

Background Report for the
Thai Marine Rehabilitation Plan 1997-2001

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Background Report for the **Thai Marine Rehabilitation Plan 1997-2001**

Executive Summary

1. Introduction

This document has been prepared as a background report for the Thai Marine Rehabilitation Plan 1997-2001. This study was commissioned under a joint project between the Department of Fisheries and the Joint Research Centre of the Commission of the European Communities for the preparation of the Plan. The data for this report was obtained from official statistics, reviews of major legislation, fisheries literature and interviews with high ranking officials in relevant government agencies, academics and industry analysts.

2. Main Findings

The main findings of this study can be summarised as follows.

1. Thailand has attained the status of being one of the world's top ten fishing nations since 1972, its largest processor and exporter of seafood in recent years, and the largest producer and exporter of shrimp since 1993. Fisheries products are among the country's top export earners, representing about 10 percent of all exports.

2. Time series trends for a number of industry indicators have raised increasing concerns about the sustainability of the sector. These include:

- the rapidly declining catch rates (catch per unit effort or CPUE), which are now only 7 percent of the levels in the early 1960s;
- the high percentage of trashfish (up to 40 percent) in marine landings;

- the declining share of fisheries GDP; it has halved between 1970 and 1996;
- the high proportion of artisanal fishery establishments (78%) which are earning less than a fifth of the total catch by value, and much less (5-6%) by volume;
- the frequent disease outbreaks in commercial aquaculture, which contributes nearly two-fifths of all fisheries exports but whose sustainability is doubtful;
- the declining comparative advantage of major trading items.

3. The problems plaguing the marine fisheries sector have been well documented.

These include:

- over-exploited fisheries and excess fleet capacity;
- coastal and marine environmental degradation resulting from infrastructure development, urbanisation, industrialisation, land-based agriculture, and also from commercial aquaculture;
- illegal fishing by commercial fleets in the 3000 m near-shore zone reserved for small scale fisherfolks;
- heavy reliance on (often illegal) migrant labour due to a paucity of local labour;
- illegal activities in fishing operations, including fishing in the exclusive economic zones of other countries.

Despite having been well documented and discussed, few serious attempts have been made to tackle the issues conclusively and in an integrated manner.

4. Social issues related to the industry have been equally serious. They include:

- a large proportion of artisanal fishers are believed to be poor and face bleak prospects for the livelihood as the industry becomes unsustainable;
- rising conflicts between various stakeholder groups, e.g., between commercial and artisanal fishers, between marine fishers and aquaculturists, between shrimp farmers and rice farmers;
- use of illegal migrants under unhygienic conditions, leading to new outbreaks of diseases that were once eradicated or under control, increased incidence of crime, drug use and AIDS and other diseases;

5. While physical and social issues are relatively well recognised, less discussed are **institutional issues**, which include:

- The penetration of the patronage system into the bureaucratic administration through the conversion of local vested interests to political power bases has affected the efficiency and credibility of the government agencies in serving the public at large. Both regulations and regulators are often subject to political and executive decisions favouring vested interests of individuals or groups, rather than broader public interests.
- Sectoral and autonomous management of resources by line ministries implies a lack of inter-agency coordination, often leading to conflicting objectives, overlapping mandates and duplication. Moreover, despite the existence of over 19 pieces of legislation dealing with coastal management, there are still a number of gaps where no agencies are assigned responsibilities.
- Rewards and incentives in the Thai bureaucratic system are non-performance based and tied to linkages with personalities, rather than expertise and capability.

The above three issues are the underlying causes of “lax enforcement”, which is a chronic problem in Thai fisheries sector.

- The five-year National Plan is used as a budget reference, rather than as a set of policy guidelines. As a result, only “projects” stipulated in the plan are implemented; “policy reforms” are seldom given their due attention.
- The sectoral plan for the fisheries sector is comprehensive in the coverage of policies but lacks vision, prioritisation, practical guidelines and consistent budgetary procedures. It is neither a strategic nor an investment plan. These shortcomings are clearly evident in the current state of the National Marine Rehabilitation Board. Formed as an inter-agency arm to enable integrated planning for the fisheries sector, the Board is currently virtually non-functional, besieged by financial constraints, and administrative bungles.
- Despite the state of degradation of the coastal and ocean resources, prevailing economic incentives tend to be tilted towards overexploitation e.g. unreasonably low license fees and charges, or promoting the fish meal sector, the subsector which relies on environmentally damaging tools.
- Stakeholders are left to compete not only for natural but also budgetary resources without agreed upon guiding principles. The Thai Marine Rehabilitation Plan will have to outline acceptable guiding principles for resource allocation among stakeholders.

6. As a key exporter, the fisheries sector faces **immense pressure from trading partners** to abide with not only health and sanitary regulations in the importing countries, but also “good practices” in environmental management, which is also the key to the long-term sustainability of the sector’s productive potential.

7. The **emerging trends** for the sector in the next several years seem to be:

- As the production of economically significant species in the Thai seas decreases and illegal fishing outside the Thai waters is contained by stricter monitoring by neighboring countries, Thailand is likely to become a net importer of edible fish and fisheries products.
- Geographical, physical and environmental constraints affecting the sustainability of shrimp farming, will likely lead to production decline and structural changes within the shrimp industry, with large, corporate-owned farms forcing small, household operators out of business. The survivors are likely to be medium scale farms under intensive care and management.
- Social and environmental conflicts will intensify, the latter both at domestic and international levels.

8. The **multiple use conflicts** in coastal and ocean resource management imply that no single government agency can effectively resolve the conflicts. A forum which can handle multi stakeholder participation and hence solve multiple use conflicts is the only reasonable solution.

9. There is **little public awareness** about the state of the Thai seas. Although it is quite apparent to industry analysts and close observers that on both efficiency and equity grounds the marine fisheries sector is no longer tenable, this perception is not reflected among the general public, who are generally ignorant about the complex institutional, social as well as environmental issues facing the sector.

10. Considering the massive exploitation of the Thai fisheries and the degradation of coastal and marine resources, there is an urgent need for an information system, to conduct more studies on resource conservation and in management and to disseminate the findings to users and in a more simplified manner, to the public. The status of the coastal resources, the fleet and major issues should be more realistically estimated. However, a clear vision of future direction is needed in order to set up a useful information system.

Recommendations

The problems of the fisheries sector are primarily institutional. There has been no dearth of technical or engineering solutions; however, in the absence of an appropriate institutional framework, they only temporarily mask the symptoms. The Department of Fisheries and the related agencies have adequately trained staff compared to many other line ministries in other resource areas. What is needed is the political will and courage to implement institutional reforms: to strengthen the institutions that work and reform those that do not. Under the democratic system that is now taking a firmer foothold in Thailand, this will occur if there is a public demand and support.

Our recommendations are:

1. **Increase public awareness** about the issues facing the fisheries sector in a systematic manner by providing accurate information about the issues and the need for public support.
2. **Initiate an integrated planning process at the national level** involving multi-stakeholders. The National Marine Rehabilitation Plan could be a good starting point provided the present problems affecting the Board are taken care of. Restructure the NMRB to allow positional and not personal tenure of the secretariat and seek institutional innovation that would resolve multiple use conflicts in the management of coastal and marine resources.
3. **Implement a pilot project on participatory management** by consensus among the related agencies and other stakeholders as an exercise toward inter-agency coordination and cooperation with resource users at the local level. Focus on an area approach rather than a sectoral approach to natural resource and environmental management.
4. **Increase support to non-governmental organisations (NGOs)** to increase stake-holder participation in the management of local resources and environmental conservation.

5. Introduce and gradually implement the “full cost resource pricing principle”, i.e., making the beneficiaries pay in full for the natural resources they have extracted. A first step would be the revision of fishing licence fees and charges.

6. Strengthen the enforcement of the 3,000m zone and abolish permanently all protection given to the fish meal industry.

7. To stop the unscrupulous mining of the Thai seas and to allow the Thai fisheries sector to achieve an economically, socially and environmentally sustainable future will mean bad times for some people. A programme to alleviate the impacts of the restructuring must be carefully thought out to avoid waste, exploitation and unwarranted social or economic injustice as occurring in many fisheries subsidies programmes overseas.

Without a serious and well co-ordinated effort from all parties concerned, the fisheries sector is likely to cease to be an national economic asset and instead turn into a net social liability in the near future.

1. Introduction

The coastal zone of Thailand has undergone tremendous economic, social and environmental changes during the past four decades, alongside and as a result of a rapid economic growth that averaged about 7 percent a year. During this period, Thailand's marine fisheries sector has been transformed from a mere artisanal occupation to a multi-billion dollar industry, vertically linked with the processing sector and other associated industries. Also significant has been the massive transformation of the coastal landscape with the development and spread of tourism, industry, human settlements and commercial agriculture, and most recently, aquaculture. Thailand today ranks the world's largest producer and exporter of edible fish and fish products, and of farmed shrimp. In 1996, marine fisheries production (capture and culture) stood at around 3.2 million tonnes. Fisheries exports fetched US\$4.4 billion — nearly US\$2.5 billion from shrimp alone.

The socio-economic and environmental impacts of these transformations have been immense — depletion of economically important species by overfishing; destruction and degradation of coastal ecosystems such as mangroves, coral reefs and sea-grass beds; water and land pollution, salinisation and land dereliction; marginalisation and fragmentation of artisanal fishing communities and a steady decline of the share of small scale fisheries in total production; and increasing conflicts — between commercial operators and small-scale fishers, and among small scale fishers themselves.

At the heart of these issues is the fact that coastal resources in Thailand are being exploited in an “open-access” manner. The numerous government agencies concerned, with their traditional problems of overlapping mandates, poor inter- and intra-agency coordination and weak enforcement capacity, have shown little *political will* to address the issues head on, or in an integrated manner. The numerous laws aimed at controlling coastal resource use are largely ineffective; they are either too general, too vague, inadequate, or

poorly enforced. Local communities are powerless in protecting the resources around them as they do not have any legal use rights; instead, many have themselves joined in the free-for-all exploitation. Among the general public and the mass media, there is far less awareness about the complex issues concerning integrated coastal zone management, compared to the issues concerning, for example, land and forest.

In short, the problems facing the coastal areas are primarily institutional. They cannot be solved merely by introducing new technology or new laws in an institutional framework whose very base remains weak. While technical or engineering solutions are no less important in addressing specific problems, without a proper institutional framework, they have, at best, only cured the symptoms; at worst, they have created new problems requiring new solutions. Strengthening the institutions that have worked and reforming those that don't, should become the main focus of the marine rehabilitation, if the Thai fisheries and coastal resource use are to become economically, ecologically and socially sustainable.

This report provides a background for the Thai Marine Rehabilitation Plan 1997-2001 initiated under the joint collaboration of the Department of Fisheries, Thailand, and the Joint Research Centre of the European Union. The report attempts to provide a brief overview of the coastal resource situation in Thailand, highlighting past trends and current patterns of resource use and its environmental, economic and social impacts, and probable future trends. The structure of the report is loosely based on the Terms of Reference given in Appendix I. The report is divided into seven sections. Section 2 provides a general overview of the Thai coastal areas, highlighting the historical context of resource use patterns, and analyses the current situation with respect to resource use. Section 3 describes the environmental degradation and impacts on the coastal ecosystems. Section 4 attempts a stakeholder analysis, focusing on major interest groups, viz., small-scale fishers, fish and shrimp farmers, commercial fishers, seafood processors and other agribusiness companies, government agencies, academic institutions, non-government organisations and other local initiatives, and consumers. The institutional framework for coastal and marine resource management in Thailand, including policies, plans, legislation and organisations, is described in Section 5. Section 6 describes the key issues in coastal resource management, highlighting major themes (eg., conflicts, institutional constraints), and describing in detail specific issues

related to marine capture, coastal aquaculture, fisheries trade and quality control. Finally, Section 7 looks at the future of Thailand's coastal and marine resources. It describes the viewpoint of the private sector and analyses its capability to assume more responsibilities for a sustainable use of coastal and marine resources. The section also reviews some recent government initiatives, in particular, the Sea Rehabilitation Plan of the Department of Fisheries and the Thai Marine Policy and Restoration Board, critically analysing their relevance, mandates and capabilities. The section concludes with a summary of priority issues and recommendations.

2. A General Overview of Thai Coastal Areas

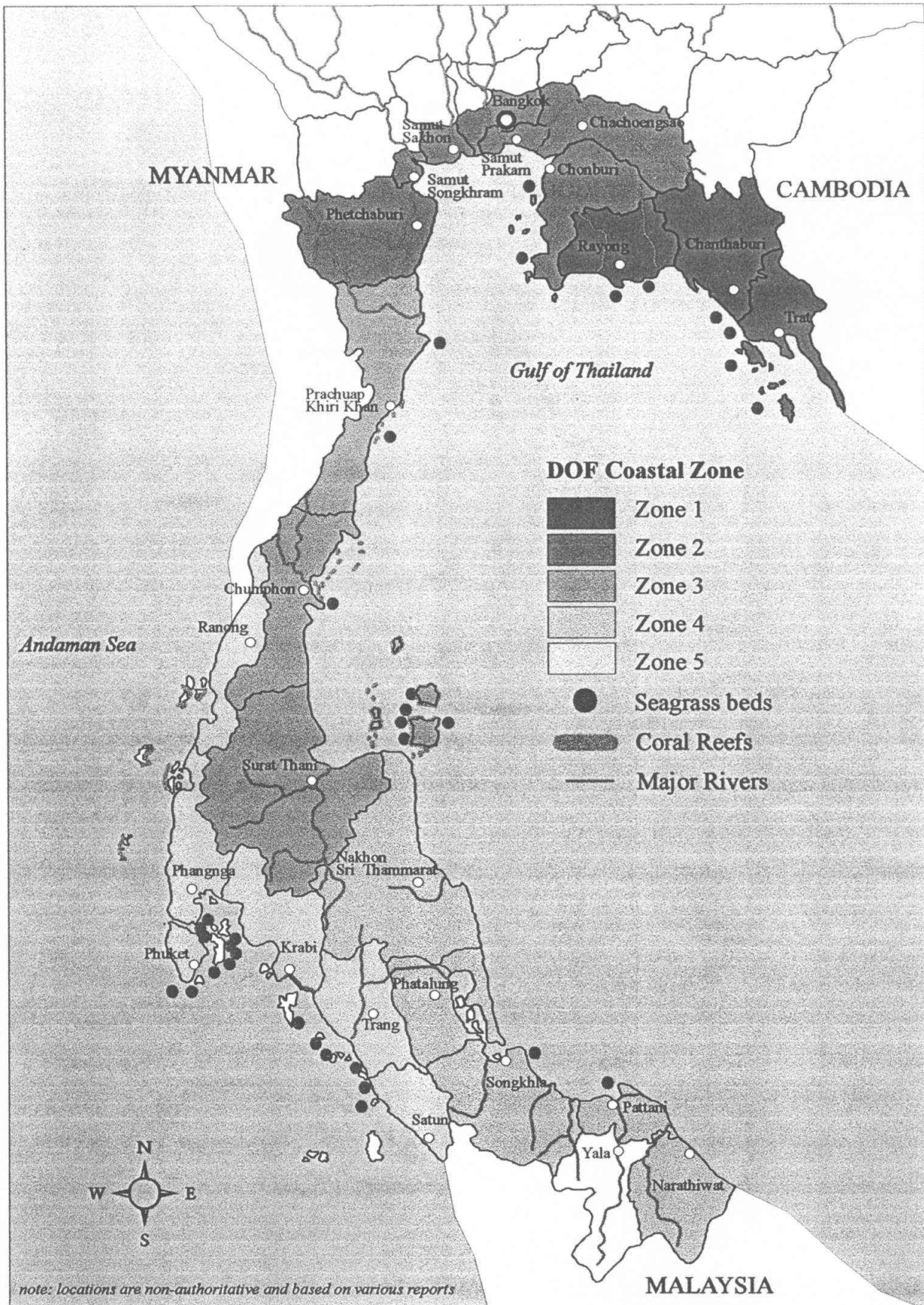
2.1 Thailand's Marine and Coastal Resources

Thailand has a relatively long coastline of 2 815 km, of which 1 878 km lines the Gulf of Thailand and another 937 km runs along the Andaman Sea (Fig. 1). The Gulf of Thailand has been one of the highly productive fishing areas owing to its shallow depth — 45 m on average and no more than 85 m deep; a generally level sea-floor, well suited for trawling; semi-enclosed topography; relatively calm waters; and a high influx of nutrients and freshwater from rivers. In contrast, the open Andaman Sea with its deep oceanic waters and a narrow, rocky, coral-reef-filled continental shelf, is generally unsuitable for trawling, although a few isolated locations such as the area off the northern tip of Krabi, are known to be excellent trawling grounds with high catch rates (TDRI 1986).

Of Thailand's 76 provinces, 24 are coastal, giving the country a good maritime access. This natural access has been further improved by the construction of ports and piers, as well as road and rail links reaching out from Bangkok to most of the coastal provinces, enabling the rapid development of tourism, industry, commerce, agriculture and aquaculture.

The Thai maritime area covers over 378 000 km² (TDRI 1996), including the territorial waters extending 12 nautical miles from the coast, and the Thai exclusive economic zone (EEZ) beyond, stretching up to 200 nautical miles from the coast. Two-thirds of the area (252 000 km²) lies in the Gulf of Thailand and the rest (126 000 km²) in the Andaman Sea (TDRI *in prep.*, Anant 1997). Landward, the coastal area in the 24 provinces covers an estimated 22 322.93 km², with a combined population of 4.82 million (Siri *et al.* 1998, citing OEPP 1995 and DOF 1977).

Figure 1. Thailand's Coastal Provinces



Five of Thailand's major rivers drain directly into the Gulf of Thailand, including the Chao Phraya, the Tha Chin, the Bangpakong, the Mae Klong in the upper Gulf, and the Songkhla in the south. The total freshwater input into the Gulf of Thailand from Thai rivers can be estimated to be 129 370 million cubic metres (mcm) annually, while in the Andaman Sea the relatively minor streams and rivers contribute about 25 540 mcm (NESDB 1994).

The Thai coast-lands and the biologically rich, shallow tropical waters of the Thai seas are well endowed with ecologically as well as economically significant living and non-living resources. These include a wide array of fishes, invertebrates, other marine fauna, seaweeds and algae, and coastal ecosystems such as mangroves, coral reefs and sea-grass beds, as well as features such as beaches, estuaries and coastal lands.

The impacts of human and economic activities on the coastal zone are all too visible in the form of resource degradation or depletion either by direct exploitation or indirectly through pollution. The marine fisheries, known for a wide range of economically important species, have been heavily depleted. Mangroves, which serve as nurseries to marine juveniles and protect shorelines, have been reduced to less than half their size in 1961, for a number of reasons — charcoal making, road and port construction, human settlements, agriculture, and most recently, aquaculture. Coral reefs and sea-grass beds have also suffered extensive damages in many parts, though inadequate past data make it difficult to estimate the exact amount of loss. Beaches have come under pressure from development activities, notably tourism. The expansion of industrial, urban and tourism activities, agriculture and aquaculture in coastal areas, and increased navigation and commerce in the Thai waters have all led to intensified resource use and pollution.

The agents of coastal resource degradation are not, however, confined to coastal areas themselves. Rapid industrial, urban and agricultural growth in other parts of the country, especially during the last decade of economic boom, has resulted in increased pollution loads entering in the sea via river runoff. Deforestation in upper watersheds have increased sediment loads in the river discharge, causing siltation and the clogging of harbours and estuaries, requiring frequent dredging. Some 70 percent of the pollution of the Gulf of Thailand is attributed to land-based activities (OEPP 1995, cited in TDRI 1996).

Pollution was implicated as one of the main factors responsible for the shrimp production crash along the upper Gulf of Thailand during 1989-90 (Briggs 1994). The nutrient-rich agricultural and domestic waste is also believed to play a major role in the frequent recurrence of algal blooms ('red tides') and fish mortalities along the Eastern and Southern coasts.

Thus, the management of the coastal zone and its living resources is a task that goes beyond the domain of any single existing government agency. The fact that the transformation of the coastal zone has occurred in the absence of any long-term governing principle for land use further stresses the need for inter-agency cooperation. Land laws in Thailand are among the most complicated, with the authority to grant user rights or title deeds vested in different agencies. Clearing the present mess would require a willing cooperation of all agencies concerned, at all levels. An inter-disciplinary, integrated, and cooperative approach is nowhere more relevant than in coastal zone management.

2.2 Thailand's Economic and Sectoral Development

Thailand embarked on a national economic development programme in the early 1960s with the adoption of a five-year national planning strategy. During the 37 years between the launch of the first National Economic and Social Development Plan (1961-66) and the most recent economic downturn, the Thai economy grew at an average 7 percent a year. Agriculture was the main engine of this growth until the 1970s, after which it was replaced by labour-intensive, export-oriented manufacturing, promoted intensively since the 1980s (Mingsarn 1993).

During the shift from agriculture to export-oriented industrialisation, natural resources remained the major basis of the Thai economy. Agri-based industries not only provided the initial impetus for industrialisation, but continue to play a major role in the country's economy and total exports, making Thailand one of the several newly agro-industrialising countries (NAICs or NACs) of Southeast Asia and Latin America (e.g., Goss 1997, Gronski 1996). Fisheries, particularly processed seafood (shrimp, tuna, bivalves),

contribute significantly to value-added exports, thanks to the country's relatively sophisticated processing industry.

Panayotou and Songpol (1987, cited in Johnson 1997) identify three factors influencing the rapid rise of the Thai fisheries since the early 1960s. These are, the introduction of new technology, notably the trawl, the purse seine and the motorized boat; a 'laissez-faire attitude' of the Thai government towards fisheries development which allowed private investors virtually a free-hand in indiscriminate resource exploitation; and finally, the demand for fisheries products in the world and domestic markets (Johnson 1997, citing Panayotou and Songpol 1987). Improved communication infrastructure and a network of traders and middlemen should also be considered important factors, since they form the crucial links between the place of production and the processing industry.

Thus, with the government promotion policies, the fisheries sector was transformed from what was "a poor man's occupation" (Panayotou and Songpol 1987, cited in Johnson 1997) into a modern multi-billion dollar industry. However, this transformation was achieved *not* by upgrading existing small-scale fishing and supporting small-scale fishing communities through technical and financial inputs, but instead by allowing investors with access to credit and capital a free entry into the fishing sector (Johnson 1997). The two sub-sectors, commercial fishers who account for 22 percent of the marine fishing establishments but 95-96 percent of the marine capture production, and the artisanal or small-scale fishers who make up 78 percent of the marine fishing establishments¹ but only about 5-6 percent of the marine capture production (Ruangrai 1997, citing NSO/DOF 1997), now compete for the same dwindling resource, leading to frequent conflicts. Further, pushed to a narrower edge by commercial fisheries, many artisanal fishers have adopted destructive fishing practices, often leading to conflicts among small-scale fishing communities themselves.

The export-led economic growth of the 1980s, with emphasis on agro-industry, further accentuated coastal resource utilisation, as it helped bring in more investment and technology in fishing, aquaculture and processing.

¹ In 1995, there were 53,112 marine fishing establishments. Marine capture production was 2 804 400 tonnes in 1994. For the definitions of fishery establishments, see footnote 4.

2.3 Historical Patterns of Coastal Resource Use and Change

The intensification of Thailand's coastal and marine resource exploitation can be said to have begun in the early 1960s with the introduction of the modern trawling technology, although its foundations were laid in the previous decade.

Prior to World War II, Thai marine fishery were mainly artisanal, using stationary gear. Although a significant number of Chinese fishermen with traditional Chinese purse seine nets dominated the scene early on, anti-Chinese policies of the late 1930s during the first Phibunsongkhram government (Wyatt 1984:254) reduced the Chinese dominance in the fisheries considerably. The ethnic Chinese groups, however, did retain, and continue to retain, their influence on trading activities in the fisheries sector.

