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Catfish fishery by dolnetters along the Saurashtra coast

K. V. S. Nair, Rekha Devi Chakraborty, Y. D. Savaria, J. P. Polara, H. K. Dhokia and B. P. Thumber
Veraval Regional Centre of CMFRI, Veraval.

In Gujarat, dolnets are operated in three regions viz., Umbergaon to Kavi along the southern Gujarat, Siyalbet to Diu along the Saurashtra coast and Takkara to Modhwa in the Gulf of Kutch region. Among these, Saurashtra is the important region and the main fish landing centers are Jaffarabad, Rajpara, Nawabunder and Goghla. Out of these the first three are the most important with more than 250 dolnetters under operation. Dolnet catch consists mainly of *Harpodon nehereus*, *Protonibea diacmthns*, penaeid prawns, non-penaeid argentens eprawns, *Pampus argenteus*, *Trichiurus* sp., carangids and catfishes. Bombay duck contributes a major share to the dolnet catches. But, recently there were heavy landings of catfishes consisting mainly of *Arius dussumieri*, which used to form only a minor by-catch earlier. Therefore, an attempt was made to study the *A. dussumieri* landings at these landing centres from 1994 to 2003, with major thrust on the landings at Nawabunder.

The catch and effort data collected on the Dolnetters based at Nawabunder, Rajpara and Jaffarabad landing centres formed the basis of the study. The data on size distribution of *A. dussumieri* was collected from Nawabandar only. Total length from the snout to the tip of the caudal fin was taken for the length frequency study and the data were grouped in 10 cm intervals for further analysis. Length - weight relationship was calculated using FiSAT (Windows version).

Craft, gear and area of operation

Dolnets are fixed bag nets using two steel poles at a fixed depth. Each boat carries 2-5 nets, which in turn makes 1-10 hauls, with duration of 5 hr/haul. Tidal fishing is done depending on the full moon day

at different depths, changing the fishing depth twice in a year.

Jaffarabad is one of the major landing centers with 270-285 dolnet units under operation, out of which 140 are 4 netters, 95 with 3 netters and the rest with 2 netters, operating at a depth of 10-50 m, South-east, South direction. Major landings were observed during April-May and October-December.

At Rajpara, around 230 dolnet units are operated, of which 120 are 4 netters, 60 are 3 netters and the rest with 2 nets, operating at a depth of 10-50 m, South east, South direction. Peak fishery was noticed from April to May and from September to December.

Nawabunder is the second largest dolnet landing centre, with 250 dolnetters and 40-50 gill netters. Cat fishes are landed in dolnets as well as gillnets operating at this centre at a depth of 30-40m in South east and South west directions.

General trend of catfish landings

The mean annual catfish landings at Nawabandar for 1994-2003 was estimated to be 1478 t for an effort of 27736 units at a catch rate of 55 kg/unit. The landings showed a sharp increase from 271 t at a catch rate of 10 kg/unit in 1994 to 3906 t at a catch rate of 162 kg/unit in 2002. The catch/unit increased from 17.7 kg to 125 kg from 1994 to 2003. The catch rate in terms of number of hauls increased from 2.13 kg/haul in 1994 to 13.2 Kg/haul in 2002, which declined to 7.93 Kg/haul in 2003. The total number of units operated from this centre showed a slight increase from 24,996 units in 1994 to 33058 units in 1997, has subsequently been indicating a marginal declining trend to 24580 units

Table 1 Estimated catch (tonnes) and catch/unit (kg) of *Arius* sp. at dolnet centers

