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Marine Fishery in Kerala: A Geographical Analysis

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Abstract

Kerala is well endowed with marine fish resources. Annual fish catch fluctuates around 0.6 million tonnes since 1989. Pelagic group of fishes dominate the catch. There are two distinct fishing zones in Kerala. Bulk of the fish landings are in Kollam, Alappuzha and Ernakulam districts. Species composition remained more or less same over the years; however the demersal group of fishes recorded a declining trend. This paper attempts to discuss marine fish catch in Kerala within the frame work of coastal water ecosystem.

1.0 Introduction

Traditionally, fish is an important component of food for a large section of population in the world. Besides being the source of high quality animal protein it supplies essential micronutrients, minerals and fatty acids required for human being. Marine fisheries constitute the major share of fish resources and as an important economic sector it is closely linked to international trade. With advances in fishing technology and improved infrastructure like cold storage facilities, easy transport and processing there was a real boost to the marine fishing sector during the second half of last century. The global oceanic fish catch climbed from 19 million tonnnes in 1950 to 93 million tonnes in 1997 (Brown, 2001). However, symptom of stress was evident in this sector from late 1980s and early 1990s. Over fishing is a major global concern today. FAO in early 1990s reported that many major fisheries were being harvested at or beyond their sustainable capacity and in certain cases there is an actual decline (FAO, 1993). Biomass flip, wherein a dominant species rapidly drops to a low level to be succeeded by another species, associated with over fishing can generate serious cascading effect among other components of the ecosystem (Sherman, 1995). Apart from over fishing the other source of perturbations are pollution at the continental margin, high nitrogen and phosphorus effluents from estuaries, presence of toxins in poorly treated sewage discharge and loss of wetland nursery. Recent studies also implicate changes in climate and the natural environment as a prime driving force of variability in the level of fish population (Alheit and Bernal, 1992).

India is the seventh largest fishing nation in the world with an Exclusive Economic Zone of 2.02 million km^2 having a fish harvest potential of 3.93 million tonnes per annum and a yield of 2.97 million tonnes in 2000-01 (Ayyappan and Diwan, 2003). The inshore water of the country (up to 50 m depth) has a potential of 2.21 million tonnes, of which the current level of exploitation stands at around 97% (D'Cruz, 2004). It is evident that like global scenario marine fishery in India is under stress. The Bay of Bengal and the Arabian Sea are two

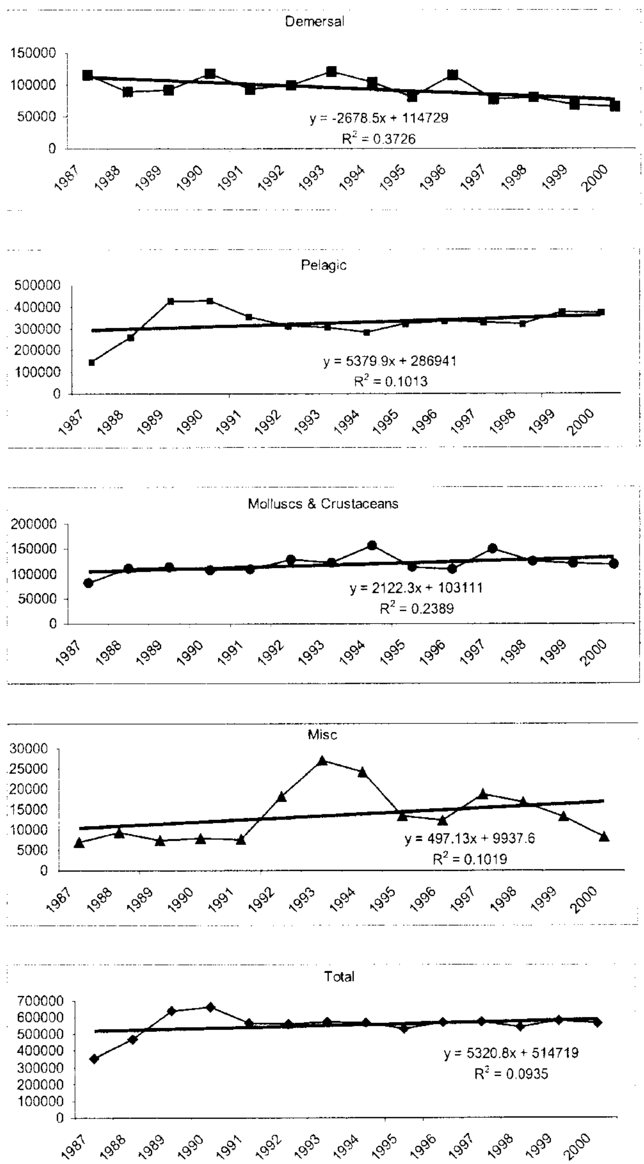

Fig. 1: **Trends of Marine Fish Landings in Kerala** (in metric tonnes)