The post-World War II period witnessed modernisation of the Thai fisheries, with the introduction of the motorised boat and development of supporting industry, notably cold storage facility and ice factory. The construction of roads, railways and ports during the 1950s with the military and economic aid from the United States, helped improve market accessibility. The average GNP growth of an estimated 4.7 percent a year during 1951-58 (Wyatt 1984:271) probably also fuelled fisheries growth by increasing domestic demand. Another important factor was the series of technical cooperation agreements in fisheries with the developed countries, notably with Holland in the 1950s and with West Germany in the early 1960s (see below). Production hovered around 150 000 tonnes a year during the 1950s (Boonlert 1992; Table 1). In 1959, marine capture stood at 147 770 tonnes, or 72 percent of the total production. Virtually all came from the Gulf of Thailand.

Table 1. Fisheries Production in Thailand (1963-1993)

Year	Production ('000 tonnes)			Value (million baht)		
	Total	Marine	Freshwater	Total	Marine	Freshwater
1947	161.0	120.2	40.8	n.a.	n.a.	n.a.
1957	234.6	170.9	63.7	n.a.	n.a.	n.a.
1960	219.0	146.5	72.5	n.a.	n.a.	n.a.
1961	305.6	233.3	72.3	n.a.	n.a.	n.a.
1962	339.8	269.7	70.1	n.a.	n.a.	n.a.
1963	393.9	323.4	70.5	n.a.	n.a.	n.a.
1964	577.0	494.2	82.8	n.a.	n.a.	n.a.
1965	615.1	529.5	85.6	n.a.	n.a.	n.a.
1966	720.3	635.2	85.1	n.a.	n.a.	n.a.
1967	847.4	762.2	85.2	n.a.	n.a.	n.a.
1968	1 089.3	1 004.1	85.2	n.a.	n.a.	n.a.
1969	1 270.0	1 179.6	90.4	n.a.	n.a.	n.a.
1970	1 448.4	1 335.7	112.7	n.a.	n.a.	n.a.
1971	1 587.1	1 470.3	116.8	5 528.1	4 554.3	973.8
1972	1 679.5	1 548.1	131.4	6 307.3	4 936.3	1 371.0
1973	1 678.9	1 538.0	140.9	8 209.2	6 562.3	1 646.9
1974	1 510.5	1 351.6	158.9	5 983.6	4 093.5	1 890.1
1975	1 555.3	1 394.6	160.7	7 194.4	5 102.0	2 092.4
1976	1 699.1	1 551.8	147.3	8 121.4	5 968.8	2 152.6
1977	2 189.9	2 067.5	122.4	10 660.5	8 622.2	2 038.3
1978	2 099.3	1 957.8	141.5	13 828.1	11 458.7	2 369.4
1979	1 946.3	1 813.1	133.2	14 004.1	11 318.5	2 865.6
1980	1 792.9	1 648.0	144.9	14 067.5	10 507.5	3 560.0
1981	1 989.0	1 824.4	164.6	17 133.9	13 213.4	3 920.5
1982	2 121.1	1 986.6	133.5	18 194.0	14 246.0	3 948.0
1983	2 255.4	2 100.0	155.4	19 238.3	15 236.2	4 002.1
1984	2 134.8	1 973.0	161.8	18 337.1	14 541.3	3 795.8
1985	2 225.2	2 057.8	167.4	19 785.5	15 650.6	4 134.9
1986	2 536.3	2 348.6	187.7	22 882.3	18 877.4	4 004.9
1987	2 779.1	2 601.9	177.2	27 641.6	23 083.2	4 558.4
1988	2 629.7	2 446.1	183.6	32 422.5	28 039.9	4 382.6
1989	2 740.0	2 539.2	200.8	35 870.0	31 428.8	4 441.2
1990	2 786.4	2 555.4	231.0	41 395.7	35 492.0	5 903.7
1991	2 967.7	2 709.0	258.7	53 025.8	46 765.8	6 260.0
1992	3 239.8	2 965.7	274.1	65 544.5	59 067.5	6 477.0
1993	3 385.1	3 048.1	337.0	78 406.7	69 827.5	8 579.1
1994	3 523.2	3 150.2	373.0	87 001.2	77 299.0	9 702.2
1995	3 631.1 ^P	3 185.0	446.1 ^P	(91 676.4 [†])	86 387.9	N. A.
1996	3 647.9 ^P	3 247.9 ^P	400.0 ^P	n.a.	n.a.	n.a.
1997	3 760.1 ^P	3 345.1 ^P	415.0 ^P	n.a.	n.a.	n.a.

Source: 1947-1962 = Vicharn (1996); 1963-1993 = DOF (1996a; 1982); 1995-1997 = DOF, unpublished data

Notes: ^P = preliminary; n.a. = data not available; [†] = does not include freshwater capture

The next dozen or so years, between 1961-72, can be called the 'Golden Era' of the Thai fisheries. Notable in this period was the rapid exploitation of demersal resources that began with the introduction of the German otterboard trawler in the early 1960s under technical cooperation with what was then West Germany. The new trawlers were far superior than the local pair trawlers, which were slow and incurred more fuel and labour costs (pers. comm., Boonlert Phasuk, December 1997). In just three years, from 1960-63, the number of registered trawlers surged dramatically from 90 to 2 026 (Boonlert 1992), while marine production more than doubled, reaching 323 400 tonnes in 1963 (Table 1). As the boats with greatly improved catch efficiency and speed increased in number, Thai fishing activities expanded into a wider area covering most of the Gulf of Thailand, parts of the South China Sea bordering Cambodia, Vietnam, Malaysia and Brunei, much of the Andaman Sea and parts of the Bay of Bengal (Vicharn 1996). By 1972, marine landings were more than ten times the levels in the 1950s, and Thailand moved up among the top ten fishing nations of the world (Boonlert 1992).

The "Golden Era" came to an end with the ever-increasing fisheries production registering a small decrease for the first time in 12 years in 1973, followed by a sharper decline for the next two years, as a result of sky-rocketing fuel prices in the wake of the 1973 oil shock and a heavily exploited demersal fish resource. From mere 0.90 baht a litre in 1969, the diesel price increased gradually to about 1.6 baht a litre in 1974-75, and then more than quadrupled, to reach 7.39 baht in 1981 (Vicharn 1996, Boonlert 1994). Maximum sustainable yields for demersal fisheries had probably been reached in the Gulf of Thailand by mid-1970s (TDRI 1986), or perhaps even earlier (*ibid.*, citing ADB 1985). The number of trawlers had reached 5,837 by 1973 (Pongpat and Amporn 1988, cited in Johnson 1997).

A full recovery in 1976 was followed by several periods of surge and decline until 1987 and increase thereafter. Just as demersal fish stocks were declining, the introduction of the luring purse seine in 1973 brought the focus of the Thai fisheries back on pelagic resources (TDRI 1986). Pelagic catches in the Gulf of Thailand nearly doubled within one year, rising from 80,000 tonnes in 1972 to 141,000 tonnes in 1973. By 1977 they crossed the maximum sustainable yield levels, variously estimated at around 365,000 tonnes to

400,000 tonnes, and declined thereafter (TDRI 1986). In the open Andaman Sea, pelagic catches have fluctuated widely after peaking during 1971-73 (TDRI 1986).

A further — and perhaps the most significant — setback to the Thai fisheries came with the declaration of exclusive economic zones (EEZs) by Thailand's neighbours during the late 1970s and early 1980s. It resulted in the loss of access to about 770 000 km² of fishing grounds and of about 200 000 tonnes/year in marine landings (Boonlert 1994).² In addition, the EEZs cut Thailand's access to the high seas, making it a 'zone-locked country' (Vicharn 1996).³ This lack of accessibility proved an added disincentive in developing oceanic fishing, in addition to the lack of knowledge and investments for deep sea fishing (*ibid.*).

Forced back on to much reduced fishing grounds that now formed Thailand's own EEZ, the Thai fishing fleet compensated for the loss by intensifying production within the Thai waters, and by fishing in other countries' EEZs, legally as well as illegally. Between 1976 and 1987, Thailand has had various types of bilateral fishing agreements with 13 countries in South and Southeast Asia, the Middle East and Australia (Vicharn 1996). Around the same time, during 1981-1993, a total of 1 566 Thai fishing vessels and 15,415 crew members were arrested in the neighbouring countries, viz., Malaysia (606 vessels, 6,059 crew), Vietnam (464 and 6,432) and Burma (319 and 3,762), followed by India, Indonesia, Cambodia and Bangladesh (Vicharn 1996, citing DOF). Surveys of fishing fleet operating outside the Thai waters indicate that the number of boats fishing illegally in other countries' EEZs is two and a half times those operating legally (Vicharn 1996). Today, an estimated third of the total landings are caught outside the Thai waters (Ruangrai 1997).

Frequent injections of new technology helped boost production. For example, pelagic fishing, especially for sardine, mackerel and skip jack, was improved with the introduction of echo-sounders, radars, and sonars, fish luring methods and other communication equipment. The introduction of vessels with on-board chillers and freezers helped reduce wastage and made longer fishing trips possible.

² Vicharn (1996:32) put these figures at 300 000 sq. miles and 600 000-800 000 tonnes respectively.

³ According to Vicharn (1996) the nearest ocean access is about 300 miles, from Phuket to the Indian Ocean.

An additional factor contributing to an increased value of production has been the rising share of coastal aquaculture, particularly shrimp, since the late 1970s, first as semi-intensive and since the late 1980s as intensive farming. Although the DOF had been promoting coastal shrimp aquaculture since the late 1960s, the earlier attempts had mixed success, with production hovering around 2 000-2 500 tonnes in the mid 1970s. After 1977, however, spurred by a rapid expansion of semi-intensive farms (average pond size 3-5 ha), shrimp aquaculture production rose sharply, nearly tripling within just one year between 1977 and 1978, while the farm area nearly doubled. At the end of the semi-intensive farm boom in 1987, farmed shrimp accounted for nearly 40 percent of coastal aquaculture production. During this period, production of shell-fish such as green mussel, bloody cockle, oyster and horse mussel, fluctuated widely, but showed a downward trend, which reversed after 1987 (Table 2).

Table 2. Coastal Aquaculture Production in Thailand, 1981-1995

(Unit: 1,000 tonnes and %)

Year	Total	Shrimp	% of total	Shell-fish	% of total	Fish	% of total
1981	67.5	13.6	20.15	53.7	79.56	0.2	0.30
1982	36.8	12.8	34.78	23.9	64.95	0.1	0.27
1983	44.7	13.7	30.65	29.8	66.67	1.2	2.68
1984	61.6	15.6	25.32	45.2	73.38	0.8	1.30
1985	60.6	17.7	29.21	42.2	69.64	0.7	1.16
1986	39.1	19.3	49.36	18.9	48.34	0.9	2.30
1987	61.8	24.5	39.64	35.8	57.93	1.5	2.43
1988	108.9	56.1	51.52	51.4	47.20	1.4	1.29
1989	168.7	94.0	55.72	72.9	43.21	1.8	1.07
1990	193.2	118.6	61.39	73.0	37.78	1.6	0.83
1991	230.4	162.1	70.36	66.3	28.78	2.0	0.87
1992	229.3	185.2	80.77	40.6	17.71	3.5	1.53
1993	295.6	225.7	76.35	66.4	22.46	3.5	1.18
1994	345.8	264.1	76.37	78.5	22.70	3.2	0.93

Source: DOF 1996a

As most shrimp farms were sited on mangrove lands, the 1979-86 period also recorded the highest rates of mangrove destruction, averaging almost 13 000 ha/year (Tongchai and Jirawan 1997), or 4.5 percent annually (Ruangrai 1994). As much as 93

percent of the mangrove destruction in this period has been attributed to conversion to shrimp farms (*ibid.*, citing Sanit 1989).

The second and much greater boost to aquaculture came with the introduction of intensive shrimp farming technology from Taiwan in the late 1980s. Once again, farmed shrimp production doubled within a year to reach 56 000 tonnes in 1988, rising rapidly thereafter to reach 260 000 tonnes in 1995. The intensive farming method relies on the monoculture of black tiger prawn (*Panaeus monodon*), a delicacy in Western markets such as Japan, the U.S. and the E.U. As extensive and semi-intensive farms were converted to intensive farms, polyculture production of fish and crab with shrimp declined rapidly. Fish/crab and shrimp polyculture today represents less than one percent of total production on shrimp farms (Table 3).

Table 3. Shrimp Farm Production in Thailand, 1976-1995

(tonnes, million baht)

Year	Total		Shrimp		Fish		Crab	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1976	3 578.510	84.890	2 533.330	79.450	1 045.180	5.440	---	---
1977	3 164.460	63.470	1 589.540	56.090	1 574.920	7.380	---	---
1978	9 921.760	365.910	6 394.830	349.160	3 520.450	16.370	6.480	0.380
1979	10 659.200	474.550	7 064.080	460.590	3 590.090	13.850	5.030	0.110
1980	11 818.290	480.540	8 063.050	458.910	3 749.890	21.450	5.350	0.180
1981	13 579.420	671.610	10 727.870	657.260	2 839.380	13.760	12.170	0.590
1982	12 841.900	782.100	10 090.770	765.680	2 734.790	15.430	16.340	0.990
1983	13 684.890	962.960	11 549.850	950.370	2 099.440	10.580	35.600	2.000
1984	15 559.660	1 046.480	13 006.750	1 024.000	2 437.830	16.680	115.080	5.800
1985	17 738.390	1 368.500	15 840.560	1 348.420	1 720.180	11.570	177.650	8.510
1986	19 289.360	1 756.440	17 885.830	1 737.580	1 180.470	9.410	223.060	9.450
1987	24 517.370	3 462.040	23 566.470	3 449.320	837.970	5.570	112.930	7.150
1988	56 119.900	7 904.330	55 632.840	7 900.550	454.660	2.600	32.400	1.180
1989	94 015.380	11 075.760	93 494.500	11 072.190	501.380	2.940	19.500	0.630
1990	118 580.130	14 367.730	118 227.050	14 365.360	343.580	2.060	9.500	0.310
1991	162 139.640	19 835.032	162 069.690	19 834.110	65.980	0.689	3.970	0.233
1992	185 201.831	25 506.599	184 884.321	25 500.140	278.260	3.367	39.250	3.092
1993	225 787.042	32 429.995	225 514.303	32 425.340	247.889	3.278	24.850	1.377
1994	264 079.245	39 855.682	263 445.960	39 845.252	583.925	8.083	49.360	2.347
1995	260 161.106	39 554.951	259 540.536	39 544.646	575.370	8.015	45.200	2.290

Source: DOF (1997)

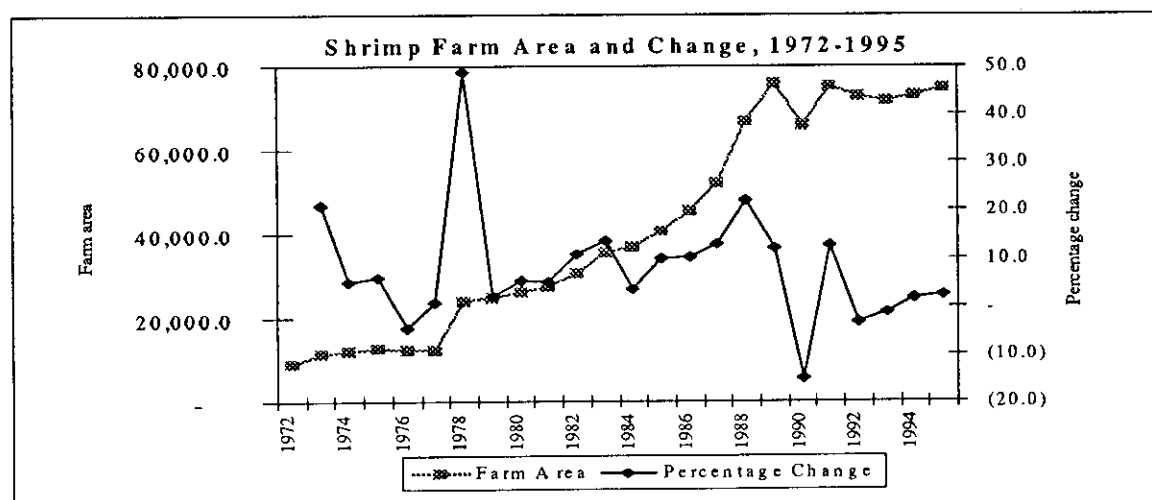
Note: Crab and fish are probably produced as polyculture, although original statistics do not clarify on this.

The share of farmed shrimp in the total shrimp production (capture and culture) has jumped from 15 percent in 1986 to 72 percent in 1995. Over the same period, wild-caught shrimp production has been steady at around 80 000-100 000 tonnes a year.

Farmed shrimp today represents about 7-8 percent of the total fisheries production but over 40 percent of its value, and together with wild-caught shrimp, 70 percent of all fisheries exports, which makes it one of Thailand's top export commodities earning 43 billion baht in 1996.

The shrimp aquaculture boom and export earnings have not come without social and environmental costs. Intensive shrimp farming is largely unsustainable, as can be seen from the number of production crashes and large scale farm abandonment. Briggs (1994) estimated that since the production crash in the upper Gulf region during 1988-89, about 45 000 ha of land that was once rice fields had been ecologically destroyed. No precise statistics are, however, available on the extent of area and number of abandoned farms, since farms are sometimes abandoned temporarily or changed to other forms of aquaculture; while others may be permanently converted to other landuses such as housing estates and industries. The wide year-to-year fluctuation in shrimp farm area should serve as an indicator of the unsustainability of this industry (Figure 2).

Figure 2. Shrimp Farm Area and Change in Thailand, 1972-1995



In addition to fishing technology and aquaculture development, two other related — and equally important — factors behind the growth of the fisheries sector were the structural changes in the Thai economy in the early- to mid-1980s, which led to the boom years in the late 1980s and the early 1990s, and the concurrent development of the export-oriented processing industry. Agro-industries including seafood processing featured prominently in the export-led growth of the late 1980s. The canning technology developed during the second half of the 1970s led in the early 1980s to a steady increase in the number of canneries to reach 22 by 1995. The devaluation of the baht in the mid-1980s made Thai products (including fisheries) more competitive in the world market. Exports of fisheries products jumped from 466 219 tonnes in 1985 to 602 486 tonnes in 1986 (Johnson 1997 citing INFOFISH 1991:28).

Thus, with the adoption of new technology in fishing, processing and aquaculture and frequent injections of credit, investment and various kinds of government support, the Thai fisheries sector managed, despite various setbacks, to double the production in two decades from 1972 to 3.4 million tonnes in 1993 and become the world's topmost processor and exporter of edible fish and fish products. The massive growth of intensive shrimp farming in less than a decade has also made Thailand the world's largest exporter of shrimp since 1991 and also the largest producer since 1993 (Direk *et al.*, *in prep*).

2.4 Analysis of the Current Situation

The impressive production and export figures do not tell the whole story of Thailand's marine fishery sector. They do not reveal that:

- About one third of the marine landings are caught outside the Thai waters.
- Fish catches from the Gulf of Thailand and the Andaman Sea are well above the estimated maximum sustainable yields (MSYs) and catch rates, measured as catch per unit effort (CPUE, kg/hr) have declined significantly;
- Nearly two-fifths of the catch from the Thai waters consist of trashfish; the demand from a heavily protected local fishmeal industry is at least partly responsible for the continued exploitation of an otherwise uneconomical

fisheries. That a significant portion of the trash-fish consists of marine juveniles also indicates that regulations on mesh sizes of the gear are frequently violated.

- An unknown amount of fish is caught illegally by commercial operators within the 3 000-m coastal zone reserved for small-scale fisheries, generating conflicts with coastal fishing communities.
- While the share of fisheries in the national GDP has remained around 1.5 percent, and has grown relative to agricultural GDP, the growth of fisheries GDP itself has slowed down in recent years, from a high of 21 percent annually during 1985-88 (28% in 1987) to only 13 percent during 1989-92 (MIDAS 1995) and .. percent during 1992-95. The expansion in the fisheries GDP has been mainly due to the strong growth of the shrimp sector since 1988 (MIDAS 1995); however, preliminary figures indicate that shrimp production has declined in the last two years.
- Artisanal fisheries, which account for 78 percent of total marine fisheries establishments, contributes only 6 percent of the marine production by volume and 19 percent by value.
- Fishing is no longer an attractive occupation for many traditional fishers. As they leave fisheries to find alternative employment, their place is being taken by "a new generation of fishermen" mainly from poorer parts of Northern Thailand (Boonlert 1994:120), and workers from neighbouring countries. This flux is often masked in the overall employment figures.
- Actual number of boats operating are much higher than those registered, since many boat owners tend to avoid registration and fish illegally. The year to year fluctuations in the number of registered boats are due to many reasons, such as licences being terminated for retired, old boats and new ones issued to ageing vessels, as well as licences being revoked for violators, or simply reluctance of some boat owners to renew the licence.
- The fishing fleet is beleaguered with the problem of excess capacity (despite a general decline in the number of registered boats); retiring excess boats, particularly those using destructive fishing gear, is a costly option, yet necessary for the sustainability of the Thai fisheries.
- The cultured shrimp industry which nets a significant sum in the total value of the fisheries exports, can be seen as the 'last resort' for the Thai fisheries production as the marine capture in the Thai waters has been on a declining trend for the past decade. Although Thailand now ranks the world's largest shrimp producer and exporter, the sector, plagued with problems of diseases and production crashes, not to mention adverse ecological, and socio-economic impacts, has yet to prove its potential for sustainable growth.

- The processing industry, particularly tuna canning, depends on imported raw material (not just the fish caught in other countries' waters), and is thus subject to the changes in the world raw material prices. This will become a sensitive issue especially since the value of the Thai currency has plummeted.
- Despite government support and many promotion programmes to develop fisheries and ensure resource conservation, state agencies charged with coastal resource management fail to monitor and enforce legislation.

Some of the issues highlighted above are discussed in greater detail in Section 6.

In assessing the current situation of the Thai fisheries, it may be useful to look at the current economic worth of the Thai marine fisheries. Considering that an estimated third of all landings are caught outside the Thai waters (Ruangrai 1998), and another 30-40 percent (or even more) are trashfish, the Thai waters seem to contribute very little in economic terms. The two major fisheries exports, frozen shrimp and canned tuna, rely on coastal aquaculture and imported frozen tuna, respectively, for raw material inputs (Ruangrai 1997), and not on Thai marine fisheries.

The marine capture fishery has been the playing field of the commercial fisheries subsector, which has been producing low-value fish. On the other hand, the small scale fisheries sub-sector which produces a small but more high-value fraction of the total production has been increasingly marginalised. Its share in the total fish production has steadily declined from 7 percent to about 5 percent during the past decade, though this small fraction accounts for nearly a fifth of the total production value.

Even though shrimp aquaculture has moved up to compensate for the losing value of the capture fisheries, it cannot be considered a substitute or even supplement to capture fisheries due to its heavy reliance on the latter for feed inputs, notably trashfish, which is used in making fishmeal (see e.g., Folke *et al.* 1996). Some 15-20 percent of the locally-made fishmeal is estimated to enter the local shrimp feed industry, which largely relies on imports of high-quality fishmeal (Ruangrai Tokrisna, pers. comm. February 1998). Further, it is doubtful whether the capital-intensive and unsustainable shrimp industry would be able to play its much-advocated role as employment alternative for local fisherfolks.

