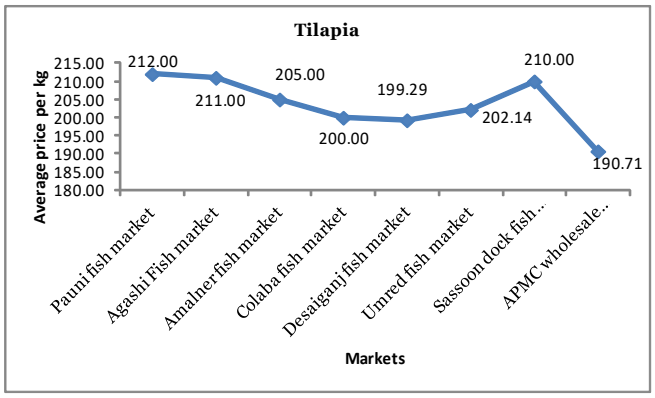
Fig. 4: Contd.....

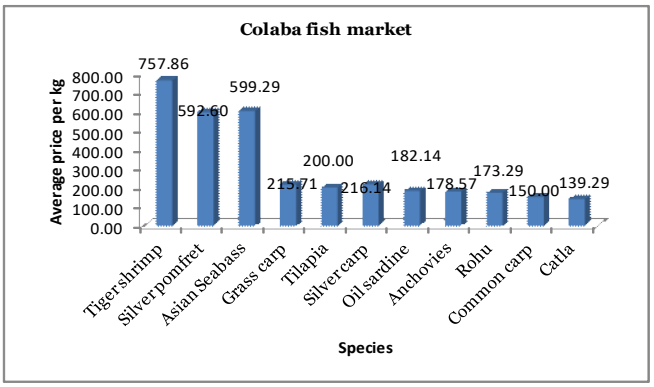


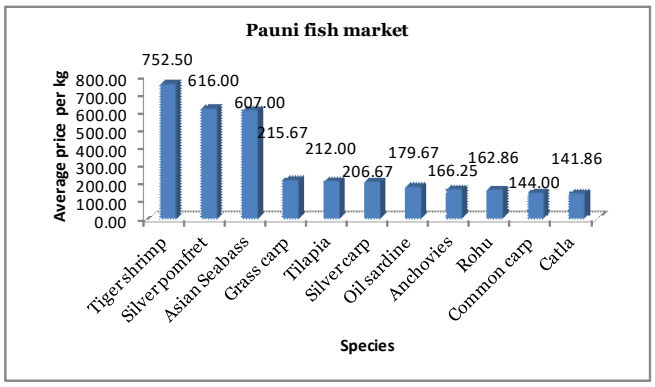












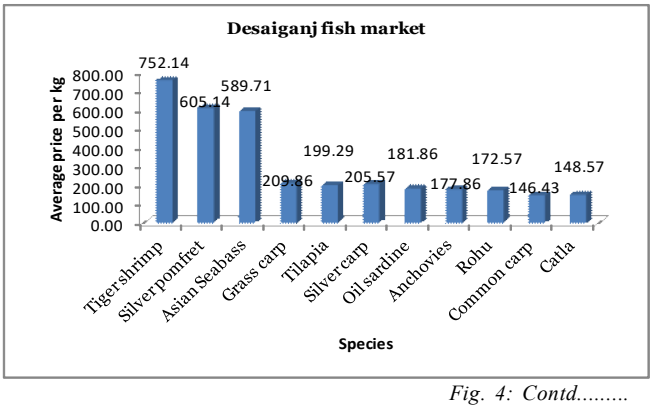


Fig. 4: Contd.....

Fig. 4: Contd.....

