

Trend Analysis of Marine Fish Production in Coramondal Coast of Nagappattinam, India

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Abstract

This paper has attempted to analyse the trend of fish production in the coramondal coast of Nagappattinam district, Tamil Nadu state of India. Eventhough the overall trend of fish production in Tamil Nadu has been increasing, it has been decreasing in Nagappattinam district. Fishing is the mainstay for people in six blocks out of 11 blocks in the district, fish landing is taking place in 46 places and 79,768 people are engaged in fishing activities in the district. Trend analysis was performed for marine fish landings per km of coastline and the fish production among the coastal districts of Tamil Nadu had been compared.

Keywords: capture fisheries, coromondal coast, fish landing, fish production, trend analysis

INTRODUCTION

The coastal fishery is a highly productive sector in Tamil Nadu, India as well as in Nagappattinam coast of the State. It is also a source of valuable food and employment. Coastal fisheries are not a scale model of marine fisheries because of substantial differences in the biological and socio-economic resource base and cultural circumstances. The management of coastal fishery represents periods and stages of increasing complexity (Kari Ranta-aho and Mika Peippo 2004). It is not possible to identify appropriate methods for fisheries assessments for developing countries (Degnbol, 2001). The world's capture fisheries has peaked and now it is over around 80 mt while demand continues to increase (Stickney, 2005). Tamil Nadu is one of the leading maritime states of India and ranks third in marine fish production. It has about 442 fishing villages and 356 fish landing centres and 8 fishing harbours (Ramachandran, 2002). The total annual fish production had been 379214 tonnes during the years 2002-2003. There are thirty-two species including prawn and crabs caught in Tamil Nadu coasts.

Nagappattinam coast has about 46 fish landing centres and 50 fishing villages. The total annual fish production was 43,819 tonnes during 2002-2003 (Table 1.) Marine fish production has increased from 59337 tonnes during 1993-94 to 71170 tonnes during 1996-97. It gradually decreased to 43819 tonnes during 2002-03, in Nagappattinam coast. But the total marine fish production of Tamilnadu increased from 317716 tonnes during 1993-94 to 379214 tonnes during 2002-03. The

prevalent fish production comes from capture fisheries. In marine fish production Nagappattinam coast ranked second during 1993-94 but during 2002-03 its rank was fourth in the State of Tamilnadu.

The marine fish production includes pelagic varieties and demarsal varieties. The demarsal species of fish are mostly bottom dwelling and pelagic species are surface living. The demarsal varieties are found on or just beneath the sand. Most of the commercially valuable species like lobsters, cuttle fish, prawn, crabs and rays belonged to demarsal varieties. The other important demarsal varieties are pomfrets, soles, perches, sharks, red mullets, catfishes and silver bellies. The contribution by the demarsal varieties is always more over whole of Tamil Nadu and minimum in Nagapattinam. The pelagic varieties included many sweet fishes like caranx fishes, mural fish, seer fish, ribbonfish, flying fish, sardines and anchoviella. The contribution by the pelagic varieties is minimum over Tamil Nadu and maximum in Nagapattinam district. This paper attempts to analyze the fish production in the coramondal coast of Nagapattinam district, Tamilnadu, India.

MATERIAL AND METHODS

Nagappattinam coast is a peninsular delta area bounded by Bay of Bengal on the east, Palk Strait on the south, and Thiruvarur and Thanjavur districts on the west and Cuddalore on the north. The study area is located between 10° 10' N to 11° 50' N latitudes and 79° 45' E to 80° 00' E longitudes (Fig. 1). It has a coast line of about 188 km in length divided in the two sections. One extends from river Collidam (Coleroon) to Point Calimere and other from Point Calimere to Palk Strait in the south. The erstwhile French pocket, Karaikkal, a portion of the Union Tertiary of Pondichery, is situated in the middle of the coastal area between the Collidam

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and Point Calimere. Karaikkal area has been excluded in the study.

The study is based on information from primary and secondary sources. The secondary data were used for estimating the productivity and production trend of fish. Trends in marine fish production in Nagapattinam coast are discussed in composition with the production of Tamil Nadu. The analysis is based on the secondary data collected from the Director of Fisheries, Chennai.

Sources of Maps are Survey of India topographic maps at the scale of 1:250000 and 1:50000, satellite images, various thematic maps, meteorological data and Survey and Records. ArcGIS Ver.9.1, AutoCAD software had been used for spatial analysis. The SPSS software was used to statistical analysis. One-way ANOVA was used to compare the fish production among the coastal districts of Tamil Nadu. Co-efficient of correlation was used to find out the trend in fish production in Nagapattinam coast and Tamil Nadu.

RESULTS AND DISCUSSION

Fishing is one of the major income generation activities for the people, especially men in the Nagapattinam district with women and children are also involved in the fishery activities. The total number of fishing crafts in Nagapattinam coast was 15 per cent of the total number of crafts in Tamil Nadu and the fish production of the district contributed 11.55 per cent of the total fish production in the state in 2002- 2003. This indicated a declining state in the production as over the years with the relative share of Nagapattinam coast steadily decreasing from 21.20 per cent in 1995 -96 to 11.55 per cent in 2002 -2003.

Table 2 shows the average percentage of fish production in different coastal districts in Tamil Nadu. It is observed that average production was high in Ramanathapuram district with average 24.38 per cent followed by the Nagapattinam coast with 18.46 per cent. The average percentage production differed significantly among the 13 coastal districts of the Tamil Nadu. (ANOVA; Pro.05)

It is observed that, the average percentage production for Ramanathapuram district (24.38%) was significantly higher than that of the Nagapattinam coast (18.46%), which in turn was significantly higher than Pudukkottai (13.99%).(DMRT) From this analysis, it was understand that the Nagapattinam coast accounts for a great share of (second largest) fish production in Tamil

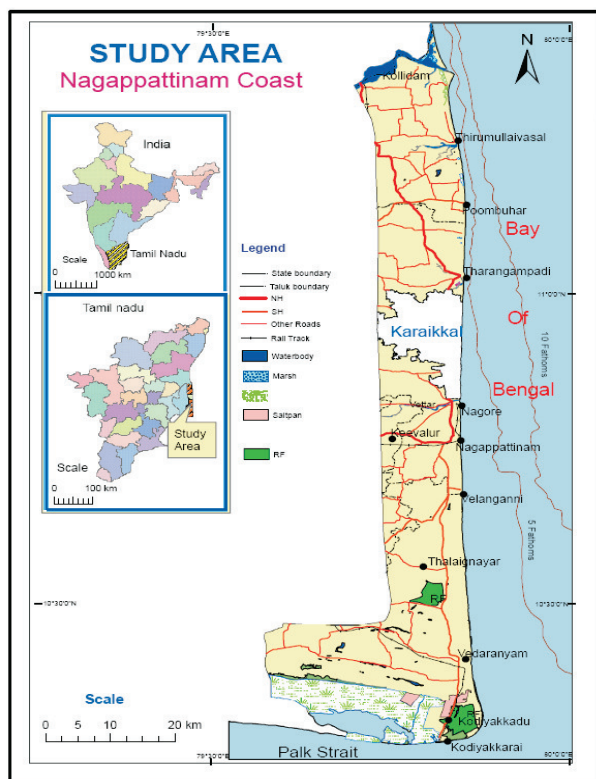


Figure 1. Map Showing the location of the study area

Table 1. Fish Production in Tamil Nadu from 1993-94 to 2002-2003 (in tonnes)

Coastal Districts of Tamilnadu	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03
Chennai	16525	16988	15686	15889	16040	14555	15118	11416	11477	17420
Thiruvallur	-	-	-	-	2427	1947	1751	2416	2430	2622
Kanchipuram	9895	10037	12096	12416	10204	12081	12648	13944	13982	1295
Villupuram	-	4493	4618	4851	5341	6255	8117	7474	7515	8842
Cuddalore	24819	25110	25910	26768	25938	27282	25064	20451	20525	45023
Nagapattinam	59337	67537	72384	71170	69942	70981	70169	65755	65998	43819
Thiruvavur	-	-	-	-	270	303	253	247	250	155
Thanjavur	8565	8993	10203	9565	9790	15804	14932	12829	12860	22402
Pudukkottai	52340	47145	48871	49743	48513	48804	45583	48898	49088	60540
Ramanathapuram	74351	76969	81943	83332	83417	87508	90425	91474	91820	108278
Thuthukkudi	39137	37201	33658	34478	33609	48140	41678	41275	41423	31587
Thirunelveli	4512	4078	3657	4838	4556	5507	6536	6507	6542	5931
Kanyakumari	292335	32178	32291	37740	46440	38316	41652	49716	49951	19643
TOTAL	317716	330729	341317	350790	356487	377483	373926	372402	373861	379214

Source: Department of Fisheries, Tamil Nadu, 2003

Table 2. Descriptive table for Fish production in different districts Tamil Nadu (in per cent)

Districts	N	Mean	Std. Deviation	Std. Error	95% Confidence interval for mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Chennai	10	4.2550	.75056	.23735	3.7181	4.7919	3.06	5.20
Thiruvallur	6	.6083	.09390	.03833	.5098	.7069	.47	.69
Kanchipuram	10	3.3500	.29717	.09397	3.1374	3.5626	2.86	3.74
Villuppuram	9	1.8078	.35706	.11902	1.5333	2.0822	1.35	2.33
Cuddalore	10	7.4580	1.77081	.55998	6.1912	8.7248	5.50	11.90
Nagapattinam	10	18.4620	2.69506	.85225	16.5341	20.3899	11.55	21.20
Thiruvarur	6	.0650	.01378	.00563	.0505	.0795	.04	.08
Thanjavur	10	3.4810	1.01419	.32072	2.7555	4.2065	2.68	5.90
Pudukkottai	10	13.9970	1.33969	.42365	13.0386	14.9554	12.19	16.46
Ramnad	10	24.3860	1.63443	.51685	23.2168	25.5552	23.18	28.55
Thuthukkudi	10	10.7030	1.34723	.42603	9.7393	11.6667	8.33	12.75
Thirunelveli	10	1.4650	.23633	.07473	1.2959	1.6341	1.07	1.75
Kanyakumari	10	10.5080	2.47766	.78351	8.7356	12.2804	5.17	13.36
TOTAL	121	8.2724	7.37655	.67060	6.9447	9.6001	.04	28.55

Nadu. The actual fish production of Tamil Nadu State and Nagappattinam coast are given in Table 3.

Trend Analysis of Fish Production

In order to assess the nature of fish production over the years, a linear trend line $y = a + bx$ was fitted (Caddy and Mahon 1995). The trend line was $Y = 298807.8 + 7634.902x$ which indicated that the annual increment rate of marine fish production of Tamil Nadu had been

Table.3 Comparison Fish Production in Tamil Nadu State and Nagappattinam Coast (in tonnes)

Year	Tamil Nadu	Nagappattinam
1991-92	299942	54446
1992-93	307349	52569
1993-94	317716	59337
1994-95	330729	67537
1995-96	341317	72384
1996-97	350780	71170
1997-98	356487	70212
1998-99	377483	71284
1999-2000	373926	70422
2000-01	372402	66002
2001-02	373861	66248
2002-03	379214	43974

7634.302 tonnes. R^2 was 0.918, which meant that 91.8 per cent of the variability in marine fish production had been explained by the variable x (year) and it is significant (Caddy 1998, Hilborn 2002, Campbell 2008). The probability of exceeding the limit reference point will not be greater than 5 per cent in any given year (Serchuk et al 1997). From the trend line, it could be predicted (Thomson and Smith 2002, Klaer 2003) that

the fish production for the year 2004-05 would be 405696.43 tonnes and for the year 2005 – 06 as 413330.5 tonnes, indicating that the fish production in Tamil Nadu, had been increasing steadily.

In order to assess the trend of fish production in Nagappattinam coast, another linear trend line $y = a + bx$ was fitted. The R^2 was 0.008, which meant that 0.8% variability in marine fish had been is 0.8 per cent, explained by the variable 'x'. From the table the trend was $Y = 66237.336 - 246.100x$. Here 246.1 was the annual decrement rate of marine fish production of Nagappattinam coast. However, the co-efficient is not-significant ($p > 0.05$). From the trend line (Fig. 2), it is understood that the trend line is not in an increasing

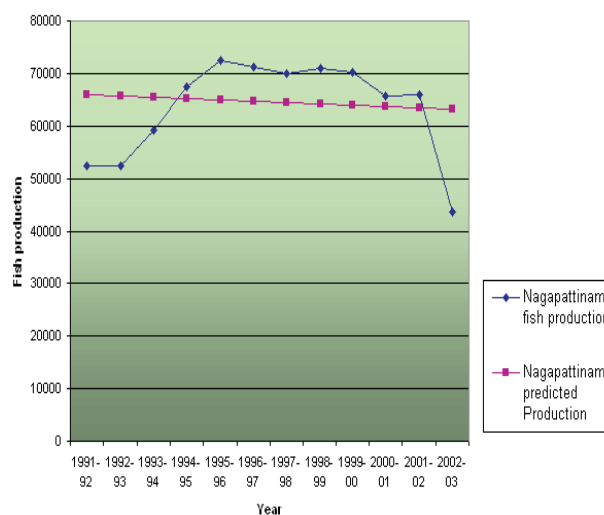


Figure 2. Trend line of Fish production in Nagappattinam coast during 1991-92 to 2002-03

pattern. Using this trend line, we cannot make predictions for the future, as R² of the model is very low.

Marine Fish Landing Per Km of Coast Line

Another measure of the efficiency of marine fish production in fisheries assessment methodologies in a development context is that the knowledge base for fisheries must be valid for all stake holders and it must be feasible to produce this knowledge on a sustained basis within the economic means of the society (Degnbol 2001). In marine fish landings per km of coastline among the marine districts, the terms “catch landings” and “productions” are used synonymously. Over the years, there had been considerable interest and discussion on the potential benefits of fisheries management toward greater resource –user participation. These potential benefits have been discussed thoroughly elsewhere (Jentoft 1989, Hanna 1995, Jentoft 1995, Synes 1996, Hanna 2003, Wilson 2003). Trend analysis for marine fish landings per km of coastline is useful to give the pattern of data over the years, whether it is increasing or decreasing or remaining constant. Marine fish landings per km of coastline are given in Table 4, and a trend analysis was used to know the nature of marine fish landings per km of coastline for Tamil Nadu as a whole and Nagapattinam coast in particular. The R² was 0.53, which indicated that 53.0 per cent of the variability in marine fish landing was explained by the variable x.

The trend line was $Y = 401.811 + 12.133x$, with the annual increment rate of marine fish landing per km of coastline being 12.133 tonnes. It was observed that, from the trend line, the fish landing per km of coastline in Tamil Nadu increased steadily over the study period. Using the trend line we predicted that Tamil Nadu State’s marine fish landing per km for the period 2004 – 2005 to be 511.0 tonnes and for the period 2005 – 2006 as 583.8 tonnes.

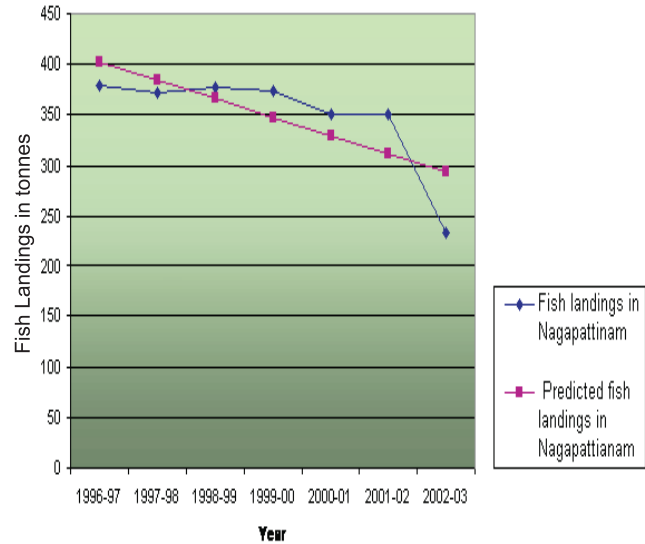


Figure 3. Trend of Fish landings in Nagapattinam Coast during 1996-97 to 2002-03.

Table 4. Marine Fish Landings per Km of Coast line, Tamilnadu (Tonnes)

Coastal Districts	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03
Chennai	338.80	844.21	766.05	795.70	600.84	604.05	916.84
Thiruvallur	-	87.00	69.78	62.76	86.60	87.10	94.00
Kanchipuram	142.40	117.02	138.54	145.04	160.00	160.34	148.53
Viluppuram	119.20	131.22	153.70	199.43	183.63	184.64	217.25
Cuddalore	465.53	451.09	474.50	435.89	355.67	356.67	783.01
Nagapattinam	378.76	372.22	377.76	373.43	349.94	351.24	233.20
Thiruvarur	-	5.72	6.42	5.36	5.23	5.29	3.28
Thanjavur	212.08	217.07	350.42	331.10	284.46	285.14	496.72
Pudukkottai	1162.22	1133.48	1140.28	1065.02	1142.47	1146.91	1414.48
Ramanad	351.90	352.26	369.54	381.86	386.29	387.75	457.25
Thuthukkudi	210.87	205.55	294.43	254.91	252.44	253.35	193.19
Thirunelveli	98.93	93.16	112.61	133.66	133.06	133.78	121.28
Kanyakumari	527.83	649.51	535.88	582.54	695.32	698.61	274.72

In order to understand the nature of marine fish landings per km of coastline of Nagappattinam, a linear trend line $y = a + bx$ was considered. The R^2 obtained was 0.563, which indicated that the 56.3 per cent variability in marine fish landing per km was explained by the variable 'x'. From the Co-efficient table, the trend line was fitted to be $Y = 420.43 - 18.088x$ with 18.088 tonnes being the annual decrement rate of marine fish landings per km of coastline in Nagapattinam coast. Using the trend line, it was predicted that Nagapattinam coast's marine fish landing per km for the period 2003 – 2004 was 269.39 tonnes and for 2004 – 2005 to be 257.638 tonnes. From the analysis, it was observed that the marine fish landing per km of coastline declined over the years from 1996-97 to 2002-03 in the Nagapattinam coast.

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