The problems of marine resource depletion and sustainability of coastal aquaculture are further compounded by the impacts of other land-based activities. These include pollution, infrastructure and tourism development in coastal areas, and conflicting goals of various agencies managing land and water resources in coastal areas. The promotion of coastal aquaculture, for example, has cut across a range of issues related to land conversion and encroachment, land and water pollution, social conflicts, and so on. Clearly, the task of addressing these issues is beyond the capacity of a single agency such as the Department of Fisheries. Rather, it calls for renewed efforts at cooperation and coordination between the agencies concerned with the various aspects of coastal resources, such as fisheries, navigation, agriculture, forestry, water resources, land development, pollution control, conservation, mineral exploration, and so on.

2.5 Main Socio-economic Indicators for the Thai Coastal Zone Management

The data in Table 4 below shows Gross Provincial Product (GPP) and the share of fisheries in GPP (fisheries GPP) for the 24 coastal provinces, in comparison to national GDP and the share of fisheries in GDP (fisheries GDP) for the two years, 1989 and 1993. At the national level, for both years, the share of fisheries GDP in total GDP has remained steady at 1.48 percent. The proportion of fisheries GPP in total GPP of most of the provinces is several times higher than the national proportion, for obvious reasons. Most provinces from the South and upper South, stand out with high percentage (above 8%) of fisheries GPP. These include, Satun, Trang, Phuket and Ranong from Zone 5 (Andaman Sea), Nakhon Si Thammarat, Songkhla and Pattani from Zone IV (Southern Gulf of Thailand), and Prachuab Khiri Khan and Chumphon from Zone III (upper South or Central Gulf of Thailand). On the Eastern coast, Trat is the only province with a high proportion of fisheries GPP, though Chanthaburi comes close. Interestingly, however, in addition to the more industrialised and less coastal Bangkok and Chachoengsao, a few Southern provinces also have a very low, or below national average, percentage of fisheries GPP. These are Patthalung, Narathiwat and Krabi.

The fisheries GPP increase has for the most part been due to a rapid expansion of coastal shrimp aquaculture. The shrimp industry's migration from the upper Gulf region to the eastern and southern coasts is evident in the significant drop in the fisheries GPP for Samut Sakhon and Samut Songkhram, the provinces worst hit by the 1989-90 production crash, and a concurrent increase for nearly all provinces along the eastern and southern Gulf and the Andaman coast, but most notably Nakhon Si Thammarat, whose Pak Phanang Bay area now accounts for about 10 percent of the country's total shrimp area (Ruangrai *et al.* 1996).

How much of the growth in the shrimp sector has benefited the local fishing population remains a moot question given that the shrimp industry has been characterised by a large presence of outsider investors with better access to credit and capital than the local fisherfolk. One survey of shrimp farms in Thailand estimated that 70 percent of all shrimp producers had other sources of income, with only 16 percent as fishers, the rest as traders (32%), rice farmers (8%), labourers (7%) and government employees (7%) (Barracough and Finger-Stich 1996, citing NACA 1994b). The same survey also found that only 20 percent farmers actually owned their farms, while some 77 percent had access to land through 'friends and relatives', and another 3 percent were corporate owners (*ibid.*). These findings raise doubt about at least one of the rationales behind the promotion of aquaculture, that is, of providing alternative employment for coastal fishers to ease the pressure on marine capture fisheries.

Except for the provinces that have benefited from tourism, industry and commercial developments (notably, Bangkok, Samut Prakarn, Rayong, Chachoengsao, and Phuket), most coastal provinces have per capita GPP lower than the national average, and the number of such provinces has increased from 15 in 1989 to 17 in 1993. The situation of small-scale fishing population is perhaps even worse than the overall GPP per capita figures would suggest. A coastal household survey conducted in 1990 (NSO 1992, cited in Johnson 1997), showed that the average annual per capita income of coastal fishers was 10 387 baht in 1990, far below the national average of 16 463 baht, and over 60 percent of the income was spent on food, suggesting poverty (Johnson 1997, citing NSO 1992 in Pongpat n.d.).

3. The Impact of Economic Growth on Coastal Environment

The economic growth has impacted Thailand's coastal resources to a varying degrees through a number of agents. These include, industrial, urban and agricultural expansion, tourism development, coastal aquaculture, mining, increased navigation and other industrial activities, including natural gas explorations in the open seas. Combining with natural factors, these human activities have often created synergistic impacts that reverberate through the complex ecological systems of the tropical waters and coasts. A number of these systems are yet to be fully studied, let alone their relationships and impacts quantified. For example, although the function of mangroves as nurseries for marine juveniles is well known, little is known about impacts of mangrove destruction on specific marine species.

3.1 Land use changes

A number of changes have occurred in the coastal land during the past three to four decades. These include, human settlements and urban expansion, infrastructure development, particularly access roads and other modes of communication, tourism and industry development, agriculture, and tree plantations, and not least, coastal aquaculture. The severity of land use change is clearly evident in the change in mangrove forest cover which has been reduced to less than half of what existed before the early 1960s (see Section 3.4.1), and in land dereliction following shrimp pond failures in a number of coastal provinces.

Land rights is one of the most complicated and politically sensitive issues in Thailand. Like their more inland counterparts, coastal communities in many places often do not have adequate land rights. Yet, land frequently changes hand through informal and illegal deals.

Table 4. Population, GPP, and Share of Fisheries in GPP for Coastal Provinces, 1989, 1993

Zone	Province	1989						1993					
		Population	GPP ('000 baht)	GPP/capita	Fisheries GPP ('000b)	% of GPP	Fish. GPP/cap.	Population	GPP ('000 baht)	GPP/capita	Fisheries GPP ('000b)	% of GPP	Fish. GPP/cap.
I	Trat	180 000	5 363 396	29 797	548 431	10.23	3 047	198 000	9 091 455	45 916	1 052 508	11.58	5 316
	Chanthaburi	403 000	9 427 146	23 392	490 250	5.20	1 217	448 000	16 045 722	35 816	1 141 358	7.11	2 548
	Rayong	417 000	30 980 576	74 294	2 395 180	7.73	5 744	441 000	48 040 891	108 936	1 702 154	3.54	3 860
II	Chonburi	855 000	80 998 727	94 735	1 869 245	2.31	2 186	916 000	154 427 506	168 589	2 371 186	1.54	2 589
	Chachoengsao	538 000	24 778 533	46 057	295 983	1.19	550	582 000	31 017 268	53 294	368 881	1.19	634
	Samut Prakan	783 000	105 783 264	135 100	2 315 617	2.19	2 957	856 000	194 031 371	226 672	4 251 272	2.19	4 966
	Bangkok	6 040 000	700 150 003	115 919	211 801	0.03	35	6 470 000	1 348 704 182	208 455	245 163	0.02	38
	Samut Sakhon	330 000	22 680 319	68 728	2 440 050	10.76	7 394	361 000	41 055 055	113 726	1 251 291	3.05	3 466
	Samut Songkhram	203 000	4 025 861	19 832	387 321	9.62	1 908	202 000	5 604 128	27 743	366 249	6.54	1 813
III	Phetchaburi	417 000	11 854 376	28 428	259 538	2.19	622	430 000	16 589 280	38 580	300 394	1.81	699
	Phachuap Khiri Khan	412 000	11 974 641	29 065	601 042	5.02	1 459	442 000	17 312 724	39 169	1 386 682	8.01	3 137
	Chumphon	409 000	8 853 075	21 646	1 181 482	13.35	2 889	448 000	14 602 998	32 596	2 585 173	17.70	5 770
IV	Surat Thani	761 000	19 020 402	24 994	756 452	3.98	994	853 000	29 241 357	34 281	1 689 859	5.78	1 981
	Nakhon Si Thammarat	1 485 000	23 068 622	15 534	696 833	3.02	469	1 582 000	36 900 789	23 325	3 041 490	8.24	1 923
	Phatthalung	478 000	7 135 131	14 927	52 932	0.74	111	515 000	9 939 153	19 299	69 788	0.70	136
	Songkhla	1 126 000	28 884 376	25 652	3 993 366	13.83	3 547	1 207 000	49 279 380	40 828	7 968 729	16.17	6 602
	Pattani	554 000	9 220 380	16 643	1 876 825	20.36	3 388	587 000	15 549 334	26 489	4 123 142	26.52	7 024
V	Narathiwat	580 000	10 432 200	17 987	12 866	0.12	22	627 000	17 073 140	27 230	43 736	0.26	70
	Satun	229 000	5 012 453	21 888	834 736	16.65	3 645	250 000	7 250 927	29 004	1 524 108	21.02	6 096
	Trang	538 000	11 216 258	20 848	841 613	7.50	1 564	581 000	16 915 204	29 114	1 510 359	8.93	2 600
	Phuket	171 000	12 736 098	74 480	996 518	7.82	5 828	206 000	19 226 961	93 335	2 090 154	10.87	10 146
	Krabi	302 000	8 764 745	29 022	119 604	1.36	396	335 000	12 102 332	36 126	171 424	1.42	512
	Phan-nga	218 000	7 498 724	34 398	461 283	6.15	2 116	234 000	9 778 654	41 789	755 711	7.73	3 230
	Ranong	119 000	5 719 723	48 065	1 611 765	28.18	13 544	142 000	9 628 403	67 806	3 773 790	39.19	26 576
	Whole country (GDP)	55 213 000	1 856 990 991	33 633	27 461 003	1.48	497	58 584 000	3 168 338 987	54 082	46 830 998	1.48	799

Source: Office of National Economic and Social Development Board; Note: The five zones are as described in NSO/DOF 1997.

3.2 Hydrological Changes, Pollution, Waste Disposal and Sedimentation

Land use changes in the coastal areas, as well as increased agricultural and industrial activities and urbanisation further inland have created a number of externalities in the form of hydrological changes and pollution, waste and sediments entering the sea. These loads are significant in the Gulf of Thailand which receives freshwater flow from some of Thailand's major rivers, especially the Chao Phraya and the Mae Klong, which together bring agricultural, urban and industrial waste from Thailand's Central, Northern and Western regions. Owing to the lack of proper sanitary systems for cities and towns, urban waste and waste water pose a serious problems for river water quality. Domestic wastewater contributed 93 percent of the BOD (biochemical oxygen demand) load in the Mae Klong river in 1990 and 75 percent in the Chao Phraya in 1988 (Rajesh 1995, cited in TDRI 1996). Dissolved oxygen (DO) levels have been recorded at zero along the 20-km stretch near the mouth of the Chao Phraya. Further, a 1991 study found 25 of Thailand's 43 major rivers, including the above two, to have been contaminated with heavy metals of industrial origin (TDRI 1996).

With massive deforestation in the upper watersheds of many of these rivers (prior to the 1988 logging ban), siltation has become a perennial problem, particularly in the Chao Phraya river on which Bangkok's Klong-toey Port is located.

Generally, for most parts, the seawater quality is within the pollution limits set by the Pollution Control Department (PCD), barring a few exceptions such as areas with high population pressure or economic activities leading to high pollution loads. This is true of a number of tourism sites such as Pattaya, Hua Hin, and the island of Ko Samet, and industrial areas such as Samut Prakarn, Rayong and Chonburi. Some improvements have occurred in coastal water quality in these areas following public outcry and pollution control campaigns (Hua Hin and Cha-am in Prachuab Khiri Khan and Petchburi provinces respectively, for example, were declared pollution control zone in 1997 by the Pollution Control Department). Further improvements are expected as waste water treatment plants are planned in some of these high pollution risk areas.

Apart from pollution loads from inland activities, coastal agriculture and aquaculture also had localised impacts on hydrology. With an increased freshwater consumption in coastal areas following commercialisation of agriculture (including orchards, rubber, oil palm and coconut plantations), and expansion of coastal aquaculture, salinisation has increased. Setting up of farms often upset local hydrological patterns, in addition to increasing pollution levels and sedimentation.

3.3 Declining marine resources

A commonly used indicator of the change in fisheries abundance is the catch rate, or the quantity of catch per unit fishing effort. While the marine capture production has increased 18-fold, from 147 770 tonnes in 1959 to 2 752 500 tonnes in 1993, catch rates (for trawl fishing) have declined severely, from 298 kg/hr in 1961 to 20 kg/hr in 1989, or only 6.7 percent (Vicharn 1996, citing DOF). In the Andaman Sea, demersal catch rates have similarly declined, from 613 kg/hr in 1966, to about 200 kg/hr during the mid- to late-1970s (TDRI 1986), and now at some 35 kg/hr.

Table 5. Catch Per Unit Effort (CPUE) in Gulf of Thailand and Andaman Sea

Year	Catch Per Unit Effort (CPUE - kg/hr)	
	Gulf of Thailand ¹	Andaman Sea
1961	298	
1966	132	613 ²
1972	63	
1977	47	
1986	40	
1989	20	
1995?	25 ³	35 ³

Source: ¹ Adapted from DOF as reported in Vicharn (1996); ² DOF, as reported in TDRI (1986).

Marine catches in recent years have been dominated by pelagic fish species such as mackerel, scads, anchovies, sardinellas and tunas, some demersal fish species such as treadfin brems, lizard fish and big-eyes, and invertebrates such as shrimp, squid and swimming crabs

(DOF 1996a). The catches of a number of other species, particularly demersal, have been on the decline. Catches of both pelagic and demersal stocks have long surpassed their estimated maximum sustainable yields (MSYs). In 1991, the catches were nearly twice the MSY levels (Table 6). Actual catches may be even higher than those reported, due to the possibly under-reported wastage in handling.

Table 6. Maximum Sustainable Yields and Actual Catches in Thai Waters

(unit: tonnes)

Area	Fish Category	Maximum Sustainable Yields ¹	Actual Catches ²
Gulf of Thailand	Pelagic	400 000	559 502
	Demersal	750 000	1 261 185
	<i>Total, Gulf of Thailand</i>	<i>1 150 000</i>	<i>1 820 687</i>
Andaman Sea	Pelagic	50 000	166 628
	Demersal	200 000	491 292
	<i>Total, Andaman Sea</i>	<i>250 000</i>	<i>657 920</i>
	Sub-total Pelagic	450 000	726 130
Total Thailand	Sub-total Demersal	950 000	1 752 477
	<i>Total</i>	<i>1 400 000</i>	<i>2 478 607</i>

Note: ¹ Various sources; ² 1991 figures.

Source: Adapted from Ruangrai (1994), as reported in TDRI (1996).

The marine fisheries decline can be attributed to a number of factors. These include, excessive fishing by an excess number of boats, use of destructive gear (e.g., trawl, pushnets) and destructive fishing methods (e.g., dynamite fishing, large-scale trawling in near-shore areas, use of push-nets near coral reefs), violation of regulations (e.g., fishing in fish spawning sites during the temporary fishing ban period, use of nets with mesh sizes smaller than those regulated), destruction of fish habitats, such as mangroves, sea-grass meadows and coral reefs, and finally wrong or uncoordinated policies (e.g., the protection of fishmeal industry has a direct impact on fisheries, since it has encouraged trash-fish capture, which contains a high proportion of marine juveniles).

3.4 Impacts on sensitive ecosystems

Important sensitive ecosystems in the Thai coastal areas include mangroves, sea-grass beds and coral reefs. The three systems are closely linked with each other, so that changes in one system affect other systems. Mangrove clearance, for example, can bring about siltation that can kill sea-grass beds and affect coral reefs. Similarly, damages to coral reefs can intensify wave and current action impinging on sea grasses and young mangroves.

3.4.1 Mangroves

Mangrove forests covered some 367 900 ha of the intertidal zone in 1961. As of 1996, only 167 582 ha remained (Tongchai and Jirawan 1997) — a loss of 54 percent. Nearly four-fifth of the remaining mangroves are found along the Andaman coast (particularly the provinces of Phang-nga, Satun, Krabi, Trang and Ranong), while the Southern coast of the Gulf of Thailand accounts for another 10 percent (mainly Nakhon Si Thammarat, Chumphorn and Surat Thani provinces). Along the eastern coast of the Gulf, which accounts for about 7 percent of the total mangroves, mangroves are particularly extensive in Trat and Chanthaburi provinces (*ibid.*). Widespread destruction has occurred first in the 1960s and early 1970s for infrastructure development, in the late 1970s till mid-1980s for extensive shrimp farming, and since 1986 for intensive shrimp farming. The Central coast, for example, which now accounts for the remaining three percent, has lost most of its mangrove cover during the first expansive phase of marine shrimp farming in the 1980s. Despite the recent measures to control mangrove encroachment, and efforts to replant in degraded areas, deforestation has continued, though at slower rates (Table 7).

Table 7. Mangrove Forest Destruction in Various Periods

Period	Remaining	Area lost	Average annual loss	
	area (ha) ¹	(ha)	(ha)	(%)
1961	376 900			0.0
1961-1975 (14 yrs.)	312 700	55 200	3 943	1.05
1975-1979 (4 yrs.)	287 300	25 400	6 350	2.03
1979-1986 (7 yrs.)	196 428	90 872	12 982	4.52
1986-1991 (5 yrs.)	173 608	22 820	4 564	2.32
1991-1993 (2 yrs.)	168 683	4 925	2 463	1.42
1993-1996 (3 yrs.)	167 582	1 100	367	0.22
1961-1996 (35 yrs.)	167 582	200 318	5 723	1.52

Note: ¹ Area remaining at the end of the period

Source: Adapted from Tongchai and Jirawan (1997: I-9; 6-7)

3.4.2 Sea grasses

Extensive sea grass beds are found near the Haad Chao Mai National Park, Talibong and Muk islands of Trang province, in the Phang-nga Bay and near Phuket province, along Andaman side, and in and near the Kung Krabaen Bay in Chanthaburi province on the eastern gulf coast (TDRI 1997?).

Nearly 70 percent of the sea-grass beds have been reported to have been in healthy or good condition, while the remaining 30 percent somewhat degraded (OEPP 1995, cited in TDRI 1996).

3.4.3 Coral Reefs

Coral reefs in Thai waters, covering 12 000 km², are the third largest in Southeast Asia and with over 300 species, rank among the world's top ten reef sites in terms of beauty and diversity. They are most abundant in Andaman coast, where two sites near Similan and Surin islands are believed to be the deepest coral formations in the Andaman Sea, occurring at about 30 m depth (MIDAS 1995: I-89).

In a number of areas, particularly in the Gulf of Thailand, coral reefs have been damaged due to a number of, mostly human-induced, factors. These include pollution, destructive fishing (e.g., using dynamites), navigation (anchor dropping, oil spillage) and tourism (snorkelling, sale to tourists).

3.5 Regional patterns of environmental impacts

Notwithstanding localised problems, the severity of environmental impacts shows a declining gradient away from the main centre of economic growth, the area closest to Bangkok, and the centre of industrial activity, the Eastern Sea-board. The Andaman coast stands out in a sharp contrast to the relatively heavily exploited and degraded Gulf of Thailand.

The upper Gulf region, which receives the freshwater flow from the Chao Phraya and the Mae Klong rivers, is perhaps the most degraded among all coastal areas. It receives high pollution loads from the Chao Phraya and the Mae Klong. The poor mixing of the waters in this region due to its semi-enclosed topography, has been blamed as one of the factors behind the massive farmed shrimp production crash in 1989-90 (Direk et al., *in prep.*). As a result, the provinces bordering the upper Gulf, notably Samut Prakarn, Samut Songkhram and Samut Sakhon are now noted for large areas of derelict shrimp farms, although some of these areas have since been converted to housing estates and industries.

Intensive shrimp farming has also had impacts along the eastern and southern coasts of the Gulf, viz., Chonburi, Chanthaburi, and Trat provinces in the East and Songkhla, Surat Thani, Nakhon Si Thammarat provinces in the South. Mangrove destruction and land dereliction has been serious in some of these provinces. Combined with natural factors, these human activities have sometimes exacerbated environmental problems in some areas. For instance, the eastern Gulf of Thailand is noted for frequent red tide occurrences. First recorded in 1952 in the Gulf region, there have been 48 occurrences between 1981-1988, and more than 49 during 1991-94 (TDRI in prep.). While red tide occurrence may be a natural phenomenon, its frequency and affected area seem to have increased considerably in recent years.

The Andaman Coast, being more isolated than the Gulf, has suffered relatively less damage environmentally. Water quality along this coast is generally good, except in touristic places such as some beaches on Phuket island (e.g., Patong beach). Mangrove forests are also far more intact. However, in the past few years, there has been a decline in mangrove forest in this region as well.

4. Stakeholder Analysis

The multiple-use, multiple-users nature of coastal resources (e.g., fisheries, mangroves), makes the coastal zone an area of potential conflict. In a tropical country like Thailand, high fish species diversity, a wide array of fishing gear and the fishing and culture practices make the resource use situation even more complex (Boonlert 1994).

Compared to other primary sectors, the fisheries sector in Thailand employs a relatively small section of the total workforce. During the past dozen years, overall employment in marine fisheries (capture and culture) seems to have declined relative to the national workforce. In 1983, the fisheries sector employed 280 000 people or 1.3 percent of the total workforce, with an equal number in secondary employment (TDRI 1986, citing ADB 1985). Considering only the 244 500 individuals employed in marine fisheries, this represented some 1.1 percent of the total workforce. By 1995, employment in marine fisheries was only fractionally higher, at 244 557, representing only 0.7 percent of the total workforce (Table 8).

Table 8. Employment in the Thai Fishing Sector; 1983, 1995

Activity	Estimated number of individuals employed	
	1983	1995
Marine Capture	223 500	161 667
Coastal aquaculture	21 000	82 890
Total Coastal and Marine	244 500	244 557
Freshwater Culture	8 000	n.a.
Freshwater Capture	27 000	n.a.
Total	279 500	n.a.

Note: Coastal aquaculture includes mariculture as well as brackishwater culture

Source: ADB, 1985 as reported in TDRI 1986; NSO/DOF 1995

The number of fishery establishments⁴, however, has registered a growth of 4 percent a year over ten years during 1985-95. While marine fishing establishments hardly grew in number, far more spectacular growth occurred in the number of coastal aquaculture establishments (Table 9).

Table 9. Changes in the Number of Fishery Establishments, 1985-1995

Type of Fishery	1985	1990	1995	% Change			Av. Annual Change
				1985-90	1990-95	1985-95	1985-1995
Total	57 591	64 904	80 704	12.70	24.34	40.13	4.01
Marine capture only	49 862	46 851	50 176	-6.04	7.10	0.63	0.06
Coastal aquaculture only	5 889	16 501	27 592	180.20	67.21	368.53	36.85
Both capture and culture	1 840	1 552	2 936	-15.65	89.18	59.57	5.96

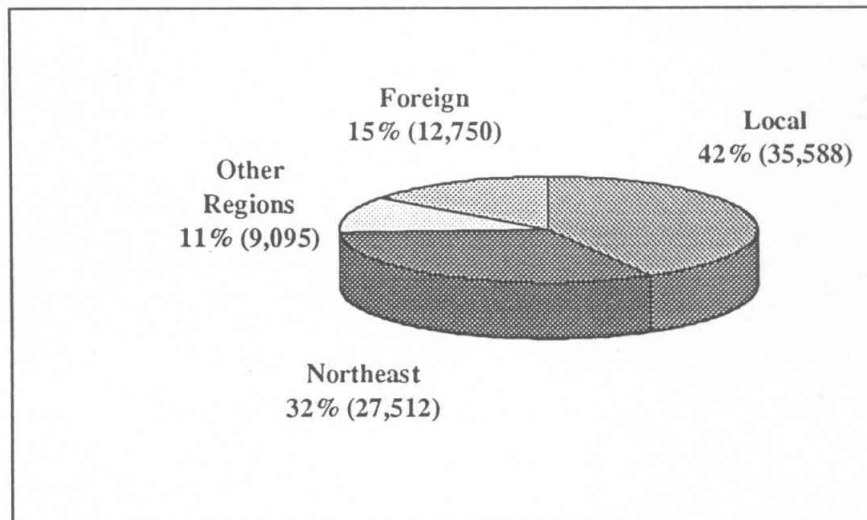
Source: DOF 1987, NSO/DOF n.d., 1997.