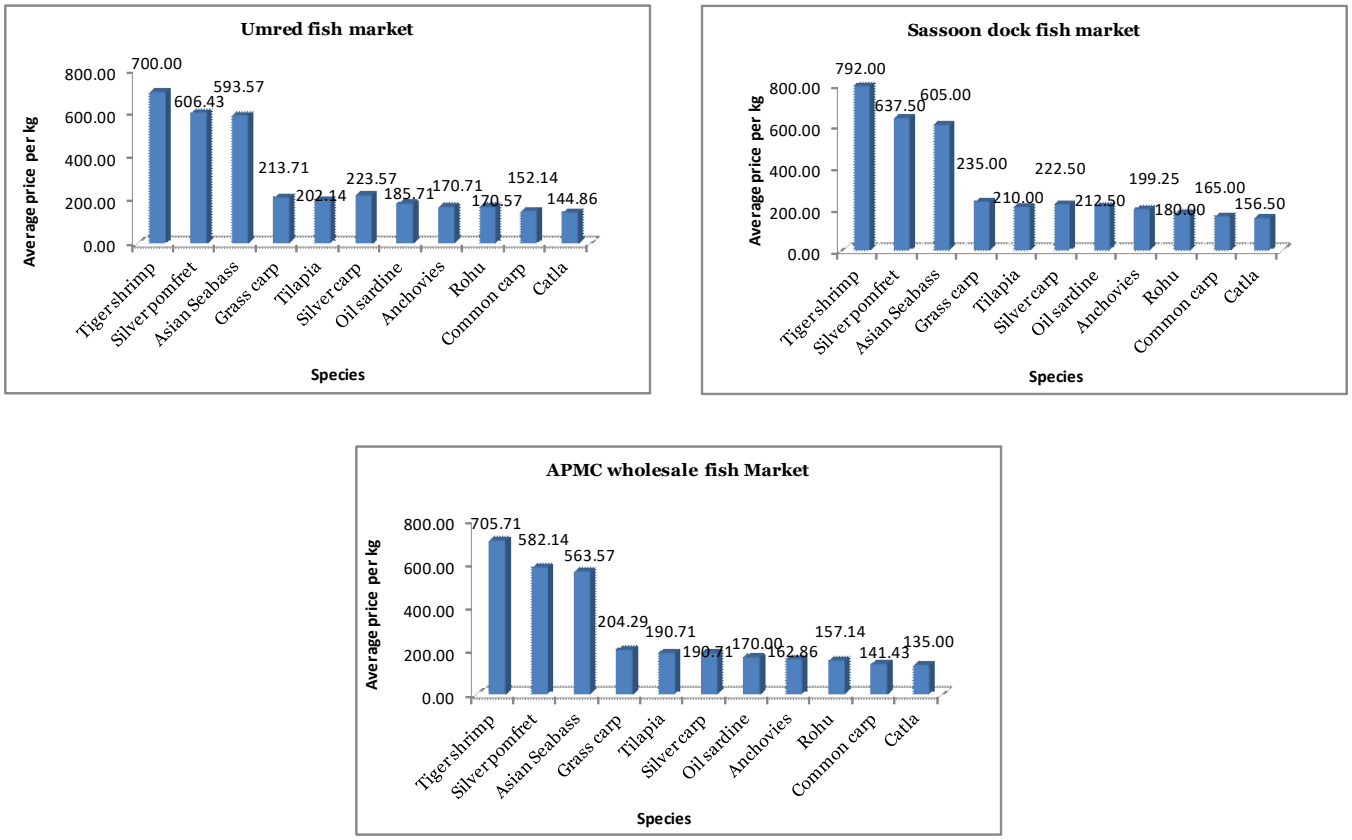


Fig. 4: Price realization of major fishes traded across the major markets of Maharashtra

water derivatives and Yavatmal wholesale fish market shared minimum number of species.

The price realization of major fishes traded is shown in Table 3. The average price realization of major fishes traded across the selected time period indicates that among eleven species traded throughout the period, the highest average price was realized for the species of Tiger shrimp Rs.732.62 per kg ranged between Rs.550 and Rs.820. Similarly the lowest average price was realized for Catla Rs.141.53 per kg ranged between Rs.125 and Rs.175 per kg, respectively. Table 4 indicates the price realization of major traded fishes across the major markets of Maharashtra during the month of August to March. From the analysis of price details of major fish species traded, price behaviour for various high value species and low value species are drawn.

The price of fish fluctuates far higher due to the changes in supply, variations in the prices ranges, uncertainty of fish production, availability, affordability, accessibility and perishability of the fish species. In the fish marketing system, price movements in different markets depend to a large extent on the cross market movement of available catch, which in turn, is governed by the demand and supply factors. The extent of price transmission from one market to the other and its direction are the important aspects to be looked into, as these would provide valuable information on the degree of integration, and in turn, the efficiency of these markets (Shyam *et al.,* 2020). The price covariance analysis was done to understand the price fluctuations of the highly diversified species (11 species) across the different markets of Maharashtra and the results point out that among the species Oil Sardines (23.04%) registered the highest and Silver Pomfrets (5.79%) the lowest. Grass carp holds the second highest covariation in the fish price followed by Anchovies (15.10%), Common carp (13.96%), Tiger shrimp (11.88%), Rohu (10.26%), Tilapia (10.14%), Silver carp (8.89%) and Asian Seabass (6.35%). The study identified that the prices were highly volatile and varied between the different species and markets which necessitates the need to assess more about the species-market wise price deflexions from the different markets

