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Recent Trends and Performance

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Fisheries Sector of Kerala:

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Abstract

Fisheries sector plays significant role in the socio-economic life of the people in the coastal areas of Kerala. It provides livelihood to 2.98 % of total population in the state. The share of fisheries sector to Gross State Value Added (GSVA) was 1% in 2017-18. Considerable efforts have been made since the introduction of 'Indo-Norwegian Project for the modernisation and development of fisheries sector. The present study has critically analysed the development initiatives in the fisheries sector by the state government during the period from tenth plan to twelfth plan. Important findings of the study are:the per capita income of the fisheries sector dependent population is one-third of the per capita income of the state and further,the former has registered a negative rate of growth during the last 15 years. Moreover,income of the fishery sector is found to be highly volatile in relation to other sub- sectors within the primary sector. The observed fall in the percapita income is further compounded by the decline in social security expenditure for the sector during the period of study.No significant relationship has observed between real plan expenditure of the marine sector schemes and total marine fish catch.On the other hand, strong positive correlation was found in the real plan expenditure of inland fishing and inland fish production.

Keywords: Fisheries Sector; Marine Fisheries; Inland Fisheries; Gross State Value Added

JEL Classification: **Q22**; **E01**; **O29**

Introduction

Fisheries sector has a significant role in the socio-economic development of India especially that of Kerala. The fisheries sector accommodates 2.98% of total population of Kerala, of which 77% are in the marine sector and 23% are in the inland fishing (Govt. of Kerala, 2017a). The number of active fishermen is 2,36,300, of which 78.83% are engaged in the marine sector and the remaining are in the inland fishing during 2016-17 (*ibid*). The production of inland and marine sectors were 4.88 lakh tones and 1.88 lakh tones respectively in 2016-17. Kerala contributes 12.97% (178646 Metric Tones) of output to total marine export of India and the revenue earned from the same was 13.12% in 2017-18 (Govt. of Kerala, 2019). The share of fisheries sector to Gross State Value Added (GSVA) was 1% in 2017-18(Govt. of Kerala, 2018b). Fisheries is one of the promising sectors categorised along with agriculture and allied activities in India.Since the introduction of economic planning, the focus of fisheries development has been strategically shifted in favour of a growth-oriented model. Due to the popular acceptance of the growth-oriented modernization model which came into being as 'Indo-Norwegian Project', laid the foundation for fisheries technology advancement and innovation in the primary sector dominated economy of the country. Since then considerable public and private efforts have been channelized into the sector to develop it as one of the principal sectors of the economy and enable it to play a

significant role in trade, commerce and in the promotion of employment and livelihoods of fishermen communities. The monthly per capita fish consumption in rural (2.26 kg) and urban (2.10 kg) areas of Kerala is much higher than the national average (Govt. of India, 2014a). It has also been found that there is a gap in the domestic fish production and fish consumption in the state. The deficit in the supply of fish in the local market of the state is met by the surplus from neighbouring states, *viz*., Karnataka, Tamil Nadu and Andhra Pradesh (Singh *et al.*, 2016). About 60% of the total fish demand in Kerala is mitigated through the supply of fish from neighbouring states (Salim *et al.*, 2017). However, domestic fish price records significant decline during post monsoon period in Kerala (*ibid*). Given the setting, the study takes into account two important issues of the fishery sector in Kerala for a detailed analysis; i) To analyse the trends in fisheries output and its effect on the livelihood of the dependent population in the state; ii) To study the allocation and expenditure pattern of schemes and programmes for the fisheries sector of the state.The discussion in the paper is organised into two sections; the performance of fisheries sector of Kerala in the Indian context is discussed in the section one. The section two analyses the contribution of the fisheries sector to GSVA and plan outlay and expenditure of development programmes under fisheries sector in the state; followed by a conclusion.

Data source and Method

The study is based on secondary data from various publications and government agencies. The Publications of the Department of the Animal Husbandry, Dairying and Fisheries of the Government of India, and NSSO 68thround data on household consumption of various goods and services were used for the study. Other important publications of the Government of Kerala used were, Kerala Fisheries Statistics at a glance, Kerala Marine Fisheries Statistics, State Budget Documents, Gross State Domestic Product (GSDP) from 2004-05 to 2010-11, GSVA from 2011-12 to 2017-18. Data from Indian Marine Census 2005 and 2010 of Central Marine Fisheries Research Institute (CMFRI) were widely used for the study. The State of World Fisheries and Aquaculture of FAO was also used to explain trends in fisheries sector at the global level. The Period of the study has chosen from 10th to 12th Five Year Plan. Basic statistical tools, *viz.*, relative share, growth rate, mean, coefficient of variation and correlation were used for the analytical purpose.

Section I

Performance of Fisheries Sector in India and Kerala

Studies on fisheries sector of Kerala have mainly addressing the issues on the sustainability of fish resources in the context of modernisation of the fisheries sector (Kurian, 2003; 1985; Kurian and Achari, 1990; Ramachandran and Mohamed, 2015; Mohanty, 2013;

Parappurathu and Ramachandran, 2017) and the livelihood issues of fisher folk in the state under the neo-liberal regime and the mechanisation of the sector (Kurian, 2000; Kurian and Vijayan, 1995; Kurian and Paul, 2001). However, the growth of the fisheries sector in the context of production and income generation needs to be addressed along with the expenditure made by the state government of its development. The fisheries sector and its thriving issues in Kerala needs to be studied against the characteristic features of the sector in India.

1.1. Fisheries Sector of India

India ranks the sixth in the world in total marine capture in 2016 and its contribution was 4.54%. On the other hand, India is the second largest producer of inland fish in the world. In the export of fish products, India had a share of 1.96% in 2004 and it has increased to 3.90% by 2016 (FAO, 2018; 2014). According to CMFRI census, 91.33% of the total fishermen families in the country are traditional fishermen (Govt. of India, 2010). However, the sector uses different types of mechanised crafts on a wider scale along with non-mechanised crafts. The traditional fishermen use Out Board Machines (OBM) for their fishing operations. The types of fishing crafts used by the sector can be classified into three; mechanised, motorised, and non-mechanised. The mechanised crafts used for the fishing in the country are trawlers, gillnetters, purseseiners, dolnetters, ringseiners, and pole and liners. Plank-built canoes and plywood boats are widely used with

OBM in motorised fishing crafts. The non-motorised crafts include catamaran, dugout canoes, and plank-built canoes. According to CMFRI Census 2005, the proportion of three categories of fishing crafts *viz*., mechanised, motorised, and non-motorised engaged in fishing in the country were 24.67%, 31.66% and 43.67% respectively. On the other hand, the analogous proportion has changed to 37.31%, 36.67%, and 26.02% in 2010. It indicates that there is a decline in the proportion of non-motorised crafts in the marine fishing operations in the country.The rate of change in the number of crafts in the last two marine censuses in the country (2005 and 2010) shows that the use of non-motorised crafts has registered a decline of 51.45% followed by motorised crafts (5.66%). But there is an increase in the use of mechanised crafts by 23.17% during this period. However, there is an overall decline in the use of all types of crafts in the marine sector (18.55 %) in the country.The occupational pattern under marine fisheries sector are classified into three, *viz*., active fishing, allied fishing, and other than fishing. Active fishing is defined as engagement of adult male members of the marine population in fishing operations either as full time or part time. The allied fishing activities include marketing, making/ repairing of nets, peeling, curing/processing, and other fish related works. According to CMFRI census 2005, 51.45% of the marine occupied population were engaged in active fishing, 43.75% were in allied fishing and the remaining 4.80% were engaged in other than

fishing operations while, the proportion has changed in to 59.45%, 36.73% and 3.82% respectively in 2010.

Inland fishing provides employment and livelihood to a large chunk of the deprived communities in the interior and far off places in the country. Inland water bodies in the country are broadly classified as; fresh water and brackish water bodies. The fresh water bodies include rivers, canals, tanks, ponds, flood plain lakes, and derelict water bodies. Rivers and canals form the major category of water bodies and it stretches to about 1,95210 kms.The relative share of inland fish production in the country has increased from 50.30% to 68.18% during the period between 2000-01 to 2016-17. (Table 1).

1.2. Fisheries Sector of Kerala

Kerala is one of the leading maritime states in the country and it ranks fifth in terms of coastal length which comes around 7.26% (590 km) of the country.The state has 7.35% (0.39 lakh Sq. Km) of the continental shelf area of the country. This part is considered as the most productive portion of the Arabian Sea. The Exclusive Economic Zone (EEZ) of the state is 1.78% (0.36 lakh Sq. Km) of India (Govt. of Kerala, 2014e). The fish landing centres of the state constitutes 12.38% of the country (Govt. of India, 2010). The proportion of traditional fishermen of the state is higher (98%) than the national average (Govt. of India, 2010). It is an indication that only a small segment of the fishermen has absorbed into the modern fisheries sector.