The coastal zone, and the marine fishery sector in particular, plays an important role as the country's social buffer (MIDAS 1995), absorbing its poor and landless from more remote areas. This feature, and the structural changes in the employment patterns in the fishing sector it has generated is not revealed in the statistics of Table 8. While employment in the sector has indeed declined, there has been a large turnover in recent years. Fishing is no longer an attractive occupation for traditional fishers who are seeking alternative employment in cities and provincial capitals, and their place has been taken by a "new generation of fishermen" (Boonlert 1994) — workers from other regions of Thailand, particularly, the poorer parts of the North and the Northeast, and neighbouring countries, such as Myanmar, Cambodia and Lao PDR. According to the 1995 Marine Fishery Census (NSO/DOF, cited in Ruangrai 1997), of the total 161 667 marine fishers (artisanal as well as commercial) during the peak season, about 53 percent (84 945) were employees, mostly on

⁴ The NSO/DOF marine fishery census defines three types of fishery establishments, viz., the operator's household, "which engages in marine capture fishing or coastal aquaculture on its own account"; the joint-management household, which comprises two or more households jointly managing capture fishing/coastal aquaculture; and a "company", which is a business entity engaged in marine capture/coastal aquaculture. The "fisheries employee's household is neither of the above, "but has one or more members of the household who were employed for the marine capture fishery/coastal aquaculture during the last 12 months" from the census reference date (NSO/DOF 1997).

commercial boats. Of these latter, some two-fifths (or 22% of the total fishers) were local, while another two-fifths (23% of the total) were from other regions, mainly Northeast (a third, or 17% of the total), and about 15 percent (8% of the total) were foreign employees (Figure 3). As Boonlert (1994:120) observes, “but for this influx [of employees from other regions], the decrease in the number of fishermen engaged in open-water fisheries would have been more dramatic.”

Figure 3. Hired Labour in Capture Fisheries by Employee's Origin; 1995



Source: NSO/DOF (1995), as reported in Ruangrai (1997)

Overall, the fisheries sector (coastal and inland) is estimated to employ a little over 600 000 individuals, of which about half are fish farmers, one-fourth marine fishers (artisanal and commercial), and the remaining one-fourth were engaged in various kinds of fishing and processing. Of the latter, no less than 50 000 were employed in linked industrial plants, such as cold storage, freezers, canning and other commercial processing units (Ruangrai 1997, citing Department of Fisheries 1997).

Of the 161 667 individuals engaged in marine fisheries during the peak season, artisanal fisheries accounted for 43 percent (69 890). The remaining 57 percent (91 777 individuals) were engaged in commercial fisheries. However, hired employees accounted for 84 percent (76 696) of the latter, as against 12 percent ((8 249) in artisanal fisheries. Most of

the hired labour in artisanal fisheries was employed by outboard-powered boat operators, and hiring was generally on a production-sharing basis rather than wages (Ruangrai 1997). In all, hired labour accounted for over 53 percent (84 945 individuals) of all those engaged in marine fisheries.

Coastal aquaculture employed 83 000, over half of these being farm owners and their family members. Of these, 85 percent (70 000) were shrimp farmers.

4.1 Artisanal fisheries and small-scale fish farmers

4.1.1 Artisanal Fisheries

Definitions of what constitutes artisanal fisheries differ even among government agencies. The terms artisanal and small-scale fisheries are often used interchangeably. The DOF, for example, considers all vessels under 14 metres in length and all non-motorised boats, as well as in-board powered boats less than 10 GT (gross tonnes) as small scale (Johnson 1997, citing Pongpat, n.d.). The National Statistical Office (NSO) on the other hand, classifies individuals, households, companies, etc. engaged in fishing or aquaculture, into several categories, such as the 'operator's household' (which practices fishery/aquaculture on its own account), 'joint management household' (two or more households investing and/or operating jointly), 'company' (operating as a registered business entity) and 'fisheries employee household' (which has one or more members employed in fishery or aquaculture during the past 12 months) (Johnson 1997, citing NSO/DOF 1967, 1985, 1992). A more encompassing albeit qualitative definition based on the socio-economic status is given by Panayotou (1982, cited in Johnson 1997), who distinguishes small scale fishers as those "who, by virtue of their limited fishing range and a host of related socio-economic characteristics, are confined to a narrow strip of land and sea around their community, faced with a limited set of options, if any, and intrinsically dependent on the local resources."

The problem of defining artisanal fisheries notwithstanding, a general characteristics of this group are more or less easily discernible. These are: the limited fishing ground over

which they operate, fishing operations carried out with limited capacity boats (non-powered or outboard powered), or even without boat, and daily fishing trips (Ruangrai 1997).

Following the NSO/DOF definition which includes all fishers without boats and with boats less than 10 GT (gross tonne) capacity, but excluding those with inboard-powered boats, Ruangrai (1997) estimates the total number of small-scale fisheries establishment at 41 239 or 78 percent of all fisheries establishments, the rest (11 873 or 22 percent) being commercial fishery establishments. In terms of number of individuals, artisanal fisheries accounts for 69 890 percent

The artisanal fishery uses a wide variety of fishing gear. Somying (1994) reports as many as 24 types of small scale fishing gear in use in coastal Thailand. Most are seasonal, with the exception of shrimp gill net, crab net, push net and beam trawl. Gill nets are the most common type of fishing gear used by this group, with 55 percent of all artisanal fishers using this type. Crab, shrimp and other gill nets are commonly used on non-powered as well as outboard powered boats, while pushnets were most commonly used by those without boats. Traps (used by 13% of all artisanal fishers), push nets (7%), hook and line(5%), and lift nets (5%) were the other commonly used gear. Other gear used by artisanal fishers, include set bag nets, beam trawl, cast nets, bamboo stake trap, beach seine, clam dredge, purse seine and many other gear and methods, including manual collection (Ruangrai 1997). Beam trawl is considered artisanal fishers' gear (hence its exclusion from the fishing ban in some areas under the 24 November 1984 Ministerial Regulation — see Section 2.4).

Gill net users, however, frequently come into conflicts with trawlers and pushnetters, especially commercial ones, since, being stationary, gill nets obstruct trawl fishing and are often damaged by trawlers. The depletion of the fishing resources of artisanal fisheries by trawlers and pushnets is another cause of conflict (Ruangrai 1997). Among artisanal fishers, boat operated pushnet users often tend to earn better incomes than other fishers (Johnson 1997).

Most artisanal fisheries are generally household operations with little dependence on hired labour. Less than one percent of those without boats, 2 percent of those with non-powered boats and 16 percent of outboard-powered boat operators hired workers, mostly

on a production-sharing basis. Over 93 percent of those hired were local employees (Ruangrai 1997).

Statistics on the number of small-scale fisheries households are somewhat confusing, not least due to the problem of definition and the fact that many fishing boats are unregistered (MIDAS 1995:5). According to Somying (1994) the number of small scale fishing households decreased by 7.8 percent during 1985-1990. On the other hand, by comparing marine fisheries census data for 1985 and 1995, Anant (1997) shows that number of small-scale fisheries households increased 21 percent from 39 263 to 47 641, while their proportion in total marine fisheries households has increased from 76 percent to 90 percent during the same period.⁵

The total estimated catches from artisanal fisheries have fluctuated between 140 000 to around 160 000 tonnes. During the past four years, the catches seem to have increased slightly. However, the share of artisanal fisheries in total marine capture has steadily declined from 7 percent to 5.6 percent, although in the recent years it seems to be somewhat stabilising (Table 10).

Table 10. Production of Thailand's Small-scale Fisheries

<i>(tonnes, %)</i>			
Year	Total marine catch	Small-scale fisheries catch	% share of small-scale fisheries
1985	1 997 200	141 390	7.08
1986	2 309 500	146 773	6.36
1987	2 540 000	155 316	6.11
1988	2 337 200	158 353	6.78
1989	2 370 500	159 825	6.74
1990	2 362 200	149 989	6.35
1991	2 478 600	154 145	6.22
1992	2 736 400	153 074	5.59
1993	2 752 500	154 467	5.61
1994	2 804 400	158 604	5.66

Source: Pongpat (no date), as reported in Johnson (1997); Ruangrai (1997)

⁵ The 1995 figure for small scale marine fisheries households differs from that (78%) by Ruangrai (1997) because Ruangrai does not consider households with inboard powered boats of less than 10 GT as small-scale. This group represented 12 percent of the total fishing households in 1995.

Catches of artisanal marine fisheries are dominated by relatively high-value invertebrates, such as swimming crabs, shrimp, squids and cuttlefish. Together these accounted for 67 percent of all catch in 1994, up from 62 percent in 1988. Fishes, mainly pelagic, comprised another 30 percent in 1994, down from 34 percent in 1988. Trashfish forms only a small portion of the artisanal catch, and its share has further declined from 3.6 percent in 1988 to 2.2 percent in 1994 (Table 11). In 1994, 83 percent of the artisanal catches came from the Gulf of Thailand while the remaining 17 percent from the Andaman Sea. The estimated value of the 1994 catch was 6 797 million baht, or 19 percent of all marine landings. mentioned earlier, although the share of the artisanal fisheries is only about 5-6 percent of the total volume of all marine landings, it accounts for about 17 percent of the latter's total value.

Table 11. Catches of Small Scale Fisheries, by species; 1988 and 1994

Species/ Group	1988	% of total	1994	(tonnes and %)
	Quantity	artisanal	Quantity	%
Pelagic fish	29 356	18.42	28 386	17.90
Demersal fish	11 488	7.21	8 385	5.29
Other food fish	13 450	8.44	11 167	7.04
<i>Total Fishes</i>	<i>54 294</i>	<i>34.07</i>	<i>47 938</i>	<i>30.22</i>
Shrimp	36 052	22.62	39 944	25.18
Crab	30 486	19.13	36 877	23.25
Squid & cuttlefish	32 828	20.60	30 373	19.15
<i>All Invertebrates</i>	<i>99 366</i>	<i>62.35</i>	<i>107 194</i>	<i>67.59</i>
Trashfish	5 693	3.57	3 472	2.19
Total	159 353	100.00	158 604	100.00

Source: Marine Community Survey, 1994, as reported in (Ruangrai 1997)

Despite the high value of their catch, the artisanal fisheries sector is generally characterised by low income and high indebtedness, mainly to the middlemen on whom they depend for loans, supply of various equipment as well as sale of their catch. According to Wiravat (1997), of the estimated 48 000 households, 45 percent are in debts, over two-fifths to middlemen, a fifth to the state-run Bank of Agriculture and Agricultural Cooperatives (BAAC), and the rest to private lenders and relatives. In 1990, the average annual per capita

income of small-scale fishers was estimated to be 10 387 baht, somewhat lower than the national average of 16 463 baht (Johnson 1997, citing Pongpat n.d.). Over 60 percent of this income is spent on food, far higher than the national average, indicating greater poverty (*ibid.*).

4.1.2 Small Scale Fish Farmers

Of the 30 528 total coastal aquaculture establishments reported by the 1995 Marine Fishery Census (NSO/DOF, cited in Ruangrai 1997), 81 percent were shrimp farms, while fish, mollusc and crab culture accounted for the remaining 19 percent, with fish and mollusc culture accounting for 8 percent each, crab culture 1 percent and polyculture the remaining 3 percent. Cultured fish species included sea-bass, grouper, red snapper, tilapia, milkfish, and mullet. Cultured molluscs included oysters, green mussels, cockles, horse mussels and pearl (Ruangrai 1997).

Most fish farms were of small size, particularly fish and crab farms, with farm size usually less than 0.8 ha. About 90 percent of all farms, including shrimp farms, were operated on a household basis. Only one fish farm, two crab farms and a polyculture farm had company ownership, as against 110 shrimp farms (Ruangrai 1997).

Coastal aquaculture (including shrimp) employed 82 890 people in 1995, 85 percent of whom were engaged in shrimp farming (Ruangrai 1997). Fish and crab farming thus employed a relatively small proportion. Largely as a result of high prospects for profits, but also due to government and private sector encouragement, the last several years have seen many fish farmers shifting toward shrimp aquaculture.

4.2 The Private Sector:

Although commercial fisheries and shrimp farmers are considered under private sector here because of their link with processing industry, this classification becomes arbitrary, since for some commercial fishers and a large number of shrimp farmers, the occupation is a household activity. Secondly, many artisanal fishers are also linked with the processing

industry, or sell their catch to businesses, including restaurants, since a major portion of their catch consists of economic species.

4.2.1 Commercial Fisheries

Commercial fisheries here include, following Ruangrai (1997), those with inboard-powered boat. They represented 23 percent of all marine fisheries establishments (11 873 out of 53 112). The number and sizes of the boats used are shown in Table 11.

As seen from Table 12, the major gear used by commercial fishers included otterboard trawl, gill net, push net, falling net, trap, various purse seines and even hook and line. Boats smaller than 10 gross-tonnes (which are included in small-scale fisheries by NSO/DOF — see Footnote 3 above), commonly used gill net and otterboard trawl, while medium sized boats (10-49 GT) used these two in addition to falling nets and pushnets. Pair trawl were generally the gear for large boats (50 GT and above), which also used otterboard trawl (Ruangrai 1997, citing NSO/DOF 1995).

Catch statistics for commercial fisheries can be estimated from the 1994 marine community survey in 1994 (Ruangrai 1997). Since 6 percent of all catches were attributed to small-scale fisheries in 1994, assuming the same percentage for 1995, commercial fisheries accounted for a production of over 2.6 million tonnes.

Table 12. Boats Used by Commercial Fishers, by Size and Gear Type, 1995

Type of Gear	All Marine	Commercial	<10 GT	10-49 GT	100 GT & above
All types	53 112	11 873	6 381	4 010	1 482
Otterboard trawl	3 294	3 294	1 158	1 511	625
Gill nets	25 437	3 152	2 504	589	59
Falling nets	2 728	1 508	656	797	55
Push nets	3 963	1 039	597	392	50
Traps	6 272	1 032	794	229	9
Pair trawl	452	452	2	38	412
Hook and line	2 610	404	368	-	4
Anchovy purse seine	398	254	97	132	25
mackerel purse seine	99	99	32	41	26
Bonito purse seine	26	26	1	5	20
Other purse seines	417	335	25	118	192
Clam dredge	157	58	18	38	2
Miscellaneous	1 799	8	7	1	-

Source: NSO/DOF 1995, as reported in Ruangrai (1997)

Commercial marine fisheries employed a large number of people as labourers. Although only 9 percent (15 081 individuals) of the total of 161 667 engaged in capture fisheries represented owner/operators in commercial fisheries (including family members employed), hired workers or labourers in commercial fisheries accounted for 47 percent (76 696 individuals) of the total (Ruangrai 1997).

Among the commercial fishers, the smaller scale (below 30 GT) are the most likely to need alternative opportunities as coastal resources continue to decline. They are therefore the target group for which the TMRP needs to provide specific strategies for fleet retirement and alternative opportunities.

4.2.2 Shrimp Farmers

The marine fisheries census of 1995 reports a total of 25 210 shrimp farms covering an area of 67 405 ha, while the Department of Fisheries reports a total of 26 037 farms covering 75 213 ha in 1995.

Most shrimp farms were intensive farms (79%), using a high stocking density (30 shrimp/m² or above, up to 100 shrimp/m²). Extensive shrimp farms were 15 percent while

the remaining 7 percent were semi-intensive. Intensive farms usually are smaller in size, of less than 3.2 ha/farm. A fourth of these had sizes between 0.48 ha and 0.79 ha, while another 25 percent had sizes between 0.8 ha and 0.9 ha (Ruangrai 1997).

The increase in the number of shrimp farms was abruptly high — at 20 percent — during 1989-91, as a result of the expansion in new areas in the wake of the production crash in the inner Gulf provinces. The growth slowed down to 2-3 percent during 1991-93, but rose to 11 percent and 17 percent respectively during 1993-94 and 1994-95 as a result of world market demand and production crashes in other countries (see e.g., Briggs 1994). Yields averaged to 3.62 tonnes/ha or 272 432 tonnes from a total of 26 037 farms occupying a total area of 75 213 ha (Ruangrai 1997).

4.2.3 Seafood processors

Food processing takes many forms in Thailand, ranging from small, cottage industries and household production to large, sophisticated plants producing for export as well as domestic consumption. In 1995, 97 percent of the 9 331 fish processing units were household operations. The remaining three percent or the 294 business-type operations included 165 freezers and 22 canneries (mainly for tuna) and other larger-scale processors. Most were located close to Bangkok along the inner Gulf, and to the east as far as Rayong.

Of all the marine catch (capture and culture), 85 percent went into processing, while only 15 percent were consumed fresh. Nearly half of the catch went into fishmeal production by 99 fishmeal plants. Some 30 percent were used in freezing and an equal percent in canning. Farmed shrimp represented 80 percent of the value of frozen products, the rest being squid, cuttlefish, shellfish and crabs.

Five large companies, each owning 2-3 or more freezers controlled 40-50 percent of the market share. These included Charoen Phokephand (CP), Surapon Food, Chotiwat Seafood, Thai Fisheries, and Pak Phanang Cold Storage. Their freezers operated at 70 percent capacity. Freezer operators have been making efforts to make more value-added products, including breaded seafood, fritters and other ready-to-cook and semi-processed

products, all of which today form about 15 percent of the total frozen products (Ruangrai 1997).

Canneries mainly depended on imported frozen tuna as raw material. Domestic supplies are limited, and there is an attempt to shift toward more value addition (Ruangrai 1997).

More importantly time series data (1990-1995) indicate that the comparative advantage of the processed fisheries products has been declining for major products, namely frozen crustaceans and molluscs, prepared and preserved fish and crustaceans (Mingsarn et al 1998). This data is consistent with the FAO statistics showing a declining net export volume of Thailand between the last decade.

Freezer and canneries operators have formed a Food Institute, whose board is chaired by the Permanent Secretary of the Ministry of Commerce, and has representatives from various relevant government agencies, including Department of Industrial Promotion, Office of the Industrial Products Standards and Office of the Food and Drug Administration.

4.3 Consumers

Consumers of the fishery production include the processing industries, domestic consumer of fresh seafood as well as end products. Of the total marine production, nearly 83-85 percent goes into various forms of processing, while the rest is consumed fresh. Fishmeal industry consumes about 32 percent of the total catch (mostly trashfish), followed by freezing (26%), canning (15%) and other processing (11%) (Ruangrai 1998).⁶

Per capita fish consumption in Thailand has increased from 17.1 kg/head in 1985 to 26.0 kg/head in 1994 (Vicharn 1996). Vicharn (*ibid.*) notes that even though communication has improved supply conditions, much of the fresh fish consumption occurs in the coastal zone.

⁶ Ruangrai (1998) notes the difference between the National Fisheries Statistics and Fishery Factory Statistics on catch utilisation, and attributes the difference to imported raw material supplies and utilisation of by-products.

4.4 Major Public Agencies Concerned with Coastal Areas Management

See Section 5.5.

4.5 Non-governmental Initiatives in Coastal Areas Management

Despite the surge during the past decade in the number of non-governmental organizations (NGOs) working on environment and development issues in Thailand, only a few NGOs are working actively on coastal resource management or coastal community development issues.

The most notable among the few NGOs working in the area of coastal resources management/community development is Yadfon Association which has been active in the area of community based resource management (CBRM) in Southern Thailand. Its work involves some 30 coastal communities in and around Trang province, where it is based. Yadfon Association has been quite successful in encouraging communities to conserve local mangrove, sea-grass beds and corals, and is credited with the establishment of Thailand's first community mangrove forest in cooperation with the Royal Forest Department (RFD). It has also been engaged in information dissemination on a host of coastal resource issues including mangrove destruction, ecological and socio-economic impacts of intensive shrimp farming, coral and sea grass beds, etc.

The other two agencies working on similar CBRM themes are the Wildlife Fund-Thailand (WFT) and the Thailand Programme of the Wetlands International. Wetlands International generally focuses on ecological issues, but the understanding that degradation of ecosystems will not halt until local communities are involved in their conservation has been growing. Wetlands International has undertaken projects with active participation of local communities in Pattani province. It is also active in information dissemination through various media, including its local bilingual newsletter (in Thai and Yawi, commonly used by Muslim communities in Southern Thailand).

4.6 Implications for the Marine Rehabilitation Plan

The Marine Rehabilitation Plan will have to answer the following questions:

- (i) What are the implications of environmental degradation on the above stakeholders?
- (ii) Which group of stakeholders should receive government assistance? What type of the assistance?

The artisanal fishers are likely to be the most affected group if coastal environmental degradation is allowed to continue. An attempt to reverse this trend means the tightening of the 3,000 metres zone and the abolition of the support given to the fishmeal industry. In addition, the stringent demand from the trading partners will force the aquaculture sector to restructure into an environmentally controlled industry. The survivors in the aquaculture sector are likely to be a medium scale farm owners who constantly seek scientific and technical information. Other groups of stakeholders are likely to have more room for maneuvering. The Marine Rehabilitation Plan will have to address each group's problems, and provide justification for support or reform. A programme to alleviate the impacts of restructuring must be carefully thought out in order to avoid waste, exploitation and unwarranted social or economic injustices as occur in many fisheries subsidies programmes overseas.

5. Institutions for Coastal Management: Plans, Policies, Legislation and Organisations

Institutions here are broadly defined to include sets of formal laws and regulations and informal customs that define the relationships between resources and their users. Organisations, then are the entities (comprising groups of people), through which these institutions work (cf. North 1990, cited in Johnson 1997).

5.1 Development Policies and Plans in Thailand

Public policies in Thailand are manifested in national and sectoral plans. The National Economic and Social Development Board (NESDB) is Thailand's principal policy making organisation. Since the early 1960s, the NESDB has been charged with the formulation of the five year National Economic and Social Development Plan, which sets the direction of national development for the plan period. Another agency responsible for policy making for coastal and other natural resources is the Office of Environmental Policy and Planning (OEPP) under the Ministry of Science, Technology and Environment. OEPP's mandate is to formulate and coordinate more detailed natural resources and environmental conservation policies and plans (MIDAS 1995:I-104).

The OEPP has recently prepared a long-term Environment Plan for the whole country. This plan, however, is far too long-term (20 years) to instill any sense of urgency for action among the line agencies. Moreover, the policies in the long-term plan are too broad. The OEPP has also prepared a more specific, medium-term (8-year) Environmental Quality Management Plan. However, this action plan has failed to meet the expectations of many practitioners as well as analysts. First, it lacks the necessary insight into the various issues concerning environmental quality. Although priorities are listed, the justification for

the priorities is lacking, and often there are misplaced priorities. Coastal resource management overall receives only 0.3 percent of the Plan's proposed budget. The plan also fails to propose any new ideas for effective management. The emphasis is once again on engineering solutions rather than institutional change. Besides, many of the measures suggested lag behind those currently undertaken by some line ministries. In general, the Plan fails to assess the capacity of the line ministries in dealing with environmental issues, and instead provides only broad guidelines.

In addition to the plans prepared by NESDB and the OEPP, line agencies (ministries or departments within a ministry) may draw their own sectoral plans, in line with the five-year National Plan. For example, the National Fisheries Plan of the DOF was prepared under the auspices of the National Fisheries Committee. Announced in 1993, the Plan has now been approved by the Cabinet, but the DOF budget does not reflect the commitments expressed in the Plan, raising the question of the Plan's practical importance. Examples of other sectoral plans commissioned or completed by other government agencies include the Tourism Master Plan of the Tourism Authority of Thailand, the Industrial Master Plan which is under way, and the National Forestry Master Plan, which has been completed but not announced due to opposition from NGOs. The Thai Marine Rehabilitation Plan, for which this report is written, is now under way.

