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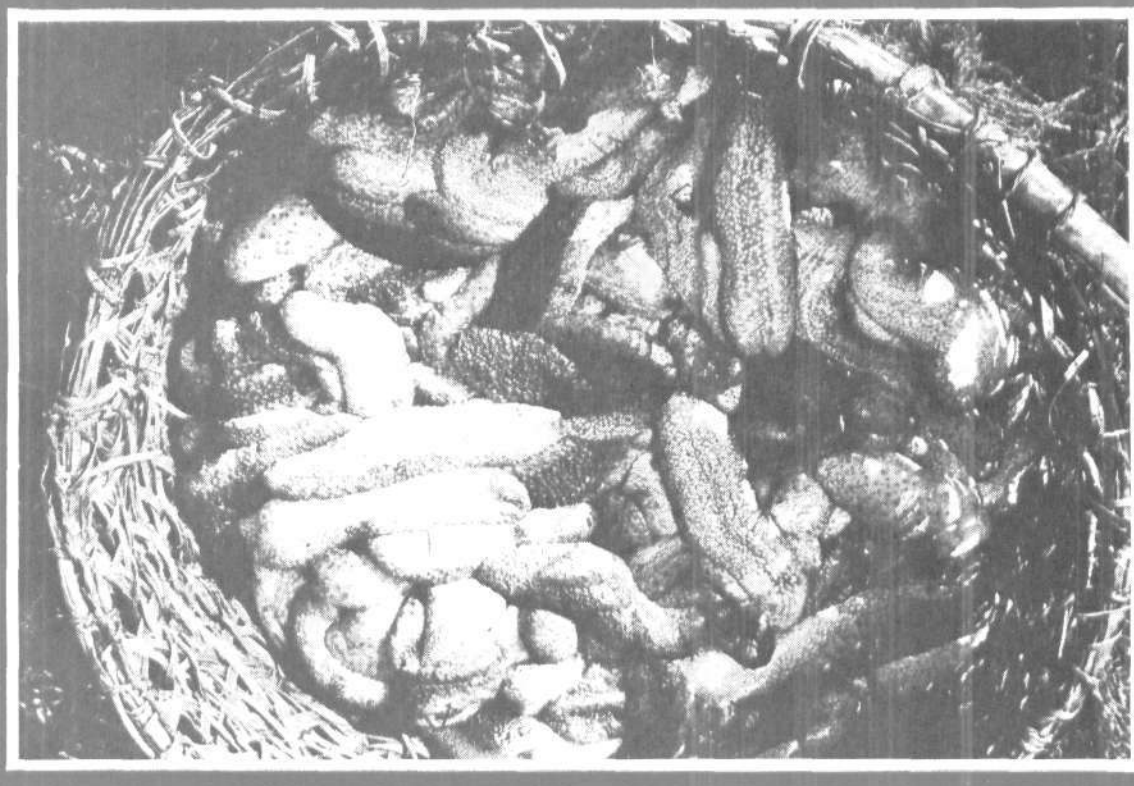

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THE STATUS OF SCIAENID FISHERY IN ORISSA COAST DURING 1984-'95 WITH SPECIAL REFERENCE TO TRAWL CATCH

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Introduction

The croakers form an important demersal fishery resource of India. The sciaenid fishery in India during the decade 1984-'95 which had been yielding 1,22,464 tonnes annually formed 6.16% of the average marine fish production of the country. The statewise analysis during the period showed that 12.28% of the country's sciaenid catch came from Orissa, where its annual average was 14,680 tonnes forming 29.21% of the total fish production. In Orissa where fishing activities are carried out throughout the year and the sciaenids are landed during all the months using one or the other type of gear. It forms one of the major demersal fish resources in this area. Earlier studies have shown that sciaenids formed 19.2% during 1980-'84 and 16.13% during 1985-'89. The status of sciaenid fishery in Orissa during the decade 1984-'95 is evaluated in the present communication.

Data base

The data used in the present study were collected from the various reports of the Institute and also from the available unpublished data including the National Marine Living Resources Data Centre located in CMFRI, Cochin.

Fishing crafts and gear

The gear used for fishing in Orissa are trawl net, gill net, drift gill net, boatseine, shoreseine and hooks and line. Traditional crafts were used in the mid eighties. From 1989 onwards traditional crafts fitted with outboard motors started operation. The introduction of outboard engine has affected the non-motorised crafts in Orissa as in most of the other states. The percentage contribution by non-mechanised gear was 38.74% before 1989 which decreased to 27.56% after 1989.