The fisheries sector of Kerala is gradually evolving into a dualistic structure consisting of dominant traditional sector on the one side and a highly sophisticated modern sector on the other. While the modern sector has transformed into an important commercial activity and the traditional sector remained as a bare Subsistence sector (Kurien, 1978).The pioneering attempts of the state in mechanization and motorization led to significant achievements of the fisheries sector. The fishing crafts used in the marine sector of the state are mechanised, motorised, and non-motorised. The mechanised craft constitutes 18.86% of total fish crafts of the state in 2005 and the share has increased to 21.68% in 2010. The motorised fishing craft is extensively used in the marine sector of Kerala. It constitutes 48.50 % of total crafts used in the state in 2005 and which has increased to 51.31% in 2010. On the other hand,the use of non-motorised fishing crafts had declined from 32.64% to 27.01% between the two marine census periods. However, there is 25% decline in the marine sector fish crafts in Kerala during the period and the rate of decline was highest in non-motorised boats (38.21%) followed by motorised (21.03%) and mechanised boats (14.21 %).The data on active fisherfolk in Kerala reveal that there is an absolute increase in their number during the reference period. Hence it is presumed that the pressure of active fishermen on existing crafts has increased during the period in Kerala (Govt. of India, 2005; 2010).

Worker Participation Ratio (WPR)[iv] of marine fishermen is an indicator of the occupational status of the marine population in the country. In 2005, the WPR of marine fishermen in Kerala was 373 per thousand fishermen and it has come down to 345 in 2010. The relative share of active fishermen (62.43%) in the state was higher than the national average in 2005 and which has further increased to 69.07% in 2010. The proportion of marine fisherfolk engaged in allied fishing activities has declined from 31.64% to 25.85% during the period. However, there is no significant change in the proportion of fishermen engaged in other than fishing activities between2005 (5.93) and 2010 (5.08%). The contribution of marine sector to total fish production was 86.92 % in 2000-01 and it has declined to 72.19% in 2016-17in the state. Among the marine states in the country, the relative share of marine fish production of Kerala has declined from 20.16% in 2000-01 to 13.44% in 2016-17.

Kerala has 1.58 % of the river and canal length of the country. The total inland water bodies in the state constitute 7.38% and the brackish water bodies constitute 19.36% of the country (Govt. of India, 2009). The contribution of inland fisheries to total fish production of the state is 27.81% (in quantity) while its share in terms of value is 40.66% (Govt. of Kerala, 2017a). It indicates that inland fish in the state fetches higher price.The relative share of Kerala's fisheries output from 2000-01 to 2016-17 shows a decline. In 2000-01 the relative

share of inland fish production was 3% of the country while it has declined to 2.42% in 2016-17. The relative share of total fish production of the state had declined from 11.53% to 5.93% during the period. The relative share of inland and marine fish production of Kerala and India for the selected years is shown in the table 1. The relative share of inland fish production of Kerala and India shows an increasing trend, whereas the share of marine sector has declined between 2000-01 and 2015-16. In 2000-01, the relative share of inland fish production of the state was 13.08% in 2000-01 and it has increased to 27.81% in 2016-17.

Table 1. Relative Share of Inland and Marine Fish Production of Kerala and India (in %)

Year	Inland		Marine	
	Kerala	India	Kerala	India
2000-01	13.08	50.30	86.92	49.70
2005-06	12.24	57.14	87.76	42.86
2010-11	17.78	60.52	82.22	39.48
2016-17	27.81	68.18	72.19	31.82

Source: Govt. of India, 2009; 2014b; Govt. of Kerala 2017a.

1.2.1. Demography of Fishermen in Kerala

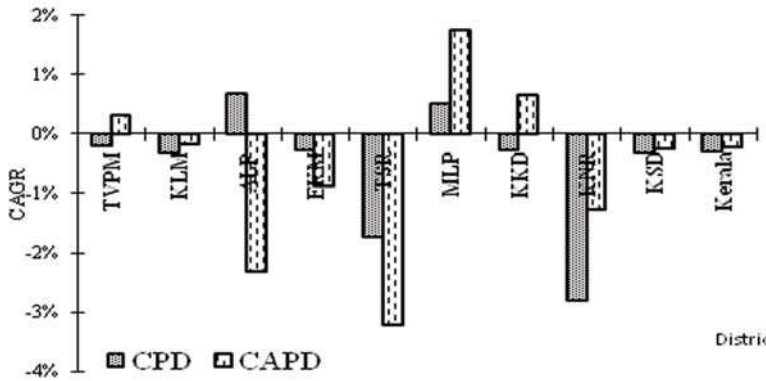
According to CMFRI Census 2010, Kerala accounts 15.26% of the marine fisherfolk of India. The average marine fishermen family size in Kerala is 5.13 and it is higher than the national average of 4.65. About 6.93% of the marine fishing villages in India are in Kerala. The proportion of BPL families in Kerala (55.04%) in the marine sector is lower than the national average (60.57%) (Govt. of India, 2010). However, the prevalence of poverty among the marine fishermen

population of Kerala is higher than the state average (*ibid*). It is also interesting to note that 73.37% of the marine fishermen in Kerala have pucca houses in 2010. The marine fishermen sex ratio in Kerala is (966 females per 1000 males) greater than the national average (928) (*ibid*). But it is lower than the average sex ratio of the state (1084). The inland fishermen population of Kerala is 23% of the total fisherfolk of the state. Inland fishing villages in the state constitute 33.73% of the total fishing villages in Kerala.

The present study uses two demographic parameters, *viz.*, Coastal Population Density (CPD) and Coastal Active Population Density (CAPD) to explain population pressure in coastal area. The CPD refers to the total number of marine fishermen population lives per kilometre coastal length and CAPD is defined as number of active fishermen per kilometre coastal length. Figure 1 shows district wise compound annual growth rate of CPD and CAPD in Kerala between 2001-02 and 2016-17. Important observations emerged from the figure 1 are; i) out of the nine marine districts, both CPD and CAPD are moving in the opposite direction in three districts, *viz*,. Thiruvanthapuram, Alappuzha and Kozhikode, ii) Malappuram district records positive compound growth rate in CPD and CAPD where CAPD is greater than CPD, iii) highest negative compound growth rate in CPD is recorded in Kannur whereas, negative compound growth rate of CAPD is highest at Thrissur, iv) The overall trend of CPD and CAPD in the state indicates that both have negative compound growth between 2001-02 and 2016-17.

The CPD is highest in Kollam, followed by Thiruvananthapuram whereas it is the lowest in Kasaragod (See Table A1 in Appendix). It has also observed that southern marine districts have higher coastal fishermen density. The coastal population density is influenced by the factors such as access to the sea coast, presence of cliffs, nature of sea, availability of fish species, river mouths and backwaters to the sea coasts etc. The CPD had declined in all the districts except Alappuzha and Malappuram during the period under investigation. The overall scenario in the state shows that CPD is declining over the years with ups and downs in the state.The CAPD is highest in Thiruvananthapuram (658) followed by Kollam (516). The CAPD is the least in Kannur district (70) (See Table A2 in Appendix).The state level trend shows that the CAPD has been declining over the years with slight fluctuations.

Figure 1. Compound Annual Growth Rate of CPD and CAPD



Note: CPD – Coastal Population Density
CAPD – Coastal Active Population Density
Source: Calculated from the Kerala Fisheries Statistics at a Glance 2003 to 2017

1.2.2. Dependency Ratio of Fishermen of Kerala

Dependency ratio of fishermen population (Inland and Marine population) refers to the number of fishermen population depending on the active fishermen. Dependency Ratio of the fishermen population in Kerala has declined from five to four during the period between 2005-06 to 2016-17. At the same time, it has also been observed that the number of active fishermen has increased during this period despite of an absolute decline in the total fishermen population in the state. The dependency ratio of the fishermen population is the lowest in Malappuram where, compound annual growth rate of active fishermen is the highest. In pathanamthitta, the dependency ratio has increased from 8 to 11, where highest negative compound growth rate of active fishermen has registered. Dependency ratio remained the same over the years in Malappuram and Kozhikode districts. The state level average dependency ratio was five in 2005-06 which has declined to four in 2016-17 (Table 2).

