



COASTAL FISHING COMMUNITIES IN THAILAND

[CONTENTS](#)

by

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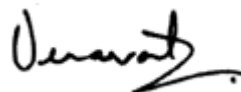
FOREWORD

The diminishing fishery resources along the coasts have increasingly added more pressure to the livelihood of fisherfolk all over Asia. Moreover, increase in the number of fishers due to population growth and migration to coastal communities can be a contributing factor in the overexploitation of local fishery resources and deterioration of the coastal environment. Recognizing that better understanding on the demographic and social dynamics of coastal fishing communities would help in developing policies to achieve sustainable use and conservation of fishery resources and the coastal environment, FAO initiated a project in cooperation with the United Nations Population Fund (UNFPA) to strengthen research and training on population and development dynamics of rural fishing communities in Asia and Africa in 1995. The report of this study: Demographic change in coastal fishing communities and its implications for coastal environment by U. Tietze, G. Groenewold and A. Marcoux, was recently published as FAO Fisheries Technical Paper No. 403.

The study identified needs for information on socio-demographic characteristics and trends for policy analysis and more relevant interventions both in the fishery domain and in the population. For Asia, fishery household surveys were conducted in the coastal States of Bangladesh, India, Malaysia and the Philippines.

It is also important to note that the National Statistical Office of the Prime Minister's Office of Thailand conducted Marine Fishery Censuses in 1985 and 1995, while an intercensal survey on marine fishery sector was conducted in 1990. These surveys and censuses collected extensive data and information on coastal fishing communities of Thailand. The ten-year interval of the 1985 and 1995 Censuses provides an excellent opportunity for analysis and comparison of changes that occurred in marine fishery sector of Thailand. The FAO Regional Office therefore commissioned Dr. Angkarb Korsieporn, a social scientist at the Social Research Institute, Chulalongkorn University (CUSRI), to analyse these changes and prepare a demographic profile of coastal fishing communities in Thailand. The study was funded by the UNFPA-FAO Project (FPA/INT/695/INT).

This publication presents the outcome of Dr. Korsieporn's study which includes not only the treatments of primary data from the Censuses but also her own field surveys in Southern Thailand to evaluate the current situation. Her efforts in preparing this important document is much appreciated. Acknowledgements are also due to Ms. Abha Siriwongs na Ayudhaya for cover picture; to Dr. U. Tietze of Fish Utilization and Marketing Service, Fishery Industries Division, FAO Fisheries Department, for his support and encouragement and to the Great Idea Co., Ltd. for the design of this publication.



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ABSTRACT

The study has two objectives. First is to compare the two marine fishery censuses of 1985 and 1995 in terms of sociological, demographic and economic changes, as well as fishing craft and gear. Second is to survey current small-scale fishing villages: Ban Sai Dang, Ranong province, and Koh Maphrao, Phuket province regarding the same aspects, as the censuses. The ultimate aim of the survey is to find out if the fishermen have any potential to participate in or to manage integrated coastal zone management (ICZM).

The field survey found that the people in Koh Maphrao village are all Muslim Thai, most of whom speak both Thai and the local dialect. to speak official Thai language. Formal organizations are few but working. The population is older than that of Sai Dang village, with about three children per family. The villagers have very good knowledge, attitude and practice of family planning, despite the older generation' objection against it. There is a clear division of labour between men and women. The heads of household are almost all fishermen, whereas their spouses tab latex to make smoked rubber sheets and some mend fishing nets. The craft are inboard-powered fishing boats and the majority of the gear are sand whiting gill nets. Though fish are depleting and the catches declining, the villagers maintain economic status despite the economic crisis because of the higher prices fetched by the catches.

The people in Sai Dang village are Buddhist Thai; some of them migrated from other regions and there is a sprinkling of newly migrated Burmese families. The village has the same number of formal organizations as Koh Maphrao, but are not as active. Migration has resulted in the population being newer and less socially cohesive than Koh Maphrao's. They also have very good knowledge and practice of family planning; each family has on average two children. The occupations of the heads of household are more diversified and the proportion of fishing families is lower than among their counterparts in Koh Maphrao. The women are mostly housewives, some engage in primary post-harvest processing. The families are poorer than in Koh Maphrao; more than half engage in either orchards or other service occupations. Fishing families also have inboard-powered boats, but the main gear are crab and fish traps.

The survey is supplemented by in-depth interviews of four people of two generations in each village as well as of officials of various ministries at the provincial level. The conclusion of the study is that the embers of the small-scale fishing communities do not have the knowledge, confidence and ability to set up and manage their own integrated coastal zone management as yet.

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CONTENTS

Foreword

Abstract

Statistical profile of development in Thailand

Part I: The desk study

1. [Introduction](#)
2. [Changes in the marine fishing population](#)
3. [Changes in the fishery and fishery employee households](#)
4. [Changes in fishing craft and gear](#)

Part II: The field study

1. [The field study](#)
2. [The surveyed households](#)
3. [The fishery households](#)
4. [Qualitative case study](#)

Part III: Conclusions and recommendations

Epilogue

Acknowledgements

References

List of figures

Part I

[1.1 The provinces of Thailand](#)

[1.2 Provinces in the five coastal zones of Thailand](#)

[1.3 Coral reef distribution \(1991\)](#)

[1.4 Condition of coral reefs in Thailand \(1991\)](#)

[1.5 Main locations of seagrass \(1997\)](#)

[2.1 Changes in the fisherman population by coastal zone between 1985 and 1995](#)

[2.2 Changes in the fishery employee population by coastal zone between 1985 and 1995](#)

[2.3 Number of fishermen by coastal zone between 1985 and 1995](#)

[2.4 Number of fisherwomen by coastal zone between 1985 and 1995](#)

[2.5 Number of male fishery employees by coastal zone between 1985 and 1995](#)

[2.6 Number of female fishery employees by coastal zone between 1985 and 1995](#)

[3.1 Fisherman households by coastal zone, 1985 and 1995](#)

[3.2 Fishery employee households by coastal zone, 1985 and 1995](#)

[4.1 Fishing craft by type, 1985 and 1995](#)

[4.2 Unpowered and outboard-powered fishing craft by coastal zone, 1985 and 1995](#)

[4.3 Inboard-powered fishing craft by coastal zone, 1985 and 1995](#)

[4.4 Recorded inboard-powered fishing boats by gross tonnage, 1985 and 1995](#)

[4.5 Recorded small-scale inboard-powered fishing boats by gross tonnage and coastal zone, 1985 and 1995](#)

[4.6 Recorded large-scale inboard-powered fishing boats by gross tonnage and coastal zone, 1985 and 1995](#)

- [4.7 Recorded commercial-scale inboard-powered fishing boats by gross tonnage and coastal zone, 1985 and 1995](#)
- [4.8 Recorded medium-scale inboard-powered fishing boats by gross tonnage and coastal zone, 1985 and 1995](#)
- [4.9 Recorded large-scale inboard-powered fishing boats by gross tonnage and coastal zone, 1985 and 1995](#)
- [4.10 Registered fishing boats by year and coastal zone. 1985 and 1995](#)
- [4.11 Census-recorded and registered outboard-and inboard-powered fishing boats, 1985](#)
- [4.12 Census-recorded and registered outboard-and inboard-powered fishing boats, 1995](#)
- [4.13 Comparison of the number of fishing boats census-recorded and registered by coastal zone, 1995](#)
- [4.14 Comparison of the number of fishing boats under 10 GT census-recorded and registered by coastal zone, 1995](#)
- [4.15 Comparison of the number of fishing boats of 10–49 GT census-recorded and registered by coastal zone, 1995](#)
- [4.16 Comparison of the number of fishing boats of 50 GT and over census-recorded and registered by coastal zone, 1995](#)
- [4.17 Registered fishing boats by type of fishing method, 1985–1995](#)
- [4.18 Inboard-powered fishing boats using large-scale and small-scale fishing gear, countrywide, 1985 and 1995](#)
 - [4.18.1 Inboard-powered fishing boats using large-scale and small-scale fishing gear for Zone I, 1985 and 1995](#)
 - [4.18.2 Inboard-powered fishing boats using large-scale and small-scale fishing gear for Zone II, 1985 and 1995](#)
 - [4.18.3 Inboard-powered fishing boats using large-scale and small-scale fishing gear for Zone III, 1985 and 1995](#)
 - [4.18.4 Inboard-powered fishing boats using large-scale and small-scale fishing gear for Zone IV, 1985 and 1995](#)

[4.18.5 Inboard-powered fishing boats using large-scale and small-scale fishing gear for Zone V, 1985 and 1995](#)

Part II

[1.1 Location of Sai Dang village in Ranong province](#)

[1.2 Location of Koh Maphrao village in Phuket province](#)

[1.3 Map of Sai Dang village](#)

[2.1 Age and sex structure of Sai Dang, 1998](#)

[2.2 Age and sex structure of Koh Maphrao, 1998](#)

[3.1 Fishing households in Sai Dang](#)

[3.2 Fishing households in Koh Maphrao](#)

[3.3 A poor fishing household in Koh Maphrao](#)

[3.4 A typical squatter toilet in Koh Maphrao](#)

[3.5 Outboard-powered boat in Sai Dang](#)

[3.6 Outboard-powered boat in Koh Maphrao](#)

[3.7 Fishing gear used in Sai Dang](#)

[3.8 Fishermen using a fish gill net in Koh Maphrao](#)

[3.9 Outboard-powered boat using a push net, Phuket province](#)

[3.10 Bycatch of an outboard-powered pushnetter, Phuket province](#)

[3.11 Woman processing shrimp paste in Sai Dang](#)

[3.12 Women cleaning green mussels in Koh Maphrao](#)

[3.13 Women repairing and making nets in Koh Maphrao](#)

List of tables

Part I

- [1.1 Crude birth rate, crude death rate and natural growth rate by region: 1995–1996 and 1985–1986 surveys of population change](#)
- [1.2 Fertility by region: 1995–1996 and 1985–1986 surveys of population change](#)
- [1.3 Migration of population 5 years of age and over, by place of birth](#)
- [1.4 Estimate of undocumented migrant workers in Thailand](#)
- [1.5 Sustainable and actual fish yields in Thai waters in 1991 \(tons\)](#)
- [1.6 Changes in mangrove forest areas by coastal zone and province, 1975–1996](#)
- [2.1 Population change of fishermen and employees by coastal zone between 1985 and 1995](#)
- [2.2 Fishermen and fishery employees by intent of involvement in fishery work, 1995](#)
- [2.3 Population change of fishermen by coastal zone and province between 1985 and 1995](#)
- [2.4 Change in area under shrimp culture as a percentage of total area under coastal aquaculture by coastal zone and province, 1985 and 1995](#)
- [2.5 Fishing craft by type and coastal zone, 1985 and 1995](#)
- [2.6 Fishing craft by type, coastal zone and province, 1985 and 1995](#)
- [2.7 Inboard-powered craft by gross tonnage and coastal zone, 1985 and 1995](#)
- [2.8 Inboard-powered craft by gross tonnage, coastal zone and province, 1985 and 1995](#)
- [2.9 Number of fisherfolk by coastal zone and sex, 1985 and 1995](#)
- [2.10 Number of fishermen by coastal zone, province and sex, 1985 and 1995](#)
- [2.11 Number of fishery employees by coastal zone and sex, 1985 and 1995](#)
- [2.12 Age distribution of fisherfolk by coastal zone, 1985 and 1995](#)
- [2.13 Age distribution of fishery employees by coastal zone, 1985 and 1995](#)
- [2.14 Educational attainment of fishermen by coastal zone, 1985 and 1995](#)
- [2.15 Educational attainment of fishery employees by coastal zone, 1985 and 1995](#)

- [3.1 Fisherman households and fishery employee households by coastal zone, 1985 and 1995](#)
- [3.2 Change in the number of members in fisherman and fishery employee households by coastal zone and sex, 1985 and 1995](#)
- [3.3 Average size of fisherman and fishery employee households, 1985 and 1995](#)
- [3.4 Changes in fisherman and fishery employee households by size of household and size of management, 1985 and 1995](#)
- [3.5 Change in the proportion of marine capture and coastal aquaculture fishery households, 1985 and 1995](#)
- [3.6 Changes in fisherman and fishery employee households by extent of dependence on fishery and size of management, 1985 and 1995](#)
- [3.7 Changes in fisherman and fishery employee households by extent of dependence on fishery, type of activity and coastal zone, 1985 and 1995](#)
- [3.8 Fishery loan by source for marine capture fishery households and aquaculture households, 1985 and 1995](#)
- [3.9 Participation in social activities by type of social activity group and size of management, 1985 and 1995](#)
- [4.1 Census-recorded inboard-powered fishing boats by gross tonnage and coastal zone, 1985 and 1995](#)
- [4.2 Census-recorded commercial-scale inboard-powered fishing boats by gross tonnage and coastal zone, 1985 and 1995](#)
- [4.3 Number of registered fishing boats by year and coastal zone, 1985–1995](#)
- [4.4 Comparison of outboard-powered and inboard-powered fishing boats in the census and in the registration, 1985 and 1995](#)
- [4.5 Comparison of the number of fishing boats census-recorded and registered by gross tonnage and coastal zone, 1995](#)
- [4.6 Registered fishing boats by type of fishing method, 1985–1995](#)
- [4.7 Inboard-powered craft by large-scale fishing gear and coastal zone, 1985 and 1995](#)
- [4.8 Inboard-powered craft by small-scale fishing gear and coastal zone, 1985 and 1995](#)

[4.9 Main fishing gear by type and size of fishing boats, 1995](#)

Part II

[2.1 Source of household drinking water, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)

[2.2 Treatment of household drinking water, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)

[2.3 Availability of toilets, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)

[2.4 Source of cooking fuel, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)

[2.5 Methods of rubbish disposal of the households, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)

[2.6 Household size in Sai Dang village and Koh Maphrao village, 1998](#)

[2.7 Household size and number of household members in Sai Dang village, and Koh Maphrao village, 1998](#)

[2.8 Age and sex structure of Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)

[2.9 Age by marital status, Sai Dang village, 1998](#)

[2.10 Age by marital status, Koh Maphrao village, 1998](#)

[2.11 Level of education completed, Sai Dang village, 1998](#)

[2.12 Level of education completed, Koh Maphrao village, 1998](#)

[2.13 Main occupation and employment status, Sai Dang village, 1998](#)

[2.14 Main occupation and employment status, Koh Maphrao village, 1998](#)

[2.15 Secondary occupation and employment status, Sai Dang village, 1998](#)

[2.16 Secondary occupation and employment status, Koh Maphrao village, 1998](#)

[2.17 Age and sex of heads of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)

- [2.18 Main occupation and employment status of heads of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [2.19 Secondary occupation and employment status of heads of household. Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [2.20 Annual income of heads of household by community, 1997](#)
- [2.21 Gross annual household income by community, 1997](#)
- [2.22 Income sufficiency by household type, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province](#)
- [2.23 Ability to save household income by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province](#)
- [2.24 Borrowing by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province](#)
- [2.25 Source of borrowing by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province](#)
- [2.26 Amount of money borrowed by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province](#)
- [2.27 Reason for borrowing by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province](#)
- [2.28 Current debts of household by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [2.29 Nationality and religion by community, 1998](#)
- [2.30 Language spoken at home by community, 1998](#)
- [2.31 Fluency in spoken standard Thai by community, 1998](#)
- [2.32 Number of live births by age of woman and community, 1998](#)
- [2.33 Women's desired family size by age and community, 1998](#)
- [2.34 Knowledge about family planning methods by community, 1998](#)
- [2.35 Attitudes toward family planning by age group and community, 1998](#)
- [2.36 Contraceptive methods ever used by community, 1998](#)

- [2.37 Contraceptive methods in current use, Sai Dang village, 1998](#)
- [2.38 Contraceptive methods in current use, Koh Maphrao village, 1998](#)
- [2.39 Source of contraceptive by community, 1998](#)
- [3.1 Main and secondary occupations of household members engaged in fishery activities by employment status, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [3.2 Age and sex of persons engaged in fishery, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [3.3 Age by education of persons engaged in fishery, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [3.4 Years engaged in fishery by age group, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [3.5 Availability of boats in fishery households, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [3.6 Boat length and horsepower, Sai Dang village, Ranong province, 1998](#)
- [3.7 Boat length and horsepower, Koh Maphrao village, Phuket province, 1998](#)
- [3.8 Distance from coast to fishing grounds, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [3.9 Fishing gear, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [3.10 Problems mentioned first by persons engaged in fishery, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1997](#)
- [3.11 Other problems mentioned by persons engaged in fishery, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1997](#)
- [3.12 Annual net income from fishery in 1997, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)
- [3.13 Total net annual income per household engaged in fishery in 1997, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998](#)

3.14 Fishery income in fishing households as percentage of total annual household income, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

3.15 Women's role in fishery, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

STATISTICAL PROFILE OF DEVELOPMENT IN THAILAND

1)	Surface area	513,000 sq km
2)	Population in 1980	46.7 million
	Population in 1998	61.1 million
3)	Population average annual growth rate (1980–1990)	2.7 %
	Population average annual growth rate (1990–1998)	1.4 %
4)	Labour force in 1998	37 million
5)	Labour average annual growth rate (1990–1998)	2.1%
6)	Women in the labour force (1998)	47 %
7)	Agricultural labour force (1980)	71 %
	Agricultural labour force (1990)	64%
8)	GNP per capita (1995)	US\$ 2,740
	Average annual growth (1985–1995)	8.4%
9)	Life expectancy at birth (1997)	66 Years
	- Male	
	-Female	72 Years
10)	Infant mortality rate (per 1,000 live births) 1997	7.2
11)	Under 5 mortality rate (per 1,000 live births) 1997	6.2
12)	Total Fertility rate (1997)	1.7
13)	Contraceptive prevalence rate (1990)	48.3%
14)	Adult illiteracy (1995)	33 %
15)	School Enrolment as % of age group	
	15.1 Primary: Female (1993)	97
	Male (1993)	98
	15.2 Secondary : Female (1993)	37
	Male (1993)	38
16)	Total forest area (1990)	127,000 sq km
	Annual deforestation (1990–1995)	3,294 sq km
17)	Nationally protected area (1996)	707,000 sq km
	as % of total land area	1.38

Sources: 1) World Bank (1999). *World Development Report 1999–2000*. New York Oxford University Press.

2) UNDP (1996). *Human Development Report 1996*. New York Oxford University Press.

3) UNDP (1999). *Human Development Report of Thailand 1999*.

PART I

The desk study

1.1 Introduction

Among the agricultural sectors of Thailand, fishery plays a significant role in providing food security and export earnings. In 1994, Thailand ranked number nine among the top ten producers of fish in the world, with a total production of 3.5 million tons, of which 3.2 million tons derived from marine fishery (Thailand Development Research Institute [TDRI], 1998, p. 11). The export of fish and fishery products in 1994 was valued at Baht [B] 110,285* million: B49,155.6 million derived from fresh and frozen shrimp, B15,619 million from canned tuna. B13,301.8 million from canned shrimp and B1,032.8 million from canned sardine (Department of Fisheries. *Fisheries Statistics of Thailand 1994*. pp. 60–63). By 1995, the export value of shrimp alone was second only to that of rubber. Among the main exports, export of shrimp amounted to 175,091 tons and was valued at B50,302 million (National Statistical Office, *Key Statistics of Thailand 1996*. p. 77).

Achieving increases in production and export earning comes at a price. At present, there are rising concerns about the sustainability of the fishery sector. The catch rates, measured by catch per unit effort, are rapidly declining and are now only seven percent of the levels of the early 1960s. Commercial fishing vessels operate illegally not only within the 3-km coastal zone reserved for small-scale fisherfolk but also in the exclusive economic zones of other countries. Up to 40 percent of marine landings consist of trash fish (TDRI, *ibid.* p. vii). Commercial aquaculture has been encroaching upon mangrove areas and even upon inland areas where rice farming predominates, and has faced frequent outbreaks of disease.

The Thai government has made various attempts to tackle the above problems but not in an integrated manner. The Thai bureaucracy is characterized by patron-client relationships and by sectoral and autonomous management of budgetary allocations by line ministries. To evaluate such attempts is difficult, mainly because of the lack of adequate and up-to-date data. For example, despite the policy to control the number of fishing vessels, the annual registration data on fishing craft and fishing gear are believed to be unreliable. Despite the plans to improve the standard of living of small-scale fisherfolk, little is known about the latter besides the facts that they constitute the majority of the fishing population and account for less than 10 percent of the total catch by value and 5–6 percent by volume (TDRI, *ibid.* p. viii). Despite the degradation and depletion of coastal and marine resources, there is little current accurate information about the state of the resources and about the use of coastal land, which affects them to some extent.

In fact, there are data sources that could provide the information needed to develop appropriate planning for the Thai fishery sector. The National Statistical Office of the Office of the Prime Minister of Thailand conducted marine fishery censuses in 1985 and in 1995. These censuses provide detailed statistical information on the 24 coastal provinces that constitute the five coastal zones of Thailand. The information covers the economic structure of marine capture fishery and aquaculture, the socio-economic structure of fishermen's and fishery employees' households and the social and demographic characteristics of fishermen and fishery employees.

In order to assess the changes over the decade, the two censuses will be analysed. The analysis should provide a holistic view of the fishery sector, of which small-scale fisherfolk and their households comprise the majority. The set of statistical information in turn will provide the context for a field study of small-scale fisherfolk and their communities. The information from the censuses and the field study will then allow us to profile fishing communities in Thailand.

* Up to 1996, the exchange rate was about 25 baht to US\$ 1, but at the height of the economic crisis in February 1998, the rate was 55.15 baht to US\$ 1.

Objectives of the study

The study aims at presenting the demographic profile of coastal fishing communities in Thailand and to assess if Thailand is capable of managing its coastal zones in an integrated manner. More specifically, the objectives of the study are to examine:

- changes in the number of small-scale and medium- to large-scale marine fishing in Thailand during 1985 and 1995;
- changes in the number of fishing craft (small-scale and medium- to large-scale) and the number of fishing gear by type of gear;
- changes of social and demographic characteristics of the fishing communities; and
- implications of the social and demographic changes in coastal fishing communities for integrated coastal zone management programmes in Thailand.

Methodology

To meet these aims, a desk study will first provide a statistical picture of the fishing population, based on the marine fishery censuses of Thailand carried out in 1985 and 1995. A field survey of two small fishing communities will then be carried out to round out the statistical profile. To go further in depth, interviews with a number of government officials and individuals from the surveyed communities will complement the desk study and field survey.

Background information

A profile of Thai fishing communities will stand out more clearly against the background of Thailand in general. Accordingly, this chapter will now provide an overview of changes in the total population, the fishing population, the natural resources and the state of the coastal environment.