The fishery data collected over a period of twelve years during 1984-'95 from Orissa were analysed. Table1 gives annual sciaenid landings and its percentage contribution to the state's catch.

TABLE 1. *Total fish and sciaenid landings in Orissa during 1984-'95*

Year	Total	Croakers	Percentage
1984	46,773	16,903	36.29
1985	46,840	15,177	32.40
1986	56,918	14,808	26.02
1987	58,494	17,215	29.43
1988	46,310	16,961	36.62
1989	47,034	10,071	21.41
1990	64,736	19,555	30.21
1991	44,524	11,236	25.24
1992	47,622	11,704	24.58
1993	62,281	18,888	30.33
1994	47,745	14,299	29.95
1995	33,760	9,348	27.69

Annual catch

The annual catch ranged from 9,348 tonnes in 1995 to 19,555 tonnes in 1993. The annual average catch was 14,680 tonnes. During the eighties the catch ranged from 2,864 tonnes in 1980 to 3,713 tonnes in 1982 and thereafter an enormous increase was noticed in 1983 forming 12,766 tonnes (Fig.1). After that the catch varied showing slight ups and downs. But in 1995 the catch showed considerable decrease to 9,348

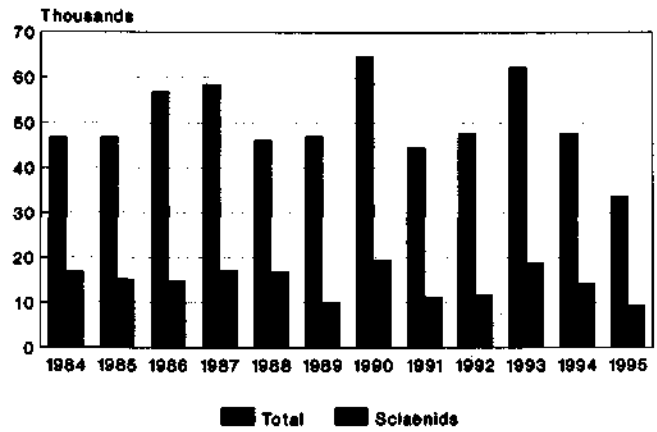

Fig. 1. Landings in Orissa (in tonnes).

tonnes. The percentage contribution of sciaenids over total landings also was less (between 5 and 11) during the period 1980-'83. From 1984 onwards it was comparably large: more than 20%. It was the highest during 1988 (36.62%).

Seasonal trend

The quarterwise catches are shown in Table 2. The average quarterwise catch ranged from 271.2 tonnes during the second quarter to 8,020.2 tonnes during the fourth quarter. Maximum landings of croakers occurred during the fourth quarter (54.71%) followed by the first quarter (33.84%), the third (9.60%) and the second (1.85%). During 1980-'84 the maximum effort was during the fourth quarter. More than 35% of the gear was operated in October, November and December. But in 1985 the number of gear operated was the highest during the second quarter. Out of the 5,44,071 units a large number of non-mechanised gill nets, (5,21,328) was operated in April, May and June 1985. During the second half of the eighties most of the gear operated were during the fourth quarter.

TABLE 2. *Quarterwise landings of sciaenids in Orissa*

Year	IQr	IIQr	IIIQr	IVQr	Total
1984	4,638	375	906	10,984	16,903
1985	6,174	166	1,317	7,520	15,177
1986	9,410	175	1,276	3,947	14,808
1987	5,638	288	2,432	8,857	17,215
1988	2,463	168	3,615	10,715	16,961
1989	2,727	445	1,462	5,437	10,071
1990	9,316	530	628	9,081	19,555
1991	3,188	198	839	6,755	10,980
1992	2,166	188	1,393	8,007	11,704
1993	6,746	269	1,085	10,788	18,888
1994	4,689	70	1,350	8,190	14,299
1995	2,422	381	584	5,961	9,348

Gearwise production

Croakers were landed by all types of gear both mechanised and non-mechanised. Mechanised nets included trawl net and gill net. Non-mechanised included mainly gill net, drift net, shoreseine, boatseine and hooks and line. Percentage contribution of these gear to the annual croaker catch is presented in Table 3.