Table 2. Dependency Ratio of Fishermen Population in Kerala

District	Thiruvananthapuram	Kollam	Pathanamthitta	Alappuzha	Kottayam	Idukki	Ernakulam	Thrissur	Palakkad	Malappuram	Kozhikode	Wayanad	Kannur	Kasaragod	Kerala
2005-06	4	5	8	4	4	5	6	10	5	3	5	NA	9	4	5
2007-08	4	5	8	4	4	5	6	12	6	3	5	NA	9	5	5
2008-09	4	5	NA	4	NA	NA	6	12	NA	3	5	NA	9	4	5
2009-10	4	5	NA	5	NA	NA	6	13	NA	3	5	NA	9	4	5
2010-11	4	5	8	4	4	5	6	14	6	3	5	NA	9	5	5
2011-12	3	4	7	4	4	4	5	12	5	3	5	NA	7	4	4
2012-13	3	5	8	4	4	4	5	13	5	3	5	NA	8	4	4
2013-14	3	5	11	4	5	9	5	10	6	3	5	NA	6	4	4
2014-15	3	5	11	4	5	4	5	11	6	3	5	NA	6	4	4
2015-16	3	5	11	4	5	4	5	11	5	3	5	NA	6	4	4
2016-17	3	5	11	4	5	5	5	11	5	3	5	NA	7	4	4

Note: NA- Not Available, District wise Data on active fishermen for 2006-07 are not available.
Source: Kerala Fisheries at a Glance 2007 to 20017.

State Income and Fisheries Sector of Kerala

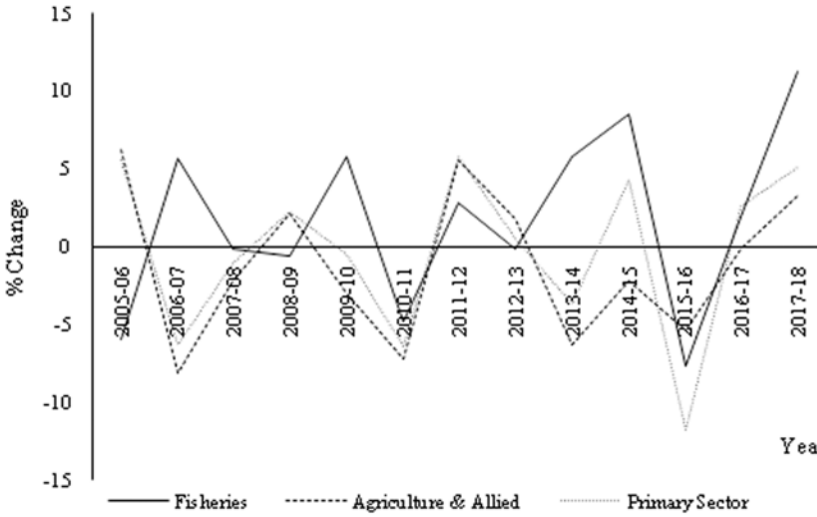
The interventions of the state government in the modernisation of fisheries sector, especially since 1991, have led to significant improvements in the fishing technology in Kerala. However, the sustainable production with equitable distribution of wealth is essential for balanced development and maximisation of socio-economic welfare of the stakeholders. Although technological advances have enhanced fish production, the neo-liberal policies followed by the governments both at the centre and the states resulted in over exploitation of resources (Kurien, 1985).This has led to cut throat competition between domestic and foreign fishing vessels and resource depletion in the fisheries sector. Hence the sector experienced disguised unemployment, decline in per capita production and intra-sectoral inequity and disturbance of the congenial socio-economic environment of the coastal villages. In this context the section analyses in detail the share of fisheries to the state income and the pattern of allocation of the developmental schemes of the fisheries sector by the state government.

2.1. Trend in Income from the Fisheries Sector of Kerala

Fisheries is one of the sub-sectors of the primary sector in Kerala. It is the mainstay of the fishermen community. Hence the development of the sector and the income accruing from it is vital. The figure 2 shows the annual percentage change in GSDP by different

sectors of Kerala and over a period from 2005-06 to 2017-18. The annual percentage change of income from fisheries sector has shown six negative rates of change during the period between 2005-06 to 2017-18 and the highest negative rate of change has recorded in 2015-16 (- 7.74%). On the other hand, the agriculture and allied sector had registered seven negative percentage change during this period.The performance of Primary sector is almost in tandem with the growth trajectory of the agriculture and allied sector.

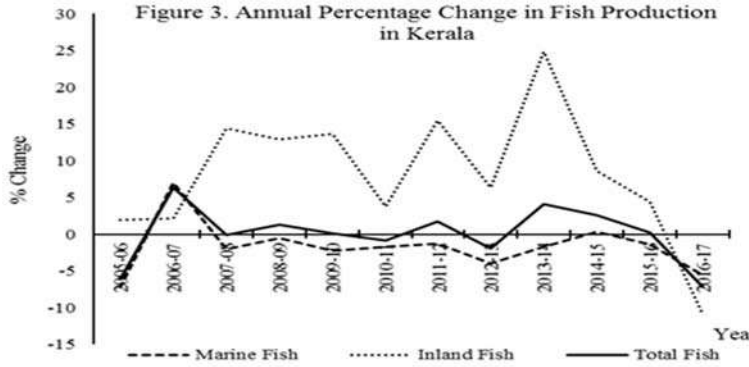
Figure 2. Annual Percentage Change in the GSDP by Different Sectors in Kerala



2004-05 to 2010-11) and GSVA at 2011-12 base year (from 2011-12 to 2017-18). Therefore, the analysis of two sets of data on the state income is carried out separately.

Source: Govt. of Kerala, 2018b; 2018c.

Figure 3 compares the annual percentage change in fish production under Inland and marine sector of Kerala. It has been found that the marine sector recorded negative percentage change in the production during the period between 2005-06 to 2016-17, except in 2006-07 and 2014-15. On the other hand, the inland fish production has shown negative percentage change only in 2016-17. The contribution of the fisheries sector to GSDP has recorded six negative annual percentage change (see fig. 2) whereas total fish production has five years of negative rate of change during the reference period. The movement in the annual percentage change of the marine fish production and the total fish production in the state shows similar trend whereas the change in the inland fish production is more volatile.



Note: There are certain problems in linking GSDP at 2004-05 base year (from 2004-05 to 2010-11) and GSVA at 2011-12 base year from 2011-12 to 2017-18). Therefore, the analysis of two sets of data on GSDP is carried out separately.

Source: Govt. of Kerala, 2019; 2018b; 2018c; Kerala Fisheries Statistics at a Glance 2005 to 2017

The table 3 gives the trend in three year moving average of the relative share of the fisheries sector to Gross District Domestic Product (GDDP) at constant price in all the districts of Kerala. The data testify that the performance of the sector in terms of the relative share to GDDP is declining over the years. Out of the 14 districts in Kerala, nine are marine districts (Thiruvananthapuram, Kollam, Alappuzha, Ernakulam, Thrissur, Malappuram, Kozhikode, Kannur, Kasaragod) and five are non-marine districts (Pathanamthitta, Kottayam, Idukki, Palakkad, Wayanad). The three marine districts, viz., Thiruvanthapuram, Malappuram and Kannur districts have less than one percent of the relative share of fisheries sector to GDDP. On the otherhand, the relative share of Ernakulam, Thrissur and Kozhikode districts to GDDP are moving in between 0.75% and 2.25%. Among the marine districts, the highest decline in the relative share of fisheries sector to GDDP has recorded in Alappuzha followed by Kollam. However, Kasaragod is the only the marine district where the share to GDDP has registered an improvement during the reference period. Although the contribution of fisheries sector to DDP in non-marine districts is less than 1%, all the five districts have registered improvements in their share and the increase is highest in Palakkad, followed by Kottayam during the reference period. However, the relative share of Pathanamthitta, Wayanad and Idukki districts to GDDP is less than 0.26%.