Although the main objective of the National Plan is to set the direction of economic and social development for the Plan period, by laying out guidelines and policies, the Plan has mainly been used as a budgetary reference. Government projects planned by line ministries are considered for approval by the Bureau of the Budget if they are consistent with the National Plan. Thus, in a way, the National Plans have been effective in disbursing government spending to line ministries' policies and projects, but less so in providing guidelines for institutional reforms, such as the implementation of Polluter-Pays-Principles and innovative uses of economic instruments, such as tax and user charge.

It is the Eighth Plan (1997-2001) that probably has intensified the trend toward sectoral planning by line ministries. Unlike the previous National Plans, the Eighth Plan is more people-oriented; it stresses on rehabilitation, public participation, supporting legislation

for abolishing destructive gear, etc., rather than the usual project-oriented approach. The lack of project-oriented approach has stimulated line agencies to propose their own projects in sectoral plans. Thus, more line agencies have resorted to formulating sectoral plans to secure their share of the National budget. Sectoral plans are also used for delegating responsibilities (and divide the budgetary cake) to various departments and agencies, both within the public and the private sector. While the Eighth Plan's emphasis on people may well have been with good intentions, a lack of consistency and clear direction on dealing with issues such as public participation and human resource development has considerably diluted the original objective. Nor have the issues been prioritised. Instead, the Plan has attempted to accommodate virtually every interest group. Another major drawback of the Eighth Plan has been its lack of clear-cut macro-economic policies.

Drafted in the economic boom years, the plan is now being revised, following the current economic turmoil. There has been criticism from some quarters on the Plan's lack of focus on the direction of economic development, "more explicitly spelled out in earlier plans" (The Nation 1998).

Policies in Thailand are implemented through ministerial regulations and notifications. The important feature of Thai policy-making is that legislation in support of each line ministry is usually brief, vague and bestows the line ministry, via ministerial regulations, a substantial discretionary power to implement policies set out in the National Plan and Sectoral Plans. Obviously, the sectoral policies of the line ministries then become a playing field for ministers who seek to dissipate rent to their own constituencies and factions, while national, not to mention international interests, are put on a back burner.

The Department of Fisheries, under the Ministry of Agriculture and Cooperatives is no exception to this description. Compared to other departments and ministries the DOF is perhaps much more successful in scientific innovations (e.g., artificial insemination for economically important fish species or the proposed sea irrigation system for shrimp farms). However, like other line agencies, the DOF has had little success in enforcing regulations or reforming institutions. The many regulations that have been announced so far look

impressive on paper, but the current state of the Thai seas and of small-scale fisheries tells a different story.

5.2 Coastal and Marine Resource Policies under National Plans

Being a natural resource based economy, Thailand's early efforts to spur economic growth were focused on the agriculture and fisheries sectors. This is evident from the emphasis on productivity in most Plans. Environmental concerns over fisheries resources did not appear in the National Plan until 1970s, and when they did it was only when the depletion of both demersal and pelagic stocks had reached serious levels due to over-exploitation. The following paragraphs summarise the major emphases on the fisheries sector in the successive National Plans.

The introduction of otterboard trawling for demersal fisheries at the beginning of the first National Plan (1961-66) was supported by the Board of Investment (Anant 1997). Capital flowed in, pushing up the number of trawlers, and boosting production. The second National Plan (1967-71) continued to stress marine capture fisheries. During the Third Plan (1972-76) the policies laid more emphasis on aquaculture development. In this period, production declined due to the oil crisis and other factors identified earlier. Development of canning technology and export of canned tuna, shrimp and baby clam began taking place in this period (Sirilak 1997).

With the marine capture production fluctuating in response to EEZ declarations and depleted fisheries, the emphasis in the fourth National Plan (1977-81) was on continuing aquaculture promotion, and for the first time, on marine habitat conservation. Several regulations were promulgated to conserve marine fisheries, and more patrol boats were provided to support conservation regulations.

Although the need for marine conservation was recognised in the Fourth Plan, the stress still remained on maximising output. The Fifth Plan (1982-86) for example, focused on projected increase of 5.5 percent a year (Anant 1997). At the same time, the processing industry was also developing rapidly, evident from the increasing numbers of freezing plants

and canneries since 1983 (Sirilak 1997). During this period, joint fisheries ventures were developed with several countries, including Oman, Saudi Arabia, Indonesia, India, Bangladesh and Australia (Anant 1997).

Following the decline in marine capture production, the objective in the Sixth Plan (1987-91) was to maintain production at 1.9 million tonnes (Anant 1997). Actual production during the Plan period was however 2.3-2.5 million tonnes annually (Johnson 1997). The policy during this Plan period also stressed on increasing aquaculture production by emphasising the culturing of species other than shrimp, including fish species such as grouper, white snapper and red snapper (Anant 1997).

Recognising the significance of the small scale fisheries in terms of employment and subsistence support it provides to coastal communities, the Seventh Plan (1992-96) stressed on the development of this sub-sector, which contributed only 13 percent of the marine production but accounted for 90 percent of coastal fisheries households (Anant 1997). Towards this end, the objectives in the Plan included increasing income and quality of life of coastal, small-scale fishers, improving access (e.g., by constructing fishing piers). A number of regulations aimed at conserving fisheries were promulgated during this period (see Table 14, Section 5.4). Measures taken were installation of artificial reefs to provide shelters for fishes, introduction of non-destructive gear (e.g., schemes for replacement of pushnets by gill nets), and temporal ban on fishing in spawning and feeding areas. As for marine fisheries, the production target was scaled down to 1.7 percent. Fisheries joint ventures were established with countries like Indonesia. A rapid growth of shrimp aquaculture during this period helped maintain the growth of overall production.

Overall, conservation measures received high priority during the 6th and 7th Plans, particularly in the latter. This period also witnessed some environmental disputes that have affected the fisheries sector, and still remain unresolved. The notable among these is the shrimp import ban by the U.S. over the turtle issue (see Section 6.5.2).

The Eighth Plan (1997-2001) was a departure from the previous Plans in that, as explained earlier, it attempted to focus on human resource development and social issues instead of taking the usual project-based approach to economic and social development. In

addition to the aims of encouraging public participation in natural resource and environmental management, there are some more specific targets that relate directly to the coastal zone. These include,

- maintaining mangrove forests (for enhancing coastal biodiversity) of no less than 160 000 ha (1 million rai) by the end year of the Plan;
- Maintaining seawater and freshwater quality at the levels in 1996; and
- Preparing and Implementing a Marine Rehabilitation Plan for the conservation and restoration of marine resources and the environment.

5.3 The National Fisheries Plan

The National Fisheries Plan was prepared by the National Fisheries Committee in 1993, and has been formally adopted with the Cabinet approval. The objectives of the plan can be grouped into four categories: development and management of fisheries within the Thai Waters, development of fisheries industries, development and management of fisheries beyond Thai waters, and aquaculture.

The Fisheries Plan has an impressive list of policy instruments that cover virtually all the problems currently encountered by the fisheries sector. However, there is little attempt to prioritise them, nor are they considered in an integrated manner, by recognising the links between the various problems. For example, the conservation and management objectives of controlling fishing fleet, fishing gear and fishing in conservation areas, are not matched by the production objective which sets a *minimum* target of 2.5 million tonnes a year, rather than putting an *upper limit* on production. Furthermore, the Plan does not detail strategies to achieve its objectives. Since most of the objectives focus on problems that have been affecting the fisheries sector for quite some time, it would follow that some new strategy may be necessary to solve these problems effectively. Although many past regulations have been impressive and some have indeed worked for a while (e.g., the 1984 fishing ban in certain areas, see Section), there has always been a lack of consistency in implementing the laws. Therefore any new strategies for achieving the stated goals would be required to focus

on filling, what Johnson (1997:39) identifies as “the gap between formal regulations and informal practice”.

The Plan also focuses on some new areas in fisheries management, including the quota systems and frontage rights for local fishing communities. Fisheries officials, however, seem unclear as to how to implement these, and the pros and cons of their application.

The Plan does touch upon some important areas, especially the problem of coordination between the DOF and the Harbour Department over boat registration and fishing licence. Another important area that has been left out is consumer protection.

5.4 Key Legislation⁷

Coastal resource management comes under the jurisdiction of a number of government agencies. These agencies and the legislation under which they operate can cover a wide range of areas, including, land (titling, use), forestry, fishing, agriculture, town and country planning, tourism, pollution control, social issues, wildlife protection, mineral extraction, and national security.

Legislation in Thailand comes in many forms. Besides the broad framework laws which are often inter-sectoral in nature, there exists a number of specific laws supporting line ministries, and departments under them. The Fisheries Act of 1947 is one such law which is implemented by the Department of Fisheries under the Ministry of Agriculture and Cooperatives. These laws, however, are usually brief, vague and bestow substantial discretionary powers to the ministries, by allowing them to issue ministerial regulations. Individual departments and ministries also issue notifications on specific issues. Since the main laws are often too broad and vague, their interpretation in the ministerial regulations may change from time to time.

In addition to these pieces of legislation, executive measures such as Cabinet Decisions and management plans issued from time to time, also affect coastal management.

⁷ Major part of this section has been adapted from Kobkun (1997).

These can be called 'soft laws' in the sense that they are regulative measures that can dictate the actions of line ministries and other government agencies. In the case of the Fisheries sector, some such important measures include the Cabinet Decision of 4 June 1991 concerning the management of mangrove forests and corals. It set out measures for management of corals, and required a clear delineation of boundaries for various mangrove forest zones (Conservation Zone, Economic A Zone and Economic B Zone in Mangroves in a manner similar to terrestrial forests) and a planting of 8 000 ha of mangroves each year for five years (until 1996). In the same year, on 23 July another Cabinet Decision to suspend all uses in mangrove areas was taken. Similarly, two Cabinet Decisions of 1991 and 1992 respectively set out measures for the management of coral reefs (Kobkun 1997).

According to Baker *et al.* (1986, cited in MIDAS 1995) there were 19 regulations concerning coastal zone and its management in Thailand. Several laws have been amended or added since then. Significant among the new laws are Thailand's new framework environmental law, the Enhancement and Conservation of National Environmental Quality Act, B.E. 2535 (NEQA 1992), and the Wild Animals Conservation and Protection Act B.E. 2535 (WACPA 1992).

The important laws concerning the coastal zone includes, the Fisheries Act, B.E. 2490 (1947); the Forest Act, B. E. 2484 (1941); the Thai Navigable Waters Act B.E. 2456 (1913); the Land Code of Thailand, B.E. 2497 (1954); the Land Development Act, B.E. 2526 (1983); the Land Reform for Agriculture Act, B.E. 2535 (1992); the City and Town Planning Act, B.E. 2518 (1975); the Tourism Act, B.E. 2522 (1979); the Minerals Act, B.E. 2510 (1967); the National Forest Reserves Act, B.E. 2507 (1964); the National Park Act B.E. 2504 (1961); and the Wild Animals Conservation and Protection Act B.E. 2535 (1992). The NEQA is implemented by the Ministry of Science, Technology and Environment (MOSTE), the Fisheries Act by the DOF, the TNWA by the Harbour Department, and the last three by the Royal Forest Department (RFD). The resources covered by these laws are shown in Table 13.

Table 13. Important Laws for Coastal Resource Management

	NEQA 1992	Fisheries Act 1947	TNWA 1913	National Park Act 1961	Forest Reserve Act 1964	WACPA 1992
Marine water quality	✓	✓	✓			
Protected areas	✓	✓		✓	✓	✓
Coastal land use	✓		✓	✓	✓	✓
Fisheries management	✓	✓		✓	✓	
Regulation of fishing boats		✓	✓			
Point source pollution	✓	✓	✓			
Mangrove & wetland conservation	✓	✓		✓		

NEQA = The Enhancement of National Environmental Quality Act 1992

TNWA = The Thai Navigable Waters Act 1913

WACPA = The Wild Animals Conservation and Protection Act 1992

Of the many laws, those concerning land management and use are perhaps the most complicated and problematic, as they are implemented by different agencies. Overlaps occur when the boundaries between the jurisdiction of different agencies are unclear. For example, the issuance of land titles (viz., NS-4, NS-3, NS-3k) is the responsibility of the Department of Land in the Ministry of Interior under the Land Code of 1954. In addition, the Royal Forest Department issues S-T-K certificates for squatters in forest areas, since the Land Code does not cover forest areas. NS-4 and NS-3 are secure land titles, which allow the owner to freely buy, sell, mortgage or transfer land, while the S-T-K certificate provides only usufruct right. However, as the forest boundaries are often ill-defined, in many cases it was found that the so-called squatters “were actually paying land taxes to the authorities, much to the chagrin of forest officers” (Clearly and Eaton 1996:70).

The NEQA is a broad, framework environmental law which covers all natural resources and the environment in Thailand, including the coastal resources. The NEQA has conferred power to the National Environment Board (NEB) to set various environmental standards including those for water and marine water quality as well as estuaries. An NEB Notification was issued in February 1994 to set standards for coastal marine waters and these are largely based on the former standards set in 1991. The Minister of the MOSTE

also has power to designate an “environmental protection zone” and this power has so far been exercised to protect sensitive coastal areas, namely coastal areas up to the width of 3 kilometres around Phuket and its several adjacent islands, Pattaya and its adjacent gulfs and beaches, and several islands in Krabi province. The significant result of declaring an area an “environmental protection zone” is that it would enable MOSTE to control land use as well as prescribing activities which are banned from the areas. These could be wide-ranging and the activities forbidden in the afore-mentioned areas so far include sand excavation for commercial purposes, anchoring along the coral reefs, collection or destruction of corals, catching of ornamental fish, shrimp farming, use of fishing gear which destroys marine juveniles, land reclamation, discharge of untreated sewage or pollution into the sea, and transporting of hazardous substances through pipelines. In some areas such as those in Krabi province, construction of hotels and condominiums is also prohibited. Although the power to designate environmental protection areas belongs to the MOSTE, the power to enforce the measures prescribed rests with the officials concerned with the particular activities involved. For instance, DOF officials are presumably responsible for enforcing the ban on destructive fishing gear, collection of corals, and shrimp farming. Similarly, local officials assigned by the Ministry of Interior would control construction of hotels or condominiums, officials from the Harbour Department would control activities involving reclamation of coastal areas whereas pollution control officials assigned by the MOSTE would have the power to ensure that standards for pollution discharge from point sources are observed. It is obvious that to render all the measures prescribed effective would require a significant degree of coordination among the governmental agencies involved.

Finally, the NEQA also requires that an EIA be conducted for certain types and sizes of projects and these include activities in coastal areas such as construction of hotels and resorts, mining and certain types of industry such as petrochemical industry, oil refineries, pulp and paper or sugar industry, coastal land reclamation, building of roads through a protected area and within the distance of 50 metres from the coast. The MOSTE is also authorised by the NEQA to designate point sources which are subject to control over their waste discharge and so far big buildings, including those located in coastal areas, have been so designated.

The second major legislation concerned with coastal resource management is the Fisheries Act of 1947 as amended. This law is most important as a tool for managing fisheries but, as the fact speaks for itself, has largely failed to function effectively. The Act authorises a provincial governor, with the approval of the Minister of Agriculture and Cooperatives, to declare certain fishing areas in his or her province to be a “reserve area” whereby no fishing or aquaculture is allowed unless a prior permission has been obtained. This provision has enabled many coastal areas to be designated and protected. Section 19 of the Act further prohibits releasing of harmful substances into fishing areas except when this is done for scientific purposes or when a prior permission has been obtained. Section 20 also prohibits use of electricity or dynamite in fishing. As far as management of fisheries is concerned, Section 32 of the Act is most relevant in that it authorises the Minister or the provincial governor concerned to enact measures for controlling types, number and components of fishing gear; prohibiting certain types of fishing tools and methods used for fishing during breeding seasons; setting a maximum allowable catch of aquatic species including a total ban on catching particular types of aquatic species. Numerous Ministerial Regulations have been enacted under this provision during the last 50 years (Table 14). Some examples include total prohibition on catching of sea turtles in 1949 and dugongs in 1961; prohibition on the use of trawl and push nets within a 3 000-metre zone from the seashore in the Gulf of Thailand in 1972 and in the Andaman sea in 1979; restrictions on the use of trawl and push nets during the breeding season (September-February) in an area of 54 square kilometre off the coast of Chonburi province in 1975; restriction in 1985 on the use of light luring purse seine nets off the coast of Trad province in the Gulf of Thailand and in an area of 1 800 square kilometres off the coasts of Phang-nga and Krabi provinces in the Andaman sea during the breeding season (mid April - mid June) of each year; designation in 1994 of a 26 400-square kilometre conservation area in the Gulf of Thailand within which all trawl and purse seine nets are prohibited during the breeding season (mid February - mid May) of each year.

Table 14. Fishery Conservation Measures under the amended Fisheries Act 1947

Period of Prohibition	Type of Gear/Fishing Method targeted	Management (prohibitory) Measures	Ministerial Regulation
Whole year	All motorised gears	3 000 m from shoreline and 400 m off any stationary gear	
		1. In the Gulf of Thailand (including the Songkhla Lake)	20 July 1972
		2. In the Andaman Sea (including Phang-nga Bay)	01 Aug 1979
Whole year	trawl, pushnet, purse seine, shortnecked clam dredge, all types of gear used with light luring devices	3 000 m from shoreline in Prachuab Khirikan and Chumphon	16 Apr 1990
Whole year	purse seine with light luring	Some areas along the Trad province	24 Jan 1985
Whole year	All kinds of shell fish racks	3 000 m from shoreline, entire coast	18 Feb 1974
Whole year	net mesh size	limiting mesh size used with light luring fishing not wider than 2.5 cm	14 Feb 1983
Whole year	purse seine with mesh size less than 2.5 cm, operating during night	All areas both in the Gulf of Thailand and Andaman Sea	14 Nov 1991
Whole year	short-necked clam dredge	1. 3 000 m from shoreline (8 000 m for Samut Sakhon) with the following conditions a. the dredge mouth-width not less than 3.5 cm b. the dredge sieve size not less than 1.2 cm c. the boat length not more than 18 m d. no more than 3 dredges per boat.	23 Apr 1985
Whole year	squid light luring with mesh smaller than 3.2 cm	All areas of Gulf of Thailand and the Andaman Sea	5 Nov 1981
Whole year	set bag net	All areas of Gulf of Thailand and the Andaman Sea	
Whole year	set net	All marine and freshwater areas	
Whole year	drive in net	All areas of the Gulf of Thailand and the Andaman Sea	
Whole year	mine equipment	All areas of Gulf of Thailand and the Andaman Sea	
Whole year	all gears	1. catching and poaching of sea turtles and turtle eggs	various ¹
Whole year	all gears	sea dugongs	09 Aug 1961
Whole year		sea corals	various ²
Whole year		dolphins	18 June 1990
Whole year		bloody cockles	28 Aug 1985
Whole year		No fishing in the preservation areas	

(Continued on page 59)

Table 14 (continued)

Period of Prohibition	Type of Gear/Fishing Method targeted	Management (prohibitory) Measures	Ministerial Regulation
Whole year		a. Certain areas in Phuket province	17 Mar 1969
Whole year		b. certain areas off Chumphon province	various ³
Whole year		c. certain areas off Trad province	09 May 1991
Whole year		d. certain areas off Phang-nga province	
Whole year	trawl, pushnet, purse seine, clam dredge and light luring net	3 000 m from shoreline in certain areas off Prachuab Khiri Khan and Chumphon provinces	
1 Sep-28 Feb	motorised fishing gears	Certain areas off Chonburi province	26 June 1975
15 Feb-15 May	pair and otterboard trawl, purse seine, gill net with mesh size not less than 4.7 cm (except the otter-board and beam trawl fishing at night time during 15 Feb-31 March and both night and day during 1 Apr-15 May)	Protection of fish spawners and larvae in certain areas off Prachuab Khiri Khan, Chumphon and Surat Thani	28 Nov 1984
Oct-Dec	All gears	No fishing of egg-bearing females of mud crab, swimming crab and <i>Charybdis feriatus</i>	11 July 1983
1 Dec-28 Feb	All gears	Protection of horse-shoe crab in Phang-nga Bay, including rivers and estuaries entering the Bay	
15 Apr-15 Jun	All trawl, purse seine, gill nets with mesh size not less than 4.7 cm	Protection of fish spawners and larvae in certain areas off Krabi and Phang-nga	11 Apr 1985
Whole year	trawl and pushnet on motorised boats	in Songkhla Lake	11 Aug 1972
Whole year	purse seine	Songkhla Lake	08 Apr 1980
Whole year	clam dredge on motorised boats	3,000 m from shoreline	18 Feb 1974
Whole year	clam dredge for fishing bivalve	Samut Sakhon Bay	17 June 1975
Whole year	all gears	Sattahip Bay	26 June 1975
Whole year	all gears	Around Tao Island and Hang Tao Island	13 Jan 1976
Whole year	trawl and pushnet	limiting amount of permitted trawl and pushnet	26 Mar 1980
Whole year	trawl and pushnet	allow the use of trawl and pushnet outside 1000 m around Tarutao Island	17 Oct 1980
Whole year	Japanese net or round up net	all areas of coral reef or rubble in the sea	26 Dec 1981

Note: ¹ 14 Apr 1949, 19 Nov 1980, 11 Aug 1981 and 15 Oct 1981; ² 10 Jan 1978, 18 Dec 1991; ³ 27 Feb 1989 and 15 May 1989.

Source: DOF, Boonlert (1994)

There is therefore no dearth of legislation for the management of marine fisheries in Thailand. Unfortunately most of these regulations have done “too little” and come “too late” to halt the unceasing depletion of the Thai fisheries resources. To a large extent, governmental policies have helped to encourage excessive growth in the commercial fisheries sector over the last thirty years, resulting in overexploitation of the resources to the critical point. The number of registered fishing boats swelled from 9 813 in 1973 to 18 079 in 1993. This figure does not include the vast number of unregistered fishing boats which, if taken into account, would bring the number of fishing boats to an approximate total of over 50 000 at present. Trawl yields have decreased steadily from 265 kg/hr in the early 1960s to the present average of 25 kg/hr in the Gulf of Thailand and 35 kg/hr in the Andaman sea. All these indicate that, not taken into account the incapacity of the DOF to enforce the measures enacted, existing laws and regulations designed for the conservation of fisheries would not be adequate. Some more comprehensive and sophisticated measures will have to be devised to allow the fishery resources to recover.

One obvious possible measure is to determine an annual total allowable catch (TAC) in the Thai maritime areas and to give fishing quotas for each fishing boat. However, apart from the difficulty in ensuring that TAC is not exceeded, determination of TAC is not an easy task which requires reliable data on the migratory patterns of aquatic species. The quota system is also possible only if fishing boats are required to operate within a designated fishing area, in contrast to the present system whereby they can move freely throughout all the maritime areas. In addition, there is an anomaly in the way the Thai authorities regulate fishing boats. The DOF has the authority in granting fishing licences whereas the Harbour Department affiliated to the Ministry of Transport and Communications is responsible for registration of fishing boats. This means that an effective control over the number and regulation of fishing activities would not be possible without a close coordination between the two Departments. It is not clear how much the two agencies have worked together, and even if the answer is positive, the results are far from impressive.

The Harbour Department is responsible for the implementation of the 1913 TNWA as amended. The primary function of the Department under the Act is to maintain the

navigability of the waterways which include rivers, canals, lakes and ponds which are open for public use, as well as the maritime areas under national jurisdiction. Section 117 prohibits construction of premises or anything which would encroach upon these waterways without a prior permission from the Department. This power has been interpreted as including control over reclamation of coastal areas. In addition, Sections 119 119 *bis* and 204 prohibit releasing or discharging of pollutants including chemicals, oil or petroleum oil into the sea. The power of the Department is therefore extensive. Given that it is charged with the responsibility to oversee all waterways throughout the country and its limited staff, it is not surprising to find that the Department could not fulfill its functions effectively.