Population changes in Thailand, 1980–1996

Thailand is a Southeast Asian country with an area of 513,115 sq km. It shares a border with Myanmar and Lao PDR in the north, with Cambodia and Lao PDR in the east, with Malaysia in the south, and with Myanmar and the Indian Ocean in the west. The country is divided into four geographical regions: the Central Region, the North, the Northeast and the South. As of 1997, there are 76 provinces (Figure 1.1).

In terms of population distribution, the Northeast is the most populous region, followed by the Central Region (minus the Bangkok metropolis), the North, the South and the Bangkok metropolis, in descending order. The distribution of the population among the regions has not changed much over time, regardless whether one looks at the census or at population

registration figures (cf. the 1980 and 1990 population and housing censuses for the whole kingdom and the interior ministry's 1996 population registration). This may indicate little but genuine inter-regional migration, or the tendency of migrants not to report their change of residence.

In terms of growth, the population in Thailand has been increasing, although the rate of increase has slowed down. The 1980 census assessed the total population at 44,824,540, the 1990 census at 54,548,530, and the Ministry of Interior registered 60,116,182 persons by 1996. Calculations based on these figures yield an annual growth rate of 1.98 percent between 1980 and 1990, and 1.63 per cent per year between 1990 and 1996. These growth rates take into account legal immigration as well as natural population growth, but exclude illegal immigration.

The natural population growth rate has been declining, as is apparent in the 1985–86 and 1995–96 surveys of population change carried out by the National Statistical Office. Tables 1.1 and 1.2 show the crude birth and crude death rates and the rate of natural growth, as well as fertility measured by region. They indicate clearly that fertility and mortality have been declining in every region, resulting in the decline of the natural growth rate. The figures differ slightly by area and by region: crude birth and crude death rates were lower in municipal areas than in non-municipal areas. In the 1985–86 survey, the population growth rate ranged from 1.44 percent in the North to 2.41 percent in the South. By 1995, it was of 0.78 percent in the North and 1.73 percent in the South. The rapid decline in the growth rate results mainly from the decline in fertility, itself linked to the high contraceptive prevalence rate (Economic and Social Commission for Asia and the Pacific, *Population Data Sheet 1997*). The trend toward a natural population growth rate below one percent signals that in the near future, it will be at or below replacement level, as the crude birth rate continues to decline and the crude death rate declines to its lowest possible level of around 4 to 6 per 1,000.

Migration, internal and international, is another factor contributing to overall population changes. In Thailand, as Table 1.3 indicates, internal migration has not been a significant contributing factor. Roughly over 90 percent of the population had not migrated from their province of birth or migrated only within their province of birth in the last five years. Of those not living in their province of birth in the census years, some 65–70 percent had not migrated for the previous five years.

In recent years, migration of labour from neighbouring countries has become an increasingly significant factor in demographic, economic and political terms. Demographically, it increases the population in Thailand by an unknown number, due to its largely clandestine nature. Estimates of the number of illegal migrant workers vary widely, but the most frequently cited figure is one million (Stern and Korsieporn, 1998). Chalamwong (1996) provides an estimate of illegal migrant workers by province in 1996 (Table 1.4) and the Ministry of Labour and Social Affairs released a set of figures that show that 87 percent of the illegal migrants who had received work permits by 30 April 1997 were Burmese.

In short, official figures from the 1980 and 1990 censuses, the 1985 and 1996 population surveys and the 1996 population registration record point to an increase in the size of the population. The rate of increase, overall as well as natural, has been declining. Though the figures pertaining to fertility, mortality and natural increase are thought to be acceptable, the actual size of the population is believed to be larger than official figures establish, due to unknown numbers of illegal workers from neighbouring countries, especially Myanmar. It is

generally believed that large numbers of Burmese immigrant workers are employed in fishery activities where they have replaced Thai employees.

Changes in the Thai fishing population, 1985–1995

In the 1980 Population and Housing Census of Thailand, fishermen are included under the main occupation group of “Agricultural, Animal Husbandry and Forest Workers, Fishermen and Hunters”. The 1990 census provides a more detailed classification, in which “Fish, Shrimp, Shell Farm Workers” is one category and “Fishermen” another. According to this census, there were 330,272 persons engaged in fishery, 239,787 of whom were fishermen and 90,485 fish, shrimp and shell farm workers. Among the self-employed fisherfolk, 80.8 percent were male, but among fish, shrimp and shell farm workers, only 61.3 percent were male. These figures most likely include freshwater fisherfolk and those employed in freshwater fish culture.

Marine fishery censuses were carried out in 1985 and 1995, and a marine fishery survey in 1990. Of the 76 provinces, 24 are coastal provinces grouped into five coastal zones (Figure 1.2). The countrywide fishery censuses established that there were 139,506 fisherfolk (including coastal aquaculture workers) in 1985, 148,306 in 1990 and 157,377 in 1995. Thus, the annual rate of increase was 1.23 percent during the 1985–1990 period and 1.19 percent during the 1990–1995 period. The rate of growth of the fishing population over 1990–1995, however, is lower than the total population growth rate for the same period, suggesting that a number of Thai fishermen gave up their occupation. The number of Thai fishery employees declined by about two percent; they are believed to have been replaced by foreign migrant workers.

Though the rate of growth of the population of Thailand has slowed down, it still means an increase in the total population and consequently a higher requirement for and exploitation of edible and non-edible natural resources.

Changes in marine resources and in the coastal environment

Tracing changes in marine resources and in the coastal environment in Thailand is no easy task. The changes are rapid and the information gathered tends to be fragmentary. To get scientific information on such resources as coral reefs and seagrass beds is time consuming, so that by the time the information is available, it has become outdated. The best that can be done is to give a general overview of some important marine resources and of the state of coastal land use.

Marine fisheries

Actual fish catches have exceeded the level of sustainability since 1977, when the catch reported was greater than the recommended maximum yield (Tokrisna, 1994, cited in TDRI, 1995, p. 36). The level of exploitation was high, and the level of overexploitation was higher in the Andaman Sea than in the Gulf of Thailand (Table 1.5). However, actual production included fish caught in non-Thai - especially Burmese - waters, which makes the total actual production far exceed the maximum sustainable yields.

For TDRI (1998, p. 27) several factors contribute to the decline of fishery resources. These are overfishing by an excessive number of boats, use of destructive gear, such as trawls and push nets, destructive fishing methods such as dynamite fishing, large-scale trawling in near-shore areas and use of push nets near coral reefs. In addition, there are widespread violations of

regulations, such as fishing during ban periods, use of illegal mesh sizes and destruction of fish habitats such as mangroves, seagrass beds and coral reefs. TDRI also notes wrong or uncoordinated policies such as protecting the fishmeal industry at the expense of losing juvenile economic fish in the process of trash fish capture.

The Department of Fisheries of the Ministry of Agriculture and Co-operatives has attempted to rebuild fish stocks by various measures, such as prohibiting fishing during the breeding season or in spawning areas and controlling the number of fishing craft and gear. The implementation of these measures has yet to be seriously considered. It is generally believed that the lack of enforcement is due to the lack of real collaboration among the relevant government agencies.

Mangrove forests, coral reefs, seagrass beds and the coasts themselves are important coastal resources. TDRI (ibid.) states that during the last few decades, all of these resources have come under increasing threat of degradation or depletion.

Mangrove

Mangrove land shrank from 2,219,375 *rai** in 1961 to 1,047,370 *rai* in 1996, representing a decline of more than 50 percent over 35 years. More recently, the rate of decline has slowed down: over the 1986–1996 period, it was of about 1.5 percent per year (Table 1.6). TDRI (unpublished preliminary report on the state of the environment, BE 2540 [1997]; pp. 4–10) points out that this might be due to greater government and public awareness of the importance of mangroves, which has translated into consequent attempts at replanting and conservation.

TDRI (preliminary report, ibid., pp. 4–11) notes that there is a negative correlation between mangrove areas and areas under shrimp cultivation. This negative correlation is repeatedly marked and statistically demonstrated in *State of the coastal resources of Thailand BE 2539–2540 [1996–97]* and in separate reports of the state of the 24 coastal provinces (Office of Environmental Policy and Planning, 1997).

The continued reduction of mangrove areas has been caused by various activities: illegal encroachment by coastal aquaculture, mining, salt ponds, construction of roads, residential areas and factories, agricultural activities within or near mangrove areas, as well as urbanization and tourism. These activities reduce the mangrove areas either directly or indirectly through silting, erosion of the shoreline and water pollution.

Government efforts, through the Royal Forestry Department, to maintain and replant mangroves began in 1987. In June 1991, the Cabinet approved the replanting of mangrove in all the coastal provinces, the setting up of four seedling centres - in Trat, Phangnga, Nakhon Si Thammarat and Satun -, a plan to increase the effectiveness of the 34 mangrove management units in the country, and the setting up of another six such units in Phetchaburi, Rayong, Chumpon, Surat Thani, Nakhon Si Thammarat and Pattani. In April 1993, with Cabinet approval, two research and conservation centres were set up, in Phuket and Nakhon Si Thammarat.

* 1 *rai* = 1,600 square metres or 0.16 ha

Coral reefs

Sudara and Yeemin (1994) reported that Thailand has more than 300 major reef groups in four main areas along its coasts. Their distribution is shown in Figure 1.3. The reefs in the inner part

of the Gulf of Thailand are along the islands on the eastern side, and most of them show that they are under severe pressure, particularly from fishing and tourism activities.

Further to the east (Rayong and Trat), the reefs along many islands were damaged in the past mostly by dynamite fishing, but the more recent factors are uncontrolled tourism and the capture of live fish for export to foreign aquariums.

To the southwest of Bangkok, the reefs along the western coast of the Gulf stretch from well south of Bangkok to the Malaysian border. While many of them are damaged by strong typhoons, all reefs close to the land have been damaged by sediment runoffs and pollution from the land. The area includes Samui, Pha-ngan and Tao islands, whose rapid development as tourist centres has resulted in the loss of more than 20 percent of the reefs.

The Andaman Sea reefs, which stretch all the way from the Burmese to the Malaysian borders, are the richest in Thailand, but those close to shore, particularly around Phuket Island, are showing signs of damage from sewage and sediment runoffs due to tourism-related development.

By 1991 only about 36 percent of the coral reefs were in good to excellent condition, and there was evidence in most areas of continuing degradation. The condition in 1991 of 27 coral reef groups is shown in Figure 1.4, which also lists the main causes of damage. The definition of quality (good, fair, poor, very poor) is not given, however, and this will make later comparative studies difficult.

Neither change in the state of coral reefs nor their present state can be assessed. The Department of Fisheries has been carrying an extensive study of the state of coral reefs for some years. However, the study is piecemeal and might not be able to provide sufficiently current data by the time it comes to an end, due to lack of expert manpower and subsequent inability to survey all the sites simultaneously. As coral reefs are important marine resources in themselves and provide habitat for the fish, their conservation and restoration is a prerequisite for fish stock building, and thus updated and current information about them must be made available.

Seagrass beds

Poovachiranon et al. (1994) reported on an initial study on five seagrass beds in Phangnga bay in 1988. Other researchers, individually or as research teams, carried out selective surveys of sites in 1989, 1991 and 1992, while the large-scale ASEAN-Australian project on living coastal resources, begun in 1988, covered both the Gulf of Thailand and the Andaman Sea.

Remarkably, during the third ASEAN-Australian symposium on living coastal resources held in 1994, there was no paper to give an overview of the status and changes of Thai seagrass beds, even though there have been studies on the subject since 1988. One factor accounting for this is perhaps that each study is site specific and research is carried out at different times, making it difficult to synthesize the various studies and findings to present a state-of-the-art report on the subject.

Seagrass beds are more abundant in the Andaman Sea than in the Gulf of Thailand. Among the 25 surveyed (Phangnga, Phuket, Krabi and Trang), 40 percent were found to be in pristine condition with abundant seagrass cover, 30 percent in fairly good condition and 30 percent in

rather poor condition. Degraded seagrass beds were found along the eastern coast of Phuket, where they were adversely affected by many man-made activities. In the Gulf of Thailand, a survey of seagrass around Samui Island found degraded seagrass beds in those areas where there were considerable industrial construction, shrimp farming and land development. It is worth noting that the ensuing study does not specify the year of the survey or the criteria used to grade the seagrass beds. Figure 1.5, provided by the Office of Environmental Policy and Planning, shows the current distribution of the main areas of seagrass. Unfortunately, the office's provincial reports of the condition of the seagrass are too general and do not specify the criteria used in assessing the state of preservation of the beds.

It is apparent even from site surveys that economic activities are the main factor affecting seagrass depletion. These activities are illegal, destructive fishing methods such as trawling or pushnetting within the prohibited 3-km offshore area, dynamite and cyanide fishing, silting caused by road construction near the shoreline or by tin dredging, as well as the release of waste water from shrimp farming and urban sewage. Given the current redoubled efforts to promote tourism in order to ease the country's economic crisis, tourism has become the more significant factor causing the depletion and deterioration of both coral reefs and seagrass beds. To halt the rapid decline in both resources, tourism must be regulated to cause the least or no damage to the resources.

As with coral reefs, the changes in the state of seagrass beds cannot be assessed. The likelihood of rapid depletion of seagrass beds makes it imperative to synthesize the state of existing knowledge on the subject. There is also a need to provide classification standards of the condition of seagrass beds - as well as of coral reefs - and to facilitate simultaneous studies of the various sites, so as to make the findings comparable.

Coastal land use

This is perhaps the most complicated part of any integrated coastal zone management project. First, there is the methodological problem of delimiting the area considered as a coastal area. If a study of coastal areas is able to provide the number of people living there (OEPP, 1997), it must have certain criteria for defining a coastal area. These should be made public. This would provide a start when studying the land use pattern of a coastal province. Second, coastal land is being used for increasingly numerous purposes, and careful study at the provincial level is required to determine the relative impact of such uses on coastal land and coastal marine resources. Third and last, as changes in land use happen at an increasingly fast pace, the gathering and updating of information will be a serious problem in coastal zone management planning.

TDRI (April 1998, p. 23) states that a number of changes have occurred in the coastal land over the past three to four decades. These changes include human settlements and urban expansion, infrastructure development, tourism and industrial development, agriculture and the development of tree plantation and aquaculture. The changes have had a negative impact on the coastal land, especially the mangrove areas. Mangroves have been reduced to less than half of their spread before the early 1960s, due mainly to their replacement by shrimp farms. Failures of the latter in a number of provinces, especially in Zone II (Bangkok and periphery), have caused land dereliction.

At present, due to the high profitability of shrimp culture in general and its lower profitability in coastal areas compared to newly opened area, shrimp farming has begun to move to the southern coastal zones as well as further inland. Controversy at the moment centres on the

encroachment of jumbo tiger prawn farming in the inland areas of 13 provinces in the Central Region. On 7 July 1998, the Cabinet banned such farming on the grounds of its negative impact (salinization) on adjacent rice farms as well as on international trade relations (by prompting trade barriers allegedly for environmental reasons), but the issue is far from dead.

Except for the information on the changes in mangrove areas and shrimp farming, there has yet to be a holistic, extensive and continuously updated set of provincial data on coastal land use for the specific purpose of defining the parameters of provincial coastal zone management. To obtain this kind of data would be an almost impossible task, as it would require concerted efforts to cut across the sectoral administrative framework of an entrenched bureaucracy. This type of administration prevents intra- and inter-ministry co-ordination. Take for instance the Ministry of Agriculture and Co-operatives and the Ministry of Transportation: these ministries have been totally unable to co-ordinate their activities in order to limit entry into fishing activities through effective control of fishing gear licensing and boat registration. Co-ordination between government bureaucrats and NGO workers has also been minimal, and relations between the "servants of the Crown" and the villagers are those of superiors and inferiors.

Given these unfortunate facts, we believe that only two main goals should be aimed for during the next few decades. One is to keep lobbying for a restructuring, and improvement in the performance, of the various government departments responsible for coastal land use and the use of coastal marine resources. For example, within the Department of Fisheries, the Fisheries Statistics subdivision should be able to make an estimate of the actual number of fishing craft and gear by comparing the data of the marine fishery censuses with the registration data and data from private sources such as the Fishery Association.

The other goal is to build databases on key factors that need to be considered in any integrated coastal management programme. The data should include all living and non-living marine resources, as well as the land use pattern in the coastal zone of each coastal province.

Summary and discussion

The objectives of this study are to examine the changes in the numbers of fisherfolk, fishing boats and fishing gear and the social and demographic changes that have taken place in the fishing communities over the last few decades. These changes are to be examined in order to assess their implications on the formulation of integrated coastal zone management programmes in Thailand.

The methodology used is a desk study comparing the relevant data from the 1985 and 1995 marine fishery censuses, two village surveys and interviews with local people and officials in Ranong and Phuket provinces.

This chapter has presented an overview of the situation of Thailand in terms of population changes and changes in the marine and coastal land resources. The population of Thailand has been increasing, albeit at reduced rates in recent years. Natural population growth has been declining due to declining fertility. Migration has become the main factor of population growth, especially the immigration of foreign (most notably Burmese) labour into the fishery sector of the Thai economy. The actual number of immigrants is unknown due to their clandestine nature, but what is known is that they have increasingly replaced or displaced Thai fishery employees, who must have shifted to other occupations in the light-industry and service sectors. Thus, two main issues arise from these population changes. The first is how the fishery sector can meet the

increase in food requirement, including seafood, without further overexploitation of marine resources and without negative environmental impact on the promotion of aquaculture. The second is the role of foreign labour in fishery and its long-term social impact on Thai society.

Attempts to give an overview of the changes in marine coastal resources and in the state of the coastal environment have almost always failed due to the lack of adequate information and standard definitions or criteria to judge the condition of resources such as coral reefs and seagrass beds. The general conclusion is only that marine living resources have been depleting due to uncontrollable overfishing and use of illegal methods. Non-living coastal marine resources have rapidly deteriorated or been depleted because of such man-made activities as tourism, water pollution due to urban sewage and untreated water from farms and factories, and silting caused by infrastructure work and sediment runoff. Changes in land use patterns are even more difficult to gauge, first because of the lack of standard criteria to define a coastal zone, and second because there has been no precise, updated information on land use patterns at provincial level. Both sets of information (marine coastal resources and coastal land use patterns) are still inadequate, yet are requisites for formulating integrated coastal zone management programmes. It is thus suggested that in preparation for such programmes, Thailand concentrate on restructuring its bureaucracy and on increasing human resource capacities. Simultaneously, there is a dire need to build up databases on factors needed to plan the programmes. Meanwhile, the question is: what kind of programmes - and at what level of the regional administration-could be initiated before an integrated coastal zone management programme can take place?



Figure 1.1 The provinces of Thailand

Source: Thailand in figures 1995–1996 by Alpha Research Co., Ltd

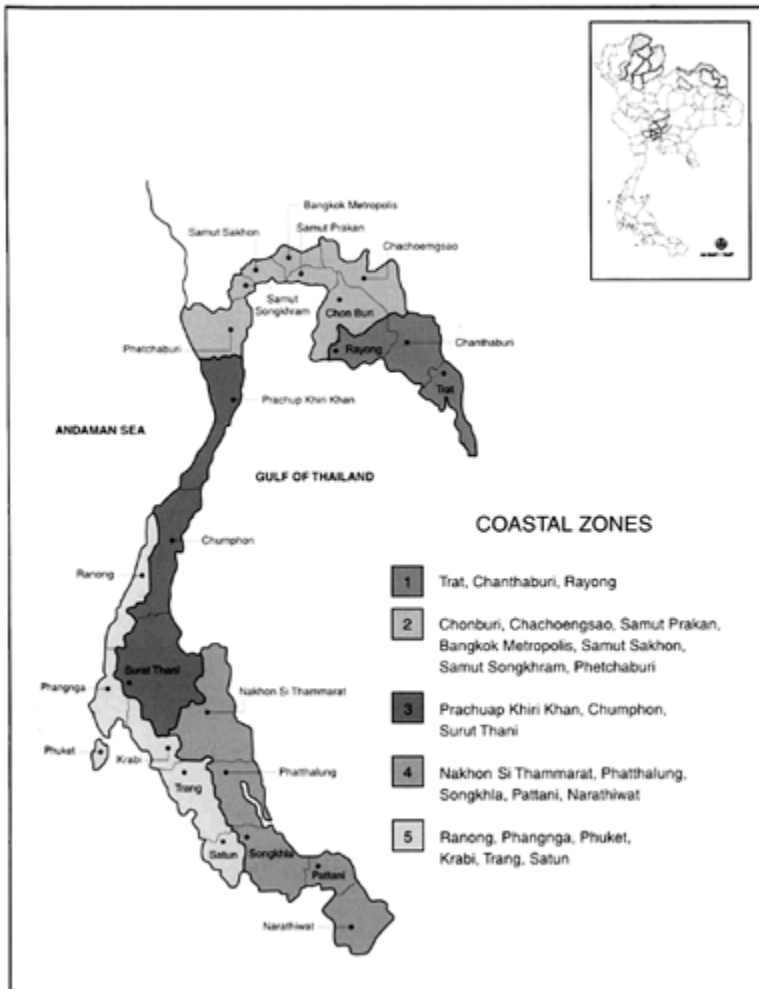


Figure 1.2 Provinces in the five coastal zones of Thailand

Source: 1995 Marine Fishery Census of the whole Kingdom

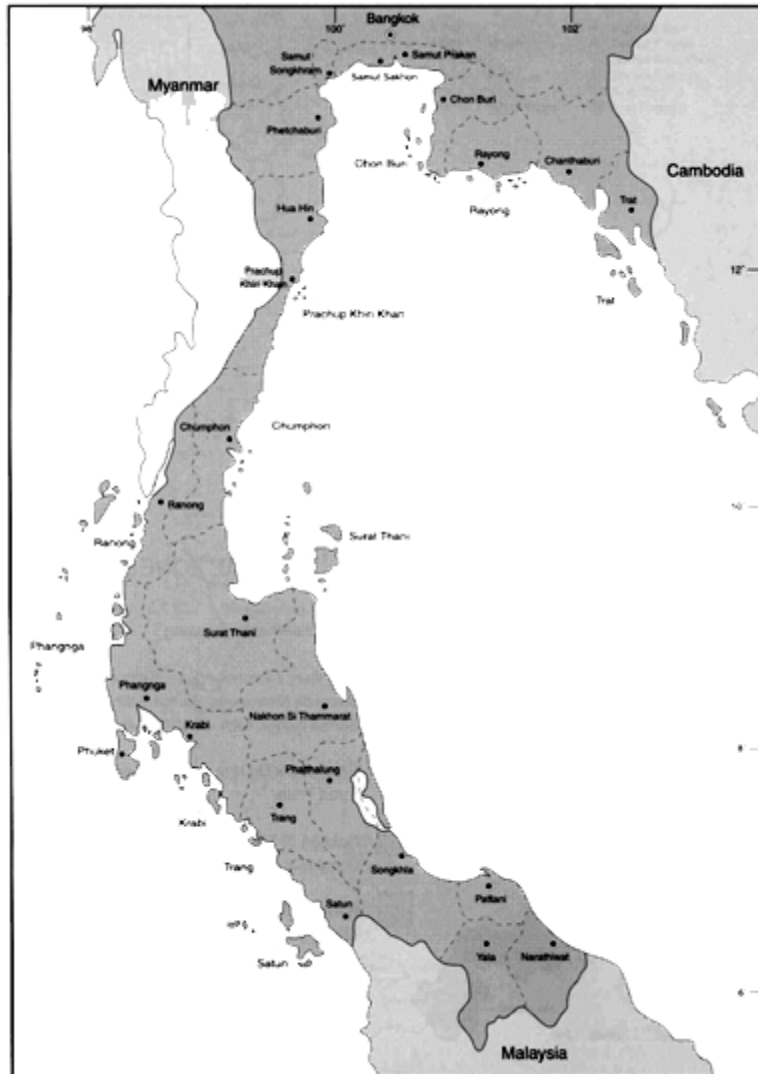


Figure 1.3 Coral reef distribution (1991)