Trawl net

The largest contribution of croakers was from trawl net. During the study period (1984-'95) more than 90% of the croaker landings was from trawl net. From 1980 onwards except in 1982 more than 75% of the croaker landings was from trawl net and in 1982 the trawl net contributed only 62%. The highest landings of croakers by trawl net occurred during 1993 (17,693 tonnes) and the least during 1981 (1,629 tonnes). From 1983 to 1985 the catch by trawl net maintained a steady trend. But in 1989 it declined to 8,155 tonnes from 15,695 tonnes during 1988. During 1990 it again increased to 16,939 tonnes. The catch declined again in 1991 to 10,121 tonnes and maintained the same trend during 1992 and again increased to 17,693 tonnes during 1993. The catch decreased to 12,425 tonnes in 1994 and still further to 8,783 tonnes during 1995. The catch/effort of croakers from trawl net was less than 50 kg during 1980-'81 and '82 but increased to 167 kg and 217 kg in 1983 and '84 respectively. From 1984 onwards it was fluctuating between 97.44 kg in 1989 and 234.99 kg in 1986.

TABLE 3. *Gearwise percentage contribution of croakers*

Year	MTN	MGN	Total mech.	NMGN	NMSS	NMBS	Others
1984	91.17	0.93	92.10	-	-	-	7.90
1985	90.47	1.30	91.77	7.17	0.08	0.23	0.75
1986	89.99	2.70	92.69	-	0.09	-	7.22
1987	89.53	1.95	91.48	6.59	0.31	1.19	0.43
1988	92.54	1.61	94.15	5.57	0.01	0.27	-
1989	80.98	3.20	84.18	10.64	0.28	4.47	0.43
1990	86.62	5.24	91.86	6.79	0.05	1.13	0.17
1991	92.18	1.68	93.86	2.64	0.03	0.01	3.46
1992	94.16	3.61	98.03	1.92	0.01	-	0.30
1993	93.67	2.15	95.82	3.97	0.02	0.01	0.18
1994	86.89	12.53	99.43	0.50	0.07	-	-
1995	93.98	4.80	98.78	1.20	0.02	-	-

Gill net

This gear was operated in traditional as well as motorised sectors. The annual effort in the motorised sector ranged from 23,000 units in 1986 to 1,34,000 units in 1995 with an average of 76,000 units per year. From 1980 it gradually declined to a minimum in 1986 and thereafter it considerably increased in 1987 and fluctuated upto 1995. Maximum catch (1,548 tonnes) was recorded in 1994 and minimum (21 tonnes) in 1989 with an annual average at 374 tonnes. The catch/effort also fluctuated and it ranged from 0.31 kg in 1989 to 17.07 kg in 1986 with an annual average value of 5.42 kg. Croakers formed 4.5% of the total fish in mechanised gill net. The contribution of mechanised drift gill net in the croakers landings

was also much encouraging. Nearly 23% of the sciaenid landings were by mechanised drift gill net.

The seasonal trend in croakers showed minimum during second quarter (1 tonne) and maximum during fourth quarter (265 tonnes). The season of abundance was from October to March.

Croakers were also caught by gill net fitted with outboard engine. The outboard engines were introduced in Orissa during 1989. Outboard engine fitted boats were operated with gill net and bottom set gill net. In 1989 and 1990 croakers were caught in large quantities by outboard engine gill net (OBGN). But after that the landings of croakers due to OBGN were not appreciable. The catch by OBGN became better in 1994 and 1995.

In the traditional sector the effort ranged from 2,07,529 units in 1995 to 9,21,036 units in 1985 with an average of 4,42,000 units. The artisanal units were in decreasing trend. The catch of sciaenids by NMGN fluctuated all through the years; the maximum being 1,327 tonnes in 1990 and the minimum 72 tonnes in 1994 with an average of 70 tonnes and it formed more than 6% of the non-mechanised gill net landings. The catch/effort fluctuated all through the years; the maximum being 2.60 kg in 1990 and the minimum 0.35 kg in 1994. On the whole gill net contributed more than 7% of the sciaenid landings in Orissa.

Boatseine

Boat seine operation started decreasing from the eighties. More than 20,000 units were operated during the eighties but it decreased to less than 2,000 in the nineties. This gear was operated almost throughout the year upto 1988 except in 1986. From 1989 onwards there was no operation of boat-seine during the monsoon period. The average annual landings of croakers by boatseine was 184 tonnes in the eighties. But in the nineties it was even less than 1 tonne with catch/effort also less than 1 kg from 1991 onwards.