large marine ecosystems in India. Between these two the Arabian Sea is more productive and accounts for 62% of total national resource potential. The exploitation level in the west coastal water was also high as it contributed around 65% of total marine fish landings in India in 1997-98. Kerala with a continental shelf area of 40,000 km^2 has a fishery potential of 0.57 million tonnes in the near shore water, which is around 26% of national potential and 38% of the potential of west coast although Kerala possesses only 7% of all India coast line and 7.8% of continental shelf area of the country. These figures indicate high productivity of coastal waters of Kerala. During the year 1997-98, Kerala's share of marine fish landing was 19% of total marine fish landings in the country. Kerala accounted for 19% of national export of marine products in 2004-05. However, annual marine fish production in Kerala fluctuates around 0.6 million tonnes since 1989. The highest annual marine fish landing was 0.66 million tonnes in 1990 and the lowest was 0.53 million tonnes in 1995.

According to 2003-04 estimates there were 0.84 million fishermen population in Kerala which is around 2.6% of total population of the State. However active fishermen population was 21.3% of total fishermen population. This indicates that dependency ratio is quite high among fishermen population. To overcome the problems due to crowding and high dependency an income spreading mechanism locally known as *Karanila* has been indigenously developed (Kurien and

Vijayan, 1995). Sex ratio among the fishermen is 968 females per 1000 males against the state average of 1058 females per 1000 male. The fishermen population lags behind in other human development indices also. In fact they are socially and economically back ward. Population growth rate of this community is higher than the state average. Kerala fishery is an over capitalized, low income fishery, in which fishermen have little alternative employment prospect (ibid, 1995).

In spite of modernization there appears to be stagnation in marine fish production in Kerala. As a result per capita availability of fish is declining in one hand and on the other hand income of people depending on fishing and related sector is reducing over time as population growth rate among fishing population continues to be high. While the cause of stagnation is a subject matter of debate, there is hardly any difference of opinion about the multiplicity of problems encountered by this sector and the people associated with it. As fish is part of regular diet of a major section of people in Kerala, and also a foreign exchange earner the problems in this sector affect the larger society in the State. The present paper attempts to provide an overview of the environmental condition of coastal water, its productivity and finally the trend of marine fish production in Kerala.

The main data source for this study was Facts and Figures-2000, and Marine Fisheries Statistics of Kerala, 2005 published by the Department of Fisheries, Government of Kerala. Additional data were collected from the Economic Review, Government of Kerala and various other reports of the Department of Fisheries. Study reports and annual reports of SIFFS (South Indian Federation of Fishermen Societies) also provided some necessary data.

2.0 Coastal Water Ecosystem of Kerala

A brief description of coastal water ecosystem is provided here as a prelude to our discussion on marine fish catch. This will cover bathymetry, wave characteristics, coastal configuration, coastal water productivity and mud bank formation as all these issues are related to fish catch.

The coastline of Kerala is 560 km. long. There are about 70sq.km. of land area for every kilometer of coastline. The short and swift flowing rivers bring down large volume of nutrient rich water and sediments to the coast. The Tropical weathering, high rainfall and dense biomass cover contribute to this nutrient enrichment.

The coastal water consists of inshore (up to 50m depth) and offshore (>50 m) areas. Bottom configuration as reflected by bathymetry shows marked variation. The 50m bathymetry is marked at 1.7 to 2km distance from the coastline in Thiruvananthapuram-Kollam (south of Neendakara) stretch. This distance from the coastline to 50m bathymetry gradually increases towards north and in Kozhikode it is around 4km. Computing average slope from the coastline to the 50m bathymetry it is observed that the average slope is around 1/340 in Thiruvananthapuram coast and 1/400 in Kollam (south of Neendakara). The slope turns gradually gentle in the north; in Kochi, it is 1/700; in Kozhikode the value is around 1/800; and in Kannur coast, it is again around 1/700. The orientation of coastline also shows variations. The Thiruvananthapuram-Kollam stretch is N40W. Further north, the line of orientation changes to N10W and N20W.

