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Fisheries contribute to around 3 % of the economy of Kerala and provides employment to about 2.14 lakh people including its secondary and tertiary sectors such as marketing and processing. The marine fish landings in Kerala (2015) was 4.82 lakh tonnes forming 73.36 % of the total fish production in the state. A considerable 30% reduction in the marine fish landings during 2015 compared to the average (2010-14) landings of 6.82 lakh tonnes was noticed. The inland fisheries sector showed a marginal increase in the production which hovered around 1.50 lakh tonnes. Kerala is the largest fish consuming state in the country with more than 85 % of the population eating fish at an average per capita fish consumption of 27- 30 kg which is four times the national average. The domestic market in Kerala is regulated not only by the purchasing power of the consumers but also by their taste and preferences. Competition between different buyers viz., local consumers, processors and exporters for fish is observed. It has been found that the domestic prices of some of the exportable species of fish viz., sardine, mackerel, squids, cuttle fish, pomfrets, seer fish and ribbon fish are found to be higher in the domestic market compared to the export market

(Shyam, *et al.*, 2013, *Seafood Export Journal*, 43 (5): 34-40; *Journal of the Marine Biological Association of India*, 55 (2):48-54). The exporters tend to export more to the international market due to the export economies of scale and realize revenue gains contributing by quantity effect rather than the price effect. While the exports lead to valuable earnings, the diversification of fish and fishery products from local communities may lead to questions of availability and affordability of fishes in domestic market. During the past three years dwindling fish landings across the Kerala coast against the soaring demand for fish have forced the state to rely upon other neighbouring states for its fish supplies. The valuation of the marine fish landed at the point of first sales during 2016 was provisionally estimated at ₹ 9753 crores registering an increase of 1.87 % compared to 2015. At the point of last sales (2016) it was provisionally estimated at ₹ 13062 crores registering a decrease of 10.78 % compared to 2015. Due to lower marine landings the unit prices rose by more than 35 % during 2015 compared to previous year. The marine fish landings in 2016 showed a marginal increase of 5% (4.82 lakh tonnes). The demand / supply estimate for fish in Kerala is furnished in Table 1.

Table 1. Total fish demand and anticipated supply assessed for Kerala

Year	2014	2015	2016	2020	2025	2030	2035
Population (in million)	33.89	34.06	34.15	34.91	35.78	36.68	37.6
Fish eaters (million)	28.81	28.95	30.74	31.42	32.20	33.01	33.84
Per capita annual fish consumption (kg)	29	30	30	30	32	34	35
Total fish demand (lakh tonnes)	8.35	8.69	9.22	9.43	10.30	11.22	11.84
Sector							
Marine fisheries (lakh tonnes)	5.76	4.82	5.02	5.87	5.95	5.92	5.86
Inland fisheries (lakh tonnes)	1.58	1.73	1.75	1.82	1.91	2.01	2.11
Total fish supply (lakh tonnes)	7.34	6.55	6.77	7.69	7.86	7.93	7.97
Export(lakh tonnes) @ 10%	0.73	0.75	0.75	0.77	0.79	0.79	0.8
Wastage(lakh tonnes) @ 2.5%	0.18	0.16	0.17	0.19	0.20	0.20	0.2
Bait industry @ 5 %	0.37	0.33	0.34	0.38	0.39	0.40	0.40
Total supply (lakh tonnes)	6.06	5.31	5.51	6.34	6.48	6.55	6.57
Demand - Supply Gap (lakh tonnes)	2.29	3.38	3.71	3.08	3.82	4.68	5.27

The demand- supply gap indicates that Kerala will be a net deficit state in terms of fish availability and will need to rely on fish arrivals / imports to the tune of 40 %. It has been found that based on the demand estimates an average of 2500 tonnes of fish is required for the daily consumption, of which the domestic supply caters to only 60 %, the rest. Around 1000 tonnes is to be sourced/ imported from other states/ countries. Barring sporadic import of Oman sardine during 2015 the entire fish demand is met by arrivals from others states. During 2016 the prices realized, registered a fall (15-20 %). The fish arrivals from the neighboring states were the major drivers which ensured stability in prices during the year 2016. The objectives of the study reported here was to assess the quantum of fish arrivals in Kerala and to determine fish arrivals across different species and states and their comparison alongside. This study has significance in the context of huge inflow of fish into Kerala and related apprehensions on its quality and checks. There are around 2500 fish markets in Kerala catering to fish business either as wholesale, retail, way side markets and terminal markets with several of them being seasonal , non-operational and with varying times and market functionalities .These markets are owned by individuals, private, corporation, societies and other agencies. Among them 60 markets are found to be major wholesale markets characterized by higher quantum of trade

and supply to retail markets, export demand and limited retail sales during marketing hours. The information on the quantum of fish trade, species traded, arrivals from different states *vis-a-vis* species were collected from 20 wholesale markets