Source: *Proceedings, Third ASEAN-Australia symposium on living coastal resources*
Chulalongkorn University, 1994, p.40

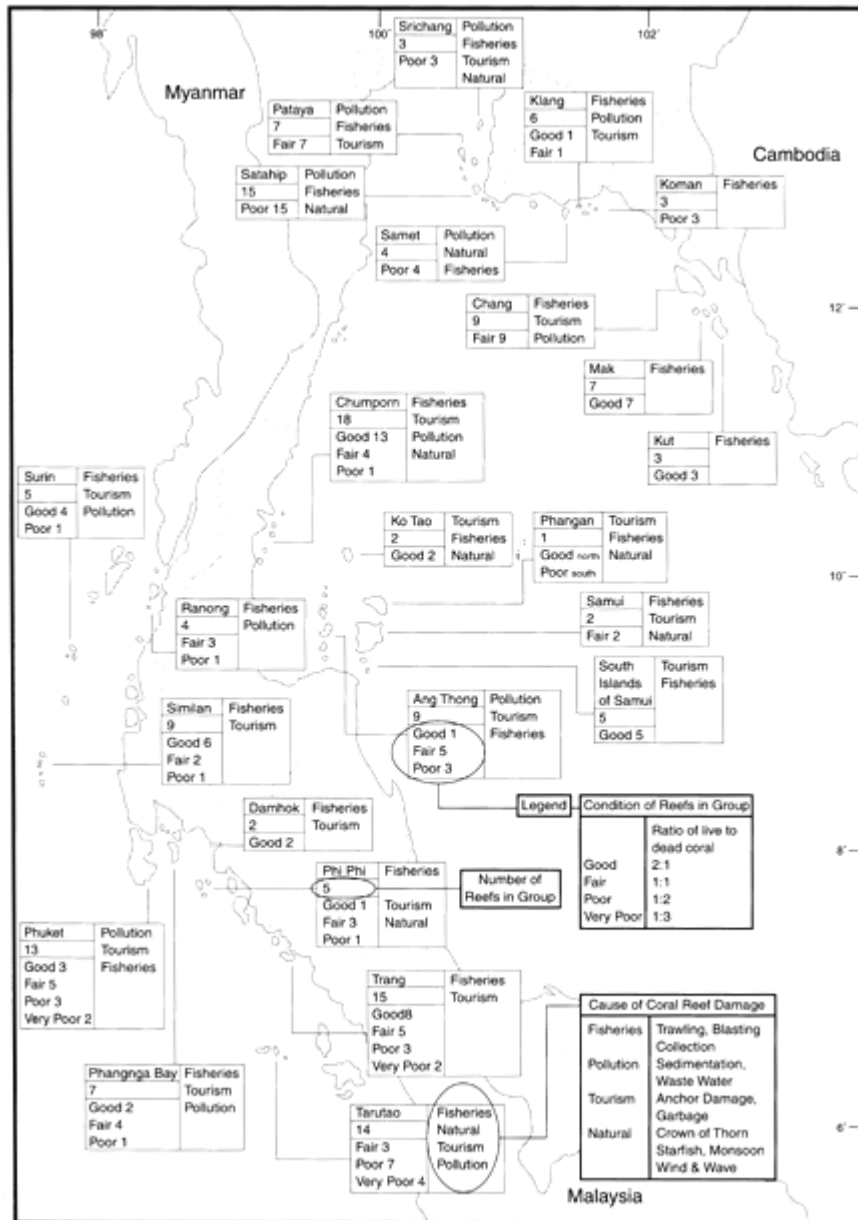


Figure 1.4 Condition of coral reefs in Thailand (1991)

Source: *Proceedings, Third ASEAN-Australia symposium on living coastal resources*
Chulalongkorn University, 1994.p.94

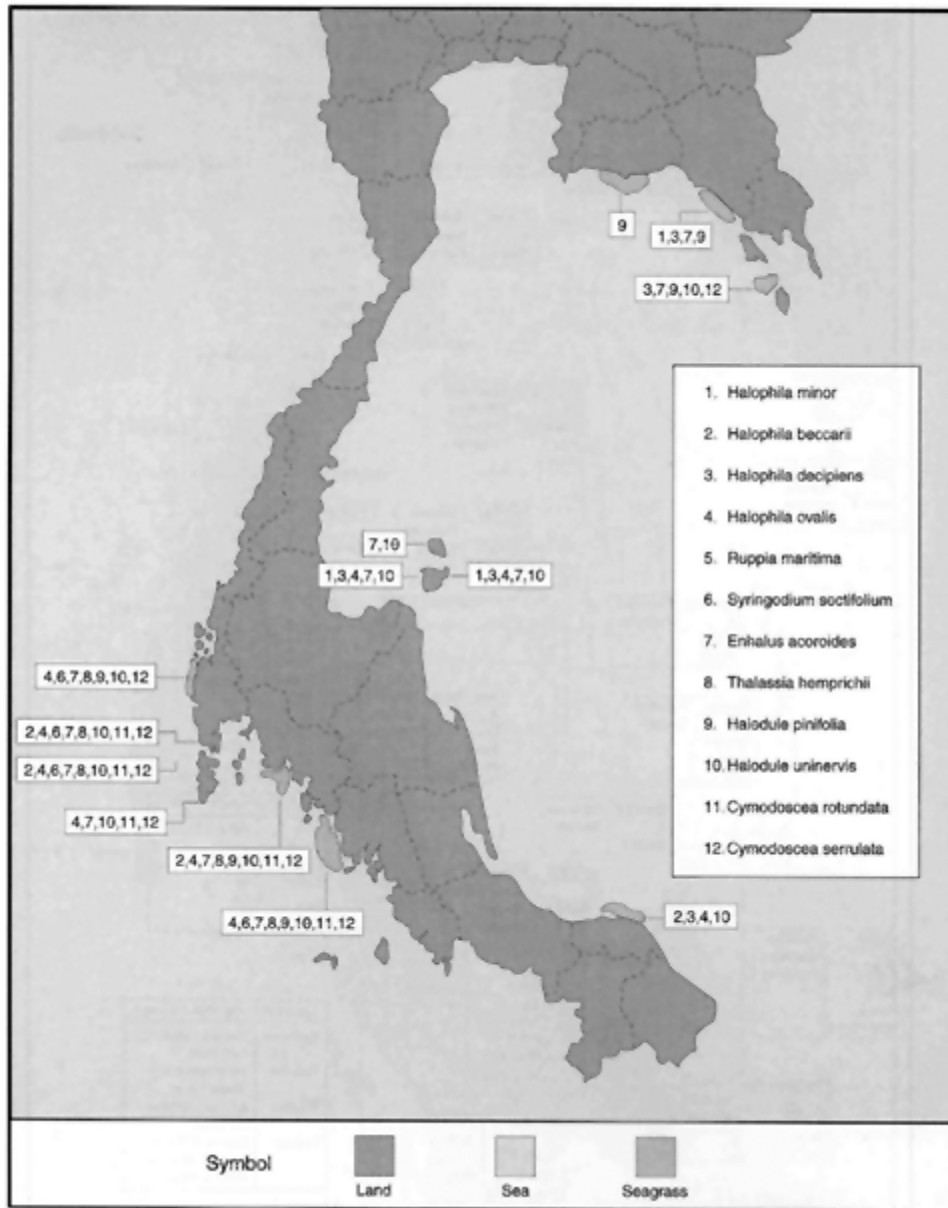


Figure 1.5 Main locations of seagrass (1997)

Source: The State of Coastal Resources in Thailand, B.E. 2539–2540 (in Thai)
Office of Environmental Policy & Planning, (1997)

Table 1.1 Crude birth rate, crude death rate and natural growth rate by region: 1995–1996 and 1985–1986 surveys of population change

Region	Survey of Population Change					
	1985–1986			1995–1996		
	Crude Birth Rate	Crude Death Rate	Natural Growth Rate (%)	Crude Birth Rate	Crude Death Rate	Natural Growth Rate (%)
Whole Kingdom	23.87	6.44	1.74	17.90	6.02	1.19
Municipal Area	18.97	4.22	1.48	14.73	4.14	1.06
Non-municipal Area	24.79	6.86	1.79	18.72	6.50	1.22
Bangkok Metropolis	18.92	3.84	1.51	14.24	3.92	1.03
Central Region (excluding Bangkok Metropolis)	22.43	5.76	1.67	15.61	5.78	0.98
Northern Region	21.60	7.23	1.44	14.83	6.97	0.79
Northeastern Region	24.87	6.82	1.81	19.96	6.12	1.38
Southern Region	31.17	7.03	2.41	24.00	6.69	1.73

Source: NSO Report on the 1995–96 Survey of Population Change, 1997

Note: CBRs and CDRs are births and deaths per 1 000 population per year

Table 1.2 Fertility by region: 1995–1996 and 1985–1986 surveys of population change

Region	Crude Birth Rate (CBR)			General Fertility Rate (GFR)			Gross Reproduction Rate (GRR)			Total Fertility Rate (TFR)		
	1985–86	1995–96	% Change	1985–86	1995–96	% Change	1985–86	1995–96	% Change	1985–86	1995–96	% Change
	Whole Kingdom	23.90	17.90	-25.10	90.30	63.06	-30.17	1.34	0.95	-29.10	2,730.00	2,021.99
Municipal Area	19.00	14.73	-22.47	60.50	43.05	-28.84	0.87	0.63	-27.59	1,766.00	1,331.59	-24.60
Non-Municipal Area	24.80	18.72	-24.52	97.20	69.33	-28.67	1.45	1.07	-26.21	2,962.00	2,284.74	-22.86
Bangkok Metropolis	18.90	14.24	-24.66	59.20	41.51	-29.88	0.85	0.61	-28.24	1,735.00	1,260.66	-27.34
Central Region (excluding Bangkok Metropolis)	22.40	15.61	-30.31	82.80	53.25	-35.69	1.22	0.77	-36.89	2,494.00	1,664.40	-33.26
Northern Region	21.60	14.83	-31.34	78.90	54.73	-30.63	1.10	0.93	-15.45	2,248.00	1,894.29	-15.73
Northeastern Region	24.90	19.96	-19.84	100.00	73.83	-26.17	1.52	1.19	-21.71	3,096.00	2,435.30	-21.34
Southern	31.20	24.00	-23.08	127.90	89.28	-30.20	1.98	1.25	-36.87	4,049.00	2,850.86	-29.59

Region

Source: NSO *Report on the 1995–1996 Survey of Population Change, 1997, p. 39*

Notes: 1) CBR = Number of births per 1 000 population per year

2) GFR = Number of births per 1 000 women of reproductive age (15–44 or 15–49 years old)

3) GRR = Average number of daughters born to a cohort of 1 000 women who follow a set of current schedule of age-specific fertility rates assuming none of the women die during their reproductive period

4) TFR = Sum of age-specific fertility rates, computed for each group of women of reproductive age. It indicates the number of children that would be born to a hypothetical cohort of 1 000 women who follow a set of current age-specific fertility rates, assuming none of the women die during their reproductive period

Table 1.3 Migration of population 5 years of age and over, by place of birth

Place of Birth	1980 Census		1990 Census	
	Number	%	Number	%
1) Living in Province of Birth in Census Year	32,804,788	100.00	42,348,706	100.00
Has not Migrated for the last 5 years	29,608,948	90.26	40,291,132	95.14
Migrated within Province	978,663	2.98	964,276	2.28
Migrated from other Province	319,961	0.98	549,462	1.30
Migrated from Abroad	77,400	0.24	5,177	0.01
Unknown whether Migrated	1,819,816	5.55	538,659	1.27
2) Not Living in Province of Birth in Census Year	5,314,078	100.00	7,127,461	100.00
Has not Migrated for the last 5 years	3,450,095	64.92	4,993,075	70.05
Migrated within Province	169,117	3.18	135,812	1.91
Migrated from Province of Birth	1,135,792	21.37	1,543,162	21.65
Migrated from other Province	318,326	5.99	398,281	5.59
Migrated from Abroad	28,446	0.54	2,203	0.03
Unknown whether Migrated	212,302	4.00	54,928	0.77
3) Unknown Province of Birth	607,070	<u>n.c.</u>	377,218	<u>n.c.</u>
4) Foreign Born & Unknown	591,002	<u>n.c.</u>	201,829	<u>n.c.</u>
Total	39,316,938		50,055,214	

Source: NSO, *1980 and 1990 population and housing censuses*, Table 15 (1980) and Table 9 (1990)

Note: n.c. = cannot be calculated

Table 1.4 Estimate of undocumented migrant workers in Thailand

Coastal Zone/Province	Estimated No.	%	Main Activity
Coastal Zone 1	35,300		
Trat	3,500	0.69	fishery, shrimp farming, rubber orchard
Chanthaburi	26,000	5.11	agriculture, industry, construction, fishery, shrimp farming

Rayong	5,800	1.14	fishery, industry, orchard, construction
Coastal Zone 2	373,535		
Chon Buri	475	0.09	construction, transportation, fishery, service
Chachoengsao	3,100	0.61	?
Samut Prakan	30,000	5.90	industry, construction, fishery
Bangkok	275,340	54.13	water transport, construction, small-scale industry
Samut Sakhon	50,300	9.89	fishery, industry, agriculture
Samut Songkhram	13,040	2.56	salt farm, construction, fishery
Phetchaburi	1,280	0.25	fishery, construction
Coastal Zone 3	13,408		
Prachuab Khiri Khan	1,910	0.38	factory, fishery, agriculture
Chumphon	8,603	1.69	fishery, agriculture, construction
Surat Thani	2,895	0.57	fishery, shrimp farming, rubber orchard
Coastal Zone 4	12,220		
Nakhon Si Thammarat	5,360	1.05	fishery, shrimp farming, construction
Phatthalung	0	0.00	-
Songkhla	680	0.13	industry, fishery, rubber orchard
Pattani	5,000	0.98	fishery, rubber orchard, construction
Narathiwat	1,180	0.23	agriculture, construction
Coastal Zone 5	74,168		
Ranong	27,898	5.48	fishery, pier, industry
Phangnga	26,290	5.17	fishery, rubber orchard, construction
Phuket	14,000	2.75	rubber orchard, construction, fishery
Krabi	4,550	0.89	palm orchard, rubber orchard, construction
Trang	1,000	0.20	fishery, construction, labour, factory
Satun	430	0.08	fishery, shrimp farming, construction
All Zones	508,631	69.33	(233,291 = 31.8% excluding Bangkok)
Other Provinces	225,009	30.67	(500,349 = 68.2% including Bangkok)
Total	733,640	100.00	

Source: Chalamwong, 1996 p. 16 (Appendix Table 2.3)

Table 1.5 Sustainable and actual fish yields in Thai waters in 1991 (tons)

Area	Fish Category	Sustainable Yield (i)	Actual Yield (ii)	Overfishing [(i)/(ii)*100]
Gulf of Thailand	Pelagic	400,000	559,502	139.90%
	Demersal	750,000	1,261,185	168.20%
Andaman Sea	Pelagic	50,000	166,628	333.30%
	Demersal	200,000	491,292	245.60%

Table 1.6 Changes in mangrove forest areas by coastal zone and province, 1975–1996

Coastal Zone/Province	Mangrove Forest Area (rai)							% Change 1986–1996
	1975	1979	1986	1989	1992	1993	1996	
Coastal Zone 1	263,750	240,700	160,892	119,324	66,045	77,625	75,522	-53.06
Trat	66,250	61,500	55,112	53,987	48,438	47,925	47,087	-14.56
Chanthaburi	163,125	150,400	90,668	54,350	16,644	25,450	24,332	-73.16
Rayong	34,375	28,800	15,112	10,987	963	4,250	4,103	-72.85
Coastal Zone 2	268,125	228,300	19,430	13,162	5,332	37,192	37,379	92.38
Chon Buri	23,750	20,700	9,362	6,550	938	575	575	-93.86
Chachoengsao	18,750	14,500	4,625	3,556	2,294	3,348	3,016	-34.79
Samut Prakan	3,750	6,500	644	0	0	1,950	1,858	188.51
Bangkok	0	0	0	0	0	1,250	1,236	
Samut Sakhon	115,625	90,100	887	0	0	11,369	10,602	1,095.26
Samut Songkhram	51,250	47,800	306	0	0	5,775	7,156	2,238.56
Phetchaburi	55,000	48,700	3,606	3,056	2,100	12,925	12,936	258.74
Coastal Zone 3	71,875	82,700	50,342	38,369	25,576	40,609	39,554	-21.43
Prachuab Khiri Khan	2,500	3,100	906	669	438	250	269	-70.31
Chumphon	46,250	43,300	22,662	14,156	11,363	20,584	19,699	-13.07
Surat Thani	23,125	36,300	26,774	23,544	13,775	19,775	19,586	-26.85
Coastal Zone 4	213,500	131,500	73,336	69,075	62,237	62,295	64,286	-12.34
Nakhon Si Thammarat	96,875	80,200	55,224	53,256	50,156	49,975	52,601	-4.75
Phatthalung	11,875	10,200	656	525	375	800	881	34.30
Songkhla	36,875	32,400	6,031	4,300	1,431	3,425	3,897	-35.38
Pattani	67,875	8,700	11,425	10,994	10,275	8,095	6,907	-39.54
Narathiwat	n.a	n.a	n.a	n.a	n.a	n.a	n.a	
Coastal Zone 5	1,198,125	1,113,475	923,674	888,564	927,195	836,545	830,650	-10.07
Ranong	151,250	141,200	135,037	132,388	121,688	120,675	120,229	-10.97
Phangnga	319,375	304,475	227,625	222,663	209,438	191,976	190,265	-16.41
Phuket	19,375	17,800	12,094	11,163	9,713	9,675	9,448	-21.88
Krabi	206,250	198,500	189,450	185,269	199,469	178,292	176,709	-6.73
Trang	212,500	205,400	164,225	156,500	192,806	152,050	150,597	-8.30
Satun	289,375	246,100	195,243	180,581	194,081	183,877	183,402	-6.06
Total	2,015,375	1,796,675	1,227,674	1,128,494	1,086,385	1,054,266	1,047,391	-14.68

Source: Unpublished preliminary report on the state of the environment, TDRI & ONEB, Chapter 4, p. 12

Note: 1 rai = 1 600 square metre

1.2 Changes in the marine fishing population

The introduction has shown that there was an increase in the population of Thailand as a whole over the 1985–1995 period, but that the rate of increase was steadily slowing down. It has also shown that fishery resources were depleting and that the coastal environment has been deteriorating rapidly. In addition, the fishing population as a whole has been shown to be on the increase. In this chapter, the fishing population will be examined more closely, simply because fisherfolk affect the changes in marine resources directly.

The data upon which this chapter is based come almost exclusively from the marine fishery censuses carried out in 1985 and 1995 by the National Statistical Office and the Department of Fisheries. The censuses cover all marine capture fishery and coastal aquaculture households or establishments and fishery employee households (excluding foreign fishery employee households) in the 24 coastal provinces of the five coastal zones (Figure 1.2). The cut-off date for the censuses was 1 April in both cases.

Number of marine fisherfolk

For the whole of Thailand, there were 139,506 fisherfolk in 1985 and 157,377 in 1995, an increase of 12.8 percent (Table 2.1). The ranking in terms of size did not change from one census to the other. Zone IV had the largest number of fisherfolk, followed by Zone V, II, III and I, in that order.

An increase occurred in every zone except Zone II (Bangkok and periphery). The increase was of 37 percent in Zone IV, 27 percent in Zone I, 20 percent in Zone V and six percent in Zone II. The factors most closely related to the changes in the number of fisherfolk within fishing activities were the evolution of marine capture fishery and the development of coastal aquaculture. Outside of the fishery sector, there are other factors that are associated with changes in the economic structure in each province. As sweeping, general explanations are inadequate, the differences in the fishing population in each zone will be later analysed by province.

Small-scale and medium- to large-scale fisherfolk

This information is not directly available and the changes cannot be determined. The crux of the matter is the data related to the extent of engagement in fishing. The information is not available in the 1985 marine fishery census, and thus only the state in 1995 can be presented. Table 2.2 shows, among other things, the proportion of small-scale to medium- to large-scale fisherfolk in marine capture fishery. 'Small-scale fisherfolk' is here defined as those without boats or with outboard- or inboard-powered boats of less than 10 gross tonnage (GT). Of the 73,225 marine capture fisherfolk, 63,569, or 86.8 percent, were small-scale.

Full-time and part-time fisherfolk

Table 2.2 also provides full and direct information regarding the extent of involvement in fishing activities. Of the 73,225 fisherfolk engaged in marine capture fishery, 76 percent engaged full-time in the activity, 13 percent engaged in it mainly and about 11 percent only part-time. A higher percentage of medium- to large-scale marine capture fisherfolk than of small-scale

marine capture fisherfolk engaged full-time in the activity - 92 percent as opposed to 74 percent. The difference means that marine capture fishery was not as profitable for small-scale fisherfolk as for the larger-scale operators, and that the former probably had to engage in supplementary occupations.