Table 3. Three Year Moving Average of Relative Share of Fisheries Sector in Gross District Domestic Product (in Constant Price*)

District	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Thiruvananthapuram	0.93	0.84	0.73	0.65	0.57	0.58	0.57	0.6	0.6	0.68	0.74	0.95
Kollam	3.55	3.24	2.91	2.64	2.4	2.38	2.16	2.08	1.82	1.75	1.6	1.87
Pathanamthitta	0.06	0.05	0.06	0.07	0.07	0.08	0.09	0.12	0.16	0.22	0.25	0.23
Alappuzha	4.75	4.32	3.72	3.33	2.88	2.87	2.65	2.71	2.68	2.36	1.95	1.46
Kottayam	0.13	0.12	0.12	0.15	0.14	0.15	0.15	0.22	0.31	0.39	0.43	0.66
Idukki	0.03	0.03	0.06	0.07	0.09	0.09	0.12	0.1	0.11	0.13	0.17	0.21
Ernakulam	1.18	1.06	1.17	1.15	1.11	1.21	1.42	1.46	1.33	1.14	1.16	1.16
Thrissur	1.67	1.51	1.5	1.4	1.39	1.41	1.48	1.47	1.28	1.06	0.86	0.76
Palakkad	0.24	0.22	0.2	0.25	0.24	0.27	0.25	0.45	0.62	0.77	0.75	0.57
Malappuram	0.78	0.72	0.71	0.65	0.65	0.6	0.59	0.49	0.46	0.56	0.70	0.64
Kozhikode	2.14	1.95	1.77	1.59	1.47	1.49	1.47	1.44	1.43	1.4	1.37	1.15
Wayanad	0.03	0.03	0.05	0.06	0.07	0.08	0.1	0.12	0.15	0.18	0.23	0.19
Kannur	0.74	0.68	0.68	0.62	0.61	0.61	0.63	0.58	0.67	0.64	0.65	0.45
Kasaragod	1.11	1.02	1.09	1.59	1.57	1.41	0.84	1.31	2.1	2.62	2.61	2.46
Kerala	1.36	1.24	1.18	1.11	1.03	1.04	1.04	1.08	1.08	1.06	1.02	0.98

Note: *There are certain problems in linking GSDP at 2004-05 base year (from 2004-05 to 2010-11) and GSVA at 2011-12 base year (from 2011-12 to 2017-18). Therefore, the analysis of two sets of data on state income is carried out separately.

Source: Govt. of Kerala, 2018b; 2018c.

The average relative share of fisheries sector in the district level income of the primary sectors has increased from 5.18 % in 1980s to 9.36 % in 1990s. The table4 shows district wise three-year moving average of the relative share of fisheries income toprimary sector in Kerala during2004-05, 2010-11 and 2016-17. As stated earlier, the marine sectorcontributesthe major shareto fisheries sector income in Kerala.That is why the relative contribution of fisheries sector is very low in the non-marine districts rather than in the marine districts. Among the districts, Alappuzha standsfirst in its contribution from fisheriessector to primary sector followed by Kollam. However, the relative share of Alappuzha district has declined from 36.68% to 25.33% during the reference period. The relative share of fisheries sector in Kollam, Ernakulam and Kozhikkode districts is moving in between 10% and 20% during the reference period. Among the non-marine districts the highest contribution is made by Kottayam (4.84%) followed by Palakkad (3.72%) in 2016-17. Changes in the relative share of the fisheries to the state must be viewed in the context of the crisis in theprimary sectorofthe state Economy.

Table 4. District wise Three-Year Moving Average of Relative Share of Fisheries Sector to Primary Sector (in Constant Price*)

District	2005-06	2010-11	2016-17
Thiruvananthapuram	8.16	7.62	12.57
Kollam	17.86	16.49	18.96
Pathanamthitta	0.29	0.37	1.02
Alappuzha	36.68	29.04	25.33
Kottayam	0.61	0.83	4.84
Idukki	0.10	0.30	0.65
Ernakulam	12.02	12.31	13.72
Thrissur	14.35	17.87	9.82
Palakkad	1.41	1.8	3.72
Malappuram	4.03	5.05	6.62
Kozhikode	16.11	18.55	14.59
Wayanad	0.07	0.32	0.85
Kannur	4.56	5.73	4.51
Kasaragod	4.17	9.35	13.6
Kerala	8.22	8.46	8.89

Note: *There are certain problems in linking GSDP at 2004-05 base year (from 2004-05 to 2010-11) and GSVA at 2011-12 base year (from 2011-12 to 2017-18). Therefore, the analysis of two sets of data on state income is carried out separately.

Source: Govt. of Kerala, 2018b; 2018c.

The relative share of districts to state fisheries income is shown in table 5. Alappuzha stands first (22.32%) in its contribution towards state fisheries income in 2004-05 and it has declined to the fifth position (8.69%) by 2017-18. It has also been observed that the decline in the compound annual growth rate in the marine fish production of Alappuzha (-14.96%) is faster than the state average (-2.01%) between 2006-07 and 2016-17. Kollam has improved its position from second (19.41%) to the first (21.62%) in relative share to state fisheries income during 2004-05 to 2017-18. Five leading marine districts (Alappuzha, Kollam, Kozhikkod, Ernakulam, and Thrissur) have contributed 79.20% to the state fisheries sector income in 2004-05, whereas the share has declined to 62% in 2017-18.The relative share of Kasaragod and Thiruvananthapuram has increased from 2.68% and 7.36% to 9.48% and 13.57% respectively during the reference period. The increment in the relative share to the state fisheries income of these two marine districts has been contributed by the increase in the fish production of inland and marine sectors. The contribution of non-marine districts (Pathanamthitta, Kottayam, Idukki, Palkkad, wayanad) to the state fisheries income has increased from 2.29% to 10.29% during the reference period. Among the non-marine districts Kottayam has registered the highest increase in its contribution to the state fisheries income (from 0.66% to 7.14%). However, the lowest contribution towards the state fisheries income has recorded inWayanad.

Table 5. Relative Share of Districts in the State Fisheries Sector Income (in Constant Price*)

District	2004-05	2010-11	2017-18
Thiruvananthapuram	7.36	6.27	13.57
Kollam	19.41	18.52	21.62
Pathanamthitta	0.17	0.19	0.45
Alappuzha	22.32	17.86	8.69
Kottayam	0.66	0.73	7.14
Idukki	0.09	0.40	0.87
Ernakulam	12.18	13.43	17.09
Thrissur	11.75	14.29	7.18
Palakkad	1.33	1.39	1.64
Malappuram	4.51	5.63	2.45
Kozhikode	13.54	13.36	7.42
Wayanad	0.04	0.09	0.19
Kannur	3.94	4.84	2.22
Kasaragod	2.68	3.02	9.48
Kerala	100	100	100

Note: *There are certain problems in linking GSDP at 2004-05 base year (from 2004-05 to 2010-11) and GSVA at 2011-12 base year (from 2011-12 to 2017-18). Therefore, the analysis of two sets of data on state income is carried out separately.

Source: Govt. of Kerala, 2018b; 2018c.

2.1.1. Per Capita Income and Coastal Population

Per capita income is considered as one of the key indicators of socio-economic wellbeing of a community. Per capita income is often used to measure a country's development status. It is treated as a means of evaluating the living conditions and quality of life. In this context, the present study uses the concept of fisheries per capita income. The fisheries per capita income is calculated by dividing the state fisheries sector income by total fisherfolk population in Kerala. Table 6 compares fishermen per capita income with the average state per capita income. In 2004-05 the state per capita income was Rs.36825 and it has increased by more than threefold to Rs.130677 in 2017-18. On the other hand, the fishermen per capita income increased from Rs.16657 to Rs. 43576 during the same period. Another notable observation is that there was absolute fall in the per capita income of fishermen for six years during the period between 2004-05 and 2017-18, while the per capita income of the state has registered a steady progress. In 2004- 05 the fisheries per capita income was only 45.23% of the average state per capita income, which was further declined to 33.35% in 2017-18. The data show that the proportion of fisheries per capita income to state average is on a declining trend in the state.The district-wise data on fisheries per capita income reveals that Palakkad has registered highest average fisheries per capita income during the reference period. On the other hand, the lowest average fisheries per capita income was

recorded in Kottayam district. Among the marine districts, Kollam is having the highest average fisheries per capita income while lowest is recorded in Thiruvananthapuram.

Table 6. Comparison of Per Capita Income of Fishermen and State Per Capita Income (in Constant Price*)

Year	State Per Capita Income (Rs)	Fishermen Per Capita Income (Rs)	Fishermen Per Capita Income as % of State Per Capita
2004-05	36825	16657	45.23
2005-06	40346	15497	38.41
2006-07	43325	16197	37.38
2007-08	46899	16000	34.12
2008-09	49267	15752	31.97
2009-10	53524	16513	30.85
2010-11	56947	15570	27.34
2011-12	100382	37675	37.53
2012-13	105849	37393	35.33
2013-14	109900	39267	35.73
2014-15	113544	42371	37.32
2015-16	119019	38875	32.66
2016-17	123960	39388	31.78
2017-18	130677	43576	33.35

Note: There are certain problems in linking GSDP at 2004-05 base year (from 2004-05 to 2010-11) and GSVA at 2011-12 base year (from 2011-12 to 2017-18). Therefore, the analysis of two sets of data on state income is carried out separately.

Source: Govt. of Kerala, 2018b; 2018c.