Finally, one of the most important Departments responsible for management of coastal zones is the Royal Forest Department (RFD). The RFD has extensive authorities in the implementation of the National Park Act, the Forest Reserve Act and the WACPA. All these legislation enable the RFD to declare specific coastal areas as protected areas and among the three the National park Act is more often used than the other two. Several coastal areas and beaches have been designated as national parks under the Act. Among these is the controversial Tarutao Marine National Park which is the largest marine park in Thailand covering 1 490 km², 1 230 km² of which are offshore marine areas. The result of such designation is that local people are excluded from using natural resources, including fisheries, in the areas. The negative impacts on the livelihood of local communities are significant, especially as the park covers a large tract of Satun coastal waters where over 60% of the total workforce is employed in the agriculture/fishery sector. The fact that the park covers such a vast geographical area also makes it impossible for the RFD to supervise that it is not violated. In reality, the Tarutao Marine National Park has remained by and large a free or an open fishing ground for both small-scale fishermen and commercial fishing boats. The Tarutao Marine National Park serves as a good example of how national park policy fails to achieve its conservation purpose. This should not be surprising since the incapacity of the RFD in supervising many other national parks in the country has always been well-known. To a great extent, inefficient state mechanism to enforce laws seriously and the failure to take into account the interest of local people contribute to the failure of such policy.

It can be concluded that there are at present a number of laws and institutions which are concerned with management of coastal resources. Some of these, such as those enacted under the Fisheries Act, are inadequate and arrive too late in time to prevent the depletion of fisheries resources. Others such as those relating to national park policy are too wide-ranging and ignore the reality that local communities' dependence on the coastal resources should be recognised. It is obvious that all the laws suffer from inadequate enforcement, rendering fishing regulations meaningless in practice. Increase in the number of staff and enhancement of staff's capability in enforcing laws and regulations may help to alleviate some of the shortcomings. What is crucial is, however, the need for more coordination among all the governmental agencies, in particular among the DOF, the RFD and the Harbour Department. One obvious possibility is to involve the DOF officials' role in enforcing national park areas. This is desirable especially if we wish to adopt an integrated approach in the management of coastal resources. With respect to the management of fisheries, it is essential that the DOF and the Harbour Department should work closely in order to control the number of fishing boats and to enforce fishery policy.

A major criticism of the Thai legislation has been that the sectoral, functional and specialised management approach adopted under the existing laws frequently causes problems of overlapping mandates among many government agencies (MIDAS 1995, citing Tasneeyanond and Rubthon, 1990). As ministries and departments vie for projects for budget reference, this overlap and a lack of coordination gives rise to work duplication in some fields, at the expense of other areas which are neglected. The jurisdictional overlap and a lack of coordination is particularly serious for the coastal zone where a variety of resources and a diversity of users co-exist. For the coastal zone, this sectoral approach has translated into the fact that there is "no legislation that provides for integrated management of coastal resources in Thailand" (MIDAS 1995, citing Tasneeyanond and Rubthon 1990). However, the main problem in coordination seems to lie not in legislation but in the lack of political will and willingness of the agencies concerned to work together and resolve differences and mandate overlaps. Despite the numerous gaps in the existing laws, integrated coastal resource management is not an impossible task under the current legislative framework, especially under the framework environment law, NEQA 1992 (see below). Whether the

National Marine Policy and Restoration Board (NMPRB) is able to fulfill its duty as a coordinating organ for agencies concerned with coastal zone management depends on how best it can make use of the existing laws. At the moment, however, the main hurdles before the NMPRB seem to be administrative and budgetary, and not legislative.

5.5 Institutional structures: Government agencies

MIDAS (1995) classifies government agencies concerned with coastal zone management by their roles as policy-making, planning and implementing agencies. These agencies and briefly their roles are highlighted below:

Policy Agencies: The two main agencies are the National Economic and Social Development Board, charged with national planning through five-year National Economic and Social Development Plans, and the Office of Environmental Policy and Planning, under the Ministry of Science, Technology and Environment. OEPP's main mandate is preparing natural resources and environment management and conservation policies.

Besides these two main agencies, other policy-making, planning and implementing agencies and their major responsibilities in brief are listed below, following MIDAS (1995):

National Environment Board: macro-level issues related to the environment, national policies on environmental protection and natural resource management, particular emphasis is being given to environmental impact assessment (EIA) and pollution control.

Committee on Land Development: criteria for land classification, soil and land improvement measures, land utilisation and development plans, and establishment of land development agencies

Central Sub-Committee for Coastal Area Development: reviews and approves proposals from provincial sub-committees on coastal land development, land classification and coastal development.

Provincial Sub-committee for Land Classification and Coastal Development: These committees exist in 23 coastal provinces (all, except Bangkok), concerned with

matters of land classification, land consolidation and agricultural land reforms, screening of coastal development projects, research initiatives on coastal development etc. Also, drafts provincial coastal land use development plans and coordinates with different land classification agencies.

National Committee for Mangrove Resources: operates with the National Research Council (NRC) of Thailand, coordinates with the National Committee for Marine Science on mangrove-related issues, advises in planning and research on mangroves, and concerned with problems relating to mangrove utilisation and conservation.

Provincial Committee on Classification of Areas for Shrimp Culture: identifies appropriate areas for marine shrimp farms on private as well as public land, the latter usually in economic B mangrove forest areas. prepares master plan for shrimp culture, which are submitted to the Central Sub-Committee for Coastal Area Development; investigates and resolves environmental problems resulting from shrimp culture, plans for establishment of fishermen groups, shrimp culture cooperatives, collects data related to land classification for shrimp culture, mangrove forest and water quality.

National Committee on Wetland Conservation: inter-agency coordination on wetland management at both policy and implementation levels.

Planning Agencies:

Tourism Authority of Thailand: provincial tourism plans

Town and Country Planning Department: municipal and sanitary district plans

Natural Resources and Environment Office, Ministry of Interior: reviews provincial environment plans

Office of the National Research Council: monitoring of natural resource utilisation using remote sensing technology, preparation of natural resource management plans if requested by other agencies.

Coastal Resource Division, Department of Land Development: plans coastal land use management

Office of Environmental Policy and Planning (OEPP): helps in the preparation of provincial environmental plans including master plans.

In addition, a number of other policy level agencies have planning functions (including NESDB, OEPP, and the Office of Agricultural Economics), while some line, or implementing agencies are also involved in planning, e.g., DOF, RFD, DLD (mentioned earlier), and Department of Agricultural Extension.

Implementing Agencies:

Under the Ministry of Agriculture and Cooperatives: **DOF, RFD, OAE, and DLD.**

Under the Ministry of Science, Technology and Environment: **OEPP.**

5.5.1 Inter-agency coordination

Inter-agency coordination is a chronic problem in Thai bureaucracy due to inter-departmental jealousy and data secrecy. As agencies vie for a share of budgetary cake by proposing projects in their plans, there is little incentive for them to make joint projects. The problem of the lack of coordination cuts across the whole range of government agency, but it is in the coastal zone management, which requires an integrated approach, that the lack of coordination could be more problematic.

So far as the Department of Fisheries, and the fisheries sector are concerned, the major issues are the need for coordination with the Harbour Department on boat registration and with the Royal Forest Department on the Marine National Park demarcation and management. These are discussed in more details in Section 6.3.2, and 5.4, respectively.

5.5.2 The National Marine Policy and Restoration Board (NMPRB)

The National Marine Policy and Restoration Board (NMPRB) was formed in 1996 during the Banhaarn Silpa-archa government, with Dr. Plodprasob Suraswadi, the then Director-General of the DOF, as the Director of its office. The Board was set up under a Regulation of the Office of the Prime Minister Regarding the National Marine Policy and Restoration,

B.E. 2539 (1996), which came into effect on 1 November 1996. The composition of the Board and its duties and authority are described below.

The Prime Minister is the Chairman of the Board, and in his capacity can assign one or more Deputy Prime Ministers as Co-Chairpersons. The members of the Board are the following:

Ministers of the following ministries: Ministry of Agriculture and Cooperatives (MOAC), Ministry of Transportation, Ministry of Interior (MOInt), Ministry of Science, Technology and Environment (MOSTE), and Ministry of Industry (MOI).

Permanent Secretaries of the following ministries/offices: Ministry of Finance (MOF), Ministry of Commerce (MOC), MOSTE, MOI, and Prime Minister's Office (PMO).

Secretaries-General of the following Offices/Boards: Judicial Committee Office, National Economic and Social Development Board, National Security Council

Directors-General of the following Department/offices: Office of the Budget Bureau (BBO), Public Relations Department (PRD), Department of Fisheries (DOF)

High ranking Officials/Chiefs from the following agencies: Commander-In-Chief of the Royal Thai Navy (RTN); Governor of the Tourism Authority of Thailand (TAT); Dean of the Faculty of Fisheries, Kasetsart University; and Chief of Marine Science Section, Faculty of Science, Chulalongkorn University.

The Director of the Office of the Board is also a member and the secretary of the Board, and has authority to appoint assistant secretaries as deemed necessary.

The major areas of responsibilities and duties of the Board as stated in the Prime Ministerial Regulation can be stated as follows:

- To propose policies and the Plan (viz., the National Marine Rehabilitation Plan) for the restoration of the Thai waters to the Cabinet for seeking approval.
- To approve any plans or project and to comment regarding the investment budget of the government offices in connection with the operation according to the national marine policy and restoration.

- To designate any guidelines concerning the coordination, management and exploitation of Thai waters.
- To be the centre for coordinating with other committees appointed by any laws or by the cabinet's resolutions and be responsible for national marine policy and restoration.
- To accelerate, monitor and supervise the operations of the responsible government offices concerning the restoration of Thai waters in order to ensure the efficient, accurate and smooth operations.
- To control, supervise, inspect and assess the outcomes of the operation according to the National Marine Policy and Restoration.
- To set the principles and action plans for the operation of the ONMPRB.
- To request the transferring of staff, material, equipment of government offices in order to facilitate the performance of the NMPRB as deemed necessary.
- To perform any other activities deemed necessary to the restoration of Thai waters.

The main task of the Office of the NMPRB is to set policy framework and management plan for the use of the Thai waters, and to coordinate with related government agencies on Thai marine rehabilitation.

The Office of the Board (ONMPRB) has set up nine sub-committees to oversee the management of 9 sectors, viz., living resources, industries and non-living resources, the environment, tourism, sea transportation legislation, fiscal policies, education and human development, and public relations.

The Board has assigned responsible agencies the task of producing and implementing plans to:

- monitor mercury and heavy metal contamination of the seas and identify preventive and mitigation measures;
- monitor red tides and identify mitigation measures and action plan;
- establish artificial reefs and breed marine animals for artificial reefs;
- draft fishing rights law and suggest measures to increase community participation and community-based management;

- set out policies for coastal and sea classification;
- solid waste management and development of waste-water collection equipment;
- review measures employed for preventing environmental impacts on the coastal zone, particularly in tourist areas; and
- reduce the number of fishing boats and determine the mesh size of fishing gear for conservation purpose.

The support of the European Union has been expected especially in the development of the coastal landuse and sea classification system (*pers. comm.* Plodprasop Suraswadi, January 1998).

In addition to requesting the above, the Board has also commissioned studies on sea classification, on the use of economic instruments in coastal utilisation, and on pollution.

The Board has faced a number of problems since its inception. First, it has no office of its own, and equipment and officials are borrowed from other agencies, particularly the DOF. Recently, the DOF has been calling back some of the equipment and transportation. Second, the Board receives a very small budget (about 1 million baht/year). Under the present economic climate, there seems little possibility that there will be any substantial budget increases in the near future. Third, the Director of the Board, a former Director-General of the DOF, has been given a new position as the Director-General of the Agricultural Land Reform Office (ALRO), and later as the Director General of the Royal Forest Department, agencies that have less prominent role in marine rehabilitation. It would have been more logical to appoint the Director for the Board on an institutional basis rather than on a personal basis. The Ministerial Regulation does not specify any criteria for selection. At least in the short term and until the Board becomes fully independent in terms of office, manpower, equipment and budget, an institutional support, especially from the lead agency (DOF) may be necessary.

5.6 The Thai Public Sector: Structural Problems

The current state of the Thai coastal and marine resources is primarily a result of institutional weaknesses and failures. While technology helped intensify the coastal and marine resource use, it is the failure to prevent the “tragedy of commons” (Hardin 1968) under an open-access resource use regime that has set the stage for indiscriminate resource exploitation. Indeed, while relying heavily on technical solutions, Thai decision-makers have generally ignored the institutional dimension of the resource management issues. Some of the institutional weaknesses in governance in Thailand are discussed below.

Penetration of the patronage system: Among the major institutional weaknesses of the Thai governance and bureaucracy is that although the system is based on a Western model, the traditional Thai patronage system has penetrated and has been informally accepted as a norm. The system emphasizes personalities rather than organisations and positions those personalities represent as a norm, hierarchy rather than equity and structures rather than functions. In turn, these characteristics have given rise to a centrally-managed, extremely hierarchical structure that is characterised by largely one-way, top-down communication, is influenced by persons in power, both within and outside the bureaucratic apparatus, and is too rigid to change with changing circumstances. This does not mean that structural changes do not occur within government agencies. Rather, they occur at the behest of some individuals in power than as a result of general consensus, and despite the apparent structural changes, the attitude of the staff, the mode of working and the power structures remain more or less the same. The recent formations of Tambon Administrative Organizations (TAO) to replace the Tambon Councils and to facilitate more ‘public participation’ is a case in point(see Section/box..).

Failure to take preventive actions: Government agencies tend to respond to a problem only when the situation seems out of control or when an immediate crisis that can potentially threaten political stability or economic interests erupts. The usual response to such situations is some sort of a temporary, *ad hoc* solution that only cures the symptoms for a while, leaving the root cause unattended.

Parochial attitudes of parliamentarians: An additional factor affecting natural resource policies in recent decades is the changes on the Thai political scene in the last two decades. Since 1992, Thailand has experienced a fully democratic system of governance with democratically elected parliaments and prime ministers, elected and installed mainly by rural population (Anek 1995), thus ending the semi-democratic style of governance during 1973-92, when most governments were led by non-elected prime ministers.⁸ This change and the rapid economic boom of the 1980s has set the stage for a greater role for civilians in the national politics, particularly for members of the emerging and increasingly influential private sector from Bangkok, but increasingly from provinces (see, e.g., Wyatt 1984, Anderson 1991). During the past decade the number of ministers and prime ministers elected from provinces outside the Bangkok Metropolitan Region has risen considerably. The relatively small sizes of Thai constituencies make it easier for local influential persons to get elected into the parliament. Once elected, however, maintaining the constituency becomes the main objective of these parliamentarians. In this process local self-interests get high priority, while issues of national, let alone international, importance are relegated to secondary position.

Emphasis on Budget-oriented Projects and Planning: As explained above, line ministries devise Sectoral plans for budgeting purposes under the National Plan. Since ministries vie for getting as big a share in the national budget as they can, projects are suitably designed in line with the direction of development in the given National Plan to get maximum funding. The emphasis is often on expensive imported engineering solutions (and imported technologies) rather than on institutional innovations. While it is true that technological development in Thailand has lagged behind those in other industrialising economies in the region, an excessive emphasis on projects with technological solutions has led to the side-tracking of more important social issues.

Often, new imported production technologies (e.g., otterboard trawlers, purse seine nets, intensive shrimp farming techniques) have helped accentuate resource exploitation in the absence of adequate safeguards to control it. Furthermore, new technologies have largely

⁸ Examples include the Prem Tinsulanond governments during the 1980s, and the two Anand Panyarachun governments during 1991-92.

benefited those with better access to capital and credit than to the less fortunate communities who continue to rely on outdated, less productive technology. Often, technical solutions are not justified when their costs are compared with potential benefits. The 2-billion-baht worth Sea Irrigation System Project discussed earlier (see Section ..) would serve as a case in point. In this case, the legal loopholes have allowed the project to go ahead without requiring an environmental impact assessment (EIA).

There is a general belief among many Thai political leaders and bureaucrats that economic growth will eventually bring in prosperity in a “trickle-down” manner, and technology is the means of achieving that growth. As such, western trained economic technocrats have generally dominated Thai policy making, though the extent of their influence has varied under different political regimes. Their glorious days were under the Prem Tinsulanond and Anand Panyarachun governments during the 1980s and 1990s, respectively.

5.7 Traditional Local Institutions in Coastal Thailand: Do They Exist?

An interesting question that closely relates to public participation and community-based management of fisheries resources, is whether and in what manner local traditional institutions exist in Thailand. Unfortunately, there is little work done on this aspect. Several examples are given for community-based management of resources in other areas of the country, including the *muang fai* irrigation system in northern Thailand. Surprisingly little information exists on the traditional management of coastal resources such as mangroves, fisheries, etc.

Several possible explanations can be given for the apparent absence of traditional systems of management in coastal areas. First, the settlement in many coastal areas, particularly, the central and the eastern Gulf coast and the Andaman coast of the South could have been a somewhat recent phenomenon, probably starting much long after the establishment of Bangkok as the capital in the late 18th century. Second, academic interest in social issues surrounding coastal areas has been rather recent, having begun with the rise

in the awareness about mangroves during the past two decades. There is still a paucity of literature concerning social and socio-economic issues, whilst most literature on mangroves and fisheries is concerned with biological and physico-chemical aspects. The traditional inhabitants of coastal areas, such as the sea gypsies, or *Chao Le* are still among the less well studied communities. The remaining small communities of this tribe already seem to have suffered a considerable cultural breakdown, unlike the more remote hill-tribes in Northern and Western Thailand.

The impacts of a rapid economic growth and the free access of outside investors into coastal areas and in fisheries is clearly evident in coastal villages of Thailand. As the fruits of economic growth have spread unevenly, in many villages, community fragmentation has occurred, resulting in frictions and sometimes serious conflicts. As for the government, until recently the focus of resource management, whether in fisheries or mangrove forestry, has been on economic output rather than conservation, much less on social issues relating to resource management.

In order for community based management in coastal resource use, including the implementation of such innovations as the territorial use rights in fisheries (TURF), or home front rights (*Sithin Na-Bahn*) to succeed, it is essential to study community management systems that exist or have once existed as well as the social structure of communities. Even if such systems have never existed, it may be useful to study the existing resource use practices and tenurial systems relating to the use of natural resources in coastal areas, since this information may be vital for the success of any new innovations involving the local communities.

6. Key Issues and Problems Related to Coastal Resources Management

A number of the problems highlighted earlier when describing the current situation (Section 2.4), and at the beginning of the report have been identified for a considerably long time (e.g., TDRI 1986). Some of these have also been targeted as top priority by the DOF under a number of projects (Anant 1997). In reality, however, the situation has improved little, if at all.

This is because measures are generally aimed at treating symptoms rather than curing root causes. There is an absence of a long-term fishery policy, and the existing policies and measures are too general, vague and poorly implemented. The inability to prioritise issues and deal with them in an integrated manner can sometimes make even supposedly effective measures to fail, as they are either unable to plug loopholes, or are superseded by new rules or modifications. By focusing on immediate problems, but ignoring long-term solutions, the measures are seldom able to avoid the conflict between the objectives of long-term sustainability and short term economic gains. Indeed, economic objectives seem to have taken precedence over conservation objectives.

Perhaps a good example of the incongruence in regulations and the conflict between short-term and long-term goals is the Ministerial Regulation of 28 November 1984, under which an area of approximately 26 400 km² was declared off limits for three months between 15 February and 15 May for all trawlers and purse seiners, except beam trawlers and day-time operation of anchovy purse seiners during 15 February to 31 March (Boonlert 1994). A rearranged version of earlier similar regulations aimed at reviving the pelagic and demersal stocks, the new regulation clearly delineated the areas closed to fishing. However, it also lifted the ban on beam trawlers and anchovy purse seiners, apparently to alleviate the hardship of fishers. As Boonlert (1994) further points out, the main reason for the beam

trawl exemption was, however, the rising demand for shrimp for export. The regulation was seemingly successful in the first few years, as indicated by a rise in demersal catch rates during 1983-84, but the rates declined again from 1984 onwards, "mainly because of beam trawling for shrimp" (Boonlert 1994:115).

As mentioned earlier in Section 2.2.2, a number of issues facing coastal resource management in Thailand, and the Thai fisheries sector in particular, have been identified for quite some time and have been taken up as priority areas by the DOF in recent years. Yet, most government measures have targetted the symptoms, ignoring the root causes.

It is therefore necessary to move beyond the obvious symptoms and look more critically at the specific factors that have been causing them. This section discusses some of the key issues facing fisheries and coastal resources. Specific issues in marine capture, aquaculture and fisheries trade are then identified and discussed.

6.1 Coastal and Marine Resource Exploitation and Multiple Use Conflicts

The multiple use, multiple user nature of the resources, rapid exploitation, and a free access of capital and credit have created a number of resource use conflicts in the coastal zone at various levels. For fisheries, the main arena for the conflicts seems to be the 3 000 m coastal fishing zone, an area of conflict between small scale fishers and commercial operators entering illegally and often damaging stationary gear. Conflicts also occur among small-scale fishers themselves, particularly between pushnets operators and others, and between those fishing into waters that the other party may consider its own territory.

On the land, there are often conflicts between local inhabitants in or near mangrove areas and government officials managing mangrove forests as well as concessionaires logging the forests for charcoal making. Another major area of conflict in recent years has been between shrimp farm operators and other land users, particularly rice farmers, orchard owners etc. over the pollution from shrimp farms and land related issues.

The issues of resource depletion and conflicts as well as enforcement problems are further analysed in Sections 6.3 and 6.4.

6.2 Institutional and Legal Constraints

As mentioned earlier, the major weaknesses of the Thai government institutions and legislative systems are the overlapping mandates, lack of coordination (which also causes overlaps), and a narrow, hands-on approach to problem solving rather than dealing with the root cause. These weaknesses have arisen primarily from the sectoral, specialised approach to management adopted by the state agencies under the existing laws (MIDAS 1995).

Institutional constraints in coastal management emerge from a number of factors. These include,

- a centrally-based policy and plan formulation and implementation;
- lack of priorities and specific objectives in Sectoral Plans, which are often prepared more as a budgetary reference than as a problem solving exercise (see Section 5.1);
- overlapping mandates and jurisdiction of different agencies, and
- a lack of coordination among agencies.

The most critical example of overlapping jurisdiction is the conflict between the DOF and the Royal Forest Department over the management of marine national parks. The RFD has designated a number of coastal areas (16 as of 1995, MIDAS 1995) as marine national park. While the jurisdiction of the RFD may extend over mangrove forests, these parks also cover offshore waters. This means some fishing areas of local fishing communities are now within park boundaries and off limits for the fishers. The controversy over the Tarutao National Park is one example of the conflict between the two government agencies.

Another example of the lack of coordination between two agencies relates to boat registration, and is discussed in Section 6.3.2 below.

6.3 Important Issues Facing Capture Fisheries

Marine capture fisheries still forms the backbone of the Thai fisheries, in terms of production (by volume) as well as employment.

6.3.1 Stock Depletion

The main indicators of stock depletion are the declining catch rates and the species composition in the landings. Catch rates for trawl fisheries declined rapidly in the Gulf and the Andaman Sea, from 297.6 kg/hr in 1961 to 49.8 kg/hr in 1981 in the Gulf of Thailand. Large decreases have also been reported in the Andaman Sea.