Fisherfolk engaged in coastal aquaculture also displayed the same pattern of involvement in their activity. Regardless of the type of culture, 73 percent of them engaged full-time in aquaculture, some 18 percent engaged in it mainly, and nine percent only part-time. The proportion of those engaged full-time in shrimp culture was slightly higher than for those engaged in other types of aquaculture.

Fisherfolk: self-employed and employees

So far, fisherfolk have been mentioned without distinction in terms of employment status. This part will examine self-employed fisherfolk and fishery employees separately. For the sake of brevity, we shall call self-employed fisherfolk 'fishermen', regardless of gender. Though it is useful, in terms of policy and planning, to explore and explain the changes in these groups, it will not be a simple task to arrive at accurate explanations at provincial level, for many reasons. Within the fishery sector itself, the changes in marine capture fishery and in aquaculture have to be examined. In addition, the changes in other economic sectors have to be analysed in relation to the fishery sector. Explaining changes in the fishery employee population will be difficult due to its volatile nature and also to the existence of unknown numbers of Burmese labourers. To arrive at accurate and detailed explanations, a separate major research at provincial level is required. This report can only offer general explanations focusing mainly on the changes in the fishery sector.

The censuses have shown that the fishing population of Thailand as a whole increased by about 13 percent between 1985 and 1995. As Table 2.1 shows, the number of fishermen increased by about 19 percent (from 100,361 to 119,123), while the number of fishery employees declined by about two percent (from 39,145 to 38,254) during the period. Fishermen comprise the great majority of fisherfolk: 72 percent in 1985 and 76 percent in 1995.

Differences between fishermen and fishery employees by zone

Table 2.1 and Figures 2.1 and 2.2 also present the data on fishermen and fishery employees by zone. Again, Zone II is the only zone that registered a percentage reduction, of both fishermen and fishery employees. It is also notable that in this zone, while the number of fishermen declined by about 15 percent, that of fishery employees declined by 50 percent. This is due to the fact that the economic structure of Zone II has changed to rely increasingly on light industries and services. Work in the fishery sector is known to be dirty, dangerous and demeaning, and given a choice, fisherfolk, especially fishery employees, will opt for other kinds of work. Even in Chachoengsao, the only province with an overall increase in the number of fisherfolk, the number of fishery employees declined by about 27 percent.

In the other zones, both the fisherman and the employee populations increased, but by different percentages. In Zone IV, the number of fishermen increased by 50 percent, but that of employees by only 10 percent. In Zone V, the increases were of about 20 percent and about 22 percent respectively, and 26 percent and 28 percent in Zone I. In Zone III, the number of fishermen increased by about eight percent, but the number of employees did not change. This raises the question of the relationship between the number of fishermen and the number of

employees. To answer it satisfactorily, many related questions need to be answered, such as what kind of fishery activities do the fishermen engage in and whether and how much labour is needed. The activities engaged in by fishery employees have to be explored, as well as the extent of their replacement by foreign labour.

Differences between fishermen and fishery employees by province

Changes in the fisherman and employee populations are here assumed to be related to changes in area under aquaculture and in the number, type and size of fishing craft. Unfortunately but unavoidably, more specific explanations can be offered only by examining the changes by province. To prove the hypothesis, Zone IV and Zone V will be examined first, because they have the largest numbers of fisherfolk in both censuses. Zone III, II and I will then be examined. Table 2.3 presents the data on fishermen and fishery employees by province, Table 2.4 the areas under aquaculture, Tables 2.5 and 2.6 present the number and type of boats by zone and by province, respectively, and Tables 2.7 and 2.8 the changes in gross tonnage by zone and by province.

Zone IV

In Zone IV, Nakhon Si Thammarat had the second largest number of both fishermen and employees in 1985, the first being Songkhla. By 1995, it had the largest number, the increase being 137 percent for fishermen and 103 percent for employees. The increase does *not* coincide with the fact that the province has the largest area under aquaculture (about 93 percent out of a total of 30 448 *rai* in 1985 and 77 percent out of 85 248 *rai* in 1995). It does coincide with the fact that the number of outboard-powered fishing boats increased by 13 percent, from 3 320 in 1985 to 3 753 by 1995. In addition, though the number of inboard-powered fishing craft in Nakhon Si Thammarat declined by about 19 percent, from 1 381 in 1985 to 1 124 in 1995, craft with 50 GT or over increased by 32 percent, from 41 in 1985 to 54 in 1995. Thus, it seems that

- the increase in the fishing population is related to marine capture fishery rather than to aquaculture;
- the increase in the fisherman population is related to the increase in outboard-powered fishing boats and in the increase in boats of high gross tonnage, and
- the increase in the employee population may be due to larger-scale capture fishery operated by either more affluent fishermen or companies or both, and to the migration of employees from Songkhla, Pattani and Narathiwat, all of which witnessed a decline in the number of employees.

Songkhla had the second largest fishing population in Zone IV by 1995, and the number of its fishermen had increased by 23 percent, while that of its fishery employees had declined by 13 percent. The increase in the fisherman population is related to a spectacular increase in acreage under coastal aquaculture and in the number of outboard-powered fishing boats and of boats of high gross tonnage. However, whereas these changes should lead to an increase in fishery employees, the census statistics actually show a decline. As stated earlier, exact explanations will need a thorough provincial study, and only general hypotheses can be provided here. Besides migration to other provinces, there are other possibilities such as a change of status from employee to small-scale fisherman or to joint operator and a replacement of Thai employees by cheaper Burmese labourers.

Pattani had the third largest fishing population in Zone IV by 1995, but it is the most interesting province because both its fishermen and of its fishery employees declined in number. The area under coastal aquaculture increased between the two censuses; the number of outboard-powered fishing boats increased by less than one percent, but that of fishing boats of 10–50 GT increased by six percent, and those of 50 GT or more by 22 percent. The only plausible explanation is that small-scale fishermen changed their occupation due to an increase in commercial fishing, which employs foreign labour, and that each remaining operator had several larger-scale craft.

Phatthalung had the fourth largest number of fisherfolk by 1995, almost all of whom were fishermen. The increase of the fisherman population was only 4 percent, from 3,142 to 3,268. The increase in acreage under coastal aquaculture was high in terms of percentage, but not impressive in terms of size, as it accounted for only 1.8 percent of the total area under coastal aquaculture in Zone IV. There was no change in the number of inboard-powered boats, but that of outboard-powered boats increased by 42 percent, from 1,375 to 1,954. This indicates that Phatthalung is a province characterized by small-scale capture fishery, whose fishermen tend to operate more than one boat.

Narathiwat has had the smallest fishing population in Zone IV, but the number of its fishermen increased by 89 percent during the period under study, while that of its fishery employees declined by 44 percent. The increase in acreage under coastal aquaculture was negligible, but the number of outboard-powered fishing boats rose impressively, from 361 to 689, a 90-percent increase. The number of inboard-powered fishing craft of less than 10 GT increased, but that of boats of more than 10 GT declined. These changes indicate that the province has changed from being one with both small- and large-scale fishery to one with mainly small-scale fishery, and that fishery employees may have become fishermen or joint operators, turned to other occupations or migrated to Nakhon Si Thammarat.

Zone V

Zone V has had the second largest number of fisherfolk. In 1985, the ranking by province, in descending order, was Satun, Phangnga and Trang, Krabi, Ranong and Phuket. By 1995, Phangnga had the largest fishing population, followed by Satun, Trang and Krabi, Ranong and Phuket.

While the number of fishermen in this zone increased by about 20 percent, it declined notably in Phuket and marginally in Ranong, and rose most impressively in Krabi. As for fishery employees, their numbers declined in Phuket, but increased most notably in Phangnga, followed by Krabi and Satun.

In Phuket, the decline in the number of both fishermen and fishery employees is certainly related to the fact that the province has become a major tourist centre, and that an unknown proportion of the fisherman and fishery employee populations must have moved to tourism-oriented activities. However, there is a trend toward rapid increase in the acreage under coastal aquaculture, which is almost exclusively shrimp culture. In addition, there was an increase in the number of outboard- as well as inboard-powered boats. The increase in the number of inboard-powered boats of 50 GT or over was exceptionally high, while the number of those of 10–49 GT also increased. Thus, besides occupational change of small-scale fishermen and fishery employees, the main factor accounting for the decline in the fishing population must have been the increasing commercialization of marine capture fishery, employing foreign labour.

Ranong also experienced a decline in the number of both fishermen and fishery employees. The province also showed a trend toward an increase in acreage under coastal aquaculture, and the highest percentage increase in inboard-powered boats of 50 GT and over. Thus, discounting tourism which is an important factor for Phuket but not for Ranong, the decline in the number of fishermen and fishery employees can only be explained by the commercialization of capture fishery and a change of occupation to fishery-related activities. The province being adjacent to Myanmar, commercial fishery there must employ quite a large number of Burmese labourers. It is generally believed that at least half of the population in the province is Burmese, and that without their labour, its fishery sector could not be sustained.

What happened in Phangnga that led to an increase of 24 percent in the number of fishermen and of 127 percent in that of fishery employees? Phangnga's acreage under coastal aquaculture was the second largest, after Satun, in 1985 and the third largest, after Krabi and Satun, by 1995. The number of boats of high gross tonnage also increased. These two facts could partly account for the increase in the number of fishery employees, but the question arises of why foreign labour was not being used in the province. The increase in coastal aquaculture could also account for the increase in the number of fishermen, but a more important factor may be the fact that there was a 50-percent increase in the number of outboard-powered fishing boats, from 2,057 to 3,087. The increase in both outboard- and large-scale inboard-powered fishing boats indicates that there might have been a growth in the number of both small-scale and larger-scale fishermen in this province, and a subsequent conflict between the two groups in term of exploitation of resources.

Satun had the second largest fishing population after Phangnga by 1995. The number of its fishermen had increased by 23 percent, while that of its fishery employees had increased by 44 percent. Satun had the largest area under coastal aquaculture in 1985, but the second largest after Krabi by 1995. Despite the change in ranking, the area under aquaculture did increase and this may account for the increase in the number of fishery employees. The number of outboard-powered fishing boats increased by about 70 percent, from 1,650 to 2,836, while that of inboard-powered fishing boats of all sizes declined. These changes indicate an increase in the number of self-employed coastal aquaculture workers and of small-scale fishermen, but a decline in commercial fishery.

Trang and Krabi had roughly the same number of fisherfolk by 1995, but the increase for both fishermen and fishery employees was much more spectacular in Krabi. The growth in Krabi is associated with the rapid spread of coastal aquaculture, which is almost exclusively shrimp culture, and with a 55-percent increase in the number of outboard-powered fishing boats coupled with a decline in that of inboard-powered fishing vessels of all sizes. The slower growth in Trang is associated with roughly the same increase in number in outboard-powered fishing boats and the rapid commercialization of capture fishery that presumably employs foreign labour.

The provincial examination of changes in the fisherman and fishery employee populations in relation to the changes in acreage under coastal aquaculture and in the number, type and size of fishing boats indicates that the three factors tend to be related. The increase in the number of fishermen tends to be related to the increase in the number of outboard-powered fishing boats. The decline in the number of both fishermen and fishery employees tends to be related to the increase in the number of inboard-powered fishing boats of higher gross tonnage. This indicates a change from small-scale to large-scale commercial fishery, in which smaller numbers of operators operate a growing number of boats that make use of foreign labour. The overall

growth of the fisherman and fishery employee populations is also related to the rapid increase in area under coastal aquaculture. Tourism, too, is related to the decline in the fishing population in Phuket.

Zone III

The fishing population in this zone increased very slowly, by about six percent, which is half the national average. The number of employees remained unchanged, but that of fishermen increased by about eight percent. Surat Thani has had the largest number of both populations, followed by Chumphon and Phachuap Khiri Khan, respectively.

The number of fishermen in Surat Thani increased by less than two percent, but that of fishery employees rose by about 50 percent. The province has had the largest area under coastal aquaculture, representing about 76 percent of the total area in Zone III in 1985, with an increase to 85 percent by 1995. Outboard-powered boats declined in number, but the number of large inboard-powered boats increased. This indicates that commercial fishery and coastal aquaculture have increased, and that small-scale fishery has declined. The high percentage growth in the number of fishery employees cannot be explained if the assumption that commercial fishery uses foreign labour is accepted, but this growth may not be significant because it is calculated from a rather low base number. There is another possibility, which is that the labour may be in aquaculture, given the unproved assumption that aquaculture is less likely than commercial fishery to employ foreign labour.

In Chumphon province, the number of fishermen increased at a much higher rate than in the rest of the zone. The province also witnessed the most extraordinary increase in acreage under coastal aquaculture. Outboard- as well as inboard-powered fishing boats of every size also increased in number. That the number of fishery employees increased at a much lower rate indicates that fishermen in the province engaged either in small-scale aquaculture or in larger-scale capture fishery.

Prachuap Khiri Khan is the only province in Zone III that saw a decline in the number of both fishermen and fishery employees. One apparent factor is that it is a tourist resort. The area under coastal aquaculture increased at the lowest rate compared to the rest of the zone. Though the proportion of outboard-powered fishing boats greatly increased, the initial, 1985 number was low. Inboard-powered fishing boats of 10 GT and over also increased in number. Thus, it seems that both fishermen and fishery employees must have moved to tourism-related occupations, and that the province's fishery sector is dominated by medium-scale commercial capture fishery.

Zone II

This zone is the only zone that experienced an overall decline of its fishing population (-27 percent). The decline in the number of fishermen was roughly 30 percent, and of fishery employees roughly 70 percent. Fishermen declined in number in every province except Chachoengsao, whereas the number of fishery employees decreased in every province. The overall decline of the fishing population coincides with the overall decline of acreage under coastal aquaculture (-24 percent) in the zone. Chachoengsao is the only province that saw an increase in area under coastal aquaculture. There was a high increase in the number of outboard-powered fishing boats and boats of 10–49 GT in Petchaburi. The data also show a significant increase in the number of inboard-powered fishing boats of 50 GT and over in Samut

Prakan, Samut Sakhon and Samut Songkhram. These three provinces also saw a small increase in boats of 10–49 GT.

Thus, the data seem to indicate that, in general, both fishermen and fishery employees moved out of the fishery sector, because of the decline in coastal aquaculture and of the growth of light industries and services in the zone. Although light industries have expanded to the periphery of Bangkok, Samut Prakan, Samut Sakhon and Samut Songkhram are still active in marine capture fishery, which is characterized by large-scale fishing.

The increase in the number of fishermen in Chachoengsao can be explained by the growth in coastal aquaculture. Petchaburi, however, presents an anomaly: its fishermen and fishery employees declined in number despite an increase in outboard-powered fishing boats. One possibility is the fact that it is a tourist resort and that both its small-scale fisherman and fishery employee populations may have moved into tourism-related activities and their fishing boats used for tourism. The other possibility is that the remaining fishermen in Petchaburi own more medium-scale boats per person.

Zone I

This zone saw an increase of 26 percent in the number of fishermen and 28 percent in that of employees. Of its three provinces, only Rayong saw a decline in both populations, but the decline in the number of fishery employees was more rapid. One apparent reason is that the populations moved to the industrial sector because the province is a part of the Eastern Seaboard Development Zone. Rayong had the smallest area under aquaculture, despite its rapid increase. The number of outboard-powered fishing craft declined but that of inboard-powered fishing boats of less than 10 GT increased. Thus, it seems that in Rayong, industrialization is the main factor of decline and that the remaining fishermen are small-scale.

Chanthaburi experienced extraordinary increases in the number of both fishermen (57 percent) and employees (167 percent). The percentage increase of employees should not be taken seriously, though, because the actual number in 1985 was not high. The overall increase coincides with the fact that the province has had the largest area under coastal aquaculture (almost 90 percent of the total area) and that the area increased by almost 100 percent over the period under study. The province also had the largest number of outboard-powered fishing boats, which increased by about 25 percent between 1985 and 1995. The number of inboard-powered fishing boats declined by 50 percent, but there was a small increase in the number of boats of 50 GT and over. Therefore, it seems that the expansion of coastal aquaculture and of coastal capture fishery accounts for the increase in the fishing population.

In Trat, the fisherman population increased by 10 percent and the number of fishery employees grew by 66 percent. The area under coastal aquaculture accounted for only eight percent of the total area of the zone, though it had increased by 98 percent by 1995. The province had the second highest number of outboard-powered fishing boats in 1985, with an increase of about 30 percent by 1995. Inboard-powered boats declined in number, though those of 50 GT and over saw their number increase by 50 percent. However, this percentage increase was calculated from an initially small number. Thus, it seems that, like Chanthaburi, the two causative factors are the growth in coastal aquaculture and the growth in coastal capture fishery employing local labour.

In summary, the provincial analysis shows that the changes in fisherman and fishery employee populations are usually related to the changes in area under coastal aquaculture or to the changes in the type and size of fishing boats. For example, the growth of the fishing population in Zone V and Zone I is closely related to the growth in coastal aquaculture, while the growth in Zone IV is closely related to coastal capture fishery.

Industrialization, tourism and the presence of foreign labour can account for most discrepancies. The decline in the number of both fishermen and fishery employees in Zone II, for example, is related to the fact that the zone has become more industrialized. The validity of the explanation given in terms of the replacement of Thai employees by Burmese labourers is rather questionable, as little is known about them. For a start, because of their clandestine nature, the exact number of Burmese labourers in the fishery sector is not even known.

While the provincial examination offers some explanations, it also creates a number of policy-related questions. Should the small-scale fisherman population increase or decline, and why? The Thai fishery employee population has declined, and Burmese labour has been increasingly used: should Thai labour be replaced by foreign labour, and why? If the answer is positive, then shouldn't there be a study of the long-term social impact of foreign labour, in addition to the study of their number, distribution, economic activities and impact on the fishery sector? Although the Thai government has allowed the use of foreign labour in the fishery sector, we believe that the decision should have been based not only on short-term economic considerations but also on more adequate data presenting all economic, social and demographic aspects, so that the long-term implications had been taken into account as well.

Gender of the fisherman and fishery employee populations

Table 2.9 shows that, for the whole country, fisherwomen accounted for 19.5 percent of the total 96,773 fisherfolk recorded in the 1985 census, and for 18.8 percent of the 119,123 fisherfolk totalled up by 1995. That is, while the total number of self-employed fisherfolk increased between 1985 and 1995, the number of fisherwomen increased more slowly than the number of fishermen.

The data by zone show that both male and female fisherfolk increased in every zone except Zone II (Table 2.9 and Figures 2.3 and 2.4). In Zone II, the decline in the number of fisherwomen was greater than the decline in the number of fishermen. Given the growth of light industries in the zone, fisherwomen must have moved into light industries, such as electronics, shoes, textile and garment factories, which are known to prefer female labour. In addition, the growth of construction in and around Bangkok could also account for the loss of fishermen to this sector.

In the other zones, the relative increase or decline in the number of fishermen and fisherwomen show no regular pattern by province (Table 2.10), and it is futile to go into further analysis until the relative roles and extent of engagement of fishermen and fisherwomen are known, both in marine capture fishery and in coastal aquaculture. Other factors outside of the fishery sector also have to be examined, and the reliability of the data on fishermen and fisherwomen has to be checked.

From field experience, it is likely that the number of fisherwomen and the role they play are underestimated, as they tend to consider themselves not as fisherwomen in their own right but as assistants to the fishermen, who tend to be their spouse or kinsmen. In fact, a research is

required to find out the respective role of women and men in fishery. If there is no under-enumeration of fisherwomen, have there been changes in gender roles that would account for the slower increase of the number of fisherwomen (14 percent) than of fishermen (20 percent)?

Let us now examine the changes in fishery employees by gender. Table 2.11 shows that, for Thailand as a whole, female employees accounted for only about five percent of the 39,145 fishery employees in 1985 and for six percent of the 38,254 fishery employees in 1995. The overall decline was due to the decline in the number of male employees (-3 percent). The number of female employees, on the contrary, increased by about 12 percent. This increase is not worth examining because there had been only about 2,000 female employees in 1985. The decline in male employees is not worth a lengthy analysis either, as it is well known that employers in the fishery sector prefer the cheaper Burmese labour. Thus the most likely explanation is that male employees were replaced by foreign labour, while female employees increased in number in the aquaculture sector in the southern zones and in Zone I (Figures 2.5 and 2.6).

Age structure of the fishing population

Table 2.12 shows that the age structure of the fishermen had grown older between the two censuses. The change in the age structure of the fisherwomen cannot be gauged, because the 1985 census did not classify fisherwomen by age group, most likely because their total number was not large. The 1995 census, however, did so, and their percentage distribution shows the great majority (57 percent) to be in the 30–49 age group.

Regarding the fishermen, the number of those between 11 and 14 years of age declined by about 48 percent countrywide over the period under study. This decline occurred across all zones, though the rate of decline differed somewhat by zone. The highest declines were in Zones II, I and III, in descending order. This was also the case for those between 15 and 19 years of age, whose number declined by 39 percent for the whole country. The decline also occurred in all zones and was highest in Zones II, I and III, in that order.

In the 20–29 age group, the number for the whole country declined by about three percent, but the decline was not consistent across all zones. Zones II and III declined by 40 percent and two percent respectively, whereas there were increases by different percentages in other zones.

Older age groups are here classified as those between 30 and 39, 40 and 49, and 50 and over. For the country as a whole and for all zones, their numbers increased but by somewhat different percentages. In terms of changes in percentage distribution, those over 30 accounted for 57 percent of the total in 1985 and for 70 percent of the total in 1995.

Thus, the majority of fishermen were in the older age groups, and those under 20 years of age comprised a lesser proportion of the total. This may be due to two factors: those in the two youngest age groups were still in the schooling system, and those in the 20–29 age group, particularly in Zone II, had changed their occupation.

The implication of the shift to an older age structure of fishermen is that as fishermen retire, the growth of the fishing population slows down, as they are less likely to be replaced by the younger generations. Also, field studies in Ranong and Phuket found that parents who are small-scale fisherfolk try very hard to have their children get as high an education as possible, so that their young ones will not need to work as hard as they themselves have had to.

Table 2.13 shows the changes in the age structure of fishery employees. As in the case of the fishermen, employees under 20 years of age were on the decline. Those in the 20–29 age group also declined by a higher percentage and in more zones (Zones II, III and IV). For the whole country, those under 30 accounted for 52.4 percent in 1985 and 43.4 percent in 1995.

While fishermen aged over 30 accounted for 55 percent and 70 percent of the total fishing population in 1985 and 1995, employees over 30 years old accounted for 47.6 percent and 56.7 percent during the same years. This indicates that the age structure of fishery employees was still younger than that of the fishermen, most likely because of employers' preference for employees in their late twenties and early thirties.