Table 7 Per Capita Fish Production in Kerala (in Kg)

Year	Marine Sector	Inland Sector	Fisheries Sector Total
2001-02	717.43	316.41	625.39
2002-03	721.45	301.22	624.96
2003-04	720.73	303.27	624.85
2004-05	718.62	304.00	622.89
2005-06	660.69	307.02	579.03
2006-07	698.74	311.56	609.69
2007-08	678.19	352.91	603.38
2008-09	668.53	394.81	605.57
2009-10	647.87	444.59	601.12
2010-11	631.15	457.37	591.18
2011-12	717.02	607.84	691.91
2012-13	685.05	643.54	675.50
2013-14	669.10	798.17	698.78
2014-15	668.45	862.69	713.13
2015-16	655.82	896.07	711.08
2016-17	615.98	794.45	657.03

Source: Calculated from Kerala Fisheries Statistics at a Glance 2003 to 2017

The table 7 shows the per capita fish production in Kerala from 2001-02 to 2016-17. It is observed that marine sector per capita fish production was more than the inland sector till 2012-13. From 2013-14 onwards, the per capita fish production of the inland sector was greater than the marine sector and the total per capita fish

production.The highest per capita fish production in the marine sector was registered in 2002-03 (721.45 Kg) and the lowest per capita fish production of 2016-17 (615.98 Kg). On the other hand, the highest per capita fish production in inland sector was (896.07Kg) in 2015-16 and the lowest was (301.22 Kg) in 2002-03. This movement in the per capita fish production of marine and inland sector indicates that when the former was showing a declining trend the latter was showing an increasing trend. Fisheries sector per capita was the lowest (579.03Kg) in 2005-06 and the highest (713.13Kg) in 2014-15.

2.2.The State Plan and the Fisheries Sector

The state plan outlay is an important part of the budget allocation for the development, rehabilitation, maintenance and improvement of infrastructure, enhancing the standard of living and welfare of the people.In our country, the centre and state governments make budget allocation for the development of different sectors. In the development of the fisheries sector also, both the centre and state allocate their share. However, the present study takes into account the plan allocation made by the state government only.

Table 8.Plan Expenditure as Percentage of Plan Outlay by Sectors in Kerala (in 2004-05 Constant Price)

Year	Agriculture	Animal Husbandry	Dairy Development	Fisheries	Total State Plan
2002-03	153.30	60.92	63.83	169.28	98.20
2003-04	81.45	61.79	92.03	81.63	85.34
2004-05	167.49	78.05	101.15	111.82	81.40
2005-06	78.50	95.58	109.87	99.25	78.79
2006-07	148.20	62.23	174.41	110.99	71.63
2007-08	109.02	58.91	100.45	110.48	81.88
2008-09	284.20	95.06	183.17	77.20	92.75
2009-10	99.06	98.72	113.80	171.19	98.44
2010-11	98.29	105.52	65.14	127.68	100.00
2011-12	96.96	92.74	88.33	130.98	97.91
2012-13	87.19	82.65	125.65	97.13	105.19
2013-14	97.38	85.59	110.44	85.95	87.65
2014-15	77.20	75.08	103.63	82.75	77.84
2015-16	73.58	72.72	98.02	81.15	106.55
2016-17	85.08	74.22	101.77	121.16	101.96
Mean	*115.8*	*80.0*	*108.8*	*110.6*	*91.0*
S.D.	*55.0*	*15.2*	*32.8*	*29.8*	*11.1*
C.V. (%)	*47.54*	*19.03*	*30.19*	*26.97*	*12.17*

Source: Government of Kerala (2010; 2014b)

The percentage share of plan expenditure to plan outlay is considered as one of the key efficiency parameters of plan fund utilization.

The percentage share of real plan expenditure to outlay of the major sub-sectors which comes under primary sector is shown in the table 8.The proportion of expenditure to outlay during the reference period shows that there are fluctuations in the percentage share in the four sectors. However, the highest fluctuation in the relative share has recorded in agriculture followed by diary development and fisheries. It is also found that the plan expenditure was higher than plan outlay for many years for agriculture (5 years), diary development (10 years), and fisheries sector (8 years) during the period from 2002-03 to 2016-17. This was mainly because of the reason that the allocations made under centrally sponsored schemes were accounted only in the state plan expenditure side of the budget.The plan expenditure during the 10th and 11th plan exceeded plan outlay in agriculture and fisheries sectors while it has declined during the 12th plan (Table A3 in Appendix). Among the four sectors which come under the primary sector, animal husbandry had the lowest percentage share in the plan expenditure under the three five-year plans. During the 12th plan period, the percentage share of plan expenditure exceeded the plan outlay only in the diary development sector.

Table 9. Per Capita Real Plan Outlay and Expenditure in Kerala (in Rs)

Year	Fisheries Sector Per Capita		Non-Fisheries Sectors Per Capita		Relative Share of Fisheries Sector to Non-Fisheries Sectors	
	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure
2002-03	350	593	1385	1351	0.88	1.52
2003-04	199	162	1424	1215	0.49	0.46
2004-05	202	226	1527	1241	0.46	0.63
2005-06	213	211	1631	1284	0.46	0.58
2006-07	488	542	1931	1377	0.89	1.38
2007-08	405	447	1913	1562	0.75	1.01
2008-09	642	496	1915	1779	1.19	0.99
2009-10	335	573	2119	2078	0.56	0.98
2010-11	406	518	2227	2223	0.65	0.83
2011-12	787	1031	2351	2294	1.03	1.39
2012-13	863	838	2598	2735	1.02	0.94
2013-14	889	764	2931	2569	0.94	0.92
2014-15	918	759	3166	2463	0.89	0.95
2015-16	899	729	3086	3295	0.90	0.68
2016-17	824	999	3585	3651	0.71	0.85
CAGR(%)	55	54	73	74	—	—

Note: CAGR-Compound Annual Growth Rate

Source: Govt. of Kerala, 2010; 2014b; 2018d

In the analysis of plan fund utilisation, it is important to study the per capita availability of funds for the development programmes. The present study analyses real per capita plan fund utilisation for the fisheries sector and for non-fisheries sector in Kerala. The real per capita plan outlay/expenditure of fisheries sector is defined as total real plan outlay/expenditure in a financial year divided by total fishermen population in that year. On the other hand, the real per capita plan outlay/expenditure for non-fisheries sectors is the total real plan outlay/ expenditure under non-fisheries sectors in a financial year divided by the population other than fishermen in the state. A comparative study of per capita real plan outlay and expenditure of the fisheries sector with that of the per capita real state plan outlay and expenditure of non-fisheries sectors in Kerala is shown in the table 9.The following are the important observations arrived at from the table: 1) Per capita plan outlay and expenditure of fisheries sector has recorded an increase of 135% and 68% respectively between 2002-03 and 2016-17. Whereas increase in the per capita plan outlay (159%) and expenditure (170%) under non-fisheries sectors was much higher than the increase in the per capita real plan fund utilisation under fisheries sector during the reference period. 2) The per capita real plan outlay andexpenditure of fisheries sector is relatively more volatile than non-fisheries sectors in the state during this period.The highest fisheries per capita plan expenditure was recorded in 2011-12 (Rs.1031), on the other hand

the per capita plan expenditure of non-fisheries sectors was highest in 2016-17 (Rs. 3651). The lowest per capita plan expenditure of the fisheries sector and non-fisheries sectors were reported in 2003-04.The fisheries sector recorded eight years of negative annual percentage change in per capita plan expenditure between 2002-03 and 2016-17, whereas only three years of negative percentage change has observed in non-fisheries sectors. The CAGR of per capita plan outlay and expenditure of non-fisheries sector is higher than the CAGR of per capita plan outlay and expenditure of the fisheries sector. It has also found that the relative share of total plan outlay and expenditure of fisheries sector to non-fisheries sectors is less than two percent during the reference period, which is below par with the relative share of fishermen population (more than three percent) to non-fishermen population in the state.

