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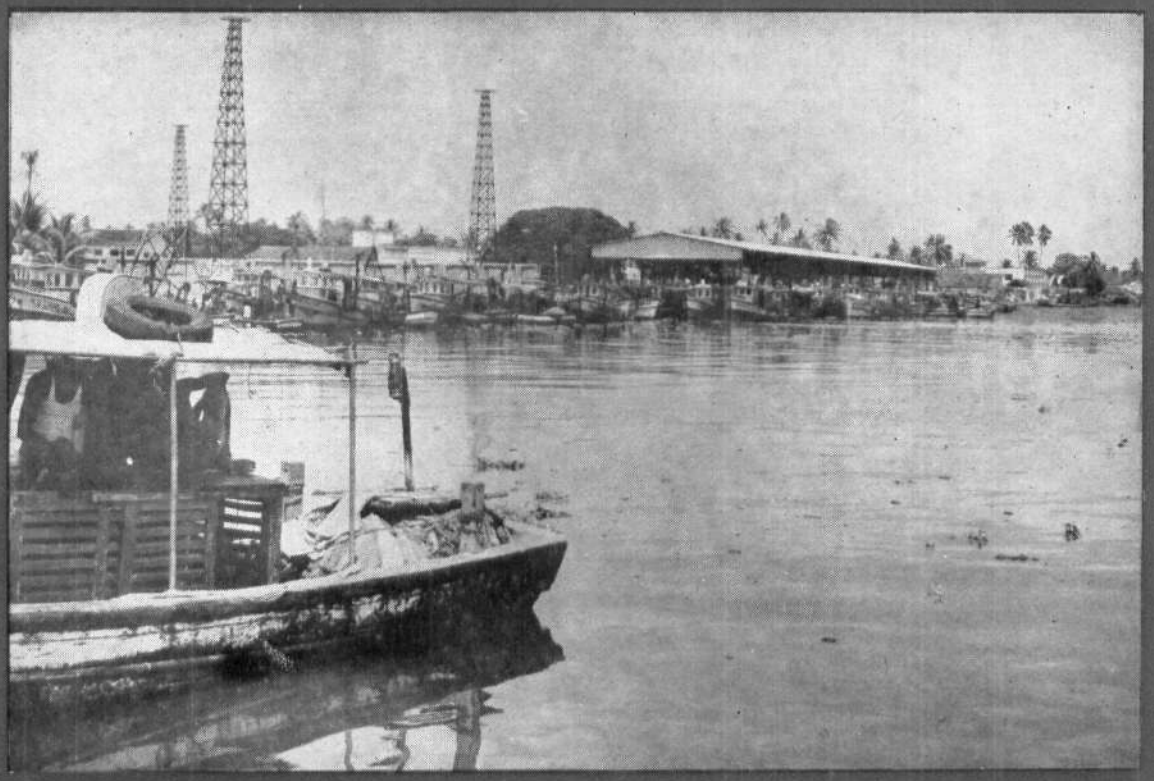

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CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

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THE MARINE FISHERIES INFORMATION SERVICE: Technical and Extension Series envisages the rapid dissemination of information on marine and brackish water fishery resources and allied data available with the Fishery Data Centre and the Research Divisions of the Institute, results of proven researches for transfer of technology to the fish farmers and industry and of other relevant information needed for Research and Development efforts in the marine fisheries sector.

Abbreviation - *Mar. Fish. Infor. Serv. T & E Ser., No.* 11: 1979

CONTENTS

Cover photo: *Boats docked at Cochin Fishing Harbour.*

MARINE FISH PRODUCTION IN INDIA DURING JANUARY TO JUNE 1979*

The total marine fish production in India (excluding Andamans and Lakshadweep) during the half year ending June 1979 was provisionally estimated at 546,876 tonnes as against 530,056 tonnes recorded during the corresponding period in 1978, showing an increase of about 17,000 tonnes (3.17%). While the landings in West Bengal, Orissa, Pondicherry, Kerala, Karnataka, Goa and Maharashtra increased, Andhra Pradesh, Tamil Nadu and Gujarat recorded lower landings. The monthwise total landings of marine fish in the various maritime states of India and the specieswise catch details for the first half of 1979 are shown in Tables 1 and 2. In general, the monthly production during the half year showed a decreasing trend from the first month, recording the maximum in January and the minimum in June.

Pelagic and demersal groups of fishes

The pelagic and demersal groups of species contribute to the total landings. The pelagic group consists of *Chirocentrus*, sardines, *Hilsa* spp, anchovies and white baits, other clupeids, Bombay duck, *Hemirhamphus & Belone*, flying fish, ribbon fish, carangids, mackerel, seer fish, tunnies, *Sphyraena*, mullets and *Bregmaceros* spp. The elasmobranchs, eels, cat fishes, lizard fishes, perches, red mullets, polynemids, sciaenids, silver bellies, *Lactarius*, pomfrets, soles, prawns, lobsters and cephalopods form the demersal group. The statewise distribution of pelagic and demersal groups of fishes is shown in Fig. 1.

Kerala, Tamil Nadu, Karnataka, Maharashtra, Gujarat and Andhra Pradesh recorded higher catch of pelagic fishes. The demersal fishes are predominantly caught in the states of Maharashtra, Tamil Nadu, Gujarat, Kerala, Andhra Pradesh and Karnataka. While Kerala accounted for the highest catch of pelagic fishes, Maharashtra contributed the maximum catch of demersal fishes.

*Prepared by the Fishery Resources Assessment Division.

Statewise production

West Bengal

The total marine fish production in West Bengal increased by about 3,000 tonnes as compared to the corresponding period in 1978 (Table 1). While the landings of sciaenids, other clupeids, *Harpodon nehereus*, pomfrets, *Chirocentrus*, *Hilsa ilisha* and perches showed significant increase, *Leiognathus* and non-penaeid prawns recorded poor landings (Table 3). While the maximum landings were recorded in the month of January, minimum catch was seen in March.

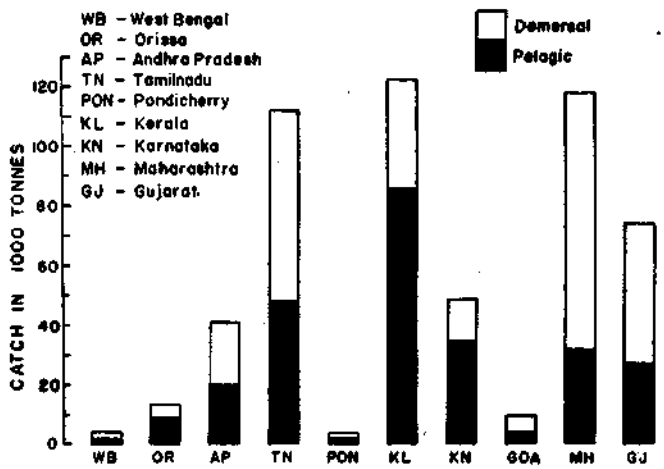

Fig. 1. Statewise pelagic and demersal catches during January to June 1979

Orissa

An increase of about 6,600 tonnes in the total landings was noticed in Orissa over that of the corresponding half year in 1978 (Table 1). The catch of *Hilsa ilisha*, other sardines, elasmobranchs, pomfrets, seer fish, *Chirocentrus*, cat fishes, other clupeids and *Leiognathus* increased substantially. The landings of *Anchoviella*, tunnies, perches and penaeid prawns, however, were comparatively poor. The monthwise and specieswise landings of marine fish in Orissa during the first half of

Table 1. *Statewise and monthwise total marine fish production in India (excluding Andamans and Lakshadweep) during the half year ending June* 1979* *(in tonnes)*

Sl. No.	Name of State	January	February	March	April	May	June	Total	Total for January to June 1978
1.	West Bengal	2,572	402	250	329	316	387	4,256	1,372
2.	Orissa	4,876	2,893	1,892	1,674	1,250	865	13,450	6,826
3.	Andhra Pradesh	11,110	6,839	9,357	7,584	3,452	2,507	40,849	43,123
4.	Tamil Nadu	19,274	19,041	23,899	16,348	14,529	19,153	1,12,244	1,12,947
5.	Pondicherry	214	621	214	710	509	1,422	3,690	2,760
6.	Kerala	20,368	18,691	22,844	20,907	31,281	8,407	1,22,498	1,14,913
7.	Karnataka	10,478	9,414	10,610	8,254	6,990	2,742	48,488	47,018
8.	Goa	2,488	1,297	3,186	1,911	717	37	9,636	5,784
9.	Maharashtra	24,668	23,254	19,130	25,426	22,609	2,589	1,17,676	1,02,066
10.	Gujarat	28,016	9,260	18,525	12,896	3,961	1,431	74,089	93,247
	TOTAL	1,24,064	91,712	1,09,907	96,039	85,614	39,540	5,46,876	5,30,056

* Provisional

1979 is shown in Table 4. The maximum and minimum landings were recorded in January and June respectively.

Andhra Pradesh

The total landings in Andhra Pradesh during the first half of 1979 showed a decline of about 2,000 tonnes (Table 1). While the landings of cat fishes, *Caranx*, *Leiognathus* spp, seer fish, *Thrissocles*, other clupeids, perches, *Saurida* & *Saurus* and non-penaeid prawns increased significantly, the catch of *Anchoviella*, other sardines, elasmobranchs, eels, other *Hilsa* and mackerel recorded poor landings (Table 5). While the maximum landings were recorded in the month of January, the minimum were seen in June.

Tamil Nadu

A minor decline of about 700 tonnes in the total landings was noticed in Tamil Nadu as compared to the half year of 1978 (Table 1). A significant increase in the landings of *Leiognathus* spp, other sardines, *Anchoviella*, sciaenids, mackerel, flying fish, other *Hilsa* and seer fish was noticed. The catch of elasmobranchs, perches, ribbon fish, crabs and other crustaceans and cat fishes, however, was comparatively poor. Table 6 shows the details of catch for the half year. While the maximum catch was recorded in March 1979, in the month of May minimum catch was seen.

Pondicherry

The total landings increased by about 900 tonnes in Pondicherry as compared to the first half of 1978. (Table 1). While the catch of flying fish, perches, *Leiognathus* spp, mackerel, penaeid prawns, *Chirocentrus* and other clupeids increased substantially, *Anchoviella*, other *Hilsa*, other sardines and sciaenids recorded poor catch (Table 7). The maximum landings were recorded in June 1979. The minimum catch was recorded in the months of January and March 1979.

Kerala

An increase of about 7,600 tonnes was noticed in the total landings in Kerala as compared to the corresponding period in 1978 (Table 1). A significant increase in the landings of oil sardines, mackerel, perches, *Leiognathus* spp, tunnies, crabs and other crustaceans was noticed. The landings of penaeid prawns, soles, sciaenids, ribbon fish, *Anchoviella*, *Chirocentrus*, cat fishes, elasmobranchs, *Saurida* & *Saurus* and cephalopods, however, were poor. Table 8 gives the monthwise and specieswise estimates of marine fish production in Kerala for the half year ending June 1979. While the total landings were maximum in the month of May, the same decreased to minimum in June.

Table 2. *Statewise composition of marine fish landings in India (excluding Andamans & Lakshadweep) during the half year ending June* 1979 *(in tonnes)*

Sl. No.	Name of fish	West Bengal	Orissa	Andhra Pradesh	Tamil Nadu	Pondicherry	Kerala	Karnataka	Goa	Maharashtra	Gujarat	Total
1.	Elasmobranchs	62	1,300	3,489	6,688	97	2,854	571	534	5,081	2,407	23,083
2.	Eels	—	—	146	87	70	3	—	4	2,191	1,719	4,220
3.	Cat fishes	94	501	2,568	2,074	27	4,084	1,314	441	4,634	2,926	18,663
4.	Chirocentrus	195	557	424	860	95	650	53	58	478	1,091	4,461
5. (a)	Oil sardine	—	—	—	743	—	37,676	9,656	658	—	—	48,733
(b)	Other sardines	—	1,494	3,940	17,227	515	4,017	3,557	485	186	—	31,421
(c)	*Hilsa ilisha*	190	3,623	—	5	—	—	2	—	345	186	4,351
(d)	Other *Hilsa*	32	293	628	2,255	4	34	26	14	109	1,440	4,835
(e)	*Anchoviella*	8	16	3,046	5,062	81	3,677	851	—	42	—	12,783
(f)	*Thrissocles*	126	120	1,020	3,636	212	434	210	815	1,115	316	8,004
(g)	Other clupeids	347	497	1,600	2,608	139	368	740	289	5,974	2,015	14,577
6. (a)	*Harpodon nehereus*	321	96	72	1	—	1	1	—	14,333	10,762	25,587
(b)	*Saurida & Saurus*	—	50	867	667	100	1,124	156	96	1,515	5	4,580
7.	*Hemirhamphus & Belone*	—	28	31	395	—	144	9	11	11	—	629
8.	Flying fish	—	4	47	1,402	495	—	—	1	—	—	1,949
9.	Perches	186	39	2,009	2,669	333	2,332	103	181	1,292	690	9,834
10.	Red mullets	—	—	170	824	94	126	29	—	555	—	1,798
11.	Polynemids	55	242	996	181	—	26	2	—	836	136	2,474
12.	Sciaenids	610	281	2,500	9,392	89	2,829	1,040	765	10,138	13,523	41,167
13.	Ribbon fish	175	176	2,380	1,626	47	2,623	432	454	5,528	2,048	15,489
14. (a)	*Caranx*	70	216	2,253	1,465	65	2,290	284	640	1,205	79	8,567
(b)	*Chorinemus*	43	260	233	570	3	44	6	49	91	82	1,381
(c)	*Trachynotus*	—	—	—	152	—	—	13	—	—	—	165
(d)	Other carangids	—	—	18	14	—	—	—	—	41	—	73
(e)	*Coryphaena*	—	—	—	33	2	48	—	—	11	—	94
(f)	*Elacate*	—	—	—	280	—	23	9	1	—	—	313
15. (a)	*Leiognathus*	22	496	2,142	25,207	236	2,056	672	583	309	—	31,723
(b)	*Gazza*	—	—	—	130	—	—	—	—	—	—	130
16.	*Lactarius*	—	—	378	314	5	143	140	146	299	209	1,634
17.	Pomfrets	287	1,194	1,112	518	12	774	98	74	4,381	2,897	11,347
18.	Mackerel	—	165	1,031	2,137	227	16,703	10,766	205	683	41	31,958
19.	Seer fish	69	690	2,112	2,241	53	1,209	404	295	446	1,475	8,994
20.	Tunnies	—	18	218	446	1	11,409	676	5	414	98	13,285
21.	*Sphyraena*	—	2	17	753	9	276	30	7	30	—	1,124
22.	*Mugil*	—	22	137	109	18	30	1	5	19	225	566
23.	*Bregmaceros*	—	—	—	—	—	—	—	—	1	254	255
24.	Soles	—	8	247	1,098	78	1,767	215	235	787	123	4,558
25. (a)	Penaeid prawns	124	69	2,482	6,223	220	12,668	4,208	1,276	18,741	4,394	50,405
(b)	Non-penaeid prawns	102	32	589	183	56	24	2	55	31,003	799	32,845
(c)	Lobsters	—	—	84	143	—	11	15	—	496	113	862
(d)	Other crustaceans	—	4	207	2,203	72	3,198	2,483	824	86	500	9,577
26.	Cephalopods	—	1	203	561	20	286	52	106	1,558	4,518	7,305
27.	Miscellaneous	1,138	956	1,453	9,062	215	6,537	9,662	324	2,712	19,018	51,077
	TOTAL	4,256	13,450	40,849	1,12,244	3,690	1,22,498	48,488	9,636	1,17,676	74,089	5,46,876

Karnataka

In Karnataka, the total landings increased by about 1,500 tonnes when compared to the landings recorded during the first half of 1978 (Table 1). While the landings of mackerel, other sardines, crabs and other crustaceans, tunnies, *Thrissocles* spp, other clupeids and ribbon fish were comparatively higher, the catch of oil sardine, penaeid prawns, pomfrets and elasmobranchs was poor (Table 9). The maximum catch was recorded in the months of January and March whereas the minimum catch was accounted for in June.

Table 3. *Composition of marine fish landings in West Bengal during the half year ending June 1979 (in tonnes)*

Sl. No.	Name of Fish	Jan.	Feb.	March	April	May	June	Total
1.	Elasmobranchs	22	—	—	26	—	14	62
2.	Eels	—	—	—	—	—	—	—
3.	Cat fishes	88	—	—	6	—	—	94
4.	*Chirocentrus*	86	30	6	24	24	25	195
5. a)	Oil sardine	—	—	—	—	—	—	—
b)	Other sardines	—	—	—	—	—	—	—
c)	*Hilsa ilisha*	112	—	6	18	—	54	190
d)	Other *Hilsa*	—	—	—	12	—	20	32
e)	*Anchoviella*	—	—	8	—	—	—	8
f)	*Thrissocles*	98	6	4	6	12	—	126
g)	Other clupeids	150	38	42	34	51	32	347
6. a)	*Harpodon nehereus*	190	36	34	6	32	23	321
b)	*Saurida & Saurus*	—	—	—	—	—	—	—
7.	*Hemirhamphus & Belone*	—	—	—	—	—	—	—
8.	Flying fish	—	—	—	—	—	—	—
9.	Perches	160	—	—	18	4	4	186
10.	Red mullets	—	—	—	—	—	—	—
11.	Polynemids	—	—	4	24	8	19	55
12.	Sciaenids	492	32	20	22	24	20	610
13.	Ribbon fish	78	36	16	4	26	15	175
14. a)	Carenx	62	—	4	4	—	—	70
b)	*Chorinemus*	—	—	—	17	8	18	43
c)	*Trachynotus*	—	—	—	—	—	—	—
d)	Other carangids	—	—	—	—	—	—	—
e)	*Coryphaena*	—	—	—	—	—	—	—
f)	*Elacate*	—	—	—	—	—	—	—
15. a)	*Leiognathus*	—	—	4	—	18	—	22
b)	*Gazza*	—	—	—	—	—	—	—
16.	*Lactarius*	—	—	—	—	—	—	—
17.	Pomfrets	12	56	48	56	34	81	287
18.	Mackerel	—	—	—	—	—	—	—
19.	Seer fish	—	—	—	24	17	28	69
20.	Tunnies	—	—	—	—	—	—	—
21.	*Sphyraena*	—	—	—	—	—	—	—
22.	*Mugil*	—	—	—	—	—	—	—
23.	*Bregmaceros*	—	—	—	—	—	—	—
24.	Soles	—	—	—	—	—	—	—
25. a)	Penaeid prawns	68	50	6	—	—	—	124
b)	Non-penaeid prawns	80	22	—	—	—	—	102
c)	Lobsters	—	—	—	—	—	—	—
d)	Other crustaceans	—	—	—	—	—	—	—
26.	Cephalopods	—	—	—	—	—	—	—
27.	Miscellaneous	874	96	48	28	58	34	1,138
	TOTAL	2,572	402	250	329	316	387	4,256

Table 4. *Composition of marine fish landings in Orissa during the half year ending June 1979 (in tonnes)*

Sl. No.	Name of fish	Jan.	Feb.	March	April	May	June	Total
1.	Elasmobranchs	286	314	268	179	148	105	1,300
2.	Eels	—	—	—	—	—	—	—
3.	Cat fishes	185	196	57	20	41	2	501
4.	*Chirocentrus*	57	102	105	106	120	67	557
5. a)	Oil sardine	—	—	—	—	—	—	—
b)	Other sardines	386	587	170	265	84	2	1,494
c)	*Hilsa ilisha*	2,386	556	124	288	147	122	3,623
d)	Other *Hilsa*	72	94	12	12	62	41	293
e)	*Anchoviella*	—	16	—	—	—	—	16
f)	*Thrissocles*	44	4	39	—	20	13	120
g)	Other clupeids	120	124	37	97	65	54	497
6. a)	*Harpodon nehereus*	70	2	4	6	12	2	96
b)	*Saurida & Saurus*	49	1	—	—	—	—	50
7.	*Hemirhamphus & Belone*	25	3	—	—	—	—	28
8.	Flying fish	1	3	—	—		—	4
9.	Perches	16	1	3	18	—	1	39
10.	Red mullets	—	—	—	—	—	—	—
11.	Polynemids	38	78	20	24	44	38	242
12.	Sciaenids	44	17	102	50	22	46	281
13.	Ribbon fish	26	8	31	54	33	24	176
14. a)	*Caranx*	10	169	8	14	—	15	216
b)	*Chorinemus*	56	79	22	35	48	20	260
c)	*Trachynotus*	—	—	—	—	—	—	—
d)	Other carangids	—	—	—	—	—	—	—
e)	*Coryphaena*	—	—	—	—	—	—	—
f)	*Elacate*	—	—	—	—	—	—	—
15. a)	*Leiognathus*	16	25	332	53	34	36	496
b)	*Gazza*	—	—	—	—	—	—	—
16.	*Lactarius*	—	—	—	—	—	—	—
17.	Pomfrets	290	233	147	218	186	120	1,194
18.	Mackerel	3	8	154	—	—	—	165
19.	Seer fish	46	187	187	105	101	64	690
20.	Tunnies	10	8	—	—	—	—	18
21.	*Sphyraena*	—	2	—	—	—	—	2
22.	*Mugil*	22	—	—	—	—	—	22
23.	*Bregmaceros*	—	—	—	—	—	—	—
24.	Soles	—	—	—	—	8	—	8
25. a)	Penaeid prawns	28	—	—	12	1	28	69
b)	Non-penaeid prawns	30	—	2	—	—	—	32
c)	Lobsters	—	—	—	—	—	—	—
d)	Other crustaceans	—	—	—	—	2	2	4
26.	Cephalopods	1	—	—	—	—	—	1
27.	Miscellaneous	559	76	68	118	72	63	956
	TOTAL	4,876	2,893	1,892	1,674	1,250	865	13,450

Table 5. *Composition of marine fish landings in Andhra Pradesh during the half year ending June* 1979 *(in tonnes)*

Sl. No.	Name of fish	Janu.	Feb.	March	April	May	June	Total
1.	Elasmobranchs	1,620	493	563	511	109	193	3,489
2.	Eels	26	14	22	53	20	11	146
3.	Cat fishes	698	230	1,335	173	60	72	2,568
4.	*Chirocentrus*	198	57	126	26	2	15	424
5.	a) Oil sardine	—	—	—	—	—	—	—
	b) Other sardines	1,142	785	1,044	551	402	16	3,940
	c) *Hilsa ilisha*	—	—	—	—	—	—	—
	d) Other *Hilsa*	477	94	20	8	29	—	628
	e) *Anchoviella*	875	404	641	1,000	85	41	3,046
	f) *Thrissocles*	234	315	177	108	64	122	1,020
	g) Other clupeids	602	456	293	98	57	94	1,600
6.	a) *Harpodon nehereus*	3	26	15	26	2	—	72
	b) *Saurida & Saurus*	500	42	74	85	99	67	867
7.	*Hemirhamphus & Belone*	11	—	1	—	—	19	31
8.	Flying fish	47	—	—	—	—	—	47
9.	Perches	693	366	336	467	112	35	2,009
10.	Red mullets	32	35	24	39	30	10	170
11.	Polynemids	99	90	86	608	98	15	996
12.	Sciaenids	463	442	528	563	226	278	2,500
13.	Ribbon fish	550	208	168	1,081	166	207	2,380
14.	a) *Caranx*	89	653	1,106	290	25	90	2,253
	b) *Chorinemus*	64	5	135	24	2	3	233
	c) *Trachynotus*	—	—	—	—	—	—	—
	d) Other carangids	3	—	2	5	5	3	18
	e) *Coryphaena*	—	—	—	—	—	—	—
	f) *Elacate*	—	—	—	—	—	—	—
15.	a) *Leiognathus*	181	390	426	691	237	217	2,142
	b) *Gazza*	—	—	—	—	—	—	—
16.	*Lactarius*	71	27	91	102	8	79	378
17.	Pomfrets	159	89	568	124	45	127	1,112
18.	Mackerel	58	25	592	290	65	1	1,031
19.	Seer fish	938	135	320	54	521	144	2,112
20.	Tunnies	91	11	—	19	97	—	218
21.	*Sphyraena*	—	4	8	4	1	—	17
22.	*Mugil*	6	131	—	—	—	—	137
23.	*Bregmaceros*	—	—	—	—	—	—	—
24.	Soles	86	33	41	22	39	26	247
25.	a) Penaeid prawns	360	993	178	238	381	332	2,482
	b) Non-penaeid prawns	158	1	31	79	247	73	589
	c) Lobsters	2	1	22	17	32	10	84
	d) Other crustaceans	30	6	19	14	27	111	207
26.	Cephalopods	21	20	45	44	54	19	203
27.	Miscellaneous	523	258	320	170	105	77	1,453
	TOTAL	11,110	6,839	9,357	7,584	3,452	2,507	40,849

Table 6. *Composition of marine fish landings in Tamil Nadu during the half year ending June* 1979 *(in tonnes)*

Sl. No.	Name of fish	Janu.	Feb.	March	April	May	June	Total
1.	Elasmobranchs	1,011	817	1,803	1,541	868	648	6,688
2.	Eels	55	7	4	5	14	2	87
3.	Cat fishes	394	379	694	186	290	131	2,074
4.	*Chirocentrus*	376	109	72	74	102	127	860
5.	a) Oil sardine	71	111	24	5	532	—	743
	b) Other sardines	4,401	2,549	3,759	2,539	2,120	1,859	17,227
	(c) *Hilsa ilisha*	—	—	—	—	5	—	5
	d) Other *Hilsa*	459	650	675	42	294	135	2,255
	e) *Anchoviella*	279	1,539	1,108	538	758	840	5,062
	f) *Thrissocles*	516	422	1,261	474	616	347	3,636
	g) Other clupeids	778	289	974	246	156	165	2,608
6.	a) *Harpodon nehereus*	1	—	—	—	—	—	1
	b) *Saurida & Saurus*	275	59	73	93	102	65	667
7.	*Hemirhamphus & Belone*	115	105	44	58	60	13	395
8.	Flying fish	—	2	2	7	491	900	1,402
9.	Perches	342	549	738	324	309	407	2,669
10.	Red mullets	149	176	164	178	107	50	824
11.	Polynemids	85	49	24	19	2	2	181
12.	Sciaenids	1,464	2,028	1,998	1,485	1,055	1,362	9,392
13.	Ribbon fish	58	150	58	17	58	1,285	1,626
14.	a) *Caranx*	201	139	223	301	463	138	1,465
	b) *Chorinemus*	87	40	199	44	133	67	570
	c) *Trachynotus*	12	—	109	6	25	—	152
	d) Other carangids	—	12	—	—	2	—	14
	e) *Coryphaena*	10	—	3	10	8	2	33
	f) *Elacate*	37	70	61	50	60	2	280
15.	a) *Leiognathus*	3,307	4,976	5,343	3,403	2,336	5,842	25,207
	b) *Gazza*	33	70	22	2	3	—	130
16.	*Lactarius*	135	2	42	6	66	63	314
17.	Pomfrets	63	40	12	288	12	103	518
18.	Mackerel	313	148	464	555	611	46	2,137
19.	Seer fish	956	151	294	307	233	300	2,241
20.	Tunnies	15	11	16	145	216	43	446
21.	*Sphyraena*	246	158	52	201	87	9	753
22.	*Mugil*	13	22	28	5	25	16	109
23.	*Bregmaceros*	—	—	—	—	—	—	—
24.	Soles	130	218	152	220	173	205	1,098
25.	a) Penaeid prawns	819	793	680	1,492	605	1,834	6,223
	b) Non-penaeid prawns	33	16	2	6	38	88	183
	c) Lobsters	47	32	38	3	9	14	143
	d) Other crustaceans	252	262	294	527	319	549	2,203
26.	Cephalopods	92	109	90	134	55	81	561
27.	Miscellaneous	1,644	1,782	2,300	812	1,111	1,413	9,062
	TOTAL	19,274	19,041	23,899	16,348	14,529	19,153	1,12,244

Table 7. *Composition of marine fish landings in Pondicherry during the half year ending June 1979 (in tonnes)*

Sl. No.	Name of fish	Janu.	Feb.	March	April	May	June	Total
1.	Elasmobranchs	2	20	5	25	11	34	97
2.	Eels	—	20	—	46	—	4	70
3.	Cat fishes	—	3	—	11	—	13	27
4.	*Chirocentrus*	2	8	8	6	9	62	95
5. a)	Oil sardine	—	—	—	—	—	—	—
b)	Other sardines	119	114	17	24	107	134	515
c)	*Hilsa ilisha*	—	—	—	—	—	—	—
d)	Other *Hilsa*	1	1	2	—	—	—	4
e)	*Anchoviella*	—	32	10	30	2	7	81
f)	*Thrissocles*	7	26	47	24	43	65	212
g)	Other clupeids	5	24	20	17	55	18	139
6. a)	*Harpodon nehereus*	—	—	—	—	—	—	—
b)	*Saurida & Saurus*	3	2	1	35	3	56	100
7.	*Hemirhamphus & Belone*	—	—	—	—	—	—	—
8.	Flying fish	—	—	—	—	—	495	495
9.	Perches	6	54	14	98	27	134	333
10.	Red mullets	1	1	3	48	15	26	94
11.	Polynemids	—	—	—	—	—	—	—
12.	Sciaenids	7	19	11	14	9	29	89
13.	Ribbon fish	15	5	8	8	—	11	47
14. a)	*Caranx*	2	6	5	19	30	3	65
b)	*Chorinemus*	—	—	1	—	—	2	3
c)	*Trachynotus*	—	—	—	—	—	—	—
d)	Other carangids	—	—	—	—	—	—	—
e)	*Coryphaena*	—	—	—	2	—	—	2
f)	*Elacate*	—	—	—	—	—	—	—
15. a)	*Leiognathus*	12	49	7	48	31	89	236
b)	*Gazza*	—	—	—	—	—	—	—
16.	*Lactarius*	—	1	—	—	3	1	5
17.	Pomfrets	2	—	—	10	—	—	12
18.	Mackerel	4	134	25	42	22	—	227
19.	Seer fish	3	1	—	2	8	39	53
20.	Tunnies	—	—	—	—	—	1	1
21.	*Sphyraena*	—	—	1	1	7	—	9
22.	*Mugil*	—	4	—	9	—	5	18
23.	*Bregmaceros*	—	—	—	—	—	—	—
24.	Soles	2	8	5	14	22	27	78
25. a)	Penaeid prawns	7	51	6	60	37	59	220
b)	Non-penaeid prawns	—	—	—	27	—	29	56
c)	Other crustaceans	4	1	5	3	31	28	72
26.	Cephalopods	—	—	1	15	—	4	20
27.	Miscellaneous	10	37	12	72	37	47	215
	TOTAL	214	621	214	710	509	1,422	3,690

Table 8. *Composition of marine fish landings in Kerala during the half year ending June 1979 (in tonnes)*

Sl. No.	Name of fish	Janu.	Feb.	March	April	May	June	Total
1.	Elamobranchs	633	402	542	255	847	175	2,854
2.	Eels	1	—	—	2	—	—	3
3.	Cat fishes	210	114	194	1,332	1,766	468	4,084
4.	*Chirocentrus*	22	115	30	381	102	—	650
5. a)	Oil sardine	10,341	9,530	7,221	2,168	6,737	1,679	37,676
b)	Other sardines	188	774	322	1,314	1,410	9	4,017
c)	*Hilsa ilisha*	—	—	—	—	—	—	—
d)	Other *Hilsa*	—	1	—	15	18	—	34
e)	*Anchoviella*	34	338	1,776	551	410	568	3,677
f)	*Thrissocles*	89	12	41	214	45	33	434
g)	Other clupeids	16	31	5	202	103	11	368
6. a)	*Harpodon nehereus*	—	—	1	—	—	—	1
b)	*Saurida & Saurus*	51	48	13	142	686	184	1,124
7.	*Hemirhamphus & Belone*	11	107	7	16	3	—	144
8.	Flying fish	—	—	—	—	—	—	—
9.	Perches	1,477	171	153	279	227	25	2,332
10.	Red mullets	—	21	105	—	—	—	126
11.	Polynemids	1	—	24	—	1	—	26
12.	Sciaenids	632	361	433	494	638	271	2,829
13.	Ribbon fish	35	32	19	189	101	2,247	2,623
14. a)	*Caranx*	447	572	200	527	461	83	2,290
b)	*Chorinemus*	3	21	4	1	15	—	44
c)	*Trachynotus*	—	—	—	—	—	—	—
d)	Other carangids	—	—	—	—	—	—	—
e)	*Coryphaena*	—	10	31	5	2	—	48
f)	*Elacate*	—	1	16	1	5	—	23
15. a)	*Leiognathus*	231	449	146	745	422	63	2,056
b)	*Gazza*	—	—	—	—	—	—	—
16.	*Lactarius*	1	—	1	1	61	79	143
17.	Pomfrets	95	156	255	45	216	7	774
18.	Mackerel	1,472	2,361	3,017	4,902	4,759	192	16,703
19.	Seer fish	542	398	95	62	95	17	1,209
20.	Tunnies	322	208	537	2,527	7,374	441	11,409
21.	*Sphyraena*	67	30	38	60	74	7	276
22.	*Mugil*	1	1	28	—	—	—	30
23.	*Bregmaceros*	—	—	—	—	—	—	—
24.	Soles	398	184	493	353	258	81	1,767
25(a)	Penaeid prawns	1,274	971	4,580	1,665	2,741	1,437	12,668
b)	Non-penaeid prawns	—	9	7	8	—	—	24
c)	Lobsters	7	2	1	—	1	—	11
d)	Other crustaceans	974	565	558	783	239	79	3,198
26.	Cephalopods	68	41	31	36	81	29	286
27.	Miscellaneous	725	655	1,920	1,632	1,383	222	6,537
	TOTAL	20,368	18,691	22,844	20,907	31,281	8,407	122,498

Table 9. *Composition of marine fish landings in Karnataka during the half year ending June* 1979 *(in tonnes)*

Sl. No.	Name of fish	Janu.	Feb.	March	April	May	June	Total
1.	Elasmobranchs	108	59	244	72	62	26	571
2.	Eels	—	—	—	—	—	—	—
3.	Cat fishes	296	137	313	502	60	6	1,314
4.	*Chirocentrus*	6	8	4	4	—	31	53
5. a)	Oil sardine	598	5,065	1,247	1,357	953	436	9,656
b)	Other sardines	293	276	599	821	1,546	22	3,557
c)	*Hilsa ilisha*	2	—	—	—	—	—	2
d)	Other *Hilsa*	1	1	24	—	—	—	26
e)	*Anchoviella*	443	45	285	7	71	—	851
f)	*Thrissocles*	73	42	41	28	18	8	210
g)	Other clupeids	385	119	140	53	29	14	740
6. a)	*Harpodon nehereus*	—	1	—	—	—	—	1
b)	*Saurida & Saurus*	24	18	31	71	12	—	156
7.	*Hemirhamphus & Belone*	—	—	9	—	—	—	9
8.	Flying fish	—	—	—	—	—	—	—
9.	Perches	1	7	25	46	23	1	103
10.	Red mullets	—	—	14	10	5	—	29
11.	Polynemids	2	—	—	—	—	—	2
12.	Sciaenids	195	182	401	64	28	170	1,040
13.	Ribbon fish	51	50	61	43	225	2	432
14. a)	*Caranx*	113	47	12	57	43	12	284
b)	*Chorinemus*	1	4	—	—	1	—	6
c)	*Trachynotus*	—	13	—	—	—	—	13
d)	Other carangids	—	—	—	—	—	—	—
e)	*Coryphaena*	—	—	—	—	—	—	—
f)	*Elacate*	4	1	3	—	—	1	9
15. a)	*Leiognathus*	110	118	132	173	120	19	672
b)	*Gazza*	—	—	—	—	—	—	—
16.	*Lactarius*	45	16	28	8	13	30	140
17.	Pomfrets	48	20	23	5	1	1	98
18.	Mackerel	3,699	990	2,253	1,535	568	1,721	10,766
19.	Seer fish	132	170	92	7	3	—	404
20.	Tunnies	—	—	1	21	626	28	676
21.	*Sphyraena*	8	2	18	2	—	—	30
22.	*Mugil*	—	—	—	—	1	—	1
23.	*Bregmaceros*	—	—	—	—	—	—	—
24.	Soles	35	26	58	78	18	—	215
25. a)	Penaeid prawns	942	882	886	787	651	60	4,208
b)	Non-penaeid prawns	—	2	—	—	—	—	2
c)	Lobsters	—	—	15	—	—	—	15
d)	Other crustaceans	747	350	1,185	162	39	—	2,483
26.	Cephalopods	32	5	11	2	2	—	52
27.	Miscellaneous	2,084	758	2,455	2,339	1,872	154	9,662
	TOTAL	10,478	9,414	10,610	8,254	6,990	2,742	48,488

Table 10. *Composition of marine fish landings in Goa during the half year ending June* 1979 *(in tonnes)*

Sl. No.	Name of fish	Janu.	Feb.	March	April	May	June	Total
1.	Elasmobranchs	138	77	133	144	42	—	534
2.	Eels	—	—	—	—	4	—	4
3.	Cat fishes	72	54	141	158	13	3	441
4.	*Chirocentrus*	25	5	7	21	—	—	58
5. a)	Oil sardine	36	79	417	113	13	—	658
b)	Other sardines	145	92	186	62	—	—	485
c)	*Hilsa ilisha*	—	—	—	—	—	—	—
d)	Other *Hilsa*	—	—	—	14	—	—	14
e)	*Anchoviella*	—	—	—	—	—	—	—
f)	*Thrissocles*	475	104	120	58	58	—	815
g)	Other clupeids	120	25	109	9	26	—	289
6. a)	*Harpodon nehereus*	—	—	—	—	—	—	—
b)	*Saurida & Saurus*	1	5	88	2	—	—	96
7.	*Hemirhamphus & Belone*	2	—	—	9	—	—	11
8.	Flying fish	1	—	—	—	—	—	1
9.	Perches	24	25	128	2	2	—	181
10.	Red mullets	—	—	—	—	—	—	—
11.	Polynemids	—	—	—	—	—	—	—
12.	Sciaenids	254	133	190	133	49	6	765
13.	Ribbon fish	27	37	176	145	69	—	454
14. a)	*Caranx*	295	116	132	40	54	3	640
b)	*Chorinemus*	3	—	33	9	4	—	49
c)	*Trachynotus*	—	—	—	—	—	—	—
d)	Other carangids	—	—	—	—	—	—	—
e)	*Coryphaena*	—	—	—	—	—	—	—
f)	*Elacate*	—	1	—	—	—	—	1
15. a)	*Leiognathus*	127	101	195	94	65	1	583
b)	*Gazza*	—	—	—	—	—	—	—
16.	*Lactarius*	35	22	23	55	11	—	146
17.	Pomfrets	29	16	12	14	3	—	74
18.	Mackerel	137	29	39	—	—	—	205
19.	Seer fish	173	52	64	6	—	—	295
20.	Tunnies	3	2	—	—	—	—	5
21.	*Sphyraena*	—	—	7	—	—	—	7
22.	*Mugil*	1	1	—	—	—	3	5
23.	*Bregmaceros*	—	—	—	—	—	—	—
24.	Soles	53	28	35	76	43	—	235
25. a)	Penaeid prawns	128	99	357	518	166	8	1,276
b)	Non-penaeid prawns	55	—	—	—	—	—	55
c)	Lobsters	—	—	—	—	—	—	—
d)	Other crustaceans	18	114	478	142	69	3	824
26.	Cephalopods	37	21	13	23	12	—	106
27.	Miscellaneous	74	59	103	64	14	10	324
	TOTAL	2,488	1,297	3,186	1,911	717	37	9,636

Table 11. *Composition of marine fish landings in Maharashtra during the half year ending June 1979 (in tonnes)*

Sl. No.	Name of fish	Janu.	Feb.	March	April	May	June	Total
1.	Elasmobranchs	1,576	510	847	609	1,338	201	5,081
2.	Eels	677	407	493	565	41	8	2,191
3.	Cat fishes	923	935	990	1,177	510	99	4,634
4.	*Chirocentrus*	68	148	70	23	169	—	478
5. a)	Oil sardine	—	—	—	—	—	—	—
b)	Other sardines	87	6	12	7	74	—	186
c)	*Hilsa ilisha*	49	170	38	9	79	—	345
d)	Other *Hilsa*	11	15	49	14	16	4	109
e)	*Anchoviella*	—	9	—	1	22	10	42
f)	*Thrissocles*	207	230	339	39	297	3	1,115
g)	Other clupeids	1,117	1,488	988	1,301	918	162	5,974
6. a)	*Harpodon nehereus*	3,768	1,920	1,461	2,832	4,063	289	14,333
b)	*Saurida & Saurus*	607	383	348	114	62	1	1,515
7.	*Hemirhamphus & Belone*	9	—	—	1	—	1	11
8.	Flying fish	—	—	—	—	—	—	—
9.	Perches	278	300	258	122	249	85	1,292
10.	Red mullets	117	132	281	21	3	1	555
11.	Polynemids	178	144	242	207	53	12	836
12.	Sciaenids	2,735	1,803	2,069	1,849	1,546	136	10,138
13.	Ribbon fish	1,527	1,191	869	874	924	143	5,528
14. a)	*Caranx*	466	122	268	61	258	30	1,205
b)	*Chorinemus*	9	2	—	52	28	—	91
c)	*Trachynotus*	—	—	—	—	—	—	—
d)	Other carangids	—	27	—	4	1	9	41
e)	*Coryphaena*	—	—	—	—	9	2	11
f)	*Elacate*	—	—	—	—	—	—	—
15. a)	*Leiognathus*	97	12	18	52	107	23	309
b)	*Gazza*	—	—	—	—	—	—	—
16.	*Lactarius*	58	229	2	9	1	—	299
17.	Pomfrets	573	903	583	1,573	671	78	4,381
18.	Mackerel	556	88	6	21	12	—	683
19.	Seer fish	93	43	74	114	114	8	446
20.	Tunnies	139	28	10	43	94	100	414
21.	*Sphyraena*	25	—	3	—	2	—	30
22.	*Mugil*	—	—	—	1	8	10	19
23.	*Bregmaceros*	—	—	—	—	1	—	1
24.	Soles	11	20	220	109	413	14	787
25. a)	Penaeid prawns	2,947	2,651	4,283	4,948	3,421	491	18,741
b)	Non-penaeid prawns	4,623	8,358	3,503	7,797	6,204	518	31,003
c)	Lobsters	58	274	46	65	36	17	496
d)	Other crustaceans	—	1	13	39	20	13	86
26	Cephalopods	314	235	271	387	285	66	1,558
27.	Miscellaneous	765	470	476	386	560	55	2,712
	TOTAL	24,668	23,254	19,130	25,426	22,609	2,589	117,676

Table 12. *Composition of marine fish landings in Gujarat during the half year ending June 1979 (in tonnes)*

Sl. No.	Name of fish	Janu.	Feb	March	April	May	June	Total
1.	Elasmobranchs	534	293	308	517	521	234	2,407
2.	Eels	1,347	88	72	210	2	—	1,719
3.	Cat fishes	257	158	1,671	632	139	69	2,926
4.	*Chirocentrus*	332	238	324	128	53	16	1,091
5. a)	Oil sardine	—	—	—	—	—	—	—
b)	Other sardines	—	—	—	—	—	—	—
c)	*Hilsa ilisha*	—	161	12	5	2	6	186
d)	Other *Hilsa*	210	333	462	269	121	45	1,440
e)	*Anchoviella*	—	—	—	—	—	—	—
f)	*Thrissocles*	87	81	33	86	22	7	316
g)	Other clupeids	1,039	29	484	324	101	38	2,015
6. a)	*Harpodon nehereus*	6,564	474	837	2,159	668	60	10,762
b)	*Saurida & Saurus*	—	5	—	—	—	—	5
7.	*Hemirhamphus & Belone*	—	—	—	—	—	—	—
8.	Flying fish	—	—	—	—	—	—	—
9.	Perches	461	11	169	40	4	5	690
10.	Red mullets	—	—	—	—	—	—	—
11.	Polynemids	—	3	1	23	97	12	136
12.	Sciaenids	4,821	2,284	4,329	1,868	172	49	13,523
13.	Ribbon fish	649	344	272	344	439	—	2,048
14. a)	*Caranx*	9	44	2	5	4	15	79
b)	*Chorinemus*	48	9	3	18	1	3	82
c)	*Trachynotus*	—	—	—	—	—	—	—
d)	Other carangids	—	—	—	—	—	—	—
e)	*Coryphaena*	—	—	—	—	—	—	—
f)	*Elacate*	—	—	—	—	—	—	—
15. a)	*Leiognathus*	—	—	—	—	—	—	—
b)	*Gazza*	—	—	—	—	—	—	—
16.	*Lactarius*	161	37	11	—	—	—	209
17.	Pomfrets	474	133	369	383	925	613	2,897
18.	Mackerel	—	—	—	6	35	—	41
19.	Seer fish	557	372	485	42	12	7	1,475
20.	Tunnies	41	31	25	1	—	—	98
21.	*Sphyraena*	—	—	—	—	—	—	—
22.	*Mugil*	52	29	55	23	18	48	225
23.	*Bregmaceros*	85	34	135	—	—	—	254
24.	Soles	21	10	70	2	—	20	123
25. a)	Penaeid prawns	3,256	149	470	392	97	30	4,394
b)	Non-penaeid prawns	65	33	414	206	76	5	799
c)	Lobsters	43	2	43	20	5	—	113
d)	Other crustaceans	—	75	359	48	10	8	500
26.	Cephalopods	194	544	2,924	827	29	—	4,518
27.	Miscellaneous	6,709	3,256	4,186	4,318	408	141	19,018
	TOTAL	28,016	9,260	18,525	12,896	3,961	1,431	74,089

Goa

The total landings in Goa showed an increase of about 4,000 tonnes (Table 1). The landings of elasmobranchs, penaeid prawns, crabs and other crustaceans, *Leiognathus* spp, sciaenids, *Caranx,* ribbon fish, oil sardine and other clupeids increased substantially. The catch of other sardines, *Saurida & Saurus,* perches and *Lactarius,* however, was poor. Table 10 gives the details of catch. While the maximum landings were recorded in the month of March, the minimum were observed in June.

Maharashtra

The total catch in Maharashtra increased by about 15,600 tonnes as compared to the corresponding half year ending June 1978 (Table 1). While the landings of penaeid prawns, non penaeid prawns, sciaenids, *Harpodon nehereus,* ribbon fish, *Caranx,* pomfrets, mackerel, other clupeids and elasmobranchs, showed substantial increase, the catch of cat fishes, perches, eels, *Chirocentrus, Hilsa ilisha,* cephalopods and soles was comparatively poor. The catch details are shown in Table 11. The maximum catch was noticed in April 1979 and the minimum in June 1979.

Gujarat

A decline of about 19,000 tonnes in the total landings was noticed in Gujarat in comparison to the first half of 1978 (Table 1). The catch of *Harpodon nehereus,* penaeid prawns and cephalopods showed significant increase. But the landings of many varieties of fishes such as elasmobranchs, sciaenids, perches, ribbon fish, *Lactarius,* pomfrets, other *Hilsa* and other clupeids were significantly lower (Table 12). The maximum and minimum catch was recorded in the months of January and June respectively.

IMPACT OF THE CYLONE OF NOVEMBER 1978 ON FISHING ACTIVITIES AT RAMESWARAM

Rameswaram Island is located in the south east coast of Tamil Nadu lying in between the Indian main land and Sri Lanka and bounded by Palk Bay on the north and the Gulf of Mannar on the south (Fig. 1). It is triangular and has an area of about 52 sq. km with a population of about 42,000. The island enjoys both the monsoons, the north-east and the south-west. The south-west monsoon extends from middle of May to beginning of September whereas the north-east monsoon commences in October and ceases in February or early March. With the onset of south west monsoon the Gulf of Mannar becomes rough and choppy, while the Palk Bay is calm. During the north-east monsoon these conditions are reversed.

A major cyclone hit the island on 24-11-78. A team from Central Marine Fisheries Research Institute, Cochin camped at Rameswaram for a period of about 18 days to make an on-the-spot study of the impact of the cyclone on the fishing activities at Rameswaram. A brief account of the cyclone and its impact is presented here.

The cyclone lasted for about 12 hours starting from noon. It was very intense for about 2½ hours between 5 and 7.30 P.M. The velocity of the wind was about 120 km per hour. The cyclone forecast had been given in advance, and as such all precautions were taken to restrict the loss to the minimum. Hence no loss of life had been reported. But it had caused tremendous loss to the fishing sector, particularly mechanised sector.

Assessment of damage

The total loss to the mechanised boats was estimated at about one crore of rupees. Out of 500

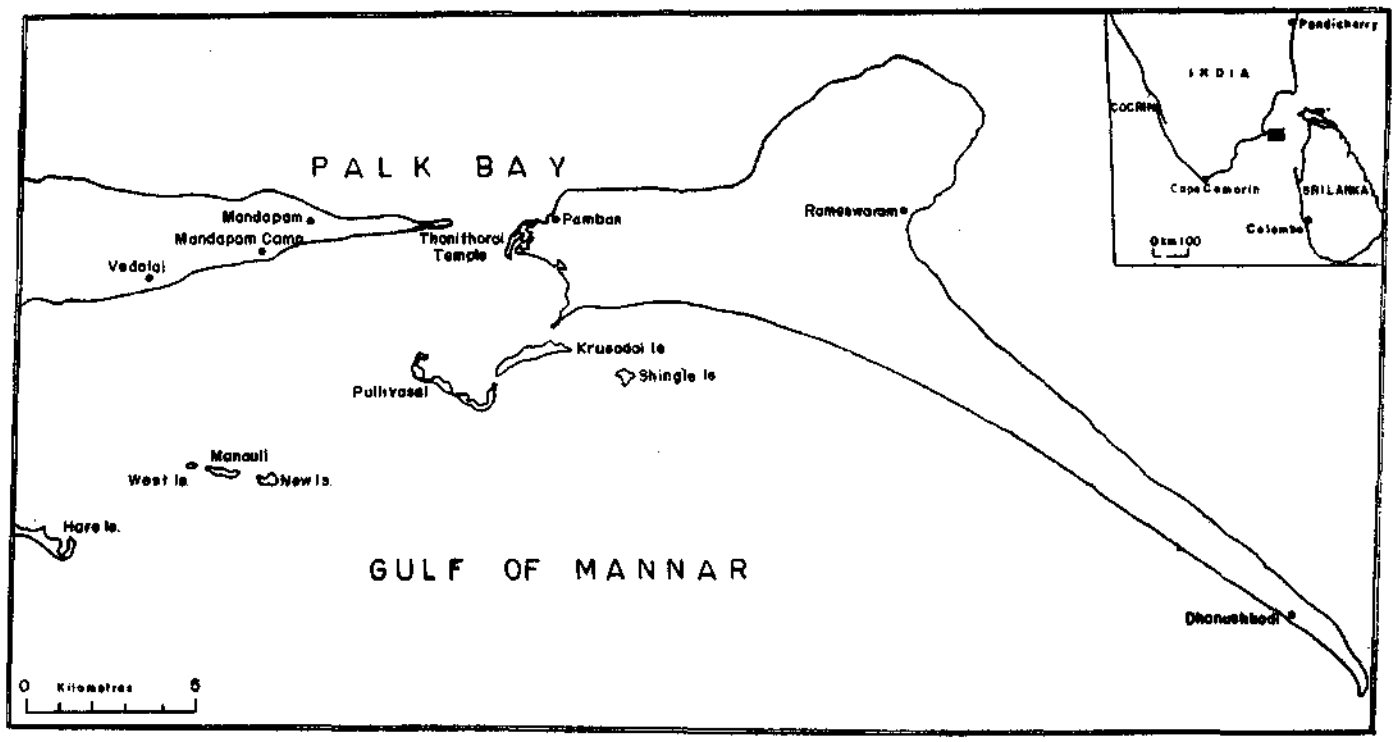

Fig. 1 Map showing the location of Rameswaram Island

boats operating at the time of cyclone, about 50 boats were either sunk or lost, 120 boats heavily damaged and 300 boats partly damaged. The extent of loss against these categories was estimated at Rs. 40, 36 and 30 lakhs respectively. But most of the boats lost or heavily damaged were under insurance cover. The loss to trawl nets numbering about 50 was estimated at one lakh of rupees. Carrier boats were also damaged due to the cyclone and the loss incurred on this account amounted to one lakh of rupees.

Information on size, H.P. and purchase value of the damaged boats was collected from 104 boat owners (Table 1 & 2). About 53% of these boats were 30′ in length and the rest 32′. Among the 30 footers and 32 footers about 76% and 86% of the boats respectively have been manufactured after 1972. The H.P. of all the 30 footers were in the range 32.5–47.5 whereas for 32 footers about 64% of them were in this range and the rest 52.5 to 65.0 H.P. About 290 houses were completely damaged and 590 partly damaged.

Impact and rehabilitation

The employment potential of the 500 mechanised boats engaged in trawl fishing prior to the cyclone, at about 10 persons including 6 fishermen per boat, was about 5,000 persons. Due to the cyclone there was no fishing from 24th to 30th November 1978 immobilising all these fishermen. On 1st December 1978 about 50 boats went for fishing and there was an increase in the number of boats going out for fishing on subsequent days till 9th December, the number ranging from 50 to 100. Again there was a set back in fishing activities due to another cyclone threat from 10th to 12 th December. However, in the beginning of January 1979 considerable progress in fishing activities was observed with about 300 boats going out for fishing.

The estimate of fish landings for November and December 1978 was 1,874 tonnes valued at Rs. 0.67 crores. During the corresponding period of 1977 the landings were estimated at 2,394 tonnes valued at Rs 2.21 crores. The decrease of 520 tonnes, mostly penaeid prawns, observed during the period covering the cyclone compared to November and December of 1977 was valued at Rs. 1.54 crores. This loss may be attributed to the immobilisation caused by the cyclone. During January 1979 the estimate of fish landings at Rameswaram was 2,187 tonnes valued at Rs. 0.68 crores as against 1,443 tonnes in January 1978 valued at Rs. 0.65 crores, the difference in value being very small

Table 1. *Details of size and H. P. of* 104 *damaged boats*

H.P.	Number of boats		
	30′ length	32′ length	Total
32.5	12	3	15
37.5	16	3	19
40.7	4	—	4
42.5	10	5	15
45.0	2	10	12
47.5	10	11	21
52.5	—	2	2
60.0	—	3	3
62.0	—	5	5
65.0	—	8	8
	54	50	104

Table 2. *Purchase particulars of* 104 *damaged boats*

Year of manufacturing	Number of boats		Average purchase value per boat (Rs.)
	30′ length	32′ length	
1965	1	—	50,000
1966	—	—	—
1967	2	—	75,000
1968	—	1	75,000
1969	1	—	75,000
1970	1	—	80,000
1971	2	4	80,000
1972	7	3	90,000
1973	7	6	90,000
1974	6	1	1,00,000
1975	8	19	1,20,000
1976	7	7	1,25,000
1977	1	3	1,25,000
1978	6	3	1,25,000
Not Available	5	3	—
Total	54	50	

compared to the earlier period. In the subsequent months the landings further picked up restoring normalcy by March 1979.

The Government of Tamil Nadu took immediate action to provide relief measures to the victims of the cyclone. The fisherfolk affected were given help both in cash and kind. Synthetic yarn for fabrication of nets were distributed and loans were offered at reduced interest rates.

The boats that got damaged during cyclone period were attended to by a heavy influx of carpenters, mechanics and other labour force from the mainland. This has accelerated the repair works and improved the fishing activities within a short period and as stated earlier, by the end of March '79 the fishing activities in the island have been restored.

This is prepared by C. R. Shanmughavelu, R. Sathiadas and S. Haja Najeemudeen in association with other staff of F. R. A. Division. The help rendered by the staff of Mandapam Regional Centre of C. M. F. R. I. is gratefully acknowledged.

NEWS — INDIA AND OVERSEAS

Marine metal protector

A British firm claims that its new product "molecular ceramic steel" would afford metal surfaces complete protection against erosion-corrosion. This is a problem wherever corrosive turbulent liquids are in contact with metal surfaces and is thus well known to operators of steel fishing craft.

The protective substance developed by. the firm, Belzona Molecular Metalife Ltd., of Harrogate, North Yorkshire, England is claimed to give previously unobtainable protection against both forms of attack. It is also said to be quick and easy to use. This includes rebuilding of components already damaged by corrosion and it resists abrasion. It has oustanding adhesion even to damp surfaces. Being an electrical insulator, molecular ceramic steel can also be used where two dissimilar metals have to be treated.

FNI 17(2): Feb. 1978

New protein concentrate in krill

The Antarctic krill, the tiny crustacean, may prove to be of greater importance as a protein source. A researcher at Norway's Institute of Technical Biochemistry has found that the small shrimp contains a previously unknown protein concentrate which can be used for animal feeds and for various processed foods. It is also described that krill keeps better than was thought.

FNI 17(3): March 1978

Hybrid lobsters produced

By cross breeding of the European lobster *Homarus gammarus* and the American lobster *Homarus americanus* hybrid lobsters have been produced at the Lobster Laboratory of University of California, San Diego. This hybridisation of cobalt blue European females and reddish brown American males is part of a major effort to develop a commercially viable lobster culture system. The project is under the auspices of the University of California's Sea Grant College Programme with support from two public-utility companies and the San Diego State University Foundation. Some of the hybrids are expected to reach maturity by next year.

FNI 17(8) August 1978

Norway's gift to Portugal

Norway has given a modern fishery research ship as a gift to Portugal. The vessel named *Norvega* is a Nansen-class ship displacing 950 tons. Other ships in the class include the *Dr. Fridtjof Nansen* which carried out survey work of Mozambique, the Scychelles and Sri Lanka, and the *Bien Dong* given to Viet Nam. The vessel has been designed for fisheries and oceanographic research and is equipped with fish sampling, biological and hydrographic laboratories. Its first task will be to map and measure Portugal's sardine stocks.

FNI 17 (10): October 1978.

Eel farming

Scotland malt whisky distillers Tomatin are diversifying into the eel business. The Company has spent some time deciding how best to use the excess heat from its plant, the largest malt whisky distillery in the world, as well as the surplus pure water it feeds back into a local stream. Initially a pilot project for eel culture was set up. This was a success, eels taking three years to reach a suitable ten ounce size when reared in cold water took one year when kept in the projects warm tanks. Large scale stocking of elvers in the rearing tanks of the company has commenced and it is hoped to export 100 tonnes of fish next year. In five years from now it is expected to make a profit of £ 2.5 million annually.

World Fishing 27(4): April 1978

Krill sticks

Huge resources of the tiny crustaceans known as krill in the antarctic region is attracting several countries. Among these, Chile has started exploiting this resource, taking advantage of the country's close proximity to this potentially rich marine food resource.. According to the development agency of the Chilean government it has been demonstrated that krill can be an excellent protein food which should be very popular in Chile and outside. Nearly 20 tonnes of frozen krill has been distributed in Santiago supermarkets over a period of five months. Krill sticks, batter dipped and formed into fish sticks, produced by a factory in San Antonio have proved quite popular in Chile despite their relatively high retail price.

FNI 17(5): May 1978

FAO warning

FAO of the United Nations has warned Pakistan that its coastal waters will be completely depleted of prawns by 1980. The warning is based on the absence of stock preservation methods in the country.

FNI 17(11): November 1978

Hexagon mesh net

A hexagon mesh net, built according to a theory developed by a Russian Scientist, has been proved to fish better than the usual rectangular mesh net by Norway's Fishery Technology Research Institute after a year of testing. The tests included trials in a commercial fishery off the coast of Finnmark.

The advantages of the hexagon mesh net are (1) it can be set and hauled-in faster because the hexagonal meshes do not fold and therefore offer less resistance in the water, (2) when it is set the net sinks faster, (3) when hauled the meshes do not close and entangle the fish and (4) it takes 25% less material to make a net with hexagonal mesh, resulting in considerable saving in the cost of net.

FNI 17(11): November 1978

Flower extract to keep fish fresh

A researcher in the Philippines is reported to have used a water hyacinth extract to keep fish fresh for more than a month without salt, ice, refrigeration or drying. The Bureau of Animal Husbandry in the Philippines has analysed the extract and found it to be non-toxic.

FNI 17(11): November 1978

Artificial fishing reefs in Japan

It is reported that Japan is spending the equivalent of £200 million on a seven-year programme to develop and install artifical fishing reefs in the waters within its 200-mile fishing zone. It is aimed at aiding local fishermen by increasing the number of fish in these waters. Several designs have been produced for dumping in the oceans. These are designed to last 20 to 30 years after being dropped in the ocean. Typically the reef structures are made of cement or a combination of cement and plastic. So far artificial reef structures have been dropped in about 100 locations off the coasts of Japan.

FNI 17(11): November 1978

BOOKS

Advances in aquaculture: Edited by T.V.R. Pillay and Wm. A. Dill, Fishing News Books Ltd., England pp. 651, 1979.

The book is published by arrangement with the Food and Agriculture Organisation of the United Nations, and contains the papers presented at the FAO Technical Conference on aquaculture at Kyoto, Japan, 26 May–2 June, 1976. This conference was in many ways a land mark in the field of aquaculture, bringing together in one forum a broad spectrum of scientists, technicians, administrators, entrepreneurs and financiers, representing government, academic and private institutions. Nearly 600 people attended the Conference and about 120 papers were presented in a total of 17 technical sessions. These papers are included in this volume under 10 chapters, entitled world aquaculture and its future role, fish culture in ponds, culture of crustaceans, culture of molluscs, culture of algae and seaweeds, aquaculture in raceways, cages and enclosures, wastes and use of recirculating water in aquaculture, artificial recruitment and transplantations, nutritional requirements and feed technology, and genetics and genetic improvement of fish. A comprehensive review of the advances in aquaculture technology and its application during the last decade along with analysis of potentials and problems in this field of food production is contained in these papers.

Behavioral Biology of Aplysia: By E.R. Kandel, W.H. Freeman and Company, San Fransisco, pp. 463, 1979.

This book is a contribution to the comparative study of Opisthobranch molluscs and a companion volume to "Cellular Basis of Behavior" (W. H. Freeman & Co., 1976) in which the author gave an introduction to the neurobiology of behavior based on cellular studies in *Aplysia* and other opisthobranchs.

Aplysia, belonging to the subclass opisthobranchia (hind-gilled snails), was possibly the first opisthobranch genus described in zoological literature. Popularly known to the ancient scholars as the "see hare", *Aplysia* ("that which does not wash") offers experimental opportunities to neurobiologists interested in cell and molecular biological studies of neuronal functioning and behavior, through the large identifiable neurons of its central nervous system. The biology and behaviour of the animal is examined from a comparative or evolutionary perspective, where the focus is on the species-specific responses and on differences between species in homologous behavior. The book thus concentrates on the various species of the molluscan genus *Aplysia,* using them as a reference point for comparisons of neurobiologically interesting molluscs, particularly opisthobranchs and pulmonates.

Compiled and prepared by M. J. George, S. K. Dharmaraja and G. Subbaraju. Published by Dr. M. J. George, Senior Scientist on behalf of the Director, Central Marine Fisheries Research Institute, Cochin-682 018