Education attainment of the fishing population

Table 2.14 shows that fisherfolk as a whole have attained slightly higher levels of education, even though the great majority (about 78 percent in both 1985 and 1995) only finished elementary education. In 1985, 17 percent of all fishermen had no education or did not complete elementary education, and the percentage of this group was higher than the country average in Zones V and IV. By 1995, about 11 percent of all fishermen had no education or less than elementary education. Even though Zones V and IV showed a decline in the percentage of fishermen of this group, the proportion of those with little or no education in the two zones remained higher than the country average.

Those with secondary or higher education increased both for the whole country and for all the coastal zones. In 1985, they accounted for 4.5 percent of all fishermen, but for 11.7 percent by 1995. The zones with an education level perceptibly lower than the national average by 1995 were Zones I and II. This is unexplainable in terms of age and is contrary to expectation, as Zone II includes Bangkok and its periphery, and Zone I is close to Zone II, where education has been most readily available.

Nonetheless, it can be concluded that the education attainment of fishermen improved, but that the great majority still attained only primary education. The implication is that without higher education, their ability to fend for themselves both as individuals and as a group will remain inadequate. Their effective participation in any kind of coastal zone management would also be minimal or unlikely. There is thus a need to raise their educational attainment to at least the secondary level or to provide them with informal education and training.

Regarding fishery employees, Table 2.15 shows that they attained even lower levels of education than the fishermen did. The proportion of fishery employees without or with less than elementary education was 27 percent in 1985 and 13 percent in 1995, whereas for fishermen, it was 17 percent and 11 percent in the same years. However, like the fishermen, though the proportion of those with little or no education declined, the great majority (69 percent in 1985 and 79 percent in 1995) had only gone through primary education. The proportion of those with secondary or higher education also increased but not as much as in the case of the fishermen. In 1995, this group accounted for 7.7 percent, compared to 11.7 percent among fishermen. The chances to raise their formal or informal education would be few, given their spatial mobility, and thus it is likely that their bargaining power will remain low.

Summary and discussion

Between the two marine fishery censuses, the fishing population as a whole increased. When they were classified by employment status, the fishermen saw their number increase by about 19 percent, whereas the fishery employees declined in number by about two percent. Examination by coastal zone shows that the number of fishermen declined in Zone II in all but one province, and increased in most provinces in the other zones except those that have become industrialized or tourist attractions. The number of fishery employees declined in all provinces in Zone II, but the change cannot be easily explained, because they are known to be replaced by Burmese labourers to an unknown but presumably large extent.

It is not possible to classify all fishermen into small-scale and medium- to large-scale, and only fishermen engaged in marine capture fishery can be thus classified by using the type and size of their boats. It was found that about 87 percent of them were small-scale. In terms of the extent of engagement in fishing activities, the majority of those engaged in marine capture fishery and in coastal aquaculture did so full time. Roughly 76 percent of marine capture fishermen and 73 percent of those in aquaculture engaged full time in their activities in 1995.

The changes in the fishing population were examined in relation to the changes in acreage under coastal aquaculture and also in the number, type and size of fishing craft. The examination yielded inclusive results, though in most provinces the increase in the number of fishermen tends to coincide with an increase in the area under aquaculture and in the number of outboard-powered fishing boats. The changes in the number of fishery employees seem to correlate with the increase in coastal aquaculture and in the number of inboard-powered fishing boats with high gross tonnage. The correlation of fishery employees with boat size is not very consistent, though, and raises the question of how much foreign labour is used in each province instead of Thai labour. As there is a definite trend toward greater use of foreign labour, a research on foreign labourers in terms of their long-term social impact was suggested.

The fishing population has always been almost exclusively male. Females accounted for only five percent of the total fishing population in 1985 and six percent in 1995. It is suspected that their number was understated, because they tend to underestimate their own economic role. Lack of data on the respective role of men and women in coastal aquaculture and in capture fishery makes accurate explanations about the changes in the number of fisherwomen impossible. To obtain information on their contribution to fishing activities, a research on the role of women and men in fishery is needed.

The age distribution of fishermen and fishery employees changed between 1985 and 1995. There was a decline in the proportion of those under 20 years of age, most probably due to their longer stay in the education system and migration out of the fishery sector. However, the age structure of the fishermen was older than that of the fishery employees. Because the fishermen are less likely to be replaced by the younger generations and foreign labour tends to replace Thai labour, there is a trend toward a slower increase in the number of fishermen and a more rapid decline of Thai labour.

The education attainment of both fishermen and fishery employees improved between 1985 and 1995. Both groups show a decrease in the proportion of those with no or less than complete elementary education and an increase in the proportion of those with secondary or higher education. However, by 1995, the overwhelming majority (almost 80 percent) in both populations had achieved only elementary education. This indicates that unless they are better educated, the bargaining power of the fisherfolk will remain low. In addition, their ability to

effectively participate in organizations representing their interests or in any kind of coastal zone management will be minimal or unlikely.

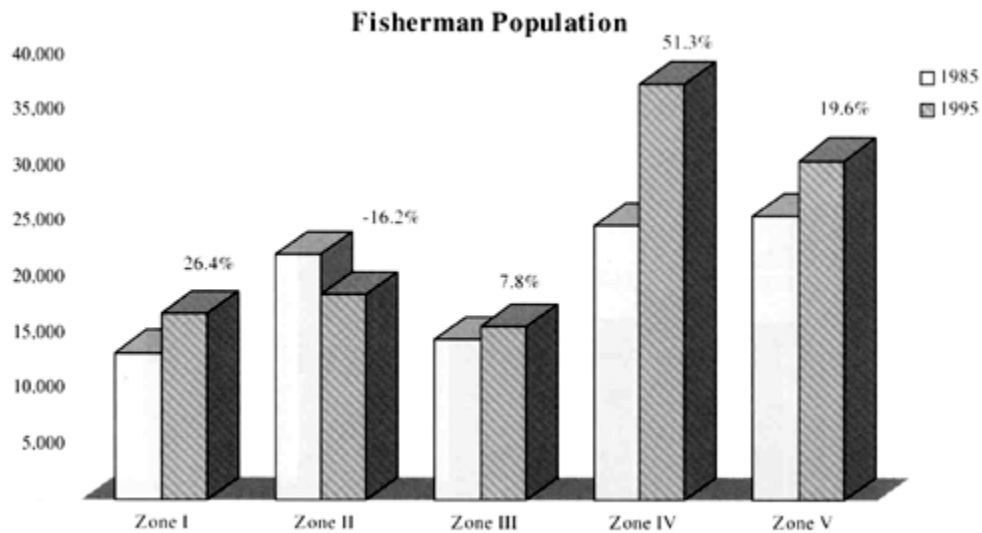


Figure 2.1 Population Change of Fisherman by Region between 1985 and 1995

Source: Table 2.1

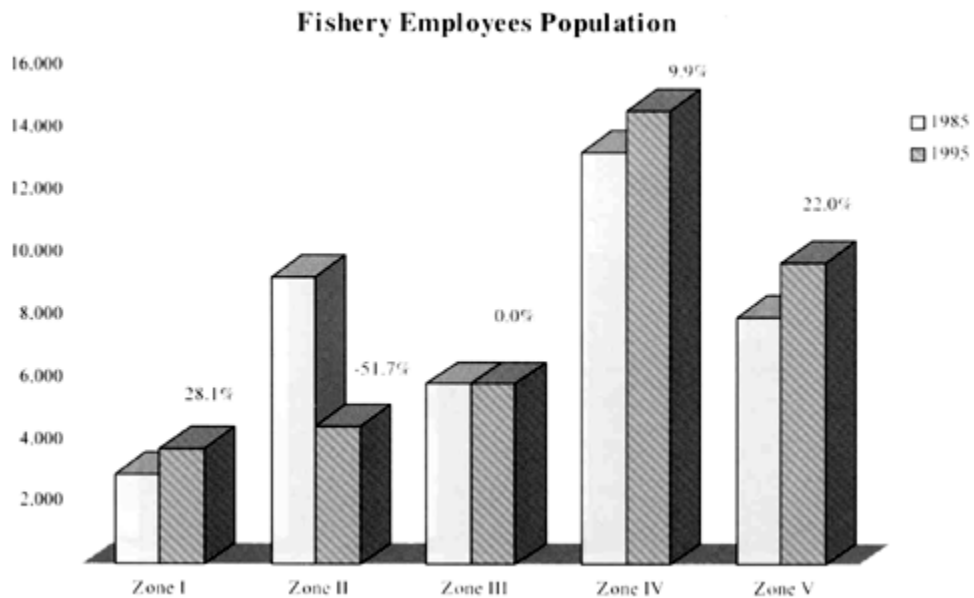


Figure 2.2 Population Change of Fishery Employees by Region between 1985 and 1995

Source: Table 2.1

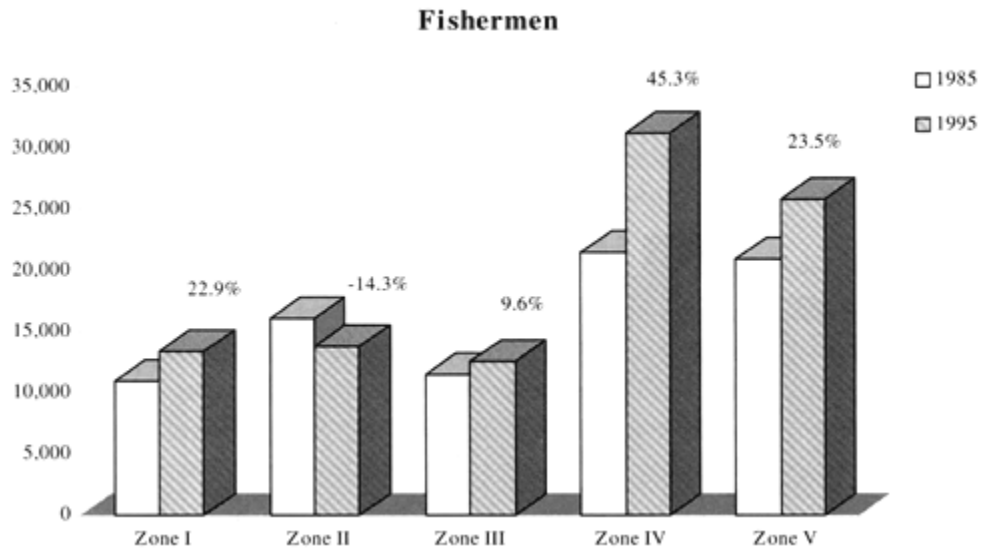


Figure 2.3 Number of Fishermen by Region between 1985 and 1995

Source: Table 2.9

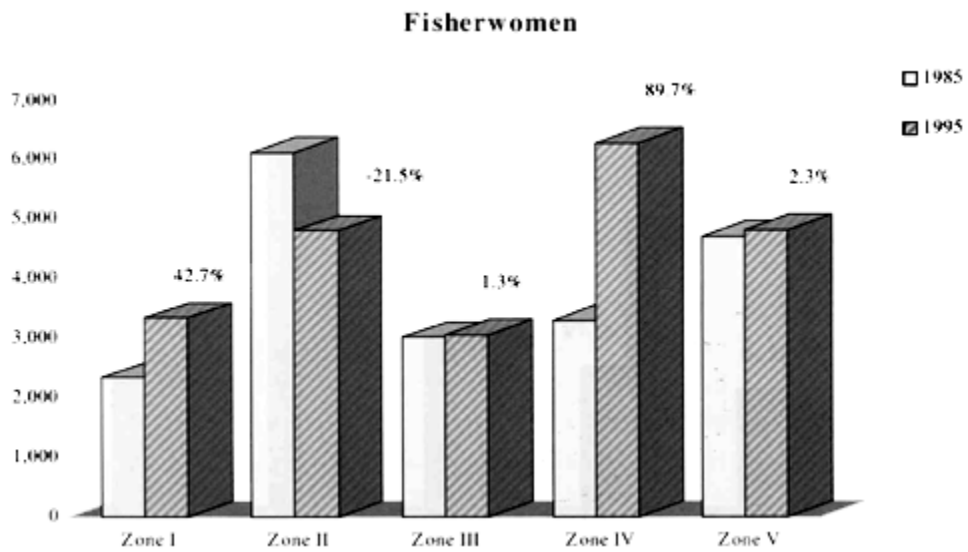


Figure 2.4 Number of Fisherwomen by Region between 1985 and 1995

Source: Table 2.9

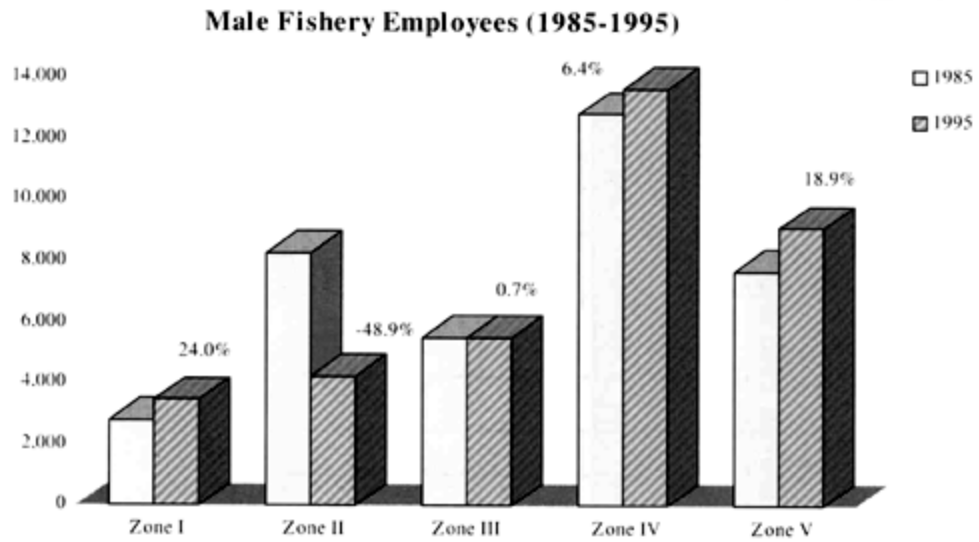


Figure 2.5 Number of Male Fishery Employees by Region between 1985 and 1995

Source: Table 2.11

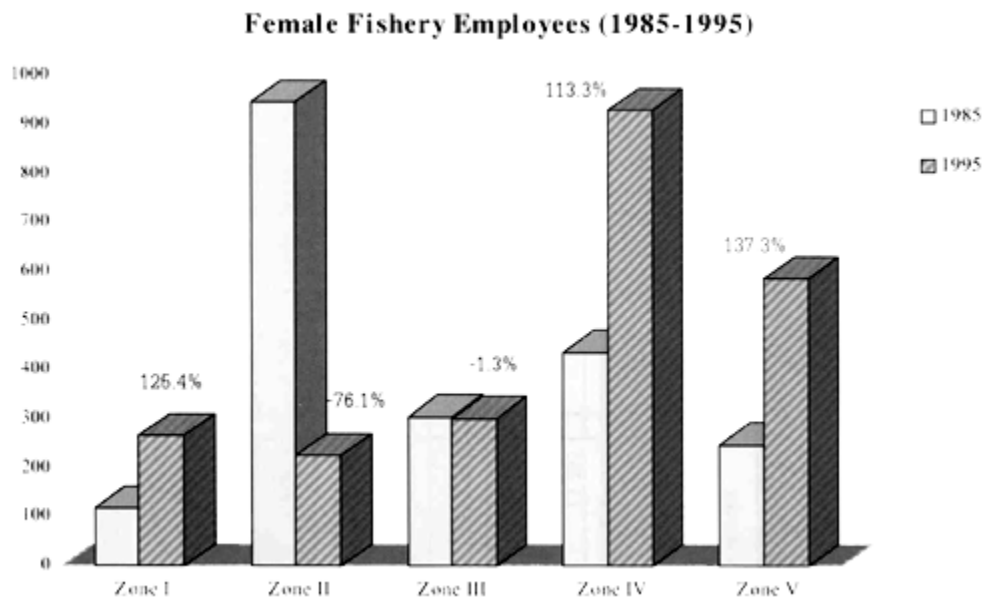


Figure 2.6 Number of Female Fishery Employees by Region between 1985 and 1995

Source: Table 2.11

Table 2.1 Population change of fishermen and employees by coastal zone between 1985 and 1995

Region	Population Change (1985)			Population Change (1995)			Change in Number			% Change		
	Fishermen	Employees	Total	Fishermen	Employees	Total	Fishermen	Employees	Total	Fishermen	Employees	Total
Coastal Zone I	13,285	2,910	16,195	16,795	3,727	20,522	3,510	817	4,327	26.42	28.08	26.72
Coastal Zone II	22,192	9,229	31,421	18,590	4,460	23,050	-3602	-4,769	-8,371	-16.23	-51.67	-26.64
Coastal Zone III	14,484	5,807	20,291	15,623	5,807	21,430	1,139	0	1,139	7.86	0.00	5.61
Coastal Zone IV	24,784	13,259	38,043	37,489	14,575	52,064	12,705	1,316	14,021	51.26	9.93	36.86
Coastal Zone V	25,616	7,940	33,556	30,626	9,685	40,311	5,010	1,745	6,755	19.56	21.98	20.13
Whole Kingdom	100,361	39,145	139,506	119,123	38,254	157,377	18,762	-891	17,871	18.69	-2.28	12.81

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p. 284

2) For 1995: *1995 Marine Fishery Census, Whole Country*, p. 198

Note: Whole Kingdom: fishermen annual increase = 1.73%; employees annual increase = -0.23%

Table 2.2 Fishermen and fishery employees by intent of involvement in fishery work, 1995

Fishermen and Employees by Type of Fisheries Engaged	Full Time Fishery Work	%	Part Time Fishery Work				Total	%
			Mainly Engaged in Fisheries	%	Partly Engaged in Fisheries	%		
Marine Capture Fisheries	55,747	76.13	9,796	13.38	7,682	10.49	73,225	100
Small-scale	46,886	73.76	9,128	14.36	7,555	11.88	63,569	100
Medium/Large scale	8,861	91.77	668	6.92	127	1.32	9,656	100
Coastal Aquaculture	33,609	73.23	8,026	17.49	4,263	9.29	45,898	100
Fish culture	1,549	61.52	578	22.95	391	15.53	2,518	100
Shrimp culture	28,999	74.58	6,668	17.15	3,218	8.28	38,885	100
Crab culture	172	65.15	53	20.08	39	14.77	264	100
Mollusc culture	1,876	67.26	403	14.45	510	18.29	2,789	100
Culture more than one species	1,013	70.25	324	22.47	105	7.28	1,442	100
Fishery Employees	34,156	89.29	3,066	8.01	1,032	2.70	38,254	100
Whole Kingdom	123,512	78.48	20,888	13.27	12,977	8.25	157,377	100

Source: 1995 Marine Fishery Census, Whole Country, p. 126–127

Table 2.3 Population change of fishermen by coastal zone and province between 1985 and 1995

Zone/Province	1985			1995			Change in Number			% Change		
	Fishermen	Employees	Total	Fishermen	Employees	Total	Fishermen	Employees	Total	Fishermen	Employees	Total
Coastal Zone I	13,285	2,910	16,195	16,795	3,727	20,522	3,510	817	4,327	26.42	28.08	26.72
Trat	4,971	992	5,963	5,478	1,651	7,129	507	659	1,166	10.20	66.43	19.55
Chantaburi	5,904	359	6,263	9,291	957	10,248	3,387	598	3,985	57.37	166.57	63.63
Rayong	2,410	1,559	3,969	2,026	1,119	3,145	-384	-440	-824	-15.93	-28.22	-20.76
Coastal Zone II	22,192	9,229	31,421	18,590	4,460	23,050	-3,602	-4,769	-8,371	-16.23	-51.67	-26.64
Chon Buri	2,663	1,197	3,860	1,886	351	2,237	-777	-846	-1,623	-29.18	-70.68	-42.05
Chachoengsao	2,209	174	2,383	3,555	127	3,682	1,346	-47	1,299	60.93	-27.01	54.51
Samut Prakan	4,363	1,219	5,582	3,316	515	3,831	-1,047	-704	-1,751	-24.00	-57.75	-31.37
Bangkok	1,342	27	1,369	982	11	993	-360	-16	-376	-26.83	-59.26	-27.47
Samut Sakhon	4,526	2,251	6,777	2,854	1,452	4,306	-1,671	-799	-2,471	-36.94	-35.50	-36.46
Samut Songkhram	3,108	1,816	4,924	2,948	824	3,772	-160	-992	-1,152	-5.15	-54.63	-23.40
Phetchaburi	3,981	2,545	6,526	3,049	1,180	4,229	-932	-1,365	-2,297	-23.41	-53.63	-35.20
Coastal Zone III	14,484	5,807	20,291	15,623	5,807	21,430	1,139	0	1,139	7.86	0.00	5.61
Prachuap Khiri Khan	3,079	2,369	5,448	2,885	1,596	4,481	-194	-773	-967	-6.30	-32.63	-17.75
Chumphon	3,778	2,329	6,107	4,999	2,545	7,544	1,221	216	1,437	32.32	9.27	23.53
Surat Thani	7,627	1,109	8,736	7,739	1,666	9,405	112	557	669	1.47	50.23	7.66
Coastal Zone IV	24,784	13,259	38,043	37,489	14,575	52,064	12,705	1,316	14,021	51.26	9.93	36.86
Nakhon Si Thammarat	7,369	3,430	10,799	17,455	6,957	24,412	10,086	3,527	13,613	136.87	102.83	126.06
Phatthalung	3,142	13	3,155	3,268	125	3,393	126	112	238	4.01	861.54	7.54
Songkhla	8,587	4,013	12,600	10,596	3,501	14,097	2,009	-512	1,497	23.40	-12.76	11.88
Pattani	4,875	4,371	9,246	4,687	3,195	7,882	-188	-1,176	-1,364	-3.86	-26.90	-14.75
Narathiwat	811	1,432	2,243	1,483	797	2,280	672	-635	37	82.86	-44.34	1.65
Coastal Zone V	25,616	7,940	33,556	30,626	9,685	40,311	5,010	1,745	6,755	19.56	21.98	20.13

Ranong	3,370	962	4,332	3,143	822	3,965	-227	-140	-367	-6.74	-14.55	-8.47
Phangnga	6,053	689	6,742	7,478	1,565	9,043	1,425	876	2,301	23.54	127.14	34.13
Phuket	2,223	1,481	3,704	1,638	951	2,589	-585	-530	-1,115	-26.32	-35.79	-30.10
Krabi	4,151	881	5,032	6,345	1,449	7,794	2,194	568	2,762	52.85	64.47	54.89
Trang	4,476	2,265	6,741	5,436	2,509	7,945	960	244	1,204	21.45	10.77	17.86
Satun	5,343	1,662	7,005	6,586	2,389	8,975	1,243	727	1,970	23.26	43.74	28.12
Whole Kingdom	100,361	39,145	139,506	119,123	38,254	157,377	18,762	-891	17,871	18.69	-2.28	12.81