Hydrodynamic condition varies from south to north. Kurian (1987) classified the coast into four wave energy zones based on bottom slope. The Thiruvananthapuram coast experiences the highest wave intensity. Based on field observations in four selected stations – Valiathura (Thiruvananthapuram), Alappuzha, Kozhikode and Tellicherry (Kannur), Kurian *et al.*, (2004) reported that the maximum wave height (around 6m) is in Valiathura during rough weather season. The wave height decreases towards north and in Tellicherry the maximum wave height is around 2.6m during rough weather season. During fair weather season the maximum value varies from <1m in Tellicherry to around 3m in Valiathura. Wave directions are also different in the Thiruvananthapuram segment compared to northern segments. What emerges from this brief discussion is that hydrodynamic condition of Thiruvananthapuram-Neendakara stretch differs perceptibly from the rest of the coastal water in the State. This is manifested in fish availability and catch.

2.1 Mud Banks

Another unique feature of south west coast with deep impact on overall condition, both hydrodynamic and productivity is the mud bank formation. Mud banks (suspended colloidal mud) are defined as patches of calm and turbid waters with high concentration of sediments in suspension appearing near shore mostly during south west monsoon (Kurup, 1977, Mathew *et al.,* 1995, Tatavarti *et al.,* 1999 and Balachandran, 2004 among others). Although formation and dynamics of mud banks are yet to be conclusively explained, it is well known that they are biologically highly productive and the adjoining coastline is protected from erosion. Sea is also calm in places where mud banks develop. As a whole, mud banks have positive implications on marine fishing. Therefore, a brief description of mud banks is provided here.

Mud banks in Kerala coast appears in the segments largely devoid of river influence. Fifteen to twenty mud banks with dimensions of 2-5km. alongshore and 1.5-4.0 km offshore and stretching from Purakkad (south of Alappuzha) in the south to Mangalore in the north appear almost every year during monsoon (Kurup, 1977, CMFRI, 1984 and Mathew *et al.*, 1995). Balachandran (2004) reported that mud banks in this area are formed in a semi circular shape, extending up to about 8km from shore at a water depth of 5-15m and about 4km alongshore. The mud bank off Purakkad coast is quite prominent on which several observations were made (Tatavarti *et al.*, 1999). During the rough monsoon season the periphery of the Purakkad mud bank extends to about 10km seawards from the coastline and stretches to about 15km alongshore. Due to remarkable damping effect on the incident waves this segment of coastal water provides a congenial environment for fishing even during the high monsoon when marine fishing in the open sea becomes highly risky. There is no mud bank formation in the stretch lying to the south of Neendakara.

3.0 Productivity of Coastal Waters

Information on primary productivity and chlorophyll-a are required to assess the fertility and to predict potential of living resources in the sea. There are several studies conducted in Indian seas from time to time to measure these elements during various expeditions and cruises. Within EEZ

Table 1: **Chlorophyll-a Concentration and Primary Production in Selected Stations off Kerala Coast**

Stations	Surface chlorophyll-a (mg. m^{-3})	Surface primary Production ($mgC.m^{-3}d^{-1}$)	Column Chlorophyll-a (mg. m^{-3})	Column primary Production ($mgC.m^{-3}d^{-1}$)
Thiruvananpuram	3.18	134.42	46.44	1256.19
Kollam	2.26	232.25	28.07	1972.06
Kochi	0.14	22.64	06.47	155.23
Kozhikode	0.21	16.24	11.00	131.70
Kannur	0.20	31.47	10.03	216.23
Kasaragod	0.15	08.17	03.29	127.50