Shoreseine

Shoreseine was also operated throughout the year upto 1987. But from 1988 onwards its operation was suspended in the third quarter due to rough sea conditions except in 1990 in which year 328 numbers of shoreseines were operated during the monsoon season. The average annual effort was 14,559 units which ranged from 1,404 units in 1986 to 30,873 in 1985. The number of units operated fluctuated all through the years. The average annual catch of croakers by shoreseine was 14 tonnes forming 0.09% of the annual croakers catch and 1.25% of the shoreseine catch. The maximum and minimum catches were recorded in 1987 (54 tonnes) and in 1992 (1tonne) respectively. The catch also fluctuated all through the years. The average annual catch/effort was 1.81 kg and the maximum catch/effort recorded was 9.97 kg in 1986. The season for croaker landings by shoreseine was the first quarter.

Hooks & line

Hooks & line fishery operate throughout the year. Operation of this gear from motorised crafts was started in 1990 in Orissa. Nearly 80% of the sciaenid catch by hooks & line came from the non-mechanised sector.

In the non-mechanised sector, the annual effort, catch and catch/effort show that this gear was operated throughout the year. The minimum and maximum effort was noticed in 1985 and 1993 respectively with an average of 31,514 units. The effort fluctuated all through the years. In some years no sciaenids were present in the hooks & line landings. The maximum sciaenids caught was 252 tonnes in 1991. The estimated catch per year was 44 tonnes which formed nearly 3% of the total catch of the year. The landings of sciaenids by hooks & line also fluctuated all through the years. Although there was an increase in the number of operation of hooks & line from October to March, no corresponding increase was noticed in the catch of sciaenids.

After the introduction of motorised fishing, a steady increase was noticed in the number of units operated. The catch fluctuated making a maximum of 30 tonnes in 1992 to nil catch by hooks & line during 1990 -'91. The average annual catch/effort was 1.7 kg.

Species composition

Johnius carutta is the predominant species that occurs in Orissa. In addition to this *Otolithes* spp. is represented mainly in Balasore and *Pseudosciaena diacanthus* mainly in Puri.

Districtwise composition

The four maritime districts in Orissa are Balasore, Cuttack, Puri and Ganjam. The contribution of croakers to the total fishes in these districts is 69, 23, 7 and 1% respectively tonnes.

Balasore

The maximum contribution of croakers from Balasore district was in 1993 (15,141 tonnes) and

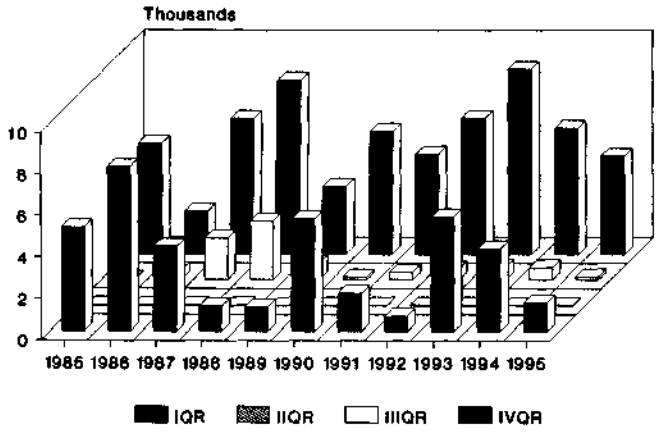

Fig. 2. Quarterwise landings of sciaenids in Balasore (in tonnes).

the least was during 1989 (5,328 tonnes) (Fig. 2) in which year the contribution of croakers by trawl net in this district was more than 99%. The CPU of croakers by trawl net was maximum in this district (195.13 kg). The other gear operating were mechanised drift gill net, non-mechanised drift gill net and sometimes shoreseine. Mostly sciaenids were not caught in these gears.

In Balasore also the fourth quarter contributed the highest landings of croakers (56.93%) except in 1986 in which year the first quarter contributed the highest landings of croakers 75.66% (Fig. 2). On an average the first quarter contributed 34.95%, followed by the third quarter 7.83% and the second quarter 0.29%.