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p. 284

2) For 1995: *1995 Marine Fishery Census, Whole Country*, p. 198

Table 2.4 Change in area under shrimp culture as a percentage of total area under coastal aquaculture by coastal zone and province, 1985 and 1995

Zone/Province	1985			1995			% Changes Between 1985 and 1995	
	Total Area under Culture (Rai)	Area under Shrimp Culture (Rai)	%	Total Area under Culture (Rai)	Area under Shrimp Culture (Rai)	%	Total Area under Culture	Area under Shrimp Culture
Coastal Zone 1	9,302	7,078	76.09	124,094	121,994	98.31	1,234.06	1,623.57
Trat	725	542	74.76	15,040	14,675	97.57	1,974.48	2,607.56
Chanthaburi	8,304	6,384	76.88	102,810	101,141	98.38	1,138.08	1,484.29
Rayong	273	152	55.68	6,244	6,178	98.94	2,187.18	3,964.47
Coastal Zone 2	168,466	161,542	95.89	138,552	123,581	89.19	-17.76	-23.5
Chon Buri	3,849	2,235	58.07	5,117	4,204	82.16	32.94	88.1
Chachoengsao	7,466	6,929	92.81	17,318	15,789	91.17	131.96	127.87
Samut Prakan	40,219	39,954	99.34	29,607	27,735	93.68	-26.39	-30.58
Bangkok	20,656	19,930	96.49	14,251	14,155	99.33	-31.01	-28.98
Samut Sakhon	51,753	50,978	98.5	32,986	32,080	97.25	-36.26	-37.07
Samut Songkhram	31,626	30,115	95.22	28,397	20,122	70.86	-10.21	-33.18
Phetchaburi	12,897	11,401	88.4	10,876	9,496	87.31	-15.67	-16.71
Coastal Zone 3	22,472	17,890	79.61	53,685	47,677	88.81	138.9	166.5
Prachuap Khiri Khan	4,486	4,289	95.61	6,235	6,026	96.65	38.99	40.5
Chumphon	859	393	45.75	13,411	12,734	94.95	1,461.23	3,140.20
Surat Thani	17,127	13,208	77.12	34,039	28,917	84.95	98.74	118.94
Coastal Zone 4	30,448	29,291	96.2	87,010	85,248	97.97	185.77	191.04
Nakhon Si Thammarat	28,190	27,193	96.46	65,705	64,823	98.66	133.08	138.38
Phattalung	11	-	-	1,573	1,566	99.55	14,200	100
Songkhla	379	274	72.3	14,636	14,509	99.13	3,761.74	5,195.26

Pattani	1,851	1,824	98.54	5,009	4,277	85.39	170,61	134.48
Narathiwat	17	-	-	87	73	83.91	411.76	-
Coastal Zone 5	3,305	1,189	35.98	44,212	42,782	96.77	1,237.73	3,498.15
Ranong	238	n.a.	n.a.	6,919	6,861	99.16	2,807.14	n.a.
Phangnga	709	30	4.23	8,804	8,024	91.14	1,141.75	26,646.67
Phuket	29	10	34.48	2,230	2,169	97.26	7,589.66	21,590
Krabi	245	218	88.98	9,187	9,114	99.21	3,649.80	4,080.73
Trang	109	1	0.92	7,715	7,698	99.78	6,977.98	769,700
Satun	1,975	930	47.09	9,357	8,916	95.29	373.77	858.71
Whole Kingdom	233,993	216,990	92.73	447,553	421,282	94.13	91.27	94.15

Sources: 1) For 1985; *1985 Marine Fishery Census of Thailand*, p.214

2) For 1995; *1995 Marine Fishery Census, Whole Country*, p. 176–180

Table 2.5 Fishing craft by type and coastal zone, 1985 and 1995

Region	1985				1995				% Change between 1985 and 1995			
	Unpowered		Powered		Unpowered		Powered		Unpowered		Powered	
	Outboard	Inboard	Total	Total	Outboard	Inboard	Total	Total	Outboard	Inboard	Total	Total
Coastal Zone I	826	2,604	3,652	7,082	243	3,253	2,929	6,425	-70.6	24.92	-19.8	-9.3
Coastal Zone II	901	2,201	4,472	7,574	170	2,331	4,219	6,720	-81.1	5.91	-5.7	-11.3
Coastal Zone III	574	4,329	2,926	7,829	138	4,706	2,729	7,573	-76.0	8.71	-6.7	-3.3
Coastal Zone IV	2,129	10,688	3,483	16,300	1,128	12,978	2,841	16,947	-47.0	21.43	-18.4	3.97
Coastal Zone V	3,647	8,546	2,449	14,642	1,147	13,162	2,564	16,873	-66.9	54.01	4.70	15.24
Whole Kingdom	8,077	28,368	16,982	53,427	2,826	36,430	15,282	54,538	-65.0	28.42	-10.0	2.08

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p. 198

2) For 1995: *1995 Marine Fishery Census, Whole Country*, p. 34, p. 154 (for the total figures); and censuses by zone for the figures of each zone

Table 2.6 Fishing craft by type, coastal zone and province, 1985 and 1995

Region	1985			1995			% Change between 1985 and 1995		
	Unpowered	Powered	Total	Unpowered	Powered	Total	Unpowered	Powered	Total

	Outboard Inboard				Outboard Inboard				Outboard Inboard			
Coastal Zone I	826	2,604	3,652	7,082	243	3,253	2,929	6,425	-70.6	24.9	-19.8	-9.3
Trat	203	869	1,966	3,038	51	1,139	1,413	2,603	-74.9	31.1	-28.1	-14.3
Chanthaburi	470	1,555	706	2,731	116	1,938	347	2,401	-75.3	24.6	-50.8	-12.1
Rayong	153	180	980	1,313	76	176	1,169	1,421	-50.3	-2.2	19.3	8.2
Coastal Zone II	901	2,201	4,472	7,574	170	2,331	4,219	6,720	-81.1	5.9	-5.7	-11.3
Chon Buri	60	192	1,146	1,398	9	113	880	1,002	-85.0	-41.1	-23.3	-28.3
Chachoengsao	372	363	181	916	12	206	121	339	-96.8	-43.3	-33.1	-63.0
Sumut Prakan	71	512	672	1,255	42	488	827	1,357	-40.8	-4.7	-33.1	8.1
Bangkok	7	1	19	27	5	3	0	8	-28.6	200.0	-100.0	-70.4
Samut Sakhon	132	170	676	978	37	197	876	1,110	-72.0	15.9	-100	13.5
Samut Songkhram	139	429	653	1,221	48	485	705	1,238	-65.5	13.1	8.0	1.4
Phetchaburi	120	534	1,125	1,779	17	839	810	1,666	-85.8	57.1	-28	-6.4
Coastal Zone III	574	4,329	2,926	7,829	138	4,706	2,729	7,573	-76.0	8.7	-28	-3.3
Prachuap Khiri Khan	111	239	1,110	1,460	10	585	965	1,560	91.0	144.8	-13.1	6.8
Chumphon	155	1,237	871	2,263	76	1,426	1,099	2,601	51.0	15.3	26.2	14.9
Surat Thani	308	2,853	945	4,106	52	2,695	665	3,412	-83.1	-5.5	-29.6	-16.9
Coastal Zone IV	2,129	10,688	3,483	16,300	1,128	12,978	2,841	16,947	-47.0	21.4	-18.4	4.0
Nakhon Si Thammarat	263	3,320	1,381	4,964	138	3,753	1,124	5,015	-47.5	13.0	-18.6	1.0
Phatthalung	836	1,375	0	2,211	334	1,954	0	2,288	-60.0	42.1		3.5
Songkhla	594	3,289	1,492	5,375	379	4,225	1,064	5,668	-36.2	28.5	-28.7	5.5
Pattani	360	2,343	522	3,225	210	2,357	570	3,137	-41.7	0.6	9.2	-2.7
Narathiwat	76	361	88	525	67	689	83	839	-11.8	90.9	-5.7	59.8
Coastal Zone V	3,647	8,546	2,449	14,642	1,147	13,162	2,564	16,873	-68.5	54.0	4.7	15.2
Ranong	619	1,240	277	2,136	233	1,763	440	2,436	-62.4	42.2	58.8	14.0
Phangnga	874	2,057	286	3,217	307	3,087	239	3,633	-64.9	50.1	-16.4	12.9
Phuket	137	479	292	908	43	575	354	972	-68.6	20.0	21.2	7.0

Krabi	618	1,623	123	2,364	230	2,515	91	2,836	-62.8	55.0	-26.0	20.0
Trang	777	1,497	356	2,630	175	2,386	527	3,088	-77.5	59.4	48.0	17.4
Satun	622	1,650	1,115	3,387	159	2,836	913	3,908	-74.4	71.9	-18.1	15.4
Whole Kingdom	8,077	28,368	16,982	53,427	2,826	36,430	15,282	54,538	-65.0	28.4	-10.0	2.1

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p. 198

2) For 1995: *1995 Marine Fishery Census, Whole Country*, p. 34, p. 154 (for the total figures); and censuses by zone for the figures of each zone

Table 2.7 Inboard-powered craft by gross tonnage and coastal zone, 1985 and 1995

Region	Gross Tonnage (1985)				Gross Tonnage (1995)				% Change			
	<10	10-49	50 & over	Total	<10	10-49	50 & over	Total	<10	10-49	50 & over	Total
Coastal Zone I	2,674	870	108	3,652	2,134	680	115	2,929	-20.2	-21.8	6.5	-19.8
Coastal Zone II	2,451	1,460	561	4,472	1,586	1,738	895	4,219	-35.3	19.0	59.5	-5.7
Coastal Zone III	1,646	1,211	69	2,926	1,281	1,320	128	2,729	-22.2	9.0	85.5	-6.7
Coastal Zone IV	1,696	1,625	162	3,483	1,026	1,598	217	2,841	-39.5	-1.7	34.0	-18.4
Coastal Zone V	1,141	1,166	142	2,449	898	1,211	455	2,564	-21.3	3.9	220.4	4.7
Whole Kingdom	9,608	6,332	1,042	16,982	6,925	6,547	1,810	15,282	-27.9	3.4	73.7	-10.0

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p. 198

2) For 1995: *1995 Marine Fishery Census, Whole Country*, p. 154

Table 2.8 Inboard-powered craft by gross tonnage, coastal zone and province, 1985 and 1995

Zone/Province	Gross Tonnage (1985)				Gross Tonnage (1995)				% Change			
	<10	10-49	50 & over	Total	<10	10-49	50 & over	Total	<10	10-49	50 & over	Total
Coastal Zone I	2,674	870	108	3,652	2,134	680	115	2,929	540	190	-7	723
Trat	1,555	403	8	1,966	1,104	297	12	1,413	451	106	-4	553

Chanthaburi	499	190	17	706	211	113	23	347	288	77	-6	359
Rayong	620	277	83	980	819	270	80	1,169	-199	7	3	-189
Coastal Zone II	2,451	1,460	561	4,472	1,586	1,738	895	4,219	865	-278	-334	253
Chon Buri	904	224	18	1,146	646	218	16	880	258	6	2	266
Chachoengsao	109	57	15	181	56	60	5	121	53	-3	10	60
Samut Prakan	118	326	228	672	108	344	375	827	10	-18	-147	-155
Bangkok	0	0	19	19	0	0	0	0	0	0	19	19
Samut Sakhon	232	310	134	676	309	362	205	876	-77	-52	-71	-200
Samut Songkhram	245	277	131	653	65	388	252	705	180	-111	-121	-52
Phetchaburi	843	266	16	1,125	402	366	42	810	441	-100	-26	315
Coastal Zone III	1,646	1,211	69	2,926	1,281	1,320	128	2,729	365	-109	-59	197
Prachuap Khiri Khan	883	207	20	1,110	594	336	35	965	289	-129	-15	145
Chumphon	470	372	29	871	567	493	39	1,099	-97	-121	-10	-228
Surat Thani	293	632	20	945	120	491	54	665	173	141	-34	280
Coastal Zone IV	1,696	1,625	162	3,483	1,026	1,598	217	2,841	670	27	-55	642
Nakhon Si Thammarat	630	710	41	1,381	371	699	54	1,124	259	11	-13	257
Phatthalung	0	0	0	0	0	0	0	0	0	0	0	0
Songkhla	887	575	30	1,492	450	561	53	1,064	437	14	-23	428
Pattani	152	281	89	522	163	298	109	570	-11	-17	-20	-48
Narathiwat	27	59	2	88	42	40	1	83	-15	19	1	5
Coastal Zone V	1,141	1,166	142	2,449	898	1,211	455	2,564	243	-45	-313	-115
Ranong	74	185	18	277	38	257	145	440	36	-72	-127	-163
Phangnga	123	154	9	286	62	158	19	239	61	-4	-10	47
Phuket	55	206	31	292	40	227	87	354	15	-21	-56	-62
Krabi	48	70	5	123	45	46	0	91	3	24	5	32
Trang	96	201	59	356	54	286	187	527	42	-85	-128	-171
Satun	745	350	20	1,115	659	237	17	913	86	113	3	202
Whole Kingdom	9,608	6,332	1,042	16,982	6,925	6,547	1,810	15,282	2,683	-215	-768	1,700

Sources: 1) For 1985: 1985 Marine Fishery Census of Thailand, p. 199

2) For 1995: 1995 Marine Fishery Census, Whole Country, p. 155

Table 2.9 Number of fisherfolk by coastal zone and sex, 1985 and 1995

Region	Fishers (1985)			Fishers (1995)			Change in Number			% Change		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Coastal Zone I	10,932	2,353	13,285	13,438	3,357	16,795	2,506	1,004	3,510	22.92	42.67	26.42
Coastal Zone II	16,066	6,126	22,192	13,779	4,811	18,590	-2,287	-1,315	-3,602	-14.24	-21.47	-16.23
Coastal Zone III	11,454	3,030	14,484	12,554	3,069	15,623	1,100	39	1,139	9.60	1.29	7.86
Coastal Zone IV	21,472	3,312	24,784	31,204	6,285	37,489	9,732	2,973	12,705	45.32	89.76	51.26
Coastal Zone V	20,895	4,721	25,616	25,798	4,828	30,626	4,903	107	5,010	23.46	2.27	19.56
Whole Kingdom	80,819	19,542	100,361	96,773	22,350	119,123	15,954	2,808	18,762	19.74	14.37	18.69

Sources: 1) For 1985: *Marine Fishery Census of Thailand*, p.284

2) For 1995: *1995 Marine Fishery Census, Whole Country*, p.198

Table 2.10 Number of fishermen by coastal zone, province and sex, 1985 and 1995

Zone/Province	Fishers (1985)			Fishers (1995)			Change in Number			% Change		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Coastal Zone I	10,932	2,353	13,285	13,438	3,357	16,795	2,506	1,004	3,510	22.92	42.67	26.42
Trat	4,387	584	4,971	4,587	891	5,478	200	307	507	4.56	52.57	10.2
Chanthaburi	4,497	1,407	5,904	7,138	2,153	9,291	2,641	746	3,387	58.73	53.02	57.37
Rayong	2,048	362	2,410	1,713	313	2,026	-335	-49	-384	-16.36	-13.54	-15.93
Coastal Zone II	16,066	6,126	22,192	13,779	4,811	18,590	-2,287	1,315	3,602	-14.24	-21.47	-16.23
Chon Buri	2,297	366	2,663	1,546	340	1,886	-751	-26	-77	-32.69	-7.1	-29.18
Chachoengsao	1,577	632	2,209	2,551	1,004	3,555	974	372	1,346	61.76	58.86	60.93
Samut Prakan	2,989	1,374	4,363	2,480	836	3,316	-509	-538	-1,047	-17.03	-39.16	-24
Bangkok	766	576	1,342	589	393	982	-177	-183	-360	-23.11	-31.77	-26.83
Samut Sakhon	3,068	1,458	4,526	2,198	656	2,854	-870	-802	1,672	-28.36	-55.01	-36.94
Samut Songkhram	2,246	862	3,108	1,987	961	2,948	-259	99	-160	-11.53	11.48	-5.15
Phetchaburi	3,123	858	3,981	2,428	621	3,049	-695	-237	-932	-22.25	-27.62	-23.41
Coastal Zone III	11,454	3,030	14,484	12,554	3,069	15,623	1,100	39	1,139	9.6	1.29	7.86

Prachuap Khiri Khan	2,420	659	3,079	2,405	480	2,885	-15	-179	-194	-0.62	-27.16	-6.3
Chumphon	3,072	706	3,778	4,085	914	4,999	1,013	208	1,221	32.98	29.46	32.32
Surat Thani	5,962	1,665	7,627	6,064	1,675	7,739	102	10	112	1.71	0.6	1.47
Coastal Zone IV	21,472	3,312	24,784	31,204	6,285	37,489	9,732	2,973	12,705	45.32	89.76	51.26
Nakhon Si Thammarat	6,259	1,110	7,369	14,031	3,424	17,455	7,772	2,314	10,086	124.17	208.47	136.87
Phatthalung	2,674	468	3,142	2,709	559	3,268	35	91	126	1.31	19.44	4.01
Songkhla	7,379	1,208	8,587	8,684	1,912	10,596	1,305	704	2,009	17.69	58.28	23.4
Pattani	4,383	492	4,875	4,333	354	4,687	-50	-138	-188	-1.14	-28.05	-3.86
Narathiwat	777	34	811	1,447	36	1,483	670	2	672	86.23	5.88	82.86
Coastal Zone V	20,895	4,721	25,616	25,798	4,828	30,626	4,903	107	14,952	23.46	2.27	95.39
Ranong	2,636	734	1,696	2,782	361	3,143	146	-373	1,447	5.54	-50.82	85.32
Phangnga	4,742	1,311	1,391	5,934	1,544	7,478	1,192	233	6,087	25.14	17.77	437.6
Phuket	1,924	299	2,886	1,431	207	1,638	-493	-92	-1,248	-25.62	-30.77	-43.24
Krabi	3,338	813	1,658	5,287	1,058	6,345	1,949	245	4,687	58.39	30.14	282.69
Trang	3,616	860	4,572	4,693	743	5,436	1,077	-117	864	29.78	-13.6	18.9
Satun	4,639	704	3,471	5,671	915	6,586	1,032	211	3,115	22.25	29.97	89.74
Whole Kingdom	80,819	19,542	100,361	96,773	22,350	119,123	11,085	5,365	16,450	19.74	14.37	18.69

Sources: 1) For 1985: 1985 Marine Fishery Census of Thailand, p. 284

2) For 1995: 1995 Marine Fishery Census, Whole Country, p. 198

Table 2.11 Number of fishery employees by coastal zone and sex, 1985 and 1995

Region	Fishery Employees (1985)			Fishery Employees (1995)			Change in Number			% Change		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Coastal Zone I	2,792	118	2,910	3,461	266	3,727	669	148	817	23.96	125.42	28.08
Coastal Zone II	8,282	947	9,229	4,234	226	4,460	-4,048	-721	-4,769	-48.88	-76.14	-51.67
Coastal Zone III	5,502	305	5,807	5,506	301	5,807	4	-4	-	0.07	-1.31	-
Coastal Zone IV	12,823	436	13,259	13,645	930	14,575	822	494	1,316	6.41	113.3	9.93
Coastal Zone V	7,693	247	7,940	9,099	586	9,685	1,406	339	1,745	18.28	137.25	21.98
Whole Kingdom	37,092	2,053	39,145	35,945	2,309	38,254	-1,147	256	-890	-3.09	12.47	-2.28

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p. 284
 2) For 1995: *1995 Marine Fishery Census, Whole Country*, p. 198
 Note: Women are not classified by age in the 1985 Marine Fishery Census

Table 2.13 Age distribution of fishery employees by coastal zone, 1985 and 1995

Zone	Sex	Age Distribution of Fishery Employees (1985)							Age Distribution of Fishery Employees (1995)							% Change						
		11-14	15-19	20-29	30-39	40-49	>49	Total	11-14	15-19	20-29	30-39	40-49	>49	Total	11-14	15-19	20-29	30-39	40-49	>49	Total
I	M	48	434	1,033	734	336	207	2,792	19	403	1,266	1,115	494	164	3,461	60.4	-7.1	22.6	51.9	47.0	20.8	24.0
	%	1.7	15.5	37.0	26.3	12.0	7.4	100.0	0.5	11.6	36.6	32.2	14.3	4.7	100.0							
	F	n.a	n.a	n.a	n.a	n.a	n.a	118	3	20	112	83	41	7	266	n.a	n.a	n.a	n.a	n.a	n.a	125.4
II	M	225	1,391	2,916	1,775	1,077	898	8,282	27	331	1,172	1,396	858	450	4,234	88.0	76.2	59.8	21.4	20.3	49.9	-48.9
	%	2.7	16.8	35.2	21.4	13.0	10.8	100.0	0.6	7.8	27.7	33.0	20.3	10.6	100.0							
	F	n.a	n.a	n.a	n.a	n.a	n.a	947	3	13	54	79	56	21	226	n.a	n.a	n.a	n.a	n.a	n.a	-76.1
III	M	127	957	2,137	1,139	686	456	5,502	45	609	1,948	1,714	794	396	5,506	64.6	36.4	-8.8	50.5	15.7	13.2	0.1
	%	2.3	17.4	38.8	20.7	12.5	8.3	100.0	0.8	11.1	35.4	31.1	14.4	7.2	100.0							
	F	n.a	n.a	n.a	n.a	n.a	n.a	305.0	2.0	24.0	99.0	104.0	49.0	23.0	301.0	n.a	n.a	n.a	n.a	n.a	n.a	-1.3
IV	M	173	1,438	4,526	3,288	1,790	1,608	12,823	60	1,030	4,424	4,564	2,455	1,112	13,645	65.3	28.4	-2.3	38.8	37.2	30.8	6.4
	%	1.3	11.2	35.3	25.6	14.0	12.5	100.0	0.4	7.5	32.4	33.4	18.0	8.1	100.0							
	F	n.a	n.a	n.a	n.a	n.a	n.a	436	3	37	353	324	153	60	930	n.a	n.a	n.a	n.a	n.a	n.a	113.3
V	M	114	1,041	2,863	2,016	1,045	614	7,693	66	1,018	3,151	2,764	1,427	673	9,099	42.1	-2.2	10.1	37.1	36.6	9.6	18.3
	%	1.5	13.5	37.2	26.2	13.6	8.0	100.0	0.7	11.2	34.6	30.4	15.7	7.4	100.0							
	F	n.a	n.a	n.a	n.a	n.a	n.a	247	3	56	239	197	68	23	586	n.a	n.a	n.a	n.a	n.a	n.a	137.2
Total	M	687	5,261	13,475	8,952	4,934	3,783	37,092	217	3,391	11,961	11,553	6,028	2,795	35,945	68.4	35.5	11.2	29.1	22.2	26.1	-3.1
	%	1.9	14.2	36.3	24.1	13.3	10.2	100.0	0.6	9.4	33.3	32.1	16.8	7.8	100.0							