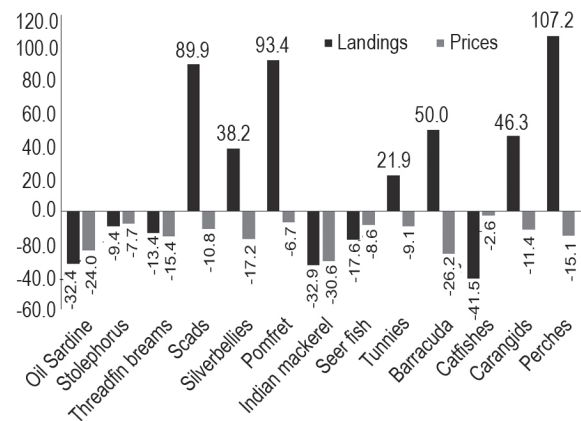


Fig. 1. The percentage change in the quantity landed and price realization of major fishes traded in 2015-2016 period

such as Pangode (Trivandrum), Neendakara (Kollam) Kodimatha, Ettumanoor (Kottayam), Kondotty, Kozhikode Central Market (Kozhikode), Tirur, Kuttippuram, Perinthalmanna, Manjeri, Ponnani, (Malappuram), Punnapra (Alappuzha) , Chambakkara, Muvattupuzha, Aluva, Perumbavoor (Ernakulam), Shakthan market (Thrissur), Payyanur, Kannur Central market (Kannur) and Kanhangad (Kasargod) that had considerable fish trade year round. The primary data was collected through personal interviews, phone calls and visits from

different whole sale markets across Kerala during the second week of February 2017. The percentage change in the quantity of fish landings and the price realization of major species traded in the state during 2015-16 is depicted in Figure 1. The prices realized during 2016 showed a decline for all the species and registered an average decrease of 14.6 % ranging from 30.6 (Indian mackerel) to 2.6% for cat fishes.

Price decline was also noticed for species which recorded increased landings during the period. The price demand relationship did not hold good for major species and highlights the fact that even if the domestic supply is less when compared to the demand, the demand supply gap is met from the fish arrivals coming from neighboring states that keeps the price fluctuations limited. The macro level analysis of the quantum of fish traded in the selected markets indicated that 1132 tonnes of fishes are traded daily in the domestic markets of which 40% were sourced from Kerala and 60% came from other states. Karnataka contributes the most followed by Andhra Pradesh and Tamil Nadu (21% each), Odisha and Gujarat (6% each) and Maharashtra (10%). It was found that the different states supply 23 fish species to Kerala for its trade and consumption. Among these, sardine the mainstay of the arrivals was nearly 256 tonnes constituting more than 37.48 % of the total arrivals. Sardine being the most preferred fish in Kerala and decline in supply by 32 % in 2016 contributed to the increased sardine arrivals from other states. The Indian mackerel which was the major contributor to the landings in the state in 2015 declined by 32% in 2016 and 15.11% of the mackerel demand (103 tonnes) was met by the arrivals from other states. Besides these species high value fishes like tunnies (15%), seer fishes (13%), perches (4%), pomfrets (3%), anchovy (3%), scads (2%), threadfin brems (1%), sail fish (1%), fresh water fishes (1%), rohu (1%), carangids (1%), *Catla* (0.89%) and other fishes arrived from various states.

The sardine which is the prime species in demand mainly arrives from Tamil Nadu (33%) followed by Karnataka (27%), Andhra Pradesh

(16.3%), Maharashtra (13.9%) and Gujarat (9%). Mackerel comes from Tamil Nadu (30%) followed by Andhra Pradesh (29%), Karnataka (26%), Goa (14%) and Gujarat (1%). Tuna comes from Goa (29%), Andhra Pradesh (28%), Odisha (27%), Maharashtra (7%), Karnataka (6%) and Tamil Nadu (3%). Seerfish comes from Karnataka (27%), Goa (23%), Andhra Pradesh (23%), Maharashtra (14%), Tamil Nadu (11%), Odisha (2%). Other perches arrive from Goa (53%), Tamil Nadu (21%), Gujarat (14%), Maharashtra (7%), Karnataka (4%), Andhra Pradesh (0.2%). Pomfrets arrive from Karnataka (49%), Goa (34%), Maharashtra (11%) and Tamil Nadu (7%). Anchovy arrivals are contributed by Gujarat (39%), Andhra Pradesh (30%), Maharashtra (23%) and Karnataka (8%). Scads are mainly from Goa (97%) and Maharashtra (3%) while threadfin brems arrive from Tamil Nadu (56%), Gujarat (25%) and Karnataka (19%). Sail fish comes entirely from Andhra Pradesh and fresh water fishes from Odisha (100%). Carps come from Odisha (68%), Karnataka (25%), Andhra Pradesh (52%) and Gujarat (5%). The non-traditional fish species like carps and fresh water fishes arrive probably for catering to the requirements of the migrant population in the state.

To summarize, the fish landings of Kerala registered a marginal increase of 4.9 % in 2016 over the last year, but the retail prices realized marked a significant decline (15-20 %). The state being the largest fish consumer and with widening fish demand supply gap has led to the increased arrivals of fish from neighboring states. The results indicated that 60 % of the current total fish demand is met through the arrivals from other states. Karnataka, Tamil Nadu, Andhra Pradesh and Goa together contribute 78 % of the total fish arrivals in the state. Among the different species, sardine ranked first (38 %) followed by mackerel (15 %), tuna (14 %) and seer fish (13 %). The rapid assessment was based on the data collected during pre monsoon season when the landings were quite low and the dependency rate from other states was comparatively higher. The fish demand supply estimates for Kerala strongly reveals that fish demand to the tune of 40-50 % is to be met with arrivals from other states. As fish landings are seasonal, often fishes are sold at very

low prices during post monsoon while during the times of shortage the retail prices soar exorbitantly. Therefore governmental intervention in fixing minimum support prices (benefit of fishers) and maximum ceiling price (benefit of consumers) would act as price stabilizing measures in ensuring better distribution across the value chain. The other major

concern for the future would be to ensure quality checks for the sourced fish at appropriate entry points. It is also important to evolve alternate fisheries production systems including mariculture and inland fisheries for improving fish production in the state.