Cuttack

In Cuttack (Fig. 3) the annual catch ranged from 2,008 tonnes in 1994 to 6,167 tonnes in 1990. In Cuttack also the highest contribution of croakers was from trawl net (85%) and the CPU from trawl

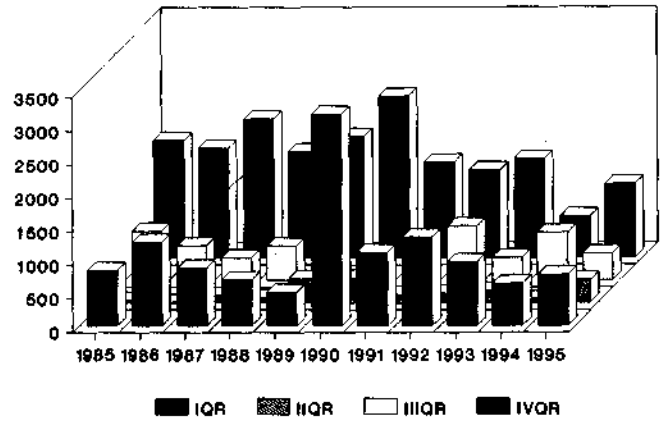

Fig. 3. Quarterwise landings of sciaenids in Cuttack (in tonnes).

net in this area was 109.14 kg. Trawl net is usually operated in Paradeep only in this district. Croakers were also caught in small quantities in gill nets and hooks & line. In this district also croakers were caught in large quantities during the fourth quarter (47.51%) and first quarter (33.04%). Next came in the third quarter 14.50% and the least in the second quarter 4.95%.

Puri

Very less sciaenids were caught in Puri district (7.53%) (Fig. 4). The annual catch ranged from 1,734 tonnes in 1990 to 194 tonnes in 1992. The landings here fluctuated all through the years. Sciaenids were caught by trawl net, gill net, boatseine and very rarely by shoreseine and hooks & line in this district. Here there was no operation

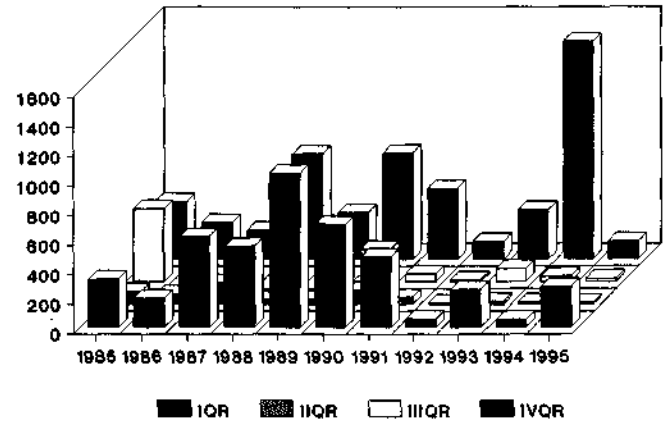

Fig. 4. Quarterwise landings of sciaenids in Puri (in tonnes).

of trawl net during 1992 - 1993. The CPUE of sciaenids by trawl net in this district was 107.77 kg which was not so small as compared to Cuttack district. Sciaenids were caught more in non-mechanised gill net in Puri than by trawl net. The season of landings of croakers here was from October to March. Here the fourth quarter contributed 42.59% and first quarter 37.82%. Then came the third quarter (14.82%) and the least in the second quarter (4.77%). But the gill net contribution of croakers was the highest during the third quarter.

Ganjam

The least contribution of croakers was from the Ganjam district (0.57%). The highest landings occurred during 1986 (117 tonnes) and the least during 1994 (1 tonne). The major gears operating here were non-mechanised gill nets (NMGN), non-mechanised boatseine (NMBS) and non-

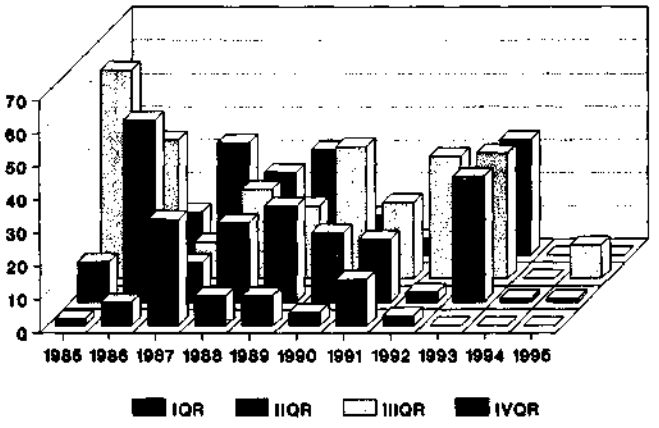

Fig. 5. Quarterwise landings of sciaenids in Ganjam (in tonnes).