Table 10.Annual Percentage Change in Real Plan Outlay and Expenditure in Kerala

Year	Agriculture		Animal Husbandry		Dairy Development		Fisheries		Total State Plan	
	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure
2002-03	-19.70	-1.02	22.54	12.65	-40.78	-56.70	11.52	196.49	28.49	50.30
2003-04	-2.14	-48.00	-6.28	-4.95	-5.00	36.98	-42.71	-72.38	3.16	-10.35
2004-05	15.26	137.03	-1.14	24.88	-3.07	6.54	1.04	38.42	6.42	1.51
2005-06	12.61	-47.22	5.75	29.50	5.54	14.64	6.41	-5.55	7.34	3.90
2006-07	116.28	308.32	32.58	-13.68	27.88	102.99	131.69	159.11	19.45	8.59
2007-08	-60.35	-70.83	-16.81	-21.25	79.27	3.25	-16.20	-16.59	-0.64	13.57
2008-09	3.41	169.57	5.68	70.54	16.03	111.59	60.05	11.84	1.01	14.44
2009-10	-0.68	-65.38	12.31	16.63	43.13	-11.08	-47.39	16.66	10.53	17.30
2010-11	62.92	61.66	49.65	59.95	101.51	15.34	22.25	-8.82	5.69	7.36
2011-12	10.90	9.40	44.48	26.99	3.19	39.92	68.51	72.86	6.98	4.74
2012-13	128.60	105.56	5.31	-6.15	28.17	82.33	10.23	-18.26	11.07	19.33
2013-14	1.30	13.14	14.96	19.04	26.99	11.62	3.66	-8.27	13.19	-5.68
2014-15	3.95	-17.59	4.62	-8.22	35.52	27.17	3.71	-0.16	8.53	-3.63
2015-16	-1.62	-6.24	-0.67	-3.79	10.53	4.54	-1.51	-3.42	-2.07	34.07
2016-17	31.86	52.47	-5.92	-3.98	13.72	18.07	-7.82	37.63	16.55	11.53
CAGR (%)	*14.06*	*9.37*	*8.86*	*10.41*	*24.43*	*28.65*	*5.90*	*3.40*	*7.49*	*7.78*

Note: CAGR-Compound Annual Growth Rate
Source:Govt. of Kerala,2010; 2014b

The table 10 shows annual percentage change in real plan outlay and The table 10 shows annual percentage change in real plan outlay and expenditure of the total state plan and of the major sectors whichcomes under primary sector. Following are the important observations of the table; 1) the plan fund utilization data show that the number of negative percentage change was highest in the fisheries sector (8 years) followed by agriculture and animal husbandry (7 years each), and diary development (2years). There were only three years of negative percentage change observed in the total state plan expenditure during 2002-03 to 2016-17. Four years of negative percentage change in the plan expenditure in the fisheries sector has observed in the twelfth five-year plan (2011-12 to 2016-17). 2)The agriculture and animal husbandry sectors have five years of negative percentage change in plan outlay. 3) It was found that fluctuations in the percentage of change in the plan outlay and expenditure are the highest in the fisheries sector followed by agriculture. The percentage change in the total state plan outlay is more stable than the outlay of all sectors under primary sector. The CAGR of plan outlay and expenditure of fisheries sector in the state is the lowest compared to other sub-sectors under primary sector. It has found that there are abnormalities in the annual percentage change in the plan expenditure of major sectors in the primary sector in certain years. This is due to the allocation of the central government,which has included only in the expenditure side of the state plan. The rate of change

in the plan outlay of the fisheries sector has recorded an increase of 76.93% in the 11th plan compared to the 10th plan. But the rate has declined to 58.53% in the 12th plan. However, the decline in the rate of change in the fisheries sector plan expenditure was much higher than the fall in the rate of change in plan outlay during 11th (76.11%) and 12th Plan (24.38%) period (see Table A4 in Appendix). The rate of change in agriculture plan outlay has increased from 0.76% to 251.96% during the same period. The rate of change in the plan outlay and expenditure of all the sectors under primary sector are more volatile than the state average during the period under investigation.

2.2.1. Development Schemes and Plan Expenditure in Kerala

In the analysis of plan fund utilisation, the study of disaggregated data assumes importance. This analysis would give trends and patterns of developmental activities carried out by the state government. Therefore, the present study has incorporated a disaggregated analysis of developmental activities carried out under the fisheries sector. For the brevity of the analysis, the schemes were broadly classified into six categories and they are; 1) fisheries resource conservation schemes, 2) programmes for development of marine fishing, 3) programmes for the development of inland fishing, 4) support facilities for fisheries development, 5) programmes for the development of fishing harbours, 6) programmes for social security and livelihood. Details of the schemes under the six categories mentioned above are described here:

1. Fisheries Resource Conservation: Important schemes which come under fisheries resource conservation are; management and conservation of fish resources, development of model fish villages, construction of ice and freezing plants , compensation to fishermen for replacement of equipments and implements which are detrimental for fisheries resource conservation.

2. Marine Fisheries: Major schemes which come under marine fisheries are different integrated projects for the development and modernisation of marine fishing, safety measures for marine fishing , modernisation of fish markets,and value addition.

3. Inland Fisheries: Schemes which come under inland fisheries are those meant for enhancing production and productivity of inland fishing, setting up of model fish farms, development of aquaculture, and training for fish farmers.

4. Support Facilities: Important support facilities for fisheries sector are financial assistance to institutions for research and development, construction of markets, seed farms, nurseries and hatcheries.

5. Fishery Harbour Development: Major programmes under fisheries harbour development are construction, management and maintenance of fish harbours and fish landing centres.

6. Social Security and Livelihood Schemes:Major programmes which come under social security and livelihood are; education, health, housing, insurance, savings, credits, micro enterprises, rehabilitation schemes, different extension activities and service delivery schemes.

The table 11 gives relative share of plan expenditure on different schemes under the fisheries sector of Kerala from 2002-03 to 2016-17. It has found that there is a steady decline in the development expenditure on social security and livelihood schemes under fisheries sector during the period between 2007-08 and 2016-17. But there is a steady rise in the relative share of expenditure on schemes for support facilities for the fisheries sector during the period from 2002-03 to 20016-17. The relative share of plan spending for marine and the inland sectors has increased during the 12th plan period but the increase is higher in the inland sector compared to marine sector. There is not much change in the relative share of plan spending for the development of fishing harbours during the 11th and 12thfive-year plans. It has also found that there was a fall of 0.48% in the relative share of plan expenditure on programmes for fisheries resource conservation between the 11th and 12thfive-year plan.

Pearson's correlation coefficient has used to examine the relationship between income from fisheries sector and investment

initiatives taken by the state government of Kerala. This study hypothesises that there is positive correlation existing between investment made by the state government on the fisheries sector and income earned. For this analysis, the total real plan expenditure on fisheries sector, real plan expenditure for schemes for marine fisheries development, real plan expenditure for schemes for inland fishing were taken as proxies of investment. The quantity of fish catch of marine, inland and total were taken as proxies for real income of fisheries sector in Kerala. The correlation results show that there is only a moderate relation (0.552) between total real plan expenditure of the fisheries sector and the total quantity of fish catch at 0.05 level of significance. No significant relationship was observed between real plan expenditure on the marine sector schemes and the total marine fish catch. However, strong positive correlation (0.898) has observed between real plan expenditure on inland fishing and inland fish production with a significance level of 0.01.

Table 11 - Relative Share of Plan Expenditure of Fisheries Sector by Major Schemes in Kerala (in %)

Year	Fisheries Resource Conservation	Marine	Inland	Supporting Facilities	Fishery Harbours	Social Security and Livelihood Support	Total
2002-03	0.70	28.42	0.77	0.61	9.04	60.47	100
2003-04	3.87	0.27	4.46	1.62	39.51	50.27	100
2004-05	2.96	0.31	3.53	1.55	20.94	70.70	100
2005-06	4.05	23.22	0.48	1.09	25.76	45.39	100
2006-07	1.70	8.94	0.15	0.70	10.76	77.75	100
10th Plan	**2.05**	**14.92**	**1.21**	**0.92**	**16.03**	**64.88**	**100**
2007-08	2.07	7.74	1.31	0.18	15.48	73.23	100
2008-09	2.22	1.07	3.72	0.32	14.25	78.42	100
2009-10	1.57	12.12	3.72	1.79	11.23	69.57	100
2010-11	1.77	12.04	4.00	2.92	15.44	63.82	100
2011-12	9.00	8.59	2.21	3.31	7.51	69.39	100
11thPlan	**4.38**	**8.62**	**2.94**	**2.10**	**11.68**	**70.28**	**100**
2012-13	2.41	3.32	4.57	10.49	6.70	72.50	100
2013-14	4.39	9.30	4.42	13.91	8.47	59.51	100
2014-15	2.94	23.85	4.47	8.10	9.81	50.83	100
2015-16	7.18	15.54	7.33	19.13	12.73	38.11	100
2016-17	2.98	6.27	13.73	24.83	17.06	35.13	100
12thPlan	**3.90**	**11.37**	**7.48**	**16.08**	**11.50**	**49.67**	**100**

Source: Govt. of Kerala, 2008; 2013b; 2018d

The developmental schemes for the marine sector are mostly conventional type and which includes; (i) construction of harbours and landing centres, (ii) social security and livelihood support schemes for fishermen community. Major activities under social security and livelihood support schemes are: saving cum relief schemes, housing, sanitation, setting up of Matsya Bhavans, group insurance for fisherfolk etc. During 2012 - 13, the state government has implemented model village scheme in Kerala (in 25 coastal Villages), when, the coastal Area Development project commenced earlier showed a slow pace in its execution (Govt. of Kerala, 2013a). The schemes meant for sustainable production and productivity enhancement were not given much prominence in the marine sector development designed by the state government. Instead the government introduced various schemes for the welfare of the marine fisherfolk in the state during the reference period. However, for the empowerment of the marine fisher women, the state government has established the Society for Assistance to Fisherwomen (SAF) in 2005. About 2500 women micro enterprise groups were formed under SAF and only 1000 groups are surviving now (Salim *et al*, 2017). However, the association of fisherwomen with activities of SAF have a positive effect on their socio-economic empowerment (*ibid*). For the socio-economic development of fisherfolk, the state government has set up Kerala State Coastal Area Development Corporation (KSCADC) in 2010 by reconstituting the

Coastal Area Development Agency. The KSCADC is aimed to undertake projects for coastal infrastructure development. But it has been found that a large number of projects which come under KSCADC are still incomplete since a long period. (Govt. of Kerala, 2018a).

