STATUS OF FISHERY RESOURCES IN THE ANDAMAN SEA COAST OF THAILAND

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1. INTRODUCTION

Six provinces of Thailand; Ranong, Phang-nga, Phuket, Krabi, Trang and Satun, face the Andaman Sea (Fig. 1). Their total coastline extends from the Malaysian border 740 km northwards to Mayanmar. The Andaman Sea is a non-enclosed sea with deep oceanic waters. It possesses a rich marine ecosystem which is characterized by vast coastal areas of mangrove forest, seagrass beds and coral reefs. These areas are suitable for nursery grounds of various associated fauna. The sea is influenced by semi-diurnal tides of approximately 3 m during spring tide and 1 m during neap tide. Two monsoon seasons prevail in this area. The south-west monsoon lasts from May to October and the north-east monsoon from November to April.

The Andaman Sea is an important coastal area for a variety of human activities, including the marine capture fisheries, aquaculture, tin mining, recreation, transportation and waste disposal. It is one of the most productive areas for marine resources. Marine capture fisheries along the Andaman Sea's 126,000 km^2 shelf fishing area contributes approximately 20% of the total fishery production of the whole country. In weight, this yielded an annual average of 0.4 million metric tons and an annual value of 4,000 million baht during the years 1980-1992. In 1332, marine fishery production reached 654,824 metric tons which was valued at 7,510 million baht.

However, the sustainability of the fishery resources in the Andaman Sea coast is increasingly constrained due to the heavy utilization of resources as well as rapid growth in industrial, urban and tourism development. Therefore, an appropriate management tool for sustainable use of fishery resources and increasing awareness must be taken into consideration. It should help increase local participation to conserve the natural environment.

The marine capture fisheries in Thailand are primarily commercial scale. Small-scale or artisanal fishing methods, however, still prevail in inshore areas or bays and is most notable in the fishing villages along the Andaman Sea coast of Thailand. Small-scale fishing communities are also often classified as 'backward communities' characterized by a low average income. Thus, within the context of massive rural development programmes and the national policy on fisheries, the Department of Fisheries has given high priority to

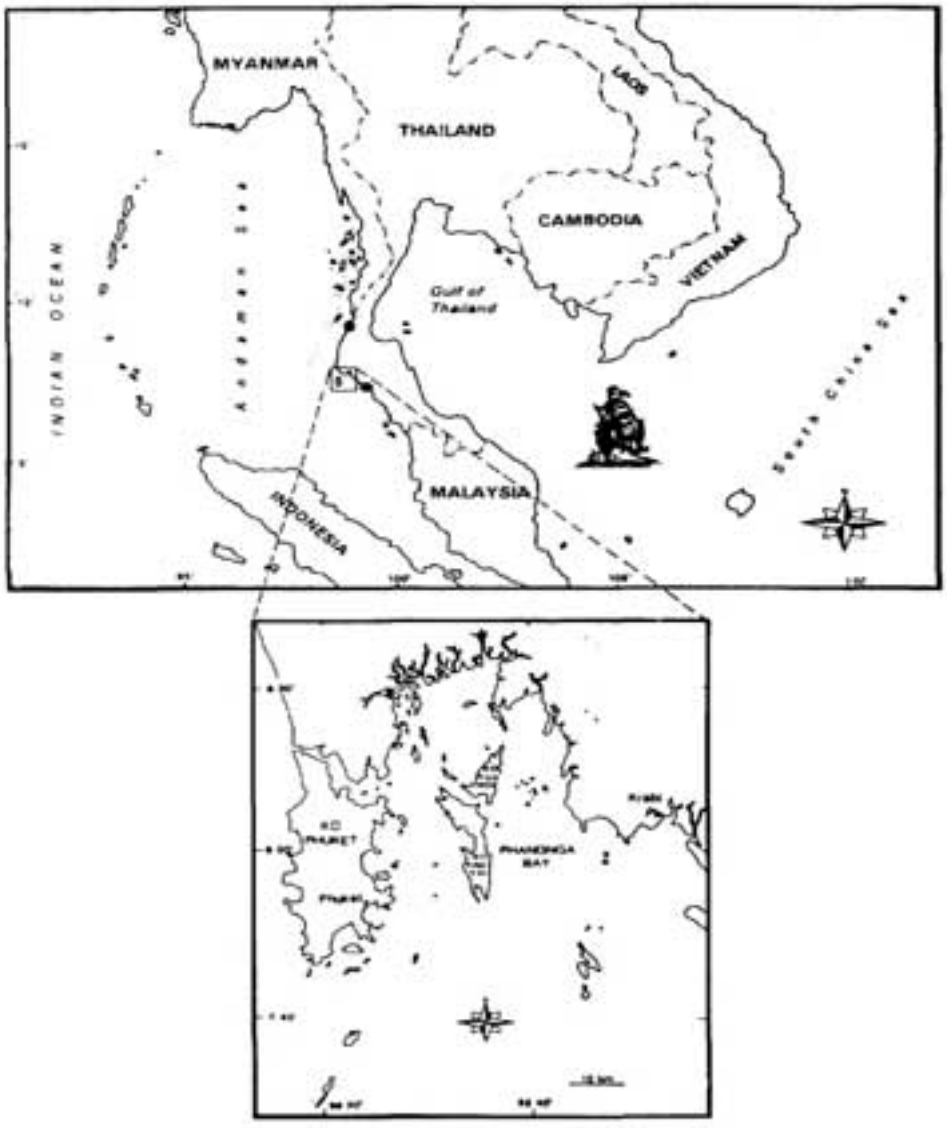

Fig. 1. Andarnan Sea coast and Phang-nga Bay, the upper south of Thailand.

small-scale fishery development and coastal resource management, in order improve the well being of small-scale fishermen throughout the coastal areas.

2. STRUCTURE OF THE MARINE FISHERY RESOURCES

The marine fishery resources in the Andaman Sea coast of Thailand can be described according to their habitats into two main groups; pelagic and demersal. Pelagic resources are generally exploited by purse seines, drift gillnets, liftnets and other surrounding nets. There are 17 species and groups of species of pelagic resources that are considered economically important.

The demersal resources include demersal fish, crustaceans, cephalopods and other mollusks and are mainly caught by trawls, push nets, bottom gillnets, traps and hooks and lines. Approximately 30 families comprising more than 300 species have been recorded.

The major fishing grounds of pelagic and demersal resources have been limited to a depth of less than 100 m. The good fishing grounds are generally located in the coastal waters with a water depth range from 10 to 60 m. Therefore, the exploited resources particularly from the trawl catch comprise borh large size of fishery resources and substantial quantities of small-sized fish of no commercial value. The small-sized fish are generally composed of non-edible species and juveniles of young economically important species that are unacceptable in the market. These so-called “trash fish” comprise more than 40% of the total catch.

The marine capture fisheries in Thailand can be broadly divided into two categories; commercial and small-scale fisheries. The commercial fisheries refers to those using inboard powered boats of over 10 gross tonns. They utilize highly efficient fishing gears and have the capacity to fish offshore and spend one or several days offshore during each fishing trip. They utilize fishing ports and usually use ice to preserve their catch. The typical fishing gear employed are medium to large size trawls, purse seines, encircling gillnet and large driftnet.

The small-scale fisheries refers to those using non-powered, outboard powered and inboard powered boat of less than 10 gross tonnes. They use traditional or low efficient fishing gears, operating from fishing villages, rarely spending more than 12 hours at sea. They generally fish in inshore waters within 3 km from shore. They typically employ small trawlers, gillnets, push net, liftnet, set bag net, traps, hooks and lines and other stationary gears operating in estuaries, bays and in nearshore waters.

2.1 Fishery establishment

The survey from the 1985 Marine Fishery Census (NSO and DOF, 1987) revealed that the total number of fishing villages along the Andaman Sea coast was 720, of which 575 fishing villages are located outside the municipal areas. They are facing many shortcomings because of limitation of facilities and basic infrastructure for their living and fishing occupations. Basic infrastructure lacking in these fishing villages includes transportation, electricity, freshwater and ice supply.

Total fishery establishments were 14,861 in 1985, representing **25.8%** of the whole country and it decreased to 13,960 in 1990 (NSO and DOF, 1992). Of these, 14,368 or 96.7% were engaged exclusively in marine capture fisheries. The number of small-scale fisheries was the largest, contributing 13,523 or 94.1% of total marine fishery establishments. The number of establishments using the fishing boats of 10 gross tonnage and over was only 845.

Besides those mentioned above, there were 493 fishery establishments engaged in coastal aquaculture. It is a known fact that the largest number were those engaged in fish culture in Phang-nga Bay.

2.2 Number of fishermen

The number of fishermen in the Andaman Sea coast in 1990 was 35,488, representing 17 percent of Thailand's total marine fishery population. Ranong had the largest number of fisherfolk, at 7,25 1, while Satun, Trang, Phang-nga, Phuket and Krabi comprised 6,692, 6,410, 5,610 5,006 and 4,519 respectively. The proportion of male fisherfolk was more than 85 percent of the total. It is interesting to note that the proportion of female fisherfolk engaged in coastal fishery and aquaculture was relatively higher in Phang-nga, Ranong and Krabi than in the rest of the country.

2.3 Fishing boats

The total number of fishing boats in the Andaman Sea that had been surveyed from the Marine Fishery Census in 1990 was 14,590 - representing 27.86 percent of the whole country. Outboard powered boats comprised the largest group, with 10,793 or 74 percent. They are found in Satun and Phang-nga, with 2,794 and 2,162 registered boats respectively. Non-powered boats were the second largest group, accounting for 1,944 or 13 percent with the majority found in Phang-nga. Inboard powered boats accounted for 1,853 or 12 percent, and the majority was found in Satun. It is observed that the number of fishing boats increased twofold in comparison with the first census in 1967. The number

of powered boats had gone up, while non-powered boats had decreased in number. It is clearly seen that the marine capture fishery had been developed from non-powered to powered boats up to the present.

The fishing gear used by outboard and inboard powered boats of less than 10 gross tonnes are mainly shrimp gillnets, crab gillnets and push nets. The fishing gears employed by fishing boats in the range 10-50 gross tonnes were mainly otter board trawls and drift gillnets. Fishing boats of over 50 gross tonnes are employed for operating large trawlers (both otter board and pair trawls) and purse seines.

The number of fishing units categorized by fishing gears registered with the Department of Fisheries is shown in Table 1. It is noted that only inboard powered boats are registered. Among them, trawlers (both otter board and pair trawls) and purse seiners play an important role in the commercial fisheries while gillnets (for shrimps, crabs and others), push nets and squid cast nets are the dominant gears for the small-scale fishery. However, a considerable number of more than 10,000 fishing boats that operated mainly with gillnets, push nets, hooks and lines, traps and others are not registered with the Department of Fisheries. They are non-powered and outboard powered boats.

2.4 Production

The marine fisheries in Thailand has been rapidly developed and expanding due to the use of new fishing gears and technologies, ventures of fishing fleets into new fishing grounds, improvement of fishing vessels, and development of support facilities and infrastructure.

The remarkable developments of the marine fisheries include: (1) the successful introduction of trawl net fishing since 1962; (2) development of the luring purse seine since 1973; (3) development of light luring fishing techniques to catch small pelagic fish and squid since 1978; and (4) development of the coastal tuna purse seine since 1982. These developments resulted in a spectacular increase in both pelagic and demersal resources production. The marine fishery production has exceeded 100,000 metric tons since 1367. In 1991, production reached a peak of 658,000 metric tons and dropped slightly to 655,000 metric tons in the following year.

The production and values of the marine capture fisheries by sub-sector, namely small-scale and commercial fisheries categorized by major fishing gears, are provided in Table 2. It is observed that the small-scale fishery sub-sector comprises on an average about 16.5% of the marine fishery production but is valued at about 26.6% (Table 3). This means that the majority of marine fishery resources available to the small-scale fisheries operating in inshore waters are economically important species.

Table 1. Number of fishing units registered in the Indian Ocean coast of Thailand, 1980-1992.

Type of Fishing Gear	No. of In-board Powered Boat												
	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980
Otter trawl	1,162	L230	1.425	1,604	769	786	810	860	1,024	947	1,328	736	814
Pairtrawl	215	170	264	248	86	86	24	96	94	86	100	98	138
Beam trawl	–	–	29	5	2	–		–	–		–	–	–
One-boatpurseseine	201	194	200	198	186	170	143	134	106		1	17	12
Chinesepurseseine		24	12	16	16	4	16	17	16	18	13	14	12
Macherelencirclinggillnet	1		1	1	18	4	6	17	78	3	11	1	–
Anchovy purse seine	96	108	130	209	131	70	52	79	102	60	32	19	6
Luringpurseseine	18	23	60	66	71	39	10	18	56	135	139	127	114
Spanishmackereldriftgillnet	62	59	60	66	60	38	32	13	22	30	31	26	24
Push net	184	270	240	641	41	70	85	96	183	295	655	333	618
Othergillnets	106	146	119	172	177	123	109	161	46	94	104	240	141
Shrimpgillnet	432	394	390	545	535	653	930	661	394	504	492	530	892
Crabgillnct	88	74	26	60	13	78	68	68	–	8	3	2	3
Other nets	6	9	15	120	76	54	66	97	57	43	35	61	74
Longline	11	14	18	19	27	6	3	11	2	15	1	3	
Squidcastnet	156	121	61	119	69	19	2		15	10			
Pomfretgill net					1			6	9	1		2	

Table 2. Catch of marine fishery by type of fishing gear and species in the Indian Ocean coast of Thailand, 1980-1992.

TypeofFishingGear	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980
Total	654,824	657.920	406,891	335,570	424,241	424,241	402.253	304,527	318,210	301.993	312,225	238,628	186.211
Large-scale fishery Sub-total	622.146	629,809	407.028	367.942	291.064	358.538	301.239	249,016	279,057	225.637	202,605	183,155	148,292
Otter trawl	404.324	397,994	249,352	230,51	178,257	211.393	209.561	154,094	169,097	148.133	134.452	172.689	139,580
Pair trawl	72.005	60.700	14.790	16,727	17.613	27.083	33,510	29.555	26,076	16.570	10,568	–	–
Purse seine	103,608	153.220	140,533	119.170	93,636	116.868	54,165	53,105	60,439	2,408	1.582	3,399	3.895
Chinese purse seine		–	–	–		–	2,606	11,055	–	590	–	–	–
Anchovy purse seine	36,676	11,849	632	276	223	1.375	134	412	341	194	65	459	657
Spanish mackerel gill net	3,990	2.373	1.721	1,258	1.335	1.695	1,263	795	47	210	687	1.622	575
Mackerel encircling gill net	1,543	3,673	–		–	124	–	–	–	–	–	–	–
Small-scale fishery Sub-total	32,678	28,111	32.027	38,949	44,506	65,703	101,014	55.511	39,153	76,356	109,650	55,437	37,919
Beam trawl	10	–	–	21	–	–		–	23,052	29,208	13,986	4,986	3,591
Push net	3,500	4,695	1.889	2.141	1,600	1.894	4,197	5.345	5,733	6,671	5,916	2.443	2,392
Shrimp gill net	3,226	2.650	2.491	2,722	2.575	2,393	3.03 1	2,544	4,016	2,581	4,004	4,462	4,986
Other gill nets	7.047	8,625	7.977	8,078	7,596	6,507	8,472	6,444	6,952	8.036	6,399	8,280	8.948
Other cast nets	68	41	97	169	249	345	219	296	135	234	390	380	250
Squidlightluring	519	405	237	195	214	236	52	–	–	–	–	–	–
Acetes scoop net	3,205	2,179	2.242	2,959	3.074	2.534	3,261	3,096	2,983	4,854	3,984	2,834	2,775
White board catching shrimp	3	3	7	4	10	36	25	38	34	28	5	40	19
Other nets	760	767	438	266	264	134	361	233	159	658	79	16	28
Other moving gears	20	14	20	36	51	29	18	–		–	–	–	–
Other stationary gears	333	141	88	30	86	34	24	–	5	11	1 2	48	3 1
Long line	859	906	710	432	288	352	659	964	622	587	378	20	116
Hook	1.399	1,533	1,583	1,357	1,665	1,417	926	973	2,076	2,719	2,371	2,987	3,177
Set bag net	2,005	2,665	3,303	3,854	3,695	4,625	4,201	3,759	3,664	3,747	4,925	8,673	9,933
Fish trap	846	572	527	837	1,049	1,195	812	843	900	907	872	750	671
Crab trap	2,242	2,111	1,850	2,066	1,886	1,900	1,508	1,596	1,761	1,147	1,899	1,735	2,387
Squid cast net	—	—	—	—	4	11	—	—	68	453	47	363	406
Others	8,399	180	8,061	13,550	19,901	41.796	73,109	29,380	10,040	43,682	78,389	2,199	1,085
Total (Value in US$ 1,000)	300,384	26343c	146,653	129,410	111,574	112,929	100,731	77,510	96,794	89,178	82,682	74,234	76,880

Table 3. Fishery production (MT) and value, 1980-1992.

Year	Grand Total		Sub total marine fishery		Small-scale Fishery		Large-scale fishery	
	MT	US$ 1000	MT	US$ 1000	MT	US$ 1000	MT	US$ 1000
1980	1,792,948	685.885	1.544,434	467,384	184,637	136,944	1,359,797	330,440
1981	1,989,025	746.24 1	1,756,939	538,512	320.442	171,745	I.436,497	366,767
1982	2,120,133	821.306	1,949,68 1	580.070	471,903	196,832	1,477,778	383,238
1983	2,255,433	834,636	2,055,225	609,514	444.217	178,333	1,61 1,008	431,181
1984	2,134,838	773,982	1,91 1,485	560.394	283,948	149,930	1,627,537	410,464
1985	2,225,204	727,156	1,997,165	517.371	334,316	155,996	I,662,849	361,375
1986	2,536,335	868.406	2,309,480	644,684	381,565	204,480	I,927,9 15	440,204
1987	2,779,07 1	1,071,795	2,540,052	750,566	396,952	181,759	2,143,100	568,807
1988	2,629,754	1,257, 174	2,337,216	768,63 1	365,834	185,583	1,97 1,382	583,048
1989	2,740,037	1,393,00 1	2,370,548	774,187	317,616	198,175	2,052,932	576,012
1990	2,786,370	1,614,497	2,362,2 18	808,830	149,982	178,104	2,2 12,229	630,728
1991	2,967,73 1	2,073,754	2,478,607	1,032,609	306,752	189,573	2,171,855	843,036
1992	3,239,880	2,568,360	2,736,352	1,286,560	372,046	237,566	2,364,306	1,048994

Source : SEAFDEC Fishery Statistical Bulletin, 1982-1 994

The marine resources caught by the commercial fisheries are divided inro two main groups – demersal and pelagic resources. Demersal resources arc mainly caught by various sizes of otter board and pair trawls, beam trawls, long lines, large push nets, large traps and bottom gillnets. Otter board trawls are the most important gear. More than 300 species of demersal fish have been caught and commercially utilized. More than 40% is trash fish, comprised of non-edible species, edible species of low commercial value and juveniles of commercially important species. The commercial demersal catch in the Andaman Sea coast reached the first peak of 216,000 metric tons in 1973 and has since declined in spite of a substantial increase in the number of trawlers. The catch started increasing again after 1985, when it yielded 174,161 metric tons. In 1992, the catch reached a second peak of 442,285 metric tons (Table 4). It is believed that substantial quantities of demersal resources have been taken from outside Thai waters.

Pelagic resources are mainly exploited by using various types of purse seine nets, drift gillnets, encircling gillnets, lift nets and other surrounding nets. They car; be divided into three groups according to size of pelagic fish *(i.e.,* small, medium and large). Although the pelagic fishery in the Andnman Sea has historically been less intensively developed than in other fishing areas of Thailand, with a gradual mechanization of fishing gear, vessel improvement, and migration of fishermen from the Gulf of Thailand to the Andaman Sea, there has been an increase in pelagic fish production from the Andaman Sea. As shown in Table 3, the catch of mackerels, sardines, round scads, anchovies and neritic tunas have increased considerably after 1385, and the total pelagic catch has subsequently exceeded the level of 100,000 metric tons each year since 1787. The catch peaked at 166,628 metric tons in 1331.

Marine fishery resources caught by the small-scale fishery sector fall into two basic groups; fish and invertebrates. Invertebrates, including shrimps, blue swimming crabs and cephalopods are particularly valuable components of the small-scale fisheries. As for marine fish caught by small-scale fishing gear, they include many species of demersal and small pelagic fish and trash fish. It is noted that rhe percentage of trash fish in the small-scale catch is not as high as in the commercial fishery catch.

3. STATUS OF MARINE FISHERY RESOURCES

The distinct and remarkable development of the marine capture fisheries in Thai waters has resulted not only in the increase of fishery production but also in the decline of resources, particularly in the coastal areas. The drastic reduction of catch rates were surveyed by the DOF research vessel (R.V. Pramong 3). Results of the survey demonstrated the occurrence of overfishing of demersal resources, as described below.

Table 4. Production (metric tons) by species of marine fisheries resources in the Andaman Sea coast of Thailand, 1985-1992.

Species	1985	1986	1987	1988	1989	1990	1991	1992
Total	3 12.568	403,500	426,987	335.570	406,89	439.055	657.920	654,824
Sub total fish	243.380	29 1,567	348,578	283.76 1	354,14 1	394.117	588,037	583.176
Sub total pelagic fish	69,219	59,428	104,123	95.450	118,308	136,946	166.628	140,891
Indo Pacific mackerel	13,757	13,868	15,143	12,122	17,570	25.258	38,82	32,953
Indian mackerel	1,163	965	2265	5,587	7,127	10.117	14,709	8,547
Sardines	27,545	26,657	41,655	32,69	29,504	28265	25,27 1	20.893
Round scad	8,025	2.464	14,298	17,747	22,330	22359	23,982	8,434
Anchovies	413	136	1.413	251	484	782	12.007	36,596
Long tail tuna	2.41 I	1,895	2,034	1297	I.529	1.039	5,620	2,168
Eastern little tuna	3.237	1,497	4,223	3,581	3,175	5,844	8,636	9,740
Trevallies	2,657	3,884	9,850	4,453	11,722	13,113	7,550	3,197
King mackerel	,95	2,303	2,392	1,939	2,503	2,967	2,848	3.912
Hardtail scad	3.196	1,738	4,668	4,872	8,428	8,799	,026	4.517
Bigeye scad	1.244	881	2.982	6,95 1	9,345	11,614	6,857	3,690
Sub total demersal fish	174,161	232,139	244,455	188,307	235,833	257.171	42 ,409	442,285
Sub total demersal food fish	21,314	27,093	23,609	20,682	24,381	34,452	66,540	63,928
Sub total miscellaneous fish	I 1,953	13,958	15,284	12.991	16,670	19,280	33,392	37,176
Sub total trash fish	140,894	191,088	205,562	154,634	194,782	203,439	32 1,477	341,181
Sub total shrimps	14,661	16,756	15,710	14,263	14,752	13.617	25.530	20,476
Squids	4,919	6,052	7,094	6242	7,108	6.762	12.816	13,565
Cuttle fish	7,036	6,503	4,967	3,961	7,846	6,515	14,952	16.960
octopus	303	1,028	431	476	,429	2,704	6,353	5,897
Swimming crab	3,528	6,312	5,307	4,970	5,492	4.366	4,878	4,470
Short necked clam	995	4,802	2,152	8,228	3,411	1.254	130	4,136

In 1966, DOF conducted a monitoring survey in Phnng-nga Bay and adjacent areas using the research vessel R.V. Pramong 3. The catch per unit effort (CPUE) of demersal resources was 238.9 kg/hr. It decreased to 105.3 kg/hr in 1771, to 64.6 kg/hr in 1778 and to a rather consistent average of 37.5 kg/hr during 1987-1988. It is now undoubtedly recognized that the demersal resources had been fully exploited since 1371 when the catch rate declined to half of the original abundance.

Attempts have been made to assess the state of demersal resource stock. It was found that the maximum sustainable yield (MSY) in coastal areas with depths ranging from 1 0-70 m was 154,000-224,000 metric tons (Isarankurn, 1971; Marr, et. *al.,* 1976; Bhatia and Chullasorn, 1980; Bhatia. et. al., 1983). Hayase (1983) estimated the demersal trawlable stock (biomass) to be about 500,000 metric tons. It is clearly observed that the catch has passed this level since 1986.

The pelagic fishery in the Andaman Sea coast has been intensively developed since 1983. Mackerels, sardines, round scad and coastal tuna have been exploited in substantial quantities to supply the demand of canneries. This is the major factor for the yearly increase in production. It seems that most of the pelagic resources in this area are still not fully exploited. An increase in pelagic fish production may be possible (Bhatia, et. al., 1973; Bhatia and Chullasorn, 1980). However, it is recognized that the catch of sardines and round scads in the latter period did not continue increasing, and may show some signs of having been fully exploited since 1383. Therefore, an increase in fishing effort of these species has to he carefully taken into consideration.

Taking into account the production of fishery resources from the small-scale fishery, a remarkable decrease has occurred since 1986. It is realized that the marine resources exploited by small-scale fishing gears operating in inshore areas using a wery small mesh size net may he in a degraded stage. Therefore, exploitation of nearshore resources should be subjected to conservation principles and management schemes.

4. FISHERY RESOURCES MANAGEMENT

It is anticipated that the decline of marine fishery production and particularly of demersal and nearshore resources, would continue in the future, and that it would cause significant damage to the economy of the country if adequate counter measures for resource conservation and utilization are not implemented.

In order to conserve the marine fishery resources for sustainable utilization, the Department of Fisheries has set up various management measures through the Fishery Act of 1901, The Fisheries Act was subsequently revised in 1947 and is undergoing some

revision at the present. Many Ministerial Notifications for management and conservation of marine fishery resources have been periodically issued and implemented. These include determination of the size and kinds of fishing implements that are permitted in the fishery; prohibition of the use of certain types of fishing methodology in certain areas, establishment of reserved areas; establishment of a closed spawning and nursery season in certain marine areas which would prohibit the use of certain types of fishing gear during the said season and within the areas; mesh size regulation; limiting of new entry by discontinuing additional trawl licenses; among other possible measures and regulations.

However, such regulations, particularly the restriction of fishing gear and provision of closed areas and seasons, have not been fully enforced. Small-scale fishermen still operate illegal fishing gears, evading the regulation, and complete enforcement of the regulation is difficult.

Taking this problem into account, it is recommended that improvement in fisheries management is urgently needed. Many options are proposed, including but not limited to fishing license and vessel limitation, mesh size regulation for all types of trawlers and push nets, zoning systems for certain size of fishing vessels and fishing methodologies, and installation of artificial reefs for resource conservation.

At present, a *new* concept of fisheries resource management has been introduced – "community-based resource management" which will be carried out in cooperation with local fishery officers. Initiatives in community-based resource management have been established which include self enforcement and protection of fishery resources and the establishment of co-operatives for sharing profit and responsibilities. Phang-nga Bay is the site of the DOF pilot project in community-based resource management and is being implemented in co-operation with BOBP. Public campaigns on community awareness in marine resources and environment conservation through education programmes for the public, as well as direct communication with fishermen, are also steps to be taken by this project.

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