Stock depletion is not a new issue. It has plagued the fisheries sector for a considerably long time. Marine catches of both demersal and pelagic fisheries have exceeded their maximum sustainable yields (MSYs) in the 1970s, if not earlier. Yet, production has continued to increase, thanks to the regular incursions into the high seas and waters of the neighbouring countries, and an unscrupulous exploitation that nets in everything from economically important species to their non-economical juveniles and other non-food trashfish.

Indeed, since the late 1960s trashfish has constantly accounted for over 30 percent of all marine landings. Its proportion seems to have been rising or falling with the changing pressure on the marine capture fishery. Trawlers are the major netters of trashfish and the depletion of demersal stocks and rise in fuel prices in the mid-1970s caused trashfish landings to rise to above 50 percent of the total. Similarly, another rise was apparent during the uncertain years of EEZ declaration in the late 1970s, when fishing in the neighbouring waters could have been temporarily suspended, creating pressure on domestic fishing grounds.

Table 15. Production and Utilisation of Trash-fish, 1976-1994

(units: thousand tonnes, million baht, %)

Year	Trashfish production		Unit price Bt/kg	As % of marine production		Utilisation (% of total trashfish production)			
	Vol.	Value		Vol.	Value	Fish-meal	animal feed fertiliser	food uses	Other
1967	275.4	n.a.	--	36.1	n.a.	0.0	42.9	43.0	14.1
1968	377.9	n.a.	--	37.6	n.a.	0.0	35.8	38.9	25.3
1969	492.4	n.a.	--	41.7	n.a.	0.0	61.4	13.3	25.2
1970	487.7	n.a.	--	36.5	n.a.	0.0	65.4	22.1	12.5
1971	655.3	393.2	0.6	44.6	8.6	0.0	46.5	24.5	28.9
1972	719.1	503.4	0.7	46.4	10.2	0.0	48.1	15.8	36.1
1973	804.5	724.0	0.9	52.3	11.0	0.0	70.9	9.2	19.9
1974	690.3	690.2	1.0	51.1	16.9	0.0	78.9	6.9	14.2
1975	635.0	641.3	1.0	45.5	12.6	0.0	84.5	8.3	7.2
1976	620.6	682.7	1.1	40.0	11.4	0.0	85.6	2.3	12.1
1977	836.6	1 045.8	1.2	40.5	12.1	68.3	31.1	0.6	0.0
1978	847.4	1 271.3	1.5	43.3	11.1	100.0	0.0	0.0	0.0
1979	784.3	1 082.3	1.4	43.3	9.6	100.0	0.0	0.0	0.0
1980	786.9	1 447.8	1.8	47.7	13.8	98.3	1.7	0.0	0.0
1981	796.7	1 410.2	1.8	43.7	10.7	94.6	5.5	0.0	0.0
1982	812.8	1 529.2	1.9	40.9	10.7	90.9	9.1	0.0	0.0
1983	803.3	1 622.7	2.0	38.3	10.7	95.9	4.1	0.0	0.0
1984	757.6	1 555.0	2.1	38.4	10.7	100.0	0.0	0.0	0.0
1985	776.4	1 640.8	2.1	37.7	10.5	100.0	0.0	0.0	0.0
1986	976.2	2 104.9	2.2	41.6	11.2	100.0	0.0	0.0	0.0
1987	1 105.7	2 258.4	2.0	42.5	9.8	100.0	0.0	0.0	0.0
1988	956.1	2 253.8	2.4	39.1	8.0	100.0	0.0	0.0	0.0
1989	980.3	2 180.5	2.2	38.6	6.9	100.0	0.0	0.0	0.0
1990	978.3	2 603.2	2.7	38.3	7.3	100.0	0.0	0.0	0.0
1991	981.9	2 474.3	2.5	36.2	5.3	100.0	0.0	0.0	0.0
1992	1 001.4	2 244.2	2.2	33.8	3.8	100.0	0.0	0.0	0.0
1993	1 026.6	2 771.3	2.7	33.7	4.0	100.0	0.0	0.0	0.0
1994	930.5	2 083.6	2.2	29.5	2.7	100.0	0.0	0.0	0.0

Source: Fisheries Statistical Year Book, DOF, various years

Note: Since 1984, DOF statistics group fish-meal and animal feedstuff in one category.

Most of the trashfish today ends up as the raw material for a heavily protected fishmeal industry, which in turn supplies to animal feed industry, though in the early years a

significant part of the trashfish (probably of better quality) was used in making fish sauce and other traditional food products. With the establishment of the fishmeal industry in the 1970s, a nexus of influential players from the industry and commercial trawler operators are pushing this exploitation even further — possibly with the help of a chain of middlemen — by sustaining the fish-meal industry despite the fact that a low protein content gives the local fishmeal lower quality than the imported fishmeal.

An import duty of 15 percent on fishmeal with protein content of 60 percent or above protects the local fishmeal industry from international competition. The industry's crucial link with the economically sensitive poultry, aquaculture and other export-oriented livestock sectors as raw material supplier is the main justification for the protection. Local fishmeal has generally lower than 60 percent protein content and local prices were higher than imported, high-quality material until the fall in the Thai currency value.

The sustenance of the Thai fisheries will depend on halting over-exploitation and maintaining fish stocks within their natural regenerative capacity. To that effect, several measures have been suggested and employed, including, a seasonal ban on fishing in spawning grounds of certain species, regulations on mesh sizes of fishing gear, and a ban on commercial fishing within 3 km from the coast to protect young juveniles of many species that inhabit nutrient rich near-shore zones, as well as to safeguard the small-scale or artisanal fisherfolks. The weak enforcement of these regulations, however, has meant that illegal fishing has continued.

An underlying factor in the continued stock depletion is the government's attitude toward fisheries. Until the early-1970s the emphasis was purely economical. Conservation measures became part of the National Plans (see Section 2.4.2) only when depletion reached serious levels. Despite these conservation concerns, however, the Department of Fisheries has consistently set its production target with a lower limit — of not less than 2.5 million tonnes — rather than setting an upper limit. With no upper limit, the focus of the fisheries is on maximum possible exploitation.

6.3.2 Excess Fleet Capacity

The problem of excessive fleet capacity, which become conspicuous after the EEZ declaration by Thailand's neighbours during the late 1970s has not been alleviated to any significant degree. There has been some declining trend in the number of inboard powered boats over the past decade, but the number of smaller, outboard boats has increased much more rapidly. New, larger vessels have been built, instead of using the existing ones, for joint venture fishing under bilateral agreements (Boonlert 1994). When the venture agreement is terminated, these vessels return to the Thai waters (Boonlert 1994, Anant 1997), or sometimes continue to fish illegally hoping for a renewal of the agreement (Vicharn 1996). The prescribed maximum number of fishing vessels in the Gulf of Thailand is, according to fisheries officials, about 3 000, but more than 10 000 are currently in operation (Anant 1997).

The number of registered trawlers and push nets has fluctuated during the past two decades, largely in response to government policies and measures. A ministerial regulation based on FAO recommendations to reduce the number of trawlers and phase out push nets was issued in 1980, but implemented only in 1982 due to administrative difficulties. The number of registered trawlers and push netters increased during this period, but declined afterwards until 1988 (Boonlert 1994). After 1989, the number increased rapidly again, as the DOF issued new licences for the fishing vessels seized in the neighbouring countries during 1981-89, and for new fishing boats constructed during 1985-89 to replace ageing vessels and undertake joint fishing ventures (*ibid.*). The total number of registered trawlers jumped to an all time high of 13 113 in 1989, but has since declined (Table 16).

Table 16. Number of Registered Trawlers and Pushnets, 1978-1995

Year	Otterboard trawl	Pair trawl	Beam trawl	All trawlers	Pushnet	Trawl and pushnet	Total regd. boats
1978	5 233	854	489	6 576	1 426	8 002	12 589
1979	7 038	1 172	537	8 747	1 923	10 670	16 146
1980	8 131	1 230	1 060	10 421	2 262	12 683	19 511
1981	6 021	1 008	496	7 525	1 216	8 741	14 759
1982	9 358	1 406	711	11 475	1 899	13 374	19 756
1983	7 796	1 266	328	9 390	1 236	10 626	17 386
1984	7 769	1 166	196	9 131	960	10 091	16 006
1985	6 968	1 218	139	8 325	759	9 084	15 968
1986	6 226	1 084	97	7 407	664	8 071	15 916
1987	6 129	1 464	50	7 643	624	8 267	16 054
1988	5 766	1 132	52	6 950	531	7 481	15 550
1989	10 438	2 193	482	13 113	1 907	15 020	20 979
1990	10 256	2 193	456	12 905	1 879	14 784	21 547
1991	8 117	2 037	144	10 298	1 047	11 345	18 170
1992	7 538	1 876	51	9 465	818	10 283	16 820
1993	7 213	1 750	123	9 086	808	9 894	18 146
1994	6 482	1 708	156	8 346	651	8 997	17 654
1995	6 321	1 576	98	7 995	634	8 629	17 281

Sources: Boonlert 1994:122; DOF (1996a), Johnson (1997:14) reporting DOF; DOF (1997)

Note: In 1995, the actual numbers of trawlers and pushnets as reported in NSO/DOF 1997 were:

Otterboard trawl = 4 880; Pair trawl = 1 318; Beam trawl = 1 028; total trawl = 7 226;
pushnets = 3 591;

The actual numbers of boats, as reported in marine fisheries census (NSO/DOF 1997) are much higher than the registered boat statistics indicate, as most small sized boats used by small-scale fishers are seldom registered. This is likely to be the case for most outboard powered boats, which constitute the bulk of all boats. Outboard powered boats have recorded the highest growth in number in the past decade, coinciding with the economic boom, while the numbers of non-powered and inboard powered boats have declined (Table 17).

Table 17. Total Number of Boats by Type, 1985, 1990 and 1995

Type of boat	1985		1990		1995		% Change		
	Number	%	Number	%	Number	%	'85-90	'90-95	'85-95
Total	53 427	100.00	52 374	100.00	54 538	100.00	-1.97	4.13	2.08
Non-powered	8 077	15.12	4 974	9.50	2 826	5.18	-38.42	-43.18	-65.01
Outboard powered	28 368	53.10	31 172	59.52	36 430	66.80	9.88	16.87	28.42
Inboard powered	16 982	31.79	16 228	30.98	15 282	28.02	-4.44	-5.83	-10.01

Source: NSO/DOF, n.d., 1997

6.3.2 Fishing Licence and Navigation Permit

The inability of the government agencies to enforce fishing ban in the specified areas and durations stems partly from the inability to control fishing vessels' access. Important in this respect is the lack of inter-agency coordination on the issue of licences given to fishing boat operators. Fishing boats are required to possess a fishing licence, issued by the District Fishing Office under the Department of Fisheries, in addition to a navigation certificate issued by the Harbour Department. The latter allows the boat access to any Thai fishing ground. Thus, a fishing boat with both licences is free to fish in any provincial fishing grounds without having to register with local fisheries officials (Johnson 1997). Furthermore, as Johnson (1997:27) observes, "even when a boat lacks the requisite certification, the issuing office is unlikely to find out unless a Fishery Patrol boards the ship and discovers the violation (which is unlikely) or a third party reports the infraction (equally unlikely)." As mentioned earlier, a significant number of boats are estimated to be operating illegally, either to avoid being caught using destructive gear prohibited under the DOF regulations, or to avoid paying registration fees, or simply because the lack of coordination between the agencies provides sufficient opportunity to "slip under the net" (Johnson 1997:13).

The inability of the present licencing system to control the movement of fishing vessels from one province to another leads to a number of problems. First, it makes it difficult to introduce a fishing quota system, successfully employed in countries such as Japan, where fishing vessels registered with one prefecture are not allowed to fish in another prefecture. Second, monitoring the movement of commercial fishing vessels becomes a

difficult task as it would require coordination between authorities in different provinces. This in turn provides a greater opportunity for the ships to slip in and out of the 3-km zone reserved for small-scale fisheries, thus posing serious problems in the implementation of conservation measures (pers. comm. with DOF officials, December 1997). Third, free movement of fishing vessels has also given rise to a number of conflicts among fisherfolks from different provinces, e.g., between those from Trad and Chanthaburi provinces on the eastern Gulf coast, and Songkhla, Prachuab Khirikan, Chumphon and Surat Thani provinces in the southern Gulf, particularly over anchovy fishing, and between commercial trawlers and push-netters and small-scale fisherfolks. Fourth, as mentioned earlier, because the two licences are issued by different agencies independently of each other, in practice a fishing vessel which has obtained a navigation certificate can fish using a destructive fishing gear, defying the Department of Fisheries regulations until it is caught in the act by one of the Fishery Patrol units.

Suggestions have been made for the Harbour Department to register and issue navigation certificates to only those fishing vessels that have already obtained a fishing gear licence. Unless this suggestion is taken seriously, or a one-stop service whereby vessels can register and obtain both navigation certificate and fishing licence from the same authority is introduced, there seems to be no way that the number of fishing vessels and fishing gear can be effectively controlled (*pers. comm.*, DOF officials, December 1997).

6.3.3 Monitoring and Enforcement

Lack of capacity to monitor and enforce regulations has been reportedly a persistent problems in most government agencies charged with resource conservation. However, the Department of Fisheries may be considered relatively well off in terms of resources (budget, equipment and human resources) for monitoring and enforcement, though they may not be evenly distributed among its provincial and district level units. The problem then also lies with the lack of motivation to enforce laws. MIDAS (1995:I-9) report lists a number of reasons for the lack of enforcements, including lack of motivation, lack of appropriate and effective penalties, a view that many illegal fishers have no alternative source of income,

pressure from influential persons, lack of appropriate equipment (e.g., patrol boats), lack of staff in law enforcement units, and cultural attitudes. As Johnson (1997:28) observes, “[B]y and large, enforcement officials will not intervene unless they receive a request for assistance. Moreover, suspects can only be arrested when they are caught in the act of breaking fisheries regulations”.

Given that the behaviour pattern in the Thai society preclude people from intervening in or interfering “with what others do” (Juree 1989), it is hardly surprising that complaints about any observed malpractice or illegal activity are made only when these activities directly affect the person lodging the complaint. As Juree (1989:438-39) further notes: “It is no wonder that zealous watchdogs for environmental protection are lacking [in Thailand]. Even officials involved do not wish to pressure offenders too severely, as they may wish to maintain good relations with others. Social conflict is a touchy and difficult thing to handle.” Even when complaints are made, the lack of communication facilities in fishing villages and the generally slow response from enforcement agency staff may provide the offenders enough time to get away with the crime since “suspects can only be arrested when they are caught in the act of breaking fisheries regulations (Johnson 1997:26). Even when they are caught, the fines are usually so small— two to three times the cost of an annual gear licence which is worth 200-300 baht a year — that they hardly serve as deterrent for illegal practices (Johnson 1997).

The problem is further compounded by the lack of coordination among the various law enforcement units, often under the same department, but at different levels. The Fishery Patrol Units under the Provincial Fisheries Officers and the Fisheries Protection Units directly under the Department of Fisheries in Bangkok, seldom have useful contacts and “Fisheries Protection Units do not see coordinated action with Provincial Fishery Patrols or Fishery Officers as part of their duties” (MIDAS 1995, see also Johnson 1997, App. IVb).

6.3.4 Rights of small-scale fishers

The frequent conflicts between commercial fishers and coastal communities and between communities themselves arise because, as noted earlier, the government agencies are unable

to monitor the 3-km zone effectively, and communities do not have distinctly defined fishing areas over which they can claim use rights.

Currently, there are no legislation which directly support community-based fishery management. The Committee on Policies and Rehabilitation of the Thai Marine (PRTM) Resources, established in 1996, is currently drafting a law which would enable a provincial governor to declare a fishing zone where a particular fishing community can enjoy exclusive use and help monitor violation of fishing regulations by both insiders and outsiders. The fishing zones so designed may exceed beyond 3-km zone if need be. Use rights could be delegated through the Tambon Administrative Council (pers. comm. DOF officials, December 1997), or through provincial governors, to village cooperatives. Department of Fisheries officials, however, express pessimism over the adoption of this law, as they believe the idea of designating areas where outsiders can be excluded by local communities might be interpreted as unconstitutional under the new constitution which stipulates that Thailand as a single kingdom cannot be divided (pers. comm. DOF officials, December 1997).

Whether or not the draft law is adopted, some fisheries officials believe community-based fisheries management can be supported using Section 32 of the existing Fisheries Act 1947 which enables a provincial governor to declare 'protected areas' in certain coastal zones and prescribe regulations to control the number and use of fishing gear. There is some scepticism, however, on whether the DOF would be able to achieve it through the existing laws as it claims.

6.4 Important Issues Facing Coastal Aquaculture

Coastal aquaculture has attracted a great deal of attention from policy makers, academics, processing industry, aquaculturists' associations and environmental groups in recent years. Of particular concern is the rapid spread and consequent socio-economic and ecological impacts of shrimp farming which accounts for 95-97 percent of all coastal aquaculture production (DOF 1997). The sustainability of shrimp farms is still doubtful, as most intensive and semi-intensive shrimp farms are estimated to be productive for no more than 5-10 years

(Somsak Baromthanarat 1995, cited in Barraclough and Finger-Stich 1996). Along with the rise of shrimp farming, culture of other forms of aquatic animals (fish, crabs, mussels, etc.) has declined, probably due to conversion of fish farms to shrimp farms. Since the shrimp industry is developed exclusively for export, the original purpose of developing aquaculture to meet the protein needs of the local population is somewhat lost.

6.4.1 Production Crashes and Unsustainability

From an economic point of view, the production downturn in two years since 1995 (about 23 percent decline in 1996) may be worrisome for the government, since shrimp accounts for over 70 percent of the total fisheries exports, or nearly 10 percent of the country's total exports. As elsewhere in shrimp producing regions of Asia and Latin America, shrimp farming in Thailand has suffered several production crashes, including the severe ones in the upper Gulf region in 1989-90 that left around 4 000 ha land derelict in Samut Songkhram province alone (MIDAS 1995). Thanks to the shrimp industry's continued expansion into other coastal areas, production continued to rise until recently. Now, however, as most of the potential areas already being used up, there is little room for further expansion without encroaching upon mangroves, agricultural land and other land uses.

6.4.2 Farm Registration

Under the regulation issued by the Department of Fisheries in November 1991, all shrimp farms are required to register with the Department. Between April 1992 when registration procedure began, until December 1994, only about 12 542 owners with farms covering 25 694 ha, or 35 percent of the total area, were registered. Many shrimp farmers tend to avoid registration either because they don't have rights to the land on which the farms are located (often on encroached lands), or they are afraid of being taxed after having registered, or simply because they did not see any benefits accruing to them from registration (Kamron 1997). The regulation, also requires shrimp farms to manage their waste and waste water disposal, which of course incur additional costs, and this could also be a major reason for the tendency to avoid registration. These additional requirements include, allocating no less than

10 percent of the pond area for a waste treatment or sedimentation pond (applies only to farms over 8 ha area), waste water must have a BOD₅²⁰ of less than 10 mg/l, saltwater should not be released into public freshwater resources or on agricultural areas, and bottom sediments must be disposed of in a suitable area, and should not be pumped out on to public areas or canals (Kamron 1997).

6.4.3 Environmental impacts

Shrimp farming has been blamed for a number of environmental impacts such as destruction and degradation of mangroves and other ecosystems, water pollution, land dereliction and land use changes, land subsidence and saltwater intrusion (Dierberg and Woraphan 1996, Funge-smith and Stewart, n.d.). Industry advocates have argued, using remote sensing data, that shrimp farming has encroached on only about 17 percent of the mangrove cover that existed in 1961. Some even play down the impact on mangroves by indicating that only about 7 percent of the mangrove land used by shrimp farming was productive mangroves, the rest being already degraded (Kamron 1997). However, the data only takes into account the existing shrimp farms, while there is no reliable data on shrimp farms that once encroached mangroves and have since been converted to other land uses.

Pollution from shrimp farms is said to be within the limits set by the Pollution Control Department. It has been pointed out, however, that the use of BOD as a water quality parameter is inappropriate in a tropical saltwater environment and may lead to the under-reporting of the pollution levels (MIDAS 1995:I-55, citing Briggs 1994). Further, the requirement under the 1991 DOF regulation, of a wastewater treatment pond covering no less than 10 percent of the total pond area applies only to farms over 8 ha, and thus does not apply to nearly 80 percent farms which are smaller than 3.2 ha (Ruangrai 1997, Appendix IVa). More severe pollution is, however, caused by pond bottom sediments, the flushing of which into natural water resources and public areas has been banned under the DOF regulation. There is a similar ban on the disposal of saltwater. However, with only 35 percent farms registered so far, the effectiveness of the ban is questionable. Sediment

flushing and saltwater intrusion are a common source of conflicts between shrimp farmers and rice farmers.

6.4.4 “Upland” marine shrimp farming

More recently, shrimp farming has moved further inland, using shipments of saltwater by trucks. This “upland” marine shrimp farming now covers nearly 3 000 ha in 13 provinces and produces an estimated 22 000 tonnes/year, worth nearly 4.4 billion baht (Kamron 1997). This type of culture may have even more serious impacts on neighbouring agricultural landuses, ranging from saltwater intrusion to sediment and wastewater disposal, and high organic matter loading to possibilities of disease outbreaks in nearby freshwater aquaculture (*ibid.*).

6.4.5 Socio-economic impacts

The inflow of outside investment and investors in shrimp farming has had many negative impacts on local coastal communities. These include loss of productive land⁹, changes in land tenures, indebtedness, conflicts between shrimp farmers and other land users, higher incidence of crime, community fragmentation, etc (see e.g., Funge-Smith and Stewart, n.d.).

While 80 percent shrimp farmers are small-scale, household enterprises with farm size less than 3.2 ha, only an estimated “20 percent of the shrimp farmers owned their farms, [while] 77 percent had access to the land through a collaboration with relatives and friends” (Barraclough and Finger-Stich 1996:17, citing NACA 1994b).

6.4.6 Zoning

Due to the impacts of the rapid expansion of shrimp farms on mangrove lands, agricultural areas and other productive landuses or ecosystems, a creation of zones to limit shrimp farms

⁹ Although in a short run, shrimp farming can be more productive economically than other agricultural land uses, its long-run productivity may well be lower than more sustainable landuses such as rice farming.

to specific areas and limit their numbers within the carrying capacity of the areas, has been suggested. However, so far only shrimp farms in Chanthaburi, Trad, Chachoengsao, and Rayong have been so managed. In most other coastal areas, zoning is yet to be carried out.

6.4.7 Seawater Irrigation System

The Seawater Irrigation System Project (SISP) is based on the conventional premise that “solution to pollution is dilution”. Since pond effluent is discharged into nearshore waters from where it reenters shrimp farms, affecting water quality and shrimp health and lowering production and farm life, mixing clean seawater brought in from further offshore with nearshore water may improve water quality. The system incorporates water treatment using mechanical and biological agents for influent water as well as effluent. Six areas are currently being targeted for installation of seawater irrigation system, with a total budget of 2.05 billion baht. The first of these, in Ranod in Songkhla province has been completed while the second in Phak Panang district, Nakhon Si Thammarat province, was expected to be complete by 1997. The other four are expected to be complete between 1998 and 1999. Besides these six, there are 67 other projects for which feasibility study has been completed by the Department of Fisheries. If completed the projects would benefit shrimp farms covering about 80 000 ha (Kamron 1997).

Seawater pumping projects are not required to undergo an environmental impact assessment (EIA) which projects of such magnitude are normally required. Furthermore, although cost-benefit analyses (CBAs) is said to have been conducted for these projects, the lack of transparency raises doubt whether environmental costs are duly considered in these CBAs, and about the overall environmental impacts of the project.