There are several agencies working for the development of inland fishing in Kerala. Fish Farmers Development Agencies (FFDA), Brackish Water Fish Farmer's Development Agency (BFFDA), Matsyafed, and *Agency for Development of Aquaculture* (ADAK) are major institutional set up for the development of inland fishing in Kerala. The state government has implemented integrated aquaculture development projects in *Kuttanad* and in *Pokkali* fields. In order to augment inland fish production, the *Matsya Keralam* programme was introduced in the state in 2008. This program was implemented with the support of several inland fishing development agencies in the state along with the support of Local Self Government Institutions (LSGIs). The program aimed to enhance total inland fish production from present 75000 tonnes to 2 lakh tonnes over a period of three years (Govt. of Kerala, 2009b). As a result, the inland fish production has increased by 1.5 lakh tonnes in 2011(Kumar, 2012). With the financial support of the central government, the state government has introduced *Matsya Samrudhi* project for the fuller utilization of inland water bodies in the state for eco-friendly fish production and for the increase in annual inland fish production from 1.5 lakh MT to 3 lakh MT over a period

from 2012-13 to 2014-15 (Govt. of Kerala, 2012b). But the annual inland fish production in the state was 2.02 lakh MT in 2014-15. (Govt. of Kerala, 2016a). However, the state government has decided to implement the second phase of the *Matsya Samrudhi* project for another three-year period from 2015-16 to 2017-18, but the project has been terminated in 2017-18 with the introduction of *Janakeeya Matsyakrishi* project.It has been often found that the development schemes under fisheries sector have been abruptly terminated during its implementation level without undertaking scientific study.

Conclusion

Fisheries sector has significant role in the socio-economic development of Kerala. The sector has immense potential to cater the nutritional needs of the state. The sector provides livelihood to 2.98% of total population in the state.But the contribution of the sector to GSVA is only one percent.The proportion of the fisheries per capita income to the state percapita showed a declining trend between 2004-05 and 2017-18.The changes in the per capita fish production of marine and inland sector indicates that the former shows a declining trend whereas the latter shows an increasing trend during this period.The annual percentage change of income from fisheries sector has shown six negative rates of change during the period under investigation. However, the performance of the fisheries sector is almost in tandem

with the growth trajectory of the primary sector. The relative contribution of the fisheries sector in the non-marine districts is less than one percent of the GDDP. However, the contribution of non-marine districts to the state fisheries sector income has been increasing in the reference period.It is also found that the relative share of plan expenditure to outlay has recorded the highest fluctuation in agriculture sector followed by diary development and fisheries during 10th to 12th Five Year Plan period. The plan expenditure is higher than the plan outlay for many years for the fisheries sector. It is also found that the central government allocation for the state fisheries sector are accounted only in the expenditure side of the state plan.The per capita real plan outlay and expenditure for the fisheries sector is relatively more volatile than the per capita real plan outlay and expenditure of non-fisheries sectors.The fisheries population constitutes 2.98% of the total population in the state. However, the relative share of total plan outlay and expenditure of the fisheries sector to non-fisheries sectors in the state is less than two percent. The annual percentage change in the plan fund utilization reveals that negative changes are more prominent in the fisheries sector than other sub-sectors under the primary sector during 2002-03 and 2016-17.The disaggregated data on plan fund utilization shows that there is a steady decline in the development expenditure on social security and livelihood schemes under fisheries sector between 2007-08 and 2016-17. However, there is a steady rise in the relative share of expenditure on

schemes for support facilities for the fisheries sector development during 2002-03 and 2016-17. No significant relationship has observed between real plan expenditure of the marine sector schemes and total marine fish production in the state. However, real plan expenditure in inland fishing and inland fish production has a strong positive correlation.The schemes meant for sustainable production and productivity enhancement are not given much prominence in the marine sector development schemes.

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Notes

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ii. Assistant Professor, PPRI, Thiruvananthapuram.
iii. Professor and Director, PPRI, Thiruvananthapuram.
iv. Worker Participation Ratio of the marine fishermen is defined as the number of persons occupied per thousand fishermen.

References

Food and Agriculture Organisation of the United Nations (2014). The State of World Fisheries and Aquaculture: Opportunities and Challenges. Rome: Food and Agriculture Organisation of the United Nations.

Food and Agriculture Organisation of the United Nations (2018). The State of World Fisheries and Aquaculture: Meeting the

Sustainable Goals. Rome: Food and Agriculture Organisation of the United Nations.

Government of India (2005). Marine Fisheries Census 2005. Kochi: Central Marine Fisheries Institute.

Government of India (2009). Handbook on Fisheries Statistics 2008. New Delhi: Department of Animal Husbandry, Dairying & Fisheries.

Government of India (2010). Marine Fisheries Census 2010 – Kerala. Kochi: Central Marine Fisheries Institute.

Government of India (2014a). *Household Consumption of Various:Goods and Services in India*- 20ll-12. NSS 68th Round. New Delhi: NSSO.

Government of India (2014b). Handbook on Fisheries Statistics 2008. New Delhi: Department of Animal Husbandry, Dairying & Fisheries.

Government of India (2017a). Economic Survey 2016-17. Volume 2. New Delhi: Ministry of Finance.

Government of India (2017b). National Policy on Marine Fisheries, 2017. F. No. 21001/05/2014-FY (Ind) Vol. V - Preamble. New Delhi: Department of Animal Husbandry, Dairying and Fisheries.

Government of Kerala (2007). Kerala Fisheries Statistics at a Glance 2007. Thiruvananthapuram: Department of Fisheries.

Government of Kerala (2008). Tenth Five Year Plan 2002-2007 - Accounts. Thiruvananthapuram: The Finance Department.

Government of Kerala (2009a). Kerala Fisheries Statistics at a Glance 2009. Thiruvananthapuram: Department of Fisheries.

Government of Kerala (2009b). Success Stories of Matsya Keralam First Phase. Department of Fisheries: Thiruvananthapuram.

Government of Kerala (2010). Plan Outlay and Expenditure Kerala (1951-2007), Volume 2, Thiruvananthapuram: Kerala.

Government of Kerala (2011). Kerala Fisheries Statistics at a Glance 2011. Thiruvananthapuram: Department of Fisheries.

Government of Kerala (2012a). Kerala Fisheries Statistics at a Glance 2012. Thiruvananthapuram: Department of Fisheries.

Government of Kerala (2012b). Matsya Samrudhi. Department of Fisheries: Thiruvananthapuram.

Government of Kerala (2013a). Economic Review 2013. Thiruvananthapuram: Kerala State Planning Board.

Government of Kerala (2013b). Eleventh Five Year Plan 2007-2012 Accounts. Thiruvananthapuram: The Finance Department.

Government of Kerala (2013c). Annual Plan 2013-14. Thiruvananthapuram: The Finance Department.

Government of Kerala (2013d). Kerala Fisheries Statistics at a Glance 2013. Thiruvananthapuram: Department of Fisheries.

Government of Kerala (2014a). Perspective Plan 2030 – Kerala. Volume 1. Thiruvananthapuram: Kerala State Planning Board.

Government of Kerala (2014b). Eleventh Five Year Plan (2007-2012) - Outlay and Expenditure. Thiruvananthapuram: Kerala State Planning Board.

Government of Kerala (2014c). Annual Plan 2014-15. Thiruvananthapuram: The Finance Department.

Government of Kerala (2014d). Kerala Fisheries Statistics at a Glance 2014. Thiruvananthapuram: Department of Fisheries.

Government of Kerala (2014e). Kerala Marine Fisheries Statistics 2013. Thiruvananthapuram: Department of Fisheries.

Government of Kerala (2014f). Economic Review 2013. Thiruvananthapuram: Kerala State Planning Board.