F n.a n.a n.a n.a n.a n.a 2,053 14 150 857 787 367 134 2,309 n.a n.a n.a n.a n.a n.a 12.5

Sources: 1) For 1985: 1985 Marine Fishery Census of Thailand, p.284

2) For 1995: 1995 Marine Fishery Census, Whole Country, p.198

Note: Women are not classified by age in the 1985 Marine Fishery Census

Table 2.14 Educational attainment of fishermen by coastal zone, 1985 and 1995

Coastal Zone	1985					1995					% Change in Educational Attainment				
	No education/ Under lower Elementary	Elementary	Secondary	Over/ Equivalent Diploma	Total	No education/ Under lower Elementary	Elementary	Secondary	Over/ Equivalent Diploma	Total	No education/ Under lower Elementary	Elementary	Secondary	Over/ Equivalent Diploma	Total
I	1,614	11,302	330	39	13,285	1,449	13,974	1,065	307	16,795	-10.2	23.6	222.7	687.2	26.4
%	12.1	85.1	2.5	0.3	100.0	8.6	83.2	6.3	1.8	100.0					
II	2,734	18,139	1,154	165	22,192	1,518	15,424	1,371	277	18,590	-44.5	-15.0	18.8	67.9	-16.2
%	12.3	81.7	5.2	0.7	100.0	8.2	83.0	7.4	1.5	100.0					
III	1,029	12,550	809	96	14,484	802	12,768	1,668	385	15,623	-22.1	1.7	106.2	301.0	7.9
%	7.1	86.6	5.6	0.7	100.0	5.1	81.7	10.7	2.5	100.0					
IV	5,617	18,107	949	111	24,784	4,743	27,222	4,113	1,411	37,489	-15.6	50.3	333.4	1,171.2	51.3
%	22.7	73.1	3.8	0.4	100.0	12.7	72.6	11.0	3.8	100.0					
V	6,043	18,654	799	120	25,616	4,099	23,113	2,525	889	30,626	-32.2	23.9	216.0	640.8	19.6
%	23.6	72.8	3.1	0.5	100.0	13.4	75.5	8.2	2.9	100.0					
Total	17,037	78,752	4,041	531	100,361	12,611	92,501	10,742	3,269	119,123	-26.0	17.5	165.8	515.6	18.7
%	17.0	78.5	4.0	0.5	100.0	10.6	77.7	9.0	2.7	100.0					

Sources: 1) For 1985: 1985 Marine Fishery Census of Thailand, p. 290

2) For 1995: 1995 Marine Fishery Census, Coastal Zone 1,2,3,4 & 5, p.76

Table 2.15 Educational attainment of fishery employees by coastal zone, 1985 and 1995

Coastal Zone	1985					1995					% Change in Educational Attainment				
	No education/ Under lower Elementary	Elementary	Secondary	Over/ Equivalent Diploma	Total	No education/ Under lower Elementary	Elementary	Secondary	Over/ Equivalent Diploma	Total	No education/ Under lower Elementary	Elementary	Secondary	Over / Equivalent Diploma	Total
I	1,614	11,302	330	39	13,285	1,449	13,974	1,065	307	16,795	-10.2	23.6	222.7	687.2	26.4
%	12.1	85.1	2.5	0.3	100.0	8.6	83.2	6.3	1.8	100.0					
II	3,993	25,818	1,430	180	31,421	1,914	19,310	1,531	295	23,050	-52.1	-25.2	7.1	63.9	-26.6
%	12.7	82.2	4.6	0.6	100.0	8.3	83.8	6.6	1.3	100.0					
III	1,259	7,679	276	15	9,229	396	3,886	160	18	4,460	-68.5	-49.4	-42.0	20.0	-51.7
%	13.6	83.2	3.0	0.2	100.0	8.9	87.1	3.6	0.4	100.0					
IV	1,029	12,550	809	96	14,484	802	12,768	1,668	385	15,623	-22.1	1.7	106.2	301.0	7.9
%	7.1	86.6	5.6	0.7	100.0	5.1	81.7	10.7	2.5	100.0					
V	9,202	27,301	1,409	131	38,043	6,653	38,772	5,143	1,496	52,064	-27.7	42.0	265.0	1,042.0	36.9
%	24.2	71.8	3.7	0.3	100.0	12.8	74.5	9.9	2.9	100.0					
Total	3,585	9,194	460	20	13,259	1,910	11,550	1,030	85	14,575	-46.7	25.6	123.9	325.0	9.9
%	27.0	69.3	3.5	0.2	100.0	13.1	79.2	7.1	0.6	100.0					

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p.290

2) For 1995: *1995 Marine Fishery Census, Coastal Zone 1,2,3,4 &5*,p.76

1.3 Changes in the fishery and fishery employee households

While the previous chapter concentrated on the fishermen and the fishery employees, this chapter will examine the characteristics of their households. These will be considered in terms of change in size and sex composition, type of household, coastal aquaculture activities, level of economic dependence on fishery, debt and source of loan, and membership in formal organizations.

The definitions given in the 1995 marine fishery census (pp. 26–27) are:

- **A fishery establishment** is an economic unit engaged in marine capture fishery or coastal aquaculture or both during the last 12 months. These establishments are classified into operator households, joint management households and companies.
- **A marine capture fishery establishment** is an economic unit engaged exclusively in marine capture fishery or both marine capture fishery and coastal aquaculture during the last 12 months. Such establishments are classified in terms of availability or unavailability of boats, boat type (unpowered, outboard- or inboard-powered) and size of inboard-powered boat (gross tonnage).
- **A coastal aquaculture establishment** is an economic unit engaged exclusively in coastal aquaculture, or both in coastal aquaculture and marine capture fishery.
- **An employee household** is a household which does not engage in marine capture or coastal aquaculture as an operator's household or a joint management household, but has one or more of its members who were employed for marine capture or coastal aquaculture or both during the last 12 months.

In this report, households are tabulated into only two types, namely, marine capture fishery and coastal aquaculture households, because in the 1985 marine fishery census, households that engaged in both activities were included into one or the other type, depending on which activity provided the main income. If the main source of income was marine capture fishery, the household is included in the marine fishery sector. The same criterion is applied to the coastal aquaculture sector (*1985 Marine Fishery Census of Thailand*, p.34).

Number of fishery and fishery employee households

Table 3.1 and Figures 3.1 and 3.2 show that in 1985 there were 84,445 households engaged in fishery, 68 percent of which were fishery households - i.e. households of self-employed fisherfolk, as opposed to fishery employee households. By 1995, the total number of households increased by 30 percent to 109,868, roughly 73 percent of which were fishery households. In fact while the fishery households increased by 40 percent, the fishery employee households increased much more slowly, by only nine percent.

The number of fishery households increased from 57,551 to 80,566, a 40 percent increase over ten years for the whole country. The highest increase occurred in Zone IV (60 percent), followed by Zone V (45 percent) and Zone I (40 percent). The lowest increase occurred in Zone II (12.5 percent) and in Zone III (26.3 percent).

The increase in the number of fishery employee households is not very impressive. Countrywide, it rose from 26,904 to 29,302 households, an increase of 8.9 percent over

ten years. Comparison by zone shows the highest increase in Zone I (28 percent) and Zone V (27.1 percent), followed by Zone III (14.3 percent) and Zone IV (14.8 percent). Only Zone II experienced a decline (-33.9 percent).

These data do not reveal anything of interest, as they roughly follow the changes in the number of fishermen and fishery employees. They only indicate that, as the growth of the fishing population was not as rapid as that of the households, the overall household size must have become smaller by 1995. This can be due to two factors: the overall trend toward nuclear families and a lower proportion of members engaged in fishing activities compared to total household members.

Changes in household size and sex composition

It is apparent from Table 3.2 that there were less female than male members in both fishery and fishery employee households. In 1985, women constituted 48.6 percent of all fishery household members in Thailand. In each zone, they also accounted for about the same percentage. By 1995, they accounted for 49.1 percent of all household members, with roughly the same percentages in each zone.

As for the fishery employee households, women accounted for 47.4 percent of total household members countrywide, both in 1985 and 1995. In both years, the variation by zone is negligible. What is worth exploring is whether fishery employees are very migratory, and if so whether they tend to leave their families behind, and what the impact of migration is on those who are left behind.

Table 3.3 shows that between 1985 and 1995, the average size of households engaged in fishing activities declined from 5.6 to 4.9 persons per household, that is to say, from about six persons to about five persons per household. The average household size of the fishery employee households has always been smaller than that of the fishery households. In 1985, there were about five persons per fishery employee household, and six persons per fishery household. In 1995, the comparable numbers were 4.6 and 5.2 persons. Two likely explanations are, first that a smaller proportion of the fishery employee household members were married, and second that they were migrant households some of whose members were left behind. The validity of these possibilities could be easily proved if the data on marital status and migration of both groups were available.

That the average size of households declined among both fishery and fishery employee households in Thailand between 1985 and 1995 was shown in Table 3.3. Further details from Table 3.4, which classifies households by size, show further that the decline in average household size was due to the decline in households with more than seven persons. Countrywide, households with nine persons or more declined by 31 percent, while those with seven or eight persons did so by 13 percent. On the other hand, households of less than seven persons increased: those with one or two persons increased by 83 percent, those with three or four persons increased by 67 percent and those with five or six persons increased by 29 percent. The pattern of increase and decline is similar when fishery and fishery employee households are compared.

Marine capture fishery and coastal aquaculture households

Table 3.4 also classifies fishery households by sector into marine capture fishery and coastal aquaculture households. As the table is rather detailed, it is simplified into Table 3.5, which compares the changes in the number and the proportion of fishery households by activity. Fishery employee households are not included, because the 1985 census did not tabulate them by activity.

Table 3.5 shows that for the whole country, coastal aquaculture households grew more rapidly than marine capture fishery households. They represented only 11 percent of all fishery households in 1985, but 35 percent by 1995. Comparison shows that Zone II had the greatest proportion of households engaged in coastal aquaculture both in 1985 and 1995, but the increase over the period was less rapid there than in the other zones. The two zones that experienced an exceptional increase, well above the national average of about 24 percent, were Zone I (35.7 percent) and Zone IV (33.4 percent). The zones that experienced some increase were Zone III (20 percent), Zone V (19 percent) and Zone II (15 percent).

The above pattern of change in the proportion of coastal aquaculture households was explained in terms of a “production crash” of shrimp farms in Zone II during 1989–1991 (TDRI, April 1988, p.43). As coastal aquaculture, especially shrimp farming, yields high returns, it is very likely that shrimp farming moved to Zone I and to the southern zones, especially Zone IV. This supposition is supported by the pattern of changes in areas under coastal aquaculture examined in the previous chapter. One implication is thus that shrimp farmers in Zone I and in the southern zones must learn from those in Zone II and avoid the same mistakes. The other implication is that information about shrimp culture in the zones must be made available, if effective monitoring and control are required to lessen negative environmental impact and land use conflicts.

The growth in households engaged in shrimp culture was high between 1985 and 1995, while the number of households engaged in other kinds of coastal aquaculture declined. In 1985, households engaged in shrimp farming accounted for roughly 69 percent of all aquaculture households; by 1995, they accounted for about 85 percent. Households engaged in mollusc culture accounted for 16.5 percent of all aquaculture households in 1985, but for only six percent by 1995. Households engaged in fish culture, which accounted for 13.5 percent in 1985, represented only six percent of the total coastal aquaculture households by 1995. As dependence mainly on shrimp culture, or on any single culture, is risky, it would be advisable to promote diversification in aquaculture activities.

So far, the data show that the proportion of marine capture fishery households declined in relation to aquaculture households. Additional information from Table 3.4 shows that, among marine capture fishery households, small-scale households comprised the majority and that there was a small tendency for them to increase (81 percent in 1985 and 84 percent in 1995).

It should be noted at this point that there is no standard definition of ‘small-scale’ and ‘large-scale’. In the marine fishery censuses, small-scale fishing operations use either no boat or outboard-powered fishing boats or boats of less than 10 GT. Ruangrai Tokrisna, a fishery expert at Kasertsart University, does not include inboard-powered fishing boats at all in her definition of small-scale. The Southeast Asia Fishery Development Centre provides a guideline that divides small-scale and large-scale fishery by type of fishing

gear (SEAFDEC, 1997). Therefore, to facilitate comparison, attempts should be made to give realistic and standard definitions of what constitute small, medium-sized and large-scale fishermen and fishing operations.

Financial dependence on fishery

The marine fishery censuses define the level of financial dependence at three levels according to the source of income. Income from fishery is classified as “sole income source”, “main income source” and “minor income source”.

The level of dependence on fishery was high among both fishery and fishery employee households (Table 3.6). Roughly half of both kinds of households derived their income solely from fishing activities. Naturally, a higher proportion of employee households than of fishery households derived their income solely from fishing activities.

For the whole country, the level of dependence on fishery income increased a little between 1985 and 1995. Table 3.6 shows that in 1985, 50.8 percent of the households (both fishery and fishery employee households) depended on fishery as their sole income source. By 1995, the percentage increased by 3.9 percent to 54.7 percent. In 1985, 49 percent of the fishery households, compared to 54.5 percent of the employee households, depended on fishing activities as their only source of income. The corresponding percentages for 1995 were 52.7 percent and 60 percent.

The proportion of those households that derived their main income from fishing activities also increased by about 2.4 percent between 1985 and 1995. In 1985, about 30 percent of the fishery households and 27.5 percent of the fishery employee households derived their income mainly from fishery. In 1995, the corresponding percentages were 32 percent and 29 percent.

The proportion of households depending on fishing activities as their supplementary income source declined by about 3.4 percent between 1985 and 1995. While fishing activities provided minor income for 21 percent of the fishery households in 1985, they did so for 18 percent of the fishery employee households. By 1995, 15 percent of the fishery households and 10 percent of the fishery employee households derived minor income from fishing activities.

In summary, both the fishery and the fishery employee households became somewhat more dependent on income from fishing activities. The proportion of those households of both kinds that derived income solely or mainly from fishing activities increased between 1985 and 1995. The proportion of those households whose fishing activities represented only a minor source of income declined.

The fishery households will now be examined more closely. As previously mentioned, we classified marine capture fishery households into small-scale and medium- to large-scale. We found that a much smaller proportion of small-scale marine capture fishery households than of larger-scale households depended on fishing activities as their sole income source. In 1985, 44 percent of the small-scale households and 68 percent of the medium- to large-scale households derived their income solely from fishing activities. In 1995, the corresponding percentages were 53 percent and 74 percent, indicating in addition a small trend among small-scale households toward increased reliance on

fishing activities as the only source of income. The high level of total reliance on fishing activities for income in the medium-to large-scale households indicates that they must find marine capture fishery very profitable.

Among fishery households in which fishing activities were the main source of income, the difference between the small-scale and medium- to large-scale households was hardly remarkable. In 1985, 31 percent of the small-scale and 28 percent of the medium-to large-scale households derived their main income from fishing activities. By 1995, the proportion had changed to 29.5 percent and 23 percent respectively.

The difference in the proportion of small-scale and medium- to large-scale households was great in terms of fishing activities as a minor source of income. In 1985, 25.5 percent of small-scale households, compared to 3.8 percent of the medium- to large-scale households, reported fishing activities as their minor source of income. By 1995, the percentage had changed to 17 percent and 3.3 percent respectively.

In summary, a smaller proportion of small-scale than of larger-scale marine capture fishery households became less dependent on fishing activities as their only source of income. Small-scale fishery households, over time, became rather more dependent on fishing activities as their sole source of income. And even though a higher proportion of medium- to large-scale than of small-scale households depended on fishing activities as their sole source of income in 1985, their dependence over time did not increase as rapidly as did that of the small-scale households. As coastal fishing became less profitable, due to the depletion of fishery resources, it is possible that small-scale fishermen and their close relatives had to engage increasingly in other income-earning activities. In fact, other economic activities should be promoted among small-scale households to ensure their economic survival.

Turning to coastal aquaculture households, the data pertaining to aquaculture as a whole indicate that, even though aquaculture used to provide the sole income of more than half of the households in 1985, there is a perceptible trend that it would turn into a main source of income only.

In shrimp culture, the proportion of households reporting their sole income from shrimp farming diminished between 1985 and 1995, whereas the number of those reporting shrimp farming as their main or supplementary source of income increased. In 1985, the distribution was 63 percent, 28 percent and 9 percent respectively. By 1995, this had changed to 46 percent, 40 percent and 14 percent respectively. This indicates that shrimp farming must have become less profitable and that the households must have other economic activities.

In mollusc culture, the changes in fishing activities as income source were the reverse of those in shrimp culture: a bigger proportion of households reported mollusc culture as their sole source of income. In 1985, the proportion of households engaged in this culture that reported it as their sole, main and subsidiary income source were 28 percent, 25 percent and 47 percent respectively. By 1995, this had changed to 46 percent, 27 percent and 27 percent.

In fish culture, the trend is similar to that in shrimp culture. That is, a smaller proportion of the households reported fish culture as their sole income source, but a higher proportion reported it as their main source of income.

Other kinds of culture were not included in the 1985 census, but were listed in the 1995 census, which showed that almost half of the households engaged in "other cultures" derived their sole income from them. It would be useful to specify them, as they indicate not only that there has been a diversification of aquaculture, but also that they may be profitable and perhaps environmentally less damaging, in which case they should be promoted.

In summary, among the coastal aquaculture households, the majority still derived their income solely from aquaculture, but less so by 1995. The change from high to lower reliance on coastal aquaculture as the sole source of income can be explained in terms of changes in financial reliance on each kind of aquaculture. A smaller proportion of households engaged in shrimp culture derived their income solely from it, though shrimp culture households represented the majority of aquaculture households. Although a higher proportion of households engaged in mollusc or crab culture reported that they derived their sole income from such activity, these households numbered much less than those involved in shrimp culture and, to a lesser extent, fish culture. There seems to be a diversification of aquaculture activities, which it might be useful to examine.

It is difficult to interpret the changes in the level of dependence of household income on coastal aquaculture. If a lower proportion of shrimp culture and fish culture households relied on each respective activity as their only source of income, is it possible that the remaining households of the same types engaged in other kinds of aquaculture or in marine capture fishery or both, or that there were more non-fishery income earners within the households? To support or reject the first possibility would require a more detailed classification of households than that tabulated in the 1985 census in order to compare it with the 1995 census. The latter provides another category of households, namely those engaged in both marine capture fishery and coastal aquaculture, with the corresponding income derived from each. To verify the second possibility, the marine fishery censuses need to provide the overall economic structure of the households, such as the total number of income earners, the type of economic activity and the income derived therefrom.

Dependence on income from fishing activities by zone

Table 3.6 shows that, for the whole country, the dependence on fishery as sole source of income both for marine capture fishery households and for aquaculture households changed between 1985 and 1995. The changes occurred in opposite directions. The proportion of marine capture fishery households relying on fishery as their sole source of income increased from 48 percent to 57 percent, while in the case of the aquaculture households, it declined from 54 percent to 46 percent for the same years.

Table 3.7 provides the same set of data by zone. Among marine capture fishery households, the increased reliance on fishing activities as sole income source differed by zone. It grew from 52 percent to 60 percent in Zone I, from 52 percent to 67 percent in Zone II, from 53 percent to 67 percent in Zones III, from 46 percent to 54 percent in Zone IV, and from 45 percent to 50 percent in Zone V. These represented increases of

eight percent in Zone I, 15 percent in Zone II, 14 percent in Zone III, eight percent in Zone IV and 15 percent in Zone V. It is possible that there are higher proportions of large-scale rather than small-scale inboard-powered fishing boats in Zone II, III and V. This is supported by the data in Table 2.7 presented in the previous chapter. The table shows that, between 1985 and 1995, there was an increase in boats of 10–49 GT only in Zones II, III and V, and that the percentage increase in boats of 50 GT and over was higher in those three zones.

Coastal aquaculture households are overwhelmingly engaged in shrimp culture. Thus, the change in aquaculture as the sole income source would be due mainly to a change in the pattern of total dependence on shrimp culture. The change in the proportion of aquaculture households whose income depended solely on aquaculture differed by zone; Zones II and V showed a decline over the period under study, Zones III and I an increase. In Zone III, the increase was of 25 percent (from 36 to 61 percent), and of 20 percent in Zone I (from 28 to 48 percent). The decline in Zone II was of 17 percent (from 64 to 47 percent) and of 12 percent in Zone V (from 42 to 30 percent). The decline in Zone II may be due to the fact that shrimp farming was declining in profitability and household members also had many opportunities to engage in light-industry and service activities. In Zone V, it is likely that aquaculture was introduced only lately and thus coexisted with the longer established marine capture fishery. It is also likely that in Zone V, more members in aquacultural households earned extra income from tourism-related activities, due to the rapid growth of tourism in the zone. In Zone IV, there was no change in the proportion of households relying solely on aquaculture where there was no significant growth in industry or tourism, and it is only likely that aquaculture remained as profitable in 1995 as in 1985.

The changes in household dependence on fishing activities as sole source of income raise two important questions. First, is the increasing dependence good or bad for the fishermen and their families? Second, what are the implications of this tendency for integrated coastal zone management programmes in Thailand?

To discuss this, it must be reiterated that small-scale households comprise the great majority of all marine capture fishery households. Although their total reliance on fishing activities for income is not as high as that of the larger-scale households, the level of reliance is still quite high and shows a tendency to increase. This is not a good sign for small-scale households, even assuming that the proportion of income earners in the household is constant, because it means that the survival of the household depends on fishing activities income from which is unstable. Thus, the nature of income earning within the households should be studied, and diversification of economic activities within the households should be promoted to reduce the risks associated with relying solely on marine capture fishery.

One of the implications of the increasing dependence of small-scale marine capture fishery households is that it will make them more receptive to the need for integrated coastal zone management programmes and more willing to make a real effort to participate in them, especially in the management of marine resources.