Source: Sumitra-Vijayaraghavan and Krishna Kumari, 1989

(Exclusive Economic Zone) of India, Arabian Sea is found to be the most productive in terms of chlorophyll-a value particularly during pre monsoon period when the seasonal average is 18.0 mg m^{-2} (Surupria and Bhargava, 1998: 293). Concentration of chlorophyll-a in the Arabian Sea varied from 0.1 to 96.4mg m^{-2} with annual average of 13.4mg m^{-2} and seasonal averages of 18.0mg m^{-2}, 7.9mg m^{-2} and 8.3mg m^{-2} for pre-monsoon, south west monsoon and post-monsoon respectively (*ibid*). Coastal waters off Cochin showed high concentration of chlorophyll-a in all the seasons. Primary productivity varies from 0.3mgC/m^3/hr at near shore of Veli to 4.2mgC/m^3/hr at offshore of Cochin (Saraladevi *et al.*, 1997). A systematic study by Sumitra-Vijayaraghavan and Krishna Kumari (1989) in the Southern Arabian Sea from Thiruvananthapuram to Marmagao indicated that primary production and chlorophyll-a concentration were the maximum at 8^0 latitude and it decreased towards north with the minimum marked at 13^0 latitude. Up welling is intense around 8^0 latitude during active monsoon. Primary productivity, probably regulated by the rate of supply of regenerated nitrogen, was high in the upwelling zone. Southeastern Arabian Sea recorded the maximum production at the surface level. Coastal waters off Kollam recorded primary production of 232.25mgC. m^{-3} d^{-1} and chlorophyll-a production of 2.26 mg m-3 at surface (Table 1). Study of Bhargava *et al.*, (1978) made similar observation about productivity in Arabian Sea.

Water quality parameters like temperature, salinity, dissolved oxygen, and transparency of columnar water and benthic biomass are some of the environmental factors that have direct effect on fishery (Rivonkar and Reddy, 1989; Jayaraj and Reddy, 1992 c.r Naik and Tamilarasan, 1998). Change in environmental factors during monsoon and post monsoon months affect fish catch. Both pelagic and demersal group of fishes are sensitive to oxygen depletion (Murthy, 1992 Naik and Tamilarasan, 1998). Reduction of demersal group of fish during monsoon is attributed to change of water mass in the bottom due to upwelling (Naik and Tamilarasan, 1998). Cold up welled water is oxygen deficient. Studies in southwest coast revealed that bulk of the pelagic fish population avoided, temporarily, the areas of intense upwelling because of low oxygen concentration (Anon, 1980, c.r Pillai, 1993). Dissolved oxygen at the surface level increases towards north corresponding to the decrease in the intensity of up welling north of Kasaragod (Pillai, 1993). The period of oxygen deficient water remaining on the continental shelf is nearly six months off Karwar in the north compared to two months off Kollam in the south (*ibid*). Monsoonal upwelling leads to blooming of phytoplankton and thereby enriches the coastal water with abundant food supply during the end of the monsoon, which is the spawning season for all the species in the west coast.

4.0 Two Fishing Zones

The brief discussion above indicates that based on hydrodynamic condition and water quality the coastal water ecosystem of Kerala can be divided into two broad fishing zones: south of Kollam (Neendakara/ Asthamudi mouth), and north of Kollam. Development of mud bank has further modified the coastal water ecosystem particularly between Alappuzha and Kochi. This division of two zones lying to the north and south of Neendakara (Kollam) is well reflected in the fishing methods, fish catch and other fishery related activities comparable to all India zonation. The area south of Neendakara is part of a national sub-zone extending up to Kanyakumari in Tamil Nadu, which forms part of a larger national zone stretching from southern Orissa in east coast to Neendakara in the west coast. The sector lying to the north of Neendakara up to the northern border of the State is the southern segment of Ratnagiri (Maharastra) – Neendakara national zone. The zone lying to the south of Neendakara is a small scale belt dominated by Kattumarans and the northern zone is part of a canoe belt (SIFFS, 1999). The fishing gear in the southern zone consists of hook and line operation from Kattumarans, a variety of gill nets, boat seines called thattumadi, shore seines, and a small number of dugout/ plank canoes for drift netting. Use of these gears reflected diversity of fish species in this zone (*ibid*). The northern belt or canoe belt is the ring seines belt formed due to merger of plank canoe belt from Neendakara to Kochi and dugout canoe belt from Vypeen to Manjeswaram. The ring seines emerged in the late 80s and mesh sizes were variously designed to catch different fishes. For example nets of mesh sizes of 18mm to 22mm was to target oil sardine and mackerel shoals and smaller mesh size, 8mm to 12mm was to catch species like anchovilla (*ibid*).