Government of Kerala (2015). Annual Plan 2015-16. Thiruvananthapuram: The Finance Department.

Government of Kerala (2015). Kerala Fisheries Statistics at a Glance 2015. Thiruvananthapuram: Department of Fisheries.

Government of Kerala (2016a). Kerala Fisheries Statistics at a Glance 2016. Thiruvananthapuram: Department of Fisheries.

Government of Kerala (2016b). Annual Plan 2016-17. Thiruvananthapuram: The Finance Department.

Government of Kerala (2016c). Socio Economic Survey of Fisherfolk in Kerala 2013. Thiruvananthapuram: The Finance Department.

Government of Kerala (2017a). Kerala Fisheries Statistics at a Glance 2017. Thiruvananthapuram: Department of Fisheries.

Government of Kerala (2018a). Economic Review 2017. Thiruvananthapuram: Kerala State Planning Board.

Government of Kerala (2018b) "Gross /Net State Value Added / Domestic Product with base year 2011-12". Retrieved on 06-03-2019. http://www.ecostat.kerala.gov.in/images/pdf/publications/State_Income/data/gsdp_1718.pdf

Government of Kerala (2018c) "Gross /Net State Domestic Product with base year 2004-05". Retrieved on 12-07-2018.http://www.ecostat.kerala.gov.in/images/pdf/publications/State_Income/data/gs_ns_1314.pdf,

Government of Kerala (2018d). Twelfth Five Year Plan 2012-2017 - Accounts. Thiruvananthapuram: The Finance Department.

Government of Kerala (2019). Economic Review 2018. Thiruvananthapuram: Kerala State Planning Board.

Kumar, K Pradeep (2012). A study on the production and marketing of aquaculture products in Kerala. (Unpublished PhD Thesis). M. G. University: Kottayam.

Kurien, John (1985). Technical Assistance Projects and Socio-Economic Change: Norwegian Intervention in Kerala's Fisheries Development. *Economic and Political weekly*. Vol 20, No. 25/26, pp. A70-A88.

Kurien, John (1978). "Entry of Big Business into Fishing: Its Impact on Fish Economy". *Economic and Political Weekly*. Vol. 13, No. 36, pp. 1557-1565.

Kurien, John(2001). "The Socio-Cultural Aspects of Fisheries: Implications for Food and Livelihood Security - A Case Study of Kerala State, India". In McGoodwin, J.R. 2001 Understanding the Cultures of Fishing Communities: A Key to Fisheries Management and Food Security, FAO Fisheries Technical Paper 401, The Food and Agriculture Organization of the United Nations

Kurien, John (2003). "The Blessing of the Commons: Small-Scale Fisheries, Community Property Rights, and Coastal Natural Assets". CDS Working Paper 349. Thiruvananthapuram: Centre for Development Studies.

Kurien, John and A. J. Vijayan (1995). "Income Spreading Mechanisms in Common Property Resource: Karanila System in Kerala's Fisheries". *Economic and Political Weekly*. Vol. 30, No. pp. 1780-1785

Kurien, John and T. R. Thankappan Achari (1990). "Overfishing along Kerala Coast: Causes and Consequences". *Economic and Political Weekly*. Vol. 25, No. 35/36, pp. 2011-2018.

Mohanty, Rajlaxmi (2013). "Review on Fishery in Kerala Perspective". MPRA Paper No. 44285. Munich Personal RePEc Archive.

Parappurathu, Shinoj and Ramachandran,C. (2017). "Taming the Fishing Blues: Reforming the Marine Fishery Regulatory Regime in India". *Economic & Political Weekly.* Vol. 52. No 45. pp. 73-81.

Ramachandran, C. and K Sunil Mohamed (2015). "Responsible Fisheries Kerala Fish Workers Open New Path in Co-Governance".*Economic & Political Weekly*, Vol. 50. No 35. Pp. 16-18

Ramakrishnan, Suja (2003). "Socio-Economic Issues and Sustainable Fishery Management. A *Case Study of Kerala". Unpublished Ph. D Thesis. Cochin: Cochin University of Science and Technology.*

Salim, Shyam. S.; P.K Safeena; Reeja Fernandez; P. R. Athira; P. V. Sunil; N.K. Harshan; Ramees M.Rahman; N.R. Athira and Remya Rajesh (2017). "A rapid assessment of the fish trade, arrivals and price realization in Kerala". *Marine Fisheries Information Service: Technical and Extension Series*, No 232. Pp. 24-27.

Salim, Shyam S.; Athira N. R.; and Reeja Fernandez (2017). 'A Performance Appraisal of Theeramythri Activity Groups in Kerala'. International Journal of Research in Applied. Vol. 5, No. 3, PP: 135-150.

Singh, Ram; P. K. Pandey; Shyam Salim and M. Krishnan (2016). "Evolving fisheries business in India with GIS". Geospatial World. Retrieved on 12-11-2018. https://www.geospatialworld.net/article/evolving-fisheries-business-in-india-with-gis/

Appendix

Table A1. Population Density of Costal Fishermen by District (per Km)

Year	TVM	KLM	ALP	EKM	TSR	MLP	KKD	KNR	KSD	Kerala
2001-02	2233	2650	1419	1647	1350	1194	1453	711	653	1403
2002-03	2255	2675	1433	1662	1363	1206	1467	717	659	1417
2003-04	2275	2700	1446	1678	1375	1217	1480	724	665	1430
2004-05	2272	2614	1418	1674	1442	1210	1452	718	657	1420
2005-06	2295	2640	1432	1691	1457	1222	1466	725	664	1434
2006-07	2326	2683	1451	1712	1458	1235	1483	731	672	1451
2007-08	2348	2709	1465	1728	1472	1247	1497	738	679	1465
2008-09	2370	2734	1478	1744	1486	1258	1511	744	685	1478
2009-10	2391	2758	1491	1760	1499	1269	1524	751	691	1491
2010-11	2412	2782	1504	1775	1512	1280	1537	757	697	1504
2011-12	2096	2418	1307	1543	1314	1113	1336	658	606	1307
2012-13	2107	2430	1314	1550	1321	1118	1343	662	609	1314
2013-14	2140	2488	1551	1560	1026	1271	1374	457	613	1322
2014-15	2151	2500	1558	1568	1031	1277	1380	459	616	1329
2015-16	2163	2514	1567	1577	1037	1284	1388	461	619	1336
2016-17	2174	2527	1575	1584	1042	1290	1395	464	622	1343
Average	**2250**	**2614**	**1463**	**1653**	**1324**	**1231**	**1443**	**655**	**650**	**1403**

Source: Kerala Fisheries at a Glance 2002-03 to 2017

Table A2. Density of Active Costal Fishermen Population by District (per km)

Year	TVM	KLM	ALP	EKM	TSR	MLP	KKD	KNR	KSD	Kerala
2005-06	627	533	418	333	160	390	284	71	148	323
2007-08	626	528	353	340	137	399	282	71	147	313
2008-09	678	529	283	286	127	402	290	72	153	307
2009-10	669	523	342	288	123	428	296	73	156	318
2010-11	673	519	374	285	110	420	299	73	144	319
2011-12	687	517	331	290	115	428	300	75	141	316
2012-13	667	505	473	330	113	431	301	70	141	335
2013-14	657	504	479	291	113	442	306	63	141	333
2014-15	653	502	316	288	107	450	307	71	143	311
2015-16	638	501	359	289	105	468	309	64	145	317
2016-17	649	523	323	302	112	472	306	62	144	316
Average	**657**	**517**	**368**	**302**	**120**	**430**	**298**	**70**	**146**	**319**

Source: Kerala Fisheries at a Glance 2002-03 to 2017

Table A3. Relative Share of Real Plan Expenditure to Outlay in Kerala (in 2004-05 Base)

Five-year Plan	Agriculture	Animal Husbandry	Dairy Development	Fisheries	Total State Plan
10th Plan	130.37	71.10	111.68	119.27	82.11
11th Plan	128.84	92.53	96.51	118.72	94.64
12th Plan	84.05	77.88	105.61	93.14	95.75

Source: Government of Kerala (2010; 2014b)

Table A4. Rate of Change in the Real Plan Outlay and Expenditure in Kerala

	Agriculture		Animal Husbandry		Dairy Development		Fisheries		Total State Plan	
Five Year Plan	Outlay	Expen	Outlay	Expen	Outlay	Expen	Outlay	Expen	Outlay	Expen
11th Plan	0.76	-0.43	59.40	107.45	365.31	302.10	76.93	76.11	36.27	57.08
12th plan	251.96	129.60	102.03	70.04	235.73	267.41	58.53	24.38	50.19	51.94

Source: Govt. of Kerala 2010; 2014b