Debt and source of loan

Interestingly, the examination of the state of indebtedness and sources of loan reveals that, among marine capture fishery households, a smaller proportion of small-scale households than of larger scale households were likely to be in debt. This finding is similar in both the 1985 and the 1995 censuses. A larger proportion of large-scale households were in debt by 1995, and more heavily so (Table 3.9). In 1985, 39 percent of the small-scale households, 73 percent of the medium-sized households and 77 percent of the large-scale households were in debt. By 1995, the corresponding percentages were 32 percent, 72 percent and 81 percent.

Regarding the sources of loan for each type of household, in 1985 the majority of small-scale households were in debt to middlemen (52 percent), to friends and relatives (16 percent), to moneylenders (11 percent) and to the Bank of Agriculture and Co-operatives (BAAC) (11 percent). The sources of loan for the medium-scale households were the middlemen (44 percent), the moneylenders (13 percent), BAAC and the commercial banks as well as relatives and friends (each accounting for about 12 percent). The main sources of loan for the large-scale households were the commercial banks (31 percent), BAAC (27 percent) and the middlemen (15 percent).

In summary, the majority of small-scale households borrowed from the middlemen. while the majority of the large-scale households borrowed from the commercial banks. The medium-sized households had the most varied sources of loan but the majority still borrowed from the moneylenders.

For 1995, the data are more difficult to interpret because one household may acquire loans from more than one source. However, the main sources of loan were still more or less the same as in 1985. The small-scale households borrowed mostly from the middlemen (39 percent), BAAC (19 percent), and friends and relatives (19 percent). Among the medium-scale households, the majority borrowed from the middlemen (32 percent), the commercial banks (23 percent) and friends and relatives (19 percent). As for the large-scale households, the majority borrowed from the commercial banks (46 percent), the middlemen (20 percent) and friends and relatives (15 percent).

The aquaculture households in 1985 borrowed from BAAC (29 percent), middlemen, and friends and relatives (each accounting for about 18 percent). In 1995 the three main sources of loan were BAAC (35 percent), the commercial bank (20 percent) and relatives and friends (21 percent).

It is notable that for the marine capture fishery households, BAAC was not the main source of borrowing for small-scale households. But the middlemen's role was most prominent among both small-scale and medium-scale households. Incidentally, it was the middlemen who acted as providers of loans and other facilities as well as buyers of the catches. Their high control over the small- and medium-scale households should be lessened somehow, and the role of BAAC further promoted. At present, the role of BAAC as provider of loans to aquaculture households is satisfactory, because coastal aquaculture involves a large proportion of investors.

Participation in formal organizations

Table 3.9 shows the size of household membership in various formal organizations. Membership in an organization is not exclusive: one household may belong to more than one organization.

In 1985, there were only four organizations: the Fishery Co-operative, the Fishermen's Group, the Fish Farmers' Group and the Fishery Association. By 1995, there were four additional organizations: the Fishery Operators' Group, the Aquaculture Co-operatives, the Aquaculture Association and the Aquaculture Operators' Group.

A comparison of the four organizations existing in 1985 shows that the Fishery Association had the largest number of members (2,247), followed by the Fishermen's Group (1,991), the Fishery Co-operatives (1,967) and the Fish Farmers' Group (913). By 1995, the ranking had changed, the Fishery Co-operatives having the largest number of members (2 608), followed by the Fishermen's Group (2,586), the Fishery Association (2,180) and the Fish Farmers' Group (1,492). In terms of percentage change, the Fishery Association was the only organization that registered a negative growth, of three percent, which means that it failed to meet the needs of its members.

The greatest growth in membership was in the Fish Farmers' Group (กลุ่มเกษตรกรเพาะเลี้ยงสัตว์น้ำ)- 63 percent for the whole country. This was due to the high growth in the membership of aquaculture households (105 percent), despite a decline in the membership of marine capture fishery households (-54 percent). The high increase is thus likely to be due to the common interest of aquaculture households in terms of seeds, feed, and disease control.

The membership of the Fishery Co-operatives grew by 33 percent between 1985 and 1995, within which the growth of the fishery households was 39 percent. The membership of marine capture fishery households increased by 34 percent, compared to about 46 percent for aquaculture households. The increased membership of the former was caused by an exceptional increase in membership of the small-scale households (109 percent), even though the membership of the larger-scale households declined by 19 percent. The increased membership of coastal aquaculture households was due to the 53-percent increase in the membership of shrimp culture households. As the organization is promoted by the Ministry of Agriculture and Co-operatives, it is likely that the promotion has focused mostly on the small-scale marine capture households.

Regarding the Fishermen's Group (กลุ่มเกษตรกรทำประมง), membership grew by about 30 percent countrywide between 1985 and 1995. The pattern of increase and decline exactly follows that of the Fishery Co-operatives.

The pattern of membership change in the Fishery Association is interesting. Nation-wide, membership declined by three percent, due to a steep decline in the membership of employee households (-57 percent) and of marine capture fishery households (-3 percent). The decline of membership in both groups could not be offset by the exceptional increase in the membership of aquaculture households, as their number in 1985 was low.

The failure to meet the needs of members may be due to a diversity of interests on their part. It is possible that both marine capture fishery and coastal aquaculture households

went over to new organizations that responded to their needs more efficiently than did the Fishery Association. For example, the marine capture fishery households may organize themselves into Fishing Operators' Groups, and coastal aquaculture households may prefer to belong to organizations focusing exclusively on aquaculture.

Of the four new organizations, it should be noted that their membership was very small in 1995. The Aquaculture Operators' Group (ชมรมผู้เพาะเลี้ยงสัตว์น้ำ) had 584 members, the Fishing Operators' Group (ชมรมผู้ประกอบการประมง) had 581 members, the Aquaculture Co-operatives (สหกรณ์เพาะเลี้ยงสัตว์น้ำ) 315 members and the Aquaculture Association (สมาคมเพาะเลี้ยงสัตว์น้ำ) only 163 members. The main objectives of the three new organizations concerned with aquaculture might be worth looking into, because if they are more or less similar, it might be worth merging them to achieve economy of scale.

So far, the data present only the size and rate of growth of the various organizations. In order to increase the ability of fishery and fishery employee households to organize so that they can further and defend their interests, it would be interesting to know what made some organizations grow more rapidly than others, and why some declined. If critical causative factors were known, it surely would be a start to promote sustainable organizations and sustainable fishing activities.

In the national seminar on the role of fishery co-operatives in the development of sustainable fishing activities in Thailand, which was held on 5–7 November 1997, seven problems were identified (Division of Co-operatives, auditing papepp. 9–10). These were:

1. the co-operatives are promoted by outsiders, not by the members themselves;
2. their size is generally small and cannot achieve economy of scale;
3. only a small part of the members' needs are met;
4. lack of fund and difficulties in obtaining loans;
5. lack of management ability of the working committee;
6. insufficient incentives to motivate administrative members; and
7. lack of awareness on the part of the majority of fisherfolk of the usefulness of joining the co-operatives.

It would be useful to check the validity of this list for every organization presented in Table 3.9.

Another useful research question would be the extent of involvement of members in the various organizations and why some members are more actively involved in their running than others. The factors accounting for active participation in organizations might be promoted to induce involvement in the management of coastal resources.

Summary and discussion

This chapter has examined fishery and fishery employee households in terms of numbers, household size and sex composition, type of fishery household, dependence on fishery as sole source of household income, and household participation in formal organizations.

The fishery households increased in number at a faster rate than the fishery employee households did. Women were slightly less numerous than men in both kinds of households. The average size of fishery households was higher than that of fishery employee households, the probable reason being the more migratory nature of the employees. The average household size declined for both types of households, but fishery households shrank somewhat faster (from six to five persons per household) than employee households (from 5.0 to 4.6). The decline in both cases was due to the decline in the number of households with more than seven persons.

Among fishery households (marine capture fishery and aquaculture), marine capture fishery households comprised the majority in both 1985 and 1995, but they had declined in proportion over the years, to the extent that by 1995, aquaculture households comprised a little over one third of all fishery households.

Among marine capture fishery households, roughly 80 percent were small-scale, and their proportion had increased a little by 1995. Coastal aquaculture households consisted almost exclusively of shrimp culture households in 1985, but their share declined due to the increase in the number of households engaged in other types of culture, especially mollusc culture.

In terms of dependence on income from fishing activities, a higher proportion of marine capture fishery households became dependent on fishery as their sole source of income during the ten-year period under review. Among the aquaculture households, a lower proportion reported that they derived their income solely from aquaculture. An examination by zone revealed that in Zones II, III and V, total reliance on income from fishing activities was related to the growth of medium- and large-scale inboard-powered vessels, signifying high profitability for large-scale fishing operations. Declining sole reliance on income from aquaculture in Zones II and V was probably due to the lower profitability of shrimp farming in Zone II, as well as to the greater participation of other household members in the light-industry and service sectors. The reduced proportion of households depending solely on aquaculture as their source of income may be due to its coexistence with small-scale marine capture fishery and to the likelihood that other household members became economically active in tourism-related activities. As for small-scale marine capture fishery households, their rather high and growing dependence on fishing activities as their sole source of income implies that their survival will be at greater risk as coastal fishery resources continue to deplete; their willingness to participate in integrated coastal zone management programmes may increase as a consequence.

Among marine capture fishery households, a smaller proportion of small-scale than of medium- and large-scale households were in debt in 1995, and we believe that a high proportion of larger-scale households obtained loans for further investment whereas small-scale households borrowed for their survival. The role of the middlemen was most prominent among the small- and medium-scale households. Their role should be lessened and that of BAAC promoted. Among the coastal aquaculture households, BAAC was the main source of loan, probably because aquaculture is more commercial than subsistence.

There were four organizations for which data were available both in 1985 and 1995. Among them, the one with the highest growth in membership was the Fish Farmers'

Group, followed not so closely by the Fishery Co-operatives and the Fishermen's Group. Only the Fishery Association experienced a decline in membership. The four new organizations reported in the 1995 census were the Fishing Operators' Group, the Aquaculture Co-operatives, the Aquaculture Association and the Aquaculture Operators' Group. Their membership was notably small, and as the last three organizations were oriented toward aquaculture, it was suggested that to achieve economy of scale, they be merged if their main objectives are compatible. Two research issues of interest are the level of involvement of members, and the factors affecting the growth of the various organizations.

An important methodological issue is the standard definition of what constitutes small-scale and large-scale fishing activities in Thailand both in marine capture fishery and in coastal aquaculture. An important research question concerns the implications for integrated coastal zone management programmes of the changing level of dependence of the fisherfolk on income derived from fishing activities. Another line of research is the growth and decline of various formal organizations concerned with fishery and the level of participation of small-scale marine capture fishery households in these organizations.

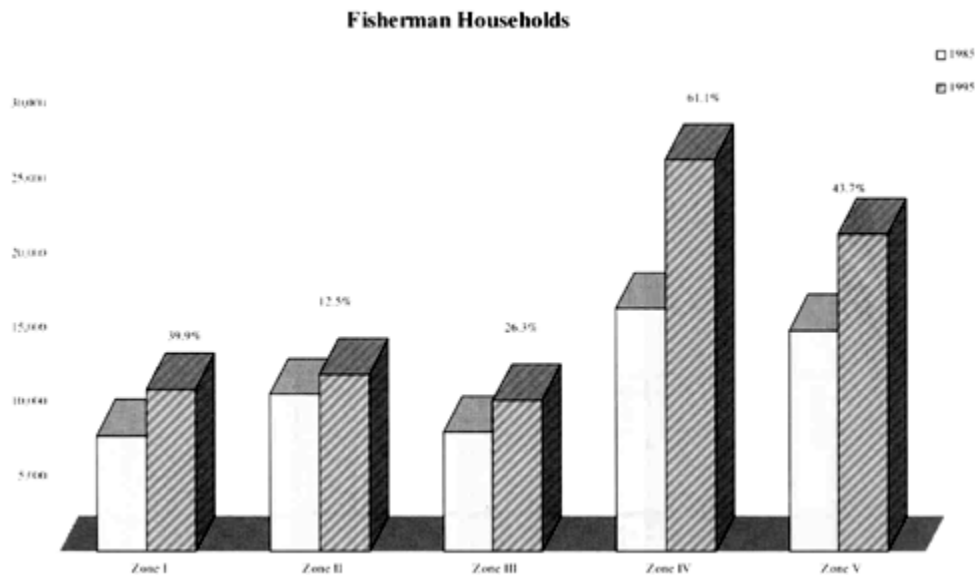


Figure 3.1 Fisherman Households by Coastal Zone, 1985 and 1995

Source: Table 3.1

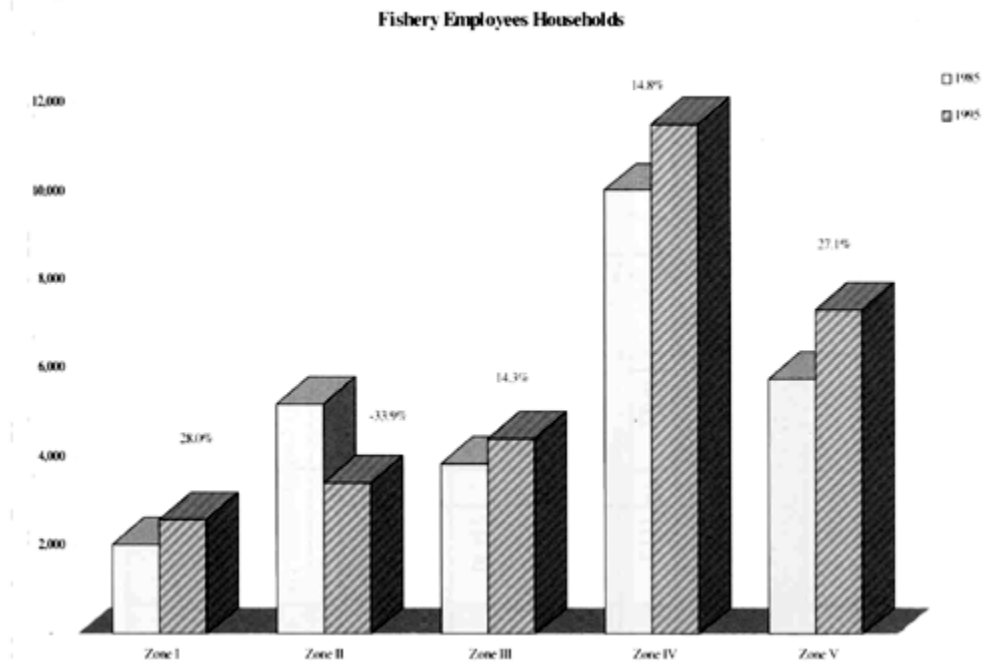


Figure 3.2 Fishery Employees Households by Coastal Zone, 1985 and 1995

Source: Table 3.1

Table 3.1 Fisherman households and fishery employee households by coastal zone, 1985 and 1995

Coastal Zone	1985			1995			Change in Number			Percentage Change		
	Fisherman Households	Employee Households	Total	Fisherman Households	Employee Households	Total	Fisherman Households	Employee Households	Total	Fisherman Households	Employee Households	Total
Coastal Zone I	7,777	2,030	9,807	10,877	2,598	13,475	3,100	568	3,668	39.9	28.0	37.4
Coastal Zone II	10,561	5,210	15,771	11,886	3,442	15,328	1,325	-1,768	-443	12.5	-33.9	-2.8
Coastal Zone III	8,025	3,864	11,889	10,139	4,417	14,556	2,114	553	2,667	26.3	14.3	22.4
Coastal Zone IV	16,342	10,036	26,378	26,327	11,521	37,848	9,985	1,485	11,470	61.1	14.8	43.5
Coastal Zone V	14,846	5,764	20,610	21,337	7,324	28,661	6,491	1,560	8,051	43.7	27.1	39.1
Whole Kingdom	57,551	26,904	84,455	80,566	29,302	109,868	23,015	2,398	25,413	40.0	8.9	30.1

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*

2) For 1995: *1995 Marine Fishery Census, Whole Country*

Notes: 1) Fisherman households are households engaged exclusively in marine capture fishery or exclusively in coastal aquaculture or both.

2) Employee households include members that are employed exclusively either in marine capture fishery or coastal aquaculture, or in both activities.

Table 3.2 Change in the number of members in fisherman and fishery employee households by coastal zone and sex, 1985 and 1995

Region	1985						1995					
	Fisher Household Members						Fisher Household Members					
	Male	%	Female	%	Total	%	Male	%	Female	%	Total	%
Coastal Zone I	21,137	51.2	20,117	48.8	41,254	100.0	25,840	51.5	24,290	48.5	50,130	100.0
Coastal Zone II	30,685	51.3	29,152	48.7	59,837	100.0	29,530	50.0	29,489	50.0	59,019	100.0
Coastal Zone III	22,721	51.8	21,172	48.2	43,893	100.0	24,110	51.3	22,927	48.7	47,037	100.0
Coastal Zone IV	50,445	51.5	47,438	48.5	97,883	100.0	70,490	50.9	67,945	49.1	138,435	100.0
Coastal Zone V	44,954	51.4	42,557	48.6	87,511	100.0	54,284	51.0	52,220	49.0	106,504	100.0
Whole Kingdom	169,942	51.4	160,436	48.6	330,378	100.0	204,254	50.9	196,871	49.1	401,125	100.0
Region	Fishery Employee Household Members						Fishery Employee Household Members					
	Male	%	Female	%	Total	%	Male	%	Female	%	Total	%
	Coastal Zone I	4,974	52.0	4,585	48.0	9,559	100.0	5,731	55.2	4,656	44.8	10,387
Coastal Zone II	14,987	53.4	13,078	46.6	28,065	100.0	8,607	50.8	8,330	49.2	16,937	100.0
Coastal Zone III	10,540	53.1	9,305	46.9	19,845	100.0	9,992	53.0	8,858	47.0	18,850	100.0
Coastal Zone IV	27,594	52.0	25,432	48.0	53,026	100.0	28,746	51.7	26,805	48.3	55,551	100.0
Coastal Zone V	15,674	52.7	14,078	47.3	29,752	100.0	17,415	53.8	14,945	46.2	32,360	100.0
Whole Kingdom	73,769	52.6	66,478	47.4	140,247	100.0	70,491	52.6	63,594	47.4	134,085	100.0

Sources: 1) For 1985: 1985 Marine Fishery Census of Thailand, p. 282

2) For 1995: 1995 Marine Fishery Census, Whole Country, p. 192

Table 3.3 Average size of fisherman and fishery employee household, 1985 and 1995

Coastal Zone	1985			1995			% Change
	No. of households	No. of family members	Average size of households	No. of households	No. of family members	Average size of households	
Both types of households	84,455	470,625	5.6	109,868	535,210	4.9	-12.58
Fishery households	57,551	330,378	5.7	80,566	401,125	5.0	-13.27

	Fishery employee households	26,904	140,247	5.2	29,302	134,085	4.6	-12.22
	Both types of households	9,807	50,813	5.2	13,475	60,517	4.5	-13.32
I	Fishery households	7,777	41,254	5.3	10,877	50,130	4.6	-13.12
	Fishery employee households	2,030	9,559	4.7	2,598	10,387	4.0	-15.09
	Both types of households	15,771	87,902	5.6	15,328	75,956	5.0	-11.09
II	Fishery households	10,561	59,837	5.7	11,886	59,019	5.0	-12.36
	Fishery employee households	5,210	28,065	5.4	3,442	16,937	4.9	-8.65
	Both types of households	11,889	63,738	5.4	14,556	65,887	4.5	-15.57
III	Fishery households	8,025	43,893	5.5	10,139	47,037	4.6	-15.18
	Fishery employee households	3,864	19,845	5.1	4,417	18,850	4.3	-16.91
	Both types of households	26,378	150,909	5.7	37,848	193,976	5.1	-10.42
IV	Fishery households	16,342	97,883	6.0	26,327	138,435	5.3	-12.21
	Fishery employee households	10,036	53,026	5.3	11,521	55,551	4.8	-8.74
	Both types of households	20,610	117,263	5.7	28,661	138,864	4.8	-14.84
V	Fishery households	14,846	87,511	5.9	21,337	106,504	5.0	-15.32
	Fishery employee households	5,764	29,752	5.2	7,324	32,360	4.4	-14.40

Source: Calculated from Tables 3.1 and 3.2

Table 3.4 Changes in fisherman and fishery employee households by size of household and size of management, 1985 and 1995

Size of management	1985						1995						% Change					
	Persons/Household						Persons/Household						Persons/Household					
	1-2	3-4	5-6	7-8	9&over	Total	1-2	3-4	5-6	7-8	9&over	Total	1-2	3-4	5-6	7-8	9&over	Total
Fisher households	3,156	16,465	20,250	11,233	6,447	57,551	6,142	30,705	28,653	10,493	4,573	80,566	94.6	86.5	41.5	-6.6	-29.1	40.0
Marine capture fishery	2,527	14,431	18,164	10,231	5,867	51,220	3,029	19,478	18,839	7,353	3,393	52,092	19.9	35.0	3.7	-28.1	-42.2	1.7
Small scale	2,186	12,126	14,696	8,134	4,450	41,592	2,666	16,906	15,717	6,072	2,618	43,979	22.0	39.4	6.9	-25.4	-41.2	5.7
Medium/Large scale	341	2,305	3,468	2,097	1,417	9,628	363	2,572	3,122	1,281	775	8,113	6.5	11.6	-10.0	-38.9	-45.3	-15.7
Coastal aquaculture	629	2,034	2,086	1,002	580	6,331	3,113	11,227	9,814	3,140	1,180	28,474	394.9	452.0	370.5	213.4	103.4	349.8
Fish culture	66	238	306	152	94	856	181	653	564	218	90	1,706	174.2	174.4	84.3	43.4	-4.3	99.3
Shrimp culture	471	1,407	1,379	692	411	4,360	2,705	9,433	8,344	2,662	974	24,118	474.3	570.4	505.1	284.7	137.0	453.2
Crab culture	5	31	24	9	4	73	26	61	58	22	2	169	420.0	96.8	141.7	144.4	-50.0	131.5
Mollusc culture	87	358	377	149	71	1,042	133	806	597	160	76	1,772	52.9	125.1	58.4	7.4	7.0	70.1
Other cultures	0	0	0	0	0	0	68	274	251	78	38	709	0.0	0.0	0.0	0.0	0.0	0.0
Employee households	2,368	9,371	8,526	4,303	2,336	26,904	3,964	12,330	8,550	3,001	1,457	29,302	67.4	31.6	0.3	-30.3	-37.6	8.9
Whole Kingdom	5,524	25,836	28,776	15,536	8,783	84,455	10,106	43,035	37,203	13,494	6,030	109,868	82.9	66.6	29.3	-13.1	-31.3	30.1

Source: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p. 182

2) For 1995: *1995 Marine Fishery Census, Whole Country*