Fishing technology underwent changes over the time. High levels of motorisation, use of large and very large ply wood boats, ring seines, introduction of winches powered by diesel engines on the thanguvallams are some of the changes noted by SIFFS (1999). There were 28198 crafts in operation during the year 1998, among these 13219 are motorized and the numbers of gears in the same year were 55712, of which 31676 were motorised (ibid). In all, 9211 Kattumarans were used; only 41 of those were motorized. All kattumarans operated in coastal water to the south of Neendakara (Thiruvananthapuram and southern part of Kollam districts). Changes were more pronounced in the northern sector with high level of mechanization. Mini trawls reported to operate in the districts of Kannur, Kozhikode, Malapuram, and Alappuzha.

Table 2: **Five years' Average Fish Catch in Kerala and Changing Trend**

Fish Group	Average Catch			Change (%)		
	1988-1992	**1993-1997**	**1998-2002**	**1988-92 to 1993-97**	**1993-97 to 1998-02**	**1988-92 to 1998-02**
Demersal	98443	100052	68063	+1.6	-32.0	-31.0
Pelagic	357310	314783	382677	-12.0	+22.0	+7.0
Molluscs and crustacea	113831	130265	114229	+14.0	-12.0	+0.3
Miscellaneous	10087	19156	12449	+9.0	-35.0	+23.0
Total	**579670**	**564256**	**577418**	**-1.0**	**+2.0**	**-0.4**

Source: Government of Kerala, 2002, 2005

5.0 Trend of Marine Fish Catch

We shall discuss the trends of marine fish catch in this section. Discussion will provide a state level picture about total catch, species composition, and temporal variation. Total marine fish catch in the State has increased from 0.28 million tonnes in 1980 to 0.66 million tonnes in 1990. The phenomenal increase was mainly due to moderanisation like increase in trawling operation, motorization of country craft, introduction of purse seines, emergence of ring seines, and increased operation of multi day trawlers and extension of fishing area. The catch crossed the mark of 0.60 million tonnes only in 1989. It was an increase of 0.17 million tonnes or 36% over the catch in the year 1988. The catch peaked in 1990 and then slid down. From 1991 to 2001 it was always below 0.6 million tonnes. During this period the lowest catch (0.53 million tonnes) was in the year 1995. In 2002 again it crossed the mark of 0.6 million tones. A study on Cochin Fishery Harbour indicated that from 1999 onwards, deep sea trawlers started to harvest the depth zone up to 400m to exploit deep sea resources (Ammini and Augustine, 2003). Deep sea prawn fishing also started in November, 1999 and it was a successful operation (Nandakumar *et al.*, 2001).

Fishes are grouped into three classes: Pelagic, Demersal, Molluscs & Crustaceans. Fishes which do not fall in any one of these categories are enlisted under a separate category as miscellaneous. The pelagic group accounts for the bulk of the catches. Its share varies from 0. 28 million tonnes or 50% of all catches in 1994 to as high as 0.45 million tonnes or 75% of all catches in 2001. Since 1989, the highest catch (0.12 million tonnes) of demersal fishes was in the year 1993 and the lowest catch (0.06 million tonnes) was in the year 2001. The highest catch of molluscs and crustaceans was in the year 1994 when it constituted around 28% of all catches. In the year (1990) of peak catch the composition of fishes was 65%, 18%, 16% and 1% for pelagic, demersal, molluscs & crustaceans, and miscellaneous categories respectively. In 1995 when the catch was the lowest among last 15 years the composition was 61%, 15%, 21%, and 3% in that

Table 3 : **Species Wise Marine Fish Catch (in Percent to Total Catch)**

Species	1980	1990	2000
Sardine (oil and lesser)	28.90	29.00	40.70
Penaeid prawns and non-penaeid prawns	19.45	6.90	11.30
Mackerel	6.60	11.90	5.60
Perches	6.40	10.20	8.40
Cat fish	5.00	0.40	Neg
Ribbon fish	4.60	1.50	1.40
Tunnies	3.80	4.90	2.60
Crabs	2.60	3.30	1.00
Soles	1.60	2.30	2.80
Seer fish	1.30	0.80	0.80
Cephalopods	1.50	3.70	5.10
Anchoviella	2.80	4.05	3.70
Elasmobranches	2.40	1.05	Neg
Saurida and sarus	2.50	1.70	1.30
Caranx and related species	1.70	10.40	7.80
Others	9.85	7.90	7.50
Total Catch (in tonnes)	**279,543**	**662,890**	**6,08,467**