to understand the price movements of the fish species. The price covariance analysis of the highly diversified markets *vis-a-vis* highly diversified species across the markets of Maharashtra gives more accurate results in the price deflexions of particular species over the time period across the selected markets. The results shows that Oil Sardine recorded the highest price covariance (7.20%) followed by Anchovies (6.54%), Silver carp (7.10%), Common carp (4.73%), Grass carp (4.41%), Rohu (4.20%), Tiger shrimp (4.05%), Silver Pomfret (3.79%), Tilapia (3.56%) and Asian Sea bass (2.51%). The price fluctuations were due to the uncertain nature of the fish harvest, perishable nature and variations in short run supply. The consumption patterns, marketing intermediaries, buyer seller transactions, marketing efficiencies of the markets as well as species etc. also cause wide fluctuations in the fish prices over the different markets of Maharashtra. Moreover, the highly elastic supply, demand of particular species, perishability of fish and absence of storage as well processing facilities force the fishermen to dispose the catch immediately after harvest and thereby causing high price variations with fishermen as the mere price takers over the different markets of Maharashtra.

It is clear from the table that fish demand was sensitive to the price changes, thus, according to the species and size of fish, price of fish become varies with season of the year. It was observed that species will not be available in all seasons. Thus, seasonal fluctuation in the fish species is a normal phenomenon (Ahmad, 1997). Abundance of fish also varies from season to season depending on demand and production. Hence, the inland fishes were the highly preferred fish species in Maharashtra because of their low price, abundance and their great food value compared to the marine fishes. Indian Major Carp species were the highly preferred fish species among consumers in India and its demand seemed to be low-responsive to price changes, keeping the income constant (Kumar *et al.,* 2005). Therefore, consumers prefer inland fishes which are readily available in the market.

Conclusion:

Maharashtra is rich in freshwater (rivers, irrigation canals, dams and lakes) reservoirs and has the largest number of manmade water bodies in the country. It constitutes 31.01 per cent to the freshwater fish diversity of India. Therefore, Maharashtra is one of the important states for fish production and natural water resources and there is great scope for developing fisheries in this state (Pawara *et al.*, 2014). While the state recorded a drastic reduction in fish landings due to the extreme weather events that occurs last year: bad weather, extended rain and cyclones as per data released by the Central Marine Fisheries Research Institute (CMFRI). Growing demand of ever increasing human population provides scope for increasing share of inland fisheries in food basket. From the study, it was found that of the total species traded across different markets of Maharashtra, Anchovies, Asian Seabass, Catla, Common carp, Grass carp, Oil sardine, Rohu, Silver carp, Silver Pomfret, Tiger shrimp and Tilapia are the most available and traded fishes compared to other fishes traded/ available across the markets. Increase or decrease in demand of any product depends on its utility reflected on consumer's preference and their income level (Sathiadhas *et al.*, 2012).

Naturally the price and demand of a fish is influenced by market structure, seasonal abundance and origin of species, size and quality. Alam *et al.* (2010) also reported influence of market structure, species quality, size and weight in price of fish. Sathiadhas and Narayanakumar (1994) also report effect of various factors on sell and price of fishes. Generally, larger species fetch more prices compared to smaller ones.The selling price structure of different species sold in fish markets is mostly depend on freshness condition and size of fishes. Larger fishes fetched better price than smaller fishes during study of Paithan fish market (Deshmukh and Jawale, 2014).

Even if the domestic supply is less when compared to the demand, the demand supply gap is met from the fish arrivals coming from neighbouring states that keeps the price fluctuations limited (Shyam *et al*., 2017). Thus, the price of fish doesn't depend upon the production within whereas the production supply from different states keeps the price fluctuations limited. The market price behaviour for the fish species varies accordingly to the characteristics of market dimensions such as market access, timing, market conduct structure, market arrivals and disposal sources, market union and regulation. Proper infrastructure facilities such as proper storage and processing facilities like packing, icing, loading, unloading, value addition, transportation costs, waste management facilities, parking areas, freezers, better drinking water etc. The perishable nature of fish, lack of infrastructure and allied amenities in markets like lack of proper storage

and processing facilities which forces the fishermen to dispose the produce immediately after harvest in turn leads to high price fluctuations.

Though Maharashtra accounts for a significant share in total marine fish production of India, their share in total fish production of India has declined over the past few years. Hence, appropriate government interventions in terms of strengthening infrastructure, decrease the cost of packing materials, transportation and the labour charges for packing loading and unloading the fish. Packing should be improved by using adequate quantity of ice and packing materials so that the fish can be delivered to consumers in distant markets in a better condition and imparting value addition should be created to facilitate better functioning of these markets. Proper institutional support mechanism for fishing and marketing activities also improves the efficiency of fish marketing. It helps more fish species to become available, accessible and affordable to consumers.

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