Year	Nawabunder		Rajpara		Jaffarabad		Total	
	Catch	Catch/ unit	Catch	Catch/ unit	Catch	Catch/ unit	Catch	Catch/ unit
1994	271	10.55	0.144	4.96	0.173	6.64	272	17.7
1995	742	24.84	0.455	14.30	0.256	9.60	743	42.3
1996	277	10.39	0.156	4.96	0.223	9.62	277	18.6
1997	1648	46.82	0.278	8.24	0.907	31.94	1649	65.7
1998	547	18.57	0.480	16.17	0.412	17.75	548	40.7
1999	1110	36.76	0.661	22.57	0.508	22.78	1111	66.9
2000	1662	63.18	0.666	20.70	0.557	23.58	1663	91.7
2001	2166	77.00	0.563	22.00	0.538	23.00	2168	106.7
2002	3907	162.00	0.665	27.47	0.923	48.20	3908	205.5
2003	2455	99.90	0.609	20.01	0.408	18.18	2456	125.9
Average catch	1479	55.00	0.467	16.14	0.490	21.13	1480	78.18

in 2003. However, the actual fishing effort expended in terms of number of hauls increased from 127561 hauls in 1994 by 143 %. The contribution of catfishes to the total dolnet landings increased from 1.7 % in 1994 to more than 16.0 % in 2002.

The average catfish landing at Rajpara for the period was estimated at 467 t (Table 1) for an effort of 29709 units at catch rate of 16 kg/unit. Though the annual production exhibited random fluctuations, it had indicated an increasing trend from 144 t in 1994 to 661 t in 1999 after which the production has leveled off. The CPUE also showed an almost identical trend increasing from 4.96 to 22.57 kg/unit in 1999 and plateauing subsequently. The catch rate per number of hauls was 1.09 and 2.59 kg/haul respectively. The percentage of catfish in the dolnet catch increased from 0.52 in 1994 to 3.25 in 2002.

The mean annual catfish landings at Jaffarabad for the period 1994-2003 was 490 t for an effort of 23880 units at catch rate of 21 kg/unit. The landings after increasing from just 172 t in 1994 to 907 t in 1997 had been indicating downtrend reaching 408 t in 2003, though the maximum production was recorded in 2002. Though there were random annual variations, the catch rate also indicated an almost identical trend increasing from 6.64 in 1994 to 31.94 kg/unit in 1997. The catch rate per number of hauls varied from 1.09 kg to 3.49 kg for the respective years.

The mean annual total catfish production for the dolnet centers was estimated to be 2436 t, which formed 13.53 % of the catfish landings in the State.

The production increased from 839 t in 1994 to 6490 t in 2002. The total catfish landings of Gujarat increased from 10,942 t to 22908 t.

Seasonal trend in production

The maximum landings of catfishes at Nawabandar were during (Fig. 1) the post monsoon months of October-December during the entire period of observation. The fishery was very poor during January-March in most of the years except in 2000 and 2002. The fishery picked up in April-May, especially from 1998 onwards. However, in the year 1997 highest catfish landings were recorded at Nawabunder (10461) and also at Jaffarabad (221 t). The dolnetting operations were restricted during June-August due to monsoon and the catch realized was also the minimum during this period.

Species composition

The catfish landings in Gujarat is composed predominantly of *Arius Jussumieri* (48%) followed by *A. tenuispinis* (17%), *A. caelatus* (13%), *Osteogeneiosus militaris* (9%) and *A. thalassinus* (12%) (Fig. 2).

Size distribution

The size distribution of *A. dussumieri* at Nawabandar showed that fishes in the size group between 40 and 79 cm mainly supported the fishery, with the dominant mode at 50-59 cm.

Length weight relationship

The length weight relationship of *A. dussumieri* was calculated following the exponential formula $W = aL^b$, where W = weight in Kg, L = length in cm and

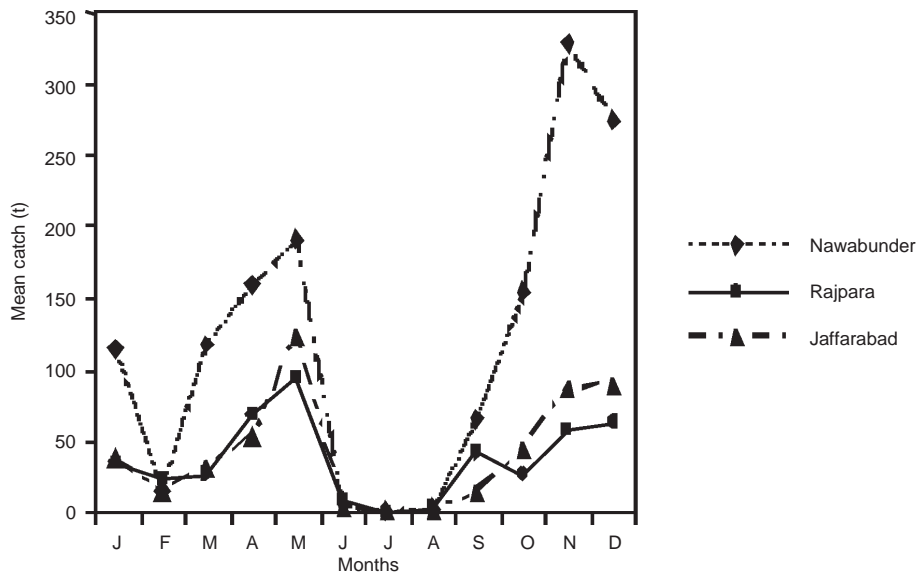


Fig. 1. Month wise average estimated catch of *Arius* sp. (tonnes) during 1994-2003

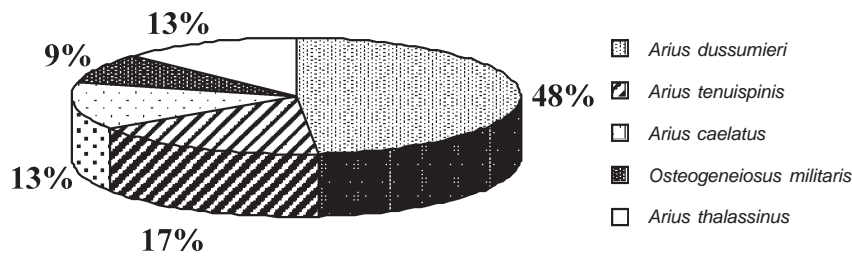


Fig. 2. Species composition of *Arius* sp.

a, b = constants. The following regression equation represent the length-weight relationship of the species.

$$\log W = - 3.95 + 2.59 \log L$$

Where, $r = 0.81$ ($p = 0.05$), $R^2 = 0.65$

The catfish production was the maximum during the post-monsoon months of October-December, with the peak landings occurring either in November or in December in most of the years at all the dolnet centres. It appears that the catfishes undertake shoreward migrations for feeding/spawning during the monsoon and post-monsoon periods and they are caught by dolnetters during the post-monsoon months.

The catfish fishery is exploited at Nawabandar, Rajpara and Jaffarabad near the mouth of the Gulf of Khambhat along the Saurashtra coast mainly by mechanized dolnetters and to a lesser extent by gill-

netters. The characteristic reproduction, shoaling and migration of many species of marine catfishes make them susceptible to over exploitation. More than 70 - 80% of the landings of *T. thalassinus* and *T. tenuispinis* by trawl nets at various centers along the southwest and southeast coasts consisted of juveniles/sub-adults (7-20 cm). Similarly purse seines caused heavy mortality of gestating males/female-shoaling spawners of *T. tenuispinis*, *T. dussumieri* and *T. serratus* along the Karanataka coast in eighties. These have resulted in the collapse of the fishery in the southern states. Northern sectors (NE and NW) remain isolated and the breeding stocks are not threatened by mass exploitation and hence continue to contribute to the fishery; moreover the circulation pattern during the SW and NE monsoon clearly shows that the monsoon current flow is strong from 17° N downwards during SW monsoon and in the North bound NE monsoon, the drift weakens and partly moves away from the coast with the same

pattern. Though trawl sector contributes the major share of the marine fishery sector in Gujarat and Maharashtra, there are large tracts along the coast where trawling is impracticable and is not being conducted as in the Gulf of Khambat. So the breeding stocks of catfish resources in the dolnet fishing zone

is not threatened by mass commercial exploitation and the catfish fishery continue to show progressive increase till now. However, to prove this hypothesis, further investigation is needed by conducting tagging, recovery, drift bottle and racial studies of migratory species.