Source: Government of Kerala, 2002

order. Fish catch again crossed 0.6 million tones in 2001. The fish groups of pelagic, demersal, molluscs & crustaceans and miscellaneous accounted for 65%, 11%, 21% and 3% respectively. It may be observed from these data that demersal group of fishes is showing a declining trend over the years. The trend line drawn for all group of fishes and total catch covering the period from 1987 to 2000 (Fig. 1) also showed negative trend (Y = 114729 – 2678.5 X) for demersel group. For all other groups, the trend is positive. However, low R2 value in all these cases indicated randomness of the series with little variation over the years or stagnating situation. To examine this point further five years' average of fish catch has been worked out for the period from 1988 to 2002 (Table 2). It emerges that average fish catch is stagnating around 0.56/0.57 million tonnes. In fact, compared to 1988-1992 the period of 1998-2002 recorded a marginal decline in total fish catch. Among the fish groups the demersal category recorded more than 30% decline. Average catch of molluscs and crustaceans also showed a declining trend.

Species wise fisheries data were considered for 1980, 1990 and 2000 to study dominance of species and compositional change over the years. Fifteen species accounted for little over 90% of total catch in all these years (Table 3). Species composition had not changed significantly; however percentage share of species varied. Sardine (oil and lesser) was the first ranking catch in all these years. Its proportion has increased from 29% in 1980 to 41% in

Table 4: **Quarter wise marine fish landings in Kerala, 2000**

Quarter of the year/ Total Fish landings in tones	Species with >5000tonnes of landing in decreasing order
1st (January-March)/ 134457 tonnes	Oil Sardine *(29), Penaeid Prawns (16), Mackerel (8.5), Stomatopods (5.5), Tunnies (5), Soles (5), and Non-Penaeid Prawns (4)
2nd (April-June)/ 151864 tonnes	Oil Sardine (45), Penaeid Prawns (11.5), Mackerel (6), Anchovilla (5.5), Perches (5) and other Carangids (4)
3rd (July-September)/ 188860 tonnes	Oil Sardine(43), Perches (16.5), Cephalopods (7.5), Penaeid Prawns (6.5), Other Carangids (6), Mackerel (4.5), and Caranx (4)
4th (October-December)/ 133286 tonnes	Oil sardine (39), Anchovilla (7.5), Caranx (6.5), Perches (6), Penaeid Prawns (6), Cephalopods (5.5), Soles (4), and Mackerel (4)

**Note: Figures in bracket are percentage shares to total quarterly catch. Source: Government of Kerala, 2002*

2000. Share of prawns (penaeid and non penaeid) decreased although total quantity of catch increased. Catch of cat fish and elasmobranches reduced noticeably. There was also considerable decline in the catch of lesser sardine. The other species which recorded decline in absolute catch were saurida and sarus, ribbon fish and crabs. Yearly catch of cephalopods, and caranx and related species increased. Considering quarterly catch it was found that the 3rd quarter (July, August and September) recorded the highest landings (31%), followed by 2nd quarter (April, May and June) (25%) and 1st quarter (January, February and March) (22%). Oil sardine was the dominant species in all four quarters. However ranks of other species were not same in all the quarters. Table 4 provides the list of fish species with more than 5,000 tonnes of landings each. Abundance of fish species recorded seasonal variations. In the 3rd quarter (July-September) after onset of the monsoon when the fish catch was the maximum, the fish species with first five ranks were Oil sardine, Perches, Cephalopods, Penaeid prawns, and other Carangids in the decreasing order. This order was Oil sardine, Penaeid prawns, Mackerel, Anchovilla, and Perches in 2nd quarter. Apart from Oil sardine, Penaeid prawns, and Mackerel the species like Stomatopods and Tunnies figured among the first five ranks during 1st quarter. In the 4th quarter the first five ranks were occupied by the species like Oil sardine, Anchovilla, Caranx, Perches and Peneid prawns. High value species like seer fish recorded the maximum landings during 4th quarter. Landings of Soles were significant in the 4th and 1st quarter. Mackerels are found through out the year, however its highest catch was only in the first quarter. Monsoon plays a vital role in triggering environmental changes in the sea. The change in water mass due to monsoonal upwelling causes depletion in catch in the demersal region (Naik and Tamilarasan, 1998). It is evident from this brief deliberation that there are seasonal variations in catch of individual species. Environmental

Table 5: **District-wise distribution of total fish landing and temporal variation**

District	1990		2003-04		Change (%)
	Total	%	Total	%	
Thiruvananthapuram	43995	6.7	53385	8.8	+21.3
Kollam	159634	24.1	145908	24.0	-8.6
Alappuzha	117358	17.7	124958	20.5	+6.5
Ernakulam	100334	15.1	61733	10.1	-38.5
Thrissur	29458	4.4	45371	7.5	+54.0
Malappuram	94308	14.2	37443	6.2	-60.3
Kozhikode	80920	12.2	98182	16.1	+21.3
Kannur	13684	2.1	32712	5.4	+139.1
Kasaragod	23199	3.5	8863	1.4	-61.8
Kerala	662890	100	608555	100	-8.20

Source: Government of Kerala, 2002 and 2005

factors might have been contributing in the stagnated catch and/ or decline in catch of certain species. The temperature, salinity, dissolved oxygen and transparency of columnar waters has direct effect on pelagic fishery. The depleted oxygen affects the distribution of pelagic and demersal species (Naik and Tamilarasan, 1998).

5.1 District wise landings

In this subsection our attempt is to discuss spatial variations of fish landings in the Sate. It has already been indicated that the State has two fishing zones: one to the north and another to the south of Neendakara and the productivity of the coastal water in the Kollam – Ernakulam stretch is high compared to other parts. These variations are manifested in the fish catch, which is indirectly reflected in the district wise fish landings. There are nine districts along the coastline. Fishing operation is conducted through 13 fishing harbours, 9 fish landing centres for mechanized boats and 14 fishing landing centres for traditional fishermen. Fifty additional fish landing centres are proposed for traditional fishermen. Estimated landings in Trivandrum district was 9% of total landings in the State in 2003-04. Kollam recorded the highest landing followed by Alappuzha. Kollam, Alappuzha and Ernakulam districts together accounted for about 55% of total fish landings in the State in the year 2003-04 (Table 5). In 1999, the year of the highest catch so far, the combined fish landing in these three districts was 57%. Predominance of this stretch in fish catch is well evident. Malappuram-Kozhikode stretch is also noteworthy for fish landings. Around 22% landings were in these two districts. Comparing data for the years of 1990 and 2003-04 it emerges that total fish landings declined by 8% in this period. However, this declining trend was not uniform in all the districts. Four districts recorded reduction. Although percentage wise reduction was more (62%) in Kasaragod it was Malapuram district which had recorded the highest reduction in absolute term (little over 56865 tonnes). Ernakulam also recorded considerable reduction in landings (38601 tonnes). Fish landings increased in five districts. The highest increase was in Kannur. The other two districts with significant increase were Kozhikode and Thrissur. In 2003-04 Kozhikode district advanced to 3rd rank after Kollam and Alappuzha.

7.0 Conclusion

Marine fish catch in Kerala varies around 0.6 million tonnes a year during last one and half decade. In view of the potential yield of 0.57 million tonnes in near shore the present catch perhaps has reached the maximum yield. Further exploitation may lead to stock depletion. There is a declining trend in the catch of demersal group of fishes; however it needs deeper probe to arrive at meaningful conclusion. Species variation is not distinct over the years. The coastal water of Kerala can be divided into two distinct fishing zones, which is evident in the types of crafts and gears used, nature of fishing and fish catch. This division of fishing zone is a manifestation of varying environmental condition of coastal water. Kollam, Alappuzha and Ernakulam in the south and central Kerala and Kozhikode in north Kerala accounted for major share in fish landings. As the catch is stagnant and fishermen population is increasing, there is a declining trend in per capita income. Catch per trip is also decreasing as fishing crafts have increased over time. Fishermen population lags behind in socio-economic development compared to average condition of the state. Marine fishing sector and people depending on marine fisheries resources need special attention and all round policy intervention for overcoming the problems.

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