Critics are sceptical of the success of the seawater pumping, since besides influent water quality, a number of other factors influence shrimp production. These include, stocking density, soil characteristics and the nature of pond bottom, feeding rate and food conversion ratio, and the quality of shrimp seed. Further, while seawater irrigation would be of more use for farms that are more inland and access seawater via canals which often also

carry the discharge, all the six projects under construction seemingly benefit coastal shrimp farms which have a direct access to seawater (MIDAS 1995).

6.4.8 Abandoned Farms (Land Dereliction and Debts)

The highly unsustainable nature of shrimp farming has resulted in a number of farms being abandoned after a short span of activity. The exact number and area of the abandoned farms is not available, and they are not included in the statistics on encroachment by shrimp farms of, e.g., mangroves. Since shrimp farming is a highly capital intensive activity, a by-product of farm abandonment is a debt-ridden farmer. The estimated cost of debt restructuring in the abandoned shrimp farm areas in Samut Songkhram province alone is around 2.5 billion baht (MIDAS 1997).

6.4.9 Technology

With sustainability of shrimp farms under question, the hopes of the shrimp industry advocates hang on some technological breakthroughs, such as vaccines against major shrimp diseases, a new resistant species, etc. There have been some private sector initiatives in research and development on some of these lines.

Some of the currently available technologies too claim to enhance profitability by reducing pollution and increasing farm life (e.g., pond bottom lining). However, the costs of these are often high and unattractive particularly to small-scale farmers, while their claims are not always convincing.

An important issue is more effective dissemination of the available know-how to small-scale farmers. The education levels of most farmers is low, while not all have traditionally been shrimp farmers, and have entered the industry only due to its prospects for lucrative profits in the short run.

6.5 Important Issues Facing Fisheries Trade

Thailand exports nearly 85 percent of its fisheries output, both capture and culture. Almost 90 percent of marine aquaculture production, dominated by penaeid shrimp, is exported. During the past several years, a number of issues with regards export trade have emerged. These are discussed below.

6.5.1 GSP Status with the European Union

The Generalised System of Preferences (GSP) formally adopted in 1971 to give developing countries special tariff treatment by circumventing the Most Favoured Nation (MFN) status, which requires equal treatment for all GATT signatories (Armstrong 1997 Appendix IVg). GSP criteria are determined independently by each developed country for their developing country trading partners. These criteria include whether the country will be granted a GSP status, for what product categories, and other conditions required by the granting country, particularly relating to the graduation of the country's GSP duties to the MFN level as its economy develops. The GSP is not a trade barrier, although with the graduation of GSP duties a country does lose its tariff privileges on its trade with the granting country. The recent decision by the European Union to cut Thailand's tariff privileges under the GSP for fishery, fruit, vegetable and other food products by up to 50 percent as of January 1, 1997 was based on the fact that Thailand's per capita income had reached the upper limit set by the EU to qualify for the GSP privileges. For raw and prepared shrimp, tariff rates rose from 4-5 and 7 percent to 8-10 and 13.5 percent, respectively and will further rise to 12-14 and 20 percent by 1999. when Thailand will have lost all GSP tariff privileges with the EU (Direk *et al. in prep.*). However, given Thailand's current economic downturn, it remains to be seen if its GSP status will be restored, or at least, no further cuts made in the remaining privileges.

6.5.2 The U.S. Shrimp Ban

In 1996, the U.S. banned imports of shrimp from Thailand and other Asian countries, which it argued, were not taking sufficient steps to protect sea turtles that are 'incidentally' caught

while harvesting wild shrimp. The US argument for the unilateral ban was based, on the one hand, on the U.S. Endangered Species Act, Section 609 of which authorises the Secretary of State to ban shrimp imports if the exporting country fails to take sufficient measures to ensure that the 'incidental taking' of sea turtles while shrimping does not exceed the average rate of incidental taking of turtles by US flagged vessels (Armstrong 1997), and on the other hand, on the interpretation of Article XX(b) of GATT 1994, which "permits restrictive trade measures that are necessary to protect human, animal or plant life or health' and Article XX (g) which permits such measures if taken in relation 'to the conservation of exhaustible natural resources .. in conjunction with restrictions on domestic production or consumption. '" (Armstrong 1997:5). Thailand, together with other countries, such as the Philippines, India, Malaysia and Pakistan filed a complaint with the WTO, on the ground of unfair trade protection (Direk *et al. in prep.*). The ban was considered an act of extra-territoriality whereby the importing country attempts to impose its laws on the exporting country. Even though two-thirds of Thailand's shrimp has been farm-raised in the recent years, as most farms are unregistered, it was difficult to label and distinguish farmed shrimp from wild-caught ones. However, since Thai shrimp exports to the U.S. were worth nearly 4 billion baht, Thailand negotiated with the U.S. on having its shrimpers installed with turtle excluder devices (TEDs). After the TEDs were installed under supervision from the U.S. authorities, the ban, which came in force on May 1, 1996, was lifted in the fall of the same year (Direk *et al. in prep.*). The dispute, however, is still unsettled. On 25 February, the WTO's Dispute Settlement Body (DSB) established a Panel to look into the issue. The Panel has requested the service of a third-party group of scientists to evaluate technical information provided by the disputants regarding habitat and migratory patterns of sea turtles (Armstrong 1997).

6.5.3 Processing Technology and Quality Control

Improvements in processing technology have been achieved by a gradual adoption of semi-automated production process. Increasing value addition has been the main objective, and to that end, the processing industry has been moving toward ready-to-cook and ready-to-eat types items, such as surimi, TV dinners, and microwavable packs. Innovative products have

also been introduced, for example fish sausage and fish-hams, on a similar line as chicken sausages.

6.5.4 Quality Control

Since Thailand's fisheries sector is primarily export-oriented, quality control on fisheries products has been an on-going concern. Among the major health related issues in the recent years were the rejection of Thai shrimp by Japan on account of high antibiotics content, the EU's rejection of bivalves due to high EDTA and metabisulphite contents, and a recent concern over the bioaccumulation of mercury released from oil and natural gas exploration activities in the Gulf of Thailand.

Along with improvements in post-harvest technology, measures have been taken, and methods developed, for quality evaluation, pre-shipment inspection, production facilities inspection, quality indices, contaminant monitoring, establishing good manufacturing practices, and laboratory techniques (Sirilak 1997). In addition to the general quality control, specific measures may also be employed to meet the standards of a specific importing country, especially, Japan, the U.S., or the European Union.

The Fish Inspection and Quality Control Division (FIQCD) of the Department of Fisheries is charged with the responsibility of certifying seafood processing plants for sanitary and quality control. The FIQCD issues three types of certificates.

- Health Certificate: an approval on production process, from quality control on raw input supplies, processing, to the finished product.
- Sanitary Certificate: a certification on plant conditions, processing and workers.
- Certificate of Analysis: certifies that the products are clean and safe for consumers according to the DOF or importing country standards.

In 1991, the Department of Fisheries introduced the Hazard Analysis and Critical Control Point (HACCP) inspection system on a voluntary basis. Mandatory HACCP for seafood exporting processors was introduced in 1996, and has been enforced for all types of

seafood processing since 18 December 1997 (Ruangrai 1997). The DOF also provides training on HACCP implementation to seafood processors on request.

Among the approximately 250 seafood packers in Thailand, 193 are under the DOF quality control system. By mid of 1996 half of them had fully implemented HACCP while 35 percent were in development process and 15 percent were at the initial stage of developing documents on HACCP plan.

Inspection procedures for facilities and operations were revised in accordance with CODEX guidelines and standards. The main purpose of employing this system is to achieve quality assurance in fish inspection laboratories to meet the requirements under the ISO/IEC Guide 25 or EN 45000 (Sirilak 1997). Since January 1996, the system has been made mandatory for fish exporters. As of July 1, 1996, 50 percent of the establishments had fully implemented HACCP, while another 35 percent were in the process of development (*ibid.*).

Beside DOF quality control service, there are other public and private quality control services. While exporters to EU market rely on DOF quality control service as being the competent authority for EU market, exporters to the other markets use the service of Department of Medical Science in the Ministry of Public Health and other private quality control services (as well as FIQCD), as required by the importing country.

In the case of the USA, most of the exporters rely on the service provided by the Department of Medical Science while the products will be randomly re-examined by USFDA at the port of destination. In case of Japan, close collaboration between domestic packers and importers have usually been developed, including the collaboration on quality control system. DOF plans to develop equivalency of inspection system with these trading partners.

Despite these improvements, health and environmental related issues have often surfaced and have affected exports. The food poisoning incident in Japan in 1996, for example, apparently led to a reduced demand for seafood, affecting Thai shrimp exports (Direk *et al. in prep.* citing Phong Wisetphaitun, in the *Manager Daily*, 26 August 1996).

6.5.5 Eco-labeling and Thailand' Preparedness

While there have been various attempts on environmental quality preparation, limited effort has been spent on eco-labeling which may be explained by the delay in finalizing this issue at the international level. There have been practices of "dolphin-safe" labels for canned tuna and attempts on development of "green dot" label for fishery products. Seafood exporters from Thailand do not foresee any critical problem in development on eco-labeling. Problem as expected is the cost of labeling which if being equally treated should not be problem for any individual exporting country.

The question of eco-lebelling on fishery products, becomes particularly sensitive for the shrimp industry, which has been bogged down with allegations of pollution, mangrove destruction and overall unsustainability. Government officials and industry supporters believe that mangrove destruction has declined due to its unsuitability as farm site, though the reality may be somewhat different, since illegal encroachment has continued, albeit at a much slower pace.

The structure of shrimp farming in Thailand has been changing from being dominated by small households toward the one dominated by large commercial farms with high investments and relatively high technology. While the social impact of this change will be enormous, from the trade and eco-labelling point of view, large commercial farms who can afford investments in water management system in order to maintain water quality and thus improve yield, may make eco-labelling easy to implement.

6.6. Information Needs

Despite a wide array of legislation and enforcement agencies, not to mention the considerable mandate overlaps, there are a number of areas that are not covered by existing legislation. A prominent example is the non-requirement of environmental impact assessment for the Sea Irrigation System Project (see Section 6.4.7). These gaps, however, cannot be identified simply by looking at the existing legislation, but by comparing real-life situations with the existing laws. Needless to say, identifying the gaps in the current legislation would

require joint efforts by all stakeholders, particularly, government officials from all agencies concerned, local resource users, observers and analysts of the fisheries sector and coastal zone managers.

Considering the massive exploitation of the Thai fisheries and the degradation of the coastal zone, there is also an urgent need both to conduct more studies on resource conservation and management, and to disseminate the findings of these studies to the resource users. Information about the status of the coastal resources and major issues should also be more widely and systematically circulated so as to create more public awareness and garner support for measures aimed at ensuring resource sustainability. However, a clear vision of future direction is needed in order to set up a useful information system.

7. Envisioning the Thai Marine Future

Given that many coastal resources are renewable in nature, it is certainly not impossible to revive the Thai fishing industry in the long run. However, this long-term prospect depends on whether the government agencies concerned, including the Department of Fisheries, are able to develop the ability to coordinate toward integrated management of the coastal zone, strengthen community-based institutions and involve them in coastal management, generate greater awareness among the public about coastal resource issues, focus on selected, prioritised issues, strengthen the capacity and ability of their staff to monitor, enforce, and work closely with local communities and non-governmental organisations, and finally, steer clear of the interest-group politics that has traditionally beleaguered the Thai public sector.

In the short term, the current economic downturn may make implementation of many projects difficult due to financial difficulties. High-investment projects, e.g., the development of deep-sea fisheries, and fleet-retirement, could be particularly affected. The National Fisheries Fund, approved by the Cabinet in April 1997, faces an uncertain future. The budget for the Fund is to be decided by the Budget Bureau, but due to the financial problems, the decision on its budget has been postponed until Fiscal Year 1999. Even by next year, it is unlikely that the budget for the Fund will be approved (pers. comm. Somying Piumsomboon, 1998). The prospects for the NMPRB also look dim, since the Board does not have its own office or staff, and is supplied with a small budget of only about 1 million baht a year.

The economic downturn could be turned into a blessing in disguise, if budgetary belt-tightening is used effectively to scrap projects that duplicate the work done by other agencies, or are counter-productive. Prioritising issues and focusing on fewer, more effective projects (e.g., streamlining boat registration process under a single agency) would help make better use of the dwindling budgets.

This would also require curtailing, or at least minimizing, the influence of the powerful interest groups in the government and the private sectors. Reassessing the protectionist policies for the fish-meal industry, which, through the trash-fish link, is at least partly responsible for the marine resource depletion, should be considered a priority area.

The recent decision to slash the surcharge on fishmeal imports to zero, however, shows that the government is still unwilling to remove the protection effectively. Imports of fishmeal with protein content 60% or more incur a duty of 15 percent and until recently faced a surcharge of 350 baht per tonne.¹⁰ The decision to scrap the surcharge at a time when the baht has plunged more than 120 percent with respect to the US dollar, would certainly make no dent in the protection policy, since imports have already become costly.

7.1 Future trends for the Fisheries Sector

7.1.1 Marine Capture Fisheries

Declining trends in marine capture in Thai waters are all too obvious from decreasing catch per unit efforts and higher trashfish content in fish landings. Production has surged for some years recently only due to catches from outside the Thai waters. In the future, capture production will retain its steady to declining character, until conservation measures, if implemented successfully, will materialise in terms of fish re-abundance.

Assuming away the possibility of deep-sea fisheries development and other overseas fishing ventures (e.g., tuna fishing in the Indian Ocean), Thailand is likely to become a net importer of fish for domestic consumption. This is because, on the one hand the local fisheries are yielding an increasingly large percentage of trash-fish and a declining percentage of food fish. On the other hand, overseas output is also declining owing to an increased protection and monitoring by other countries for their fisheries resources, and the

¹⁰ Effective from 1 January 1998, the surcharge has been brought down to zero, but not officially removed leaving a possibility of its resumption later.

requirements for primary processing to be carried out in the host countries under bilateral fishing ventures.

Tuna fishing in the Indian Ocean could offer some opportunity for Thai fishers to support the canning industry, but Thailand has been a late starter on that front, and the current financial turmoil is less likely to provide the much needed capital support at least for some time. High sea operations can be made more economical by reorganising fleet structure and the way they fish. Instead of venturing in the high seas independently, these boats can cluster around a large mother ship.

7.1.2 Coastal Aquaculture

Some observers consider coastal aquaculture the “last resort” for the Thai fisheries sector, as marine capture fisheries are dwindling rapidly. With Thailand’s current economic crisis, the shrimp production will gain even more importance. Hence, in the years to come, Thailand will continue to stress marine shrimp farming.

The Bay of Bengal Programme’s recent report (BOBP 1996:9-10) notes that, while “[t]he environmental and social problems encountered by the [Thai shrimp] sector are quite similar to those of the other countries in the region. However, what is different is that Thailand is confident of overcoming the problem and managing the sector sustainably.” This optimism arises probably from Thailand’s achievement in less than a decade to become the world leader in shrimp production. However, it also hinges on the hopes for some technological breakthroughs that would increase the sustainability of the shrimp industry. Even though new technologies may provide answers to many problems now facing the shrimp industry, their impacts on the economics of global shrimp production as well as on the environment and the society should not be ignored.

According to many shrimp industry analysts the Thai shrimp industry will undergo some restructuring before becoming sustainable. This involves a shift towards an increasing dominance by large and medium sized producers (mainly corporate), with the elimination of most small-scale producers which now today represent nearly 80 percent of all shrimp

farmers. Only more successful small-scale operators are likely to survive. If this prediction is true, then the socio-economic impacts of shrimp farming are likely to be even more adverse.

7.1.3 Trade Issues

The lowered value of the Thai currency in the current Asian financial turmoil may once again improve Thailand's price competitiveness in the world market. While this may be good news for shrimp exports, other fish and fish products exports may face some hurdles. The liquidity crunch may impose some constraints on tuna importers. A rise in fuel prices will affect marine capture fisheries. Furthermore, a large part of the capture fishery goes to the domestic, highly protected fish-meal industry, and does not compete in the world market. Indeed, fish-meal exports have declined from over 110 000 tonnes in 1981 to around 18 000 tonnes in 1990 (Johnson 1997:11, citing INFOFISH 1991). With the local prices declining due to currency devaluation, fish-meal production may again become competitive for import substitution, if not for export, consequently spurring fishing efforts, and causing more detrimental impacts on the fisheries.

Environmental and health related issues and other non-tariff barriers are likely to remain a major area of contention for fisheries exports, and will become increasingly important. Thailand may be particularly vulnerable, given the state of its environment and enforcement record.

For Thailand's exports to the EU, it remains to be seen if the GSP status will be renewed following the current economic crisis that may leave long term impacts on the Thai economy.

Exports of shrimp are likely to surge to a new high in terms of value, provided the disease outbreaks do not recur. The Department of Fisheries has been preparing new database on potential farm areas along the coast. A recent analysis estimates about 62 000 ha, or 78 percent of the existing shrimp farm area, as having a high potential for shrimp farm development (Siri *et al.* 1998). However, since many farms are situated in mangrove forests and relocation of such farms is difficult due to weak monitoring and enforcement, there is possibility that farm area may actually increase rather than contract.

7.2 Conclusions and Recommendations

In conclusion, the open access nature of coastal resources, which has led to the current state of resource degradation and depletion, has been largely a result of the inability of the government agencies to administer an effective control over the use of resources under their jurisdiction. This lack of control has in turn been a result of a centralised bureaucracy, a specialised, sectoral approach to resource management leading to overlapping mandates and jurisdictions, lack of coordination among agencies, excessive emphasis on production at the expense of long-term conservation goals, and on costly, quick-fix engineering solutions rather than long-term institutional innovations. The problem of control is further compounded by the presence of influential groups both within the government structures as well as outside in the private sector. Further, unlike forestry, land, and water resources, coastal resource management issues have generally remained isolated from media and public attention.

At the same time, local coastal communities have been powerless in halting the degradation of resources on which they have traditionally depended. Instead, taking advantage of the economic opportunities elsewhere as well as in the fisheries sector, they have either joined in the exploitation of the resources or have left them to the economically powerful outside investors and poor inlanders and workers from neighbouring countries.

The multiple-resource, multiple-use and multiple-user nature of the coastal zone calls for an integrated management approach. The sectoral approach of the government agencies and a lack of coordination among them make it very difficult to implement inter-sectoral management plans. This has been a chronic problem in Thai bureaucracy, but perhaps more significant in the coastal zone than in any other areas. To date there is no single law providing for integrated management of coastal resources. The National Marine Policy and Rehabilitation Board may be a step in that direction. However, as discussed earlier, many changes would be necessary if the Board is to be effective in its work. Some of these changes are highlighted in the recommendations below.

The two sensitive areas requiring urgent attention are the problem of coordination between the DOF and the Harbour Department on boat registration and fishing licence, and the DOF and the RFD (Royal Forest Department) on marine national park management.

7.2.1 Recommendations for Responsible and Sustainable Coastal Zone Management

The problems of the fisheries sector are primarily institutional. There has been no dearth of technical or engineering solutions; however, in the absence of an appropriate institutional framework, they only temporarily mask the symptoms. The Department of Fisheries and the related agencies have adequately trained staff compared to many other line ministries in other resource areas. What is needed is the political will and courage to implement institutional reforms: to strengthen the institutions that work and reform those that do not. Under the democratic system that is now taking a firmer foothold in Thailand, this will occur if there is a public demand and support.

Our recommendations are:

1. **Increase public awareness** about the issues facing the fisheries sector in a systematic manner by providing accurate information about the issues and the need for public support.

2. **Initiate an integrated planning process at the national level** involving multi-stakeholders. The National Marine Rehabilitation Plan could be a good starting point provided the present problems affecting the Board are taken care of. Restructure the NM RB to allow positional and not personal tenure of the secretariat and seek institutional innovation that would resolve multiple use conflicts in the management of coastal and marine resources.

3. **Implement a pilot project on participatory management** by consensus among the related agencies and other stakeholders as an exercise toward inter-agency coordination and cooperation with resource users at the local level. Focus on an area approach rather than a sectoral approach to natural resource and environmental management.

4. Increase support to non-governmental organisations (NGOs) to increase stake-holder participation in the management of local resources and environmental conservation.

5. Introduce and gradually implement the “full cost resource pricing principle”, i.e., making the beneficiaries pay in full for the natural resources they have extracted. A first step would be the revision of fishing licence fees and charges.

6. Strengthen the enforcement of the 3,000m zone and abolish permanently all protection given to the fish meal industry.

7. To stop the unscrupulous mining of the Thai seas and to allow the Thai fisheries sector to achieve an economically, socially and environmentally sustainable future will mean bad times for some people. A programme to alleviate the impacts of the restructuring must be carefully thought out to avoid waste, exploitation and unwarranted social or economic injustice as occurring in many fisheries subsidies programmes overseas.

Without a serious and well co-ordinated effort from all parties concerned, the fisheries sector is likely to cease to be an national economic asset and instead turn into a net social liability in the near future.

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Appendix I. Terms of Reference

Background report for the Thai Marine Rehabilitation Plan 1997-2001

The consultant is to write a report and prepared a simple multimedia presentation in the English language. The draft should be presented by December 1997. The final report by January 1998, save time extension allowed by EU. Total duration of the study: 5 months. The study must include interviews with key representatives of DOF, Thai Marine Policy and Restoration Board, Private Sector's Organization (in the fisheries, shrimp farming, seafood processing and agribusiness sectors).

During the study two workshops will be organized between the EU, DOF, TDRI and the private sector. The workshops organization, agenda and TDRI contributions will be dealt in a separate agreement.

The study content is detailed as follows:

1. General overview of Thai coastal areas

1.1 Economic and sectoral development

- Brief historical pattern - situation analysis - trend - main socio-economic indicators

1.2 Environmental impact of economic development / coastal environment degradation

- Land use - pollution - waste disposal - agriculture and urban runoffs - sedimentation - decline of marine resources - sensitive ecosystems (mangrove, sea grass, corals, estuaries) - regional patterns

1.3 Existing policies, institutions, legal framework

- National and sectoral policies/plan
- Key legislations

- Committees/inter agency coordinator (with particular emphasis on the new Thai Marine Policy and Restoration Board and its role in relation to the line Agencies, NESDB, OEPP, Coastal Land Development Committee, National Mangrove Committee, etc.)
- Brief comments on the public sector structural problem in Thailand

2. Stakeholders Analysis (structure/performance/trends)

2.1 Artisanal fisheries and small scale farmers

2.2 Private sector profile

- Fisheries, shrimp farmers, seafood processing, agribusiness) own data and consultant's interviews)

2.3 Consumers

2.4 Major Public Agencies concerned with coastal areas management

- DOF/RFD/OEPP/PCD/LDD/OEA etc., check also the composition of the Thai Marine Policy and Restoration Board

2.5 Major University involved in training/research (optional)

3. Key issues and problems related to coastal resources management (with special emphasis on DOF responsibility)

3.1 Coastal/marine resources exploitation and multiple use conflicts

3.2 Institutional and legal constraints

3.3 Impact of international trade policies

- GSP
- Environmental tax
- Unilateral ban
- Phytosanitary issues (check the molluscs exports ban from EU)

3.4 The quality control issue

- DOF quality control services (raw materials and processed products) - efficiency and private sector response
- Private quality control services
- Environmental quality and eco-labels - is Thailand prepared?

4. Envisioning the Thai Marine Future

- 4.1 The private sector point of view - is the sector ready to assume its responsibilities on environmental sustainability?
- 4.2 DOF Sea Rehabilitation Plan - is the answer to the problems consistent? will the plan be fully implemented after IMF? - is DOF organized to meet the tasks?
- 4.3. The Thai Marine Policy and Restoration Board - the Board's plans - what future for the board? - what support from the Government?
- 4.4 The consultant's conclusions and recommendations

5. Reference / Contacted Persons and Institutions