mechanised shoreseine (NMSS). There was no operation of trawl net in Ganjam district except a few operated during 1988. Even in this operation no croakers were caught. Unlike in other districts, the highest landings of croakers occurred in the third quarter (40%) in Ganjam district (Fig. 5). Then the second quarter (27%) followed by the fourth quarter (23%) and the first quarter (10%).

Potential yield

The landings of croakers by the important gears from 1985 to 1995 is considered. The maximum landings of croakers by the important gears is taken. These maxima are added to obtain the estimate of the potential yield of croakers in Orissa (Table 4).

Using the Maximum Contribution Approach method (Alagaraja, 1986 MS) the potential yield of croakers is estimated to be 22,459 tonnes. Hence there is scope of improvement for this fishery.

TABLE 4. *Gearwise landings of croakers*

Gear	Maximum landings	Year
MTN	17,693	1993
MGN	1,792	1994
NMGN	1,327	1990
NMDN	113	1985
NMSS	54	1987
NMBS	450	1989
Others	1,030	1986
Total	22,459	

TABLE 5. *Trawl net landings in Orissa*

Year	Trawl landings	Sciaenids landings	Effort (units)	CPU (Trawl) (kg)	CPU (Sciaenid) (kg)
1984	25,323	15,411	71,000	356.66	217.06
1985	26,994	13,730	68,083	396.49	201.67
1986	29,882	13,325	56,704	526.98	234.99
1987	26,384	15,413	83,016	317.82	185.66
1988	25,668	15,695	81,688	314.22	192.13
1989	18,382	8,155	83,696	219.63	97.44
1990	33,431	16,939	97,894	341.50	173.03
1991	19,557	10,121	77,374	252.76	130.81
1992	24,162	11,021	85,528	282.50	128.86
1993	32,912	17,693	1,11,686	294.68	158.42
1994	21,920	12,425	82,025	267.24	151.48
1995	24,509	8,783	75,878	323.01	115.75

Table 5 shows the catch, effort (in units) and catch/effort (in kg) in respect of sciaenids and trawl landings in Orissa from 1984 to '95. From this table it is seen that effort put in also fluctuated. The CPU for both sciaenids and trawl landings has been changing thus showing that in spite of the higher input of effort, there was no corresponding increase either in the catch of sciaenids or in trawl catch as a whole.

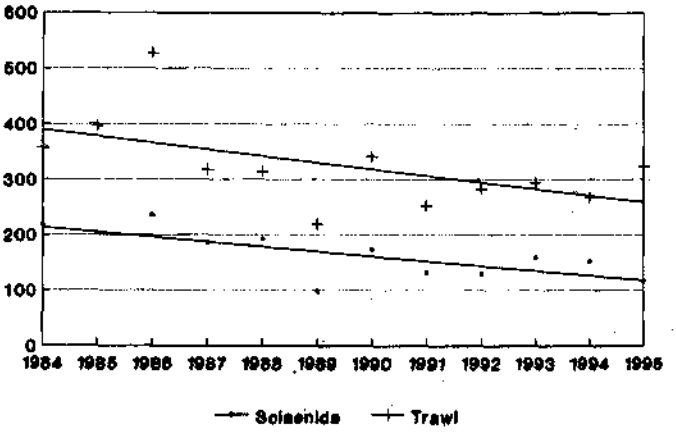

Fig. 6. Trends in catch/effort relationship.

Conclusion

A conspicuous increase was noticed from 1983 to 1993 in the case of sciaenids catch in Orissa. Here October to March is the peak season of sciaenid fishery. *Johnius carutta* is the dominant species in Orissa.

The Maximum Contribution Approach indicates futher scope of improvement of sciaenid fishery in Orissa. From the CPU relation (Fig. 6) it

could be seen the slope is more in the case of trawl catch than sciaenids. So it may be presumed that there is overfishing due to trawl net in Orissa. Hence it may be concluded that improvement in this fishery may be achieved by introducing other type of gears or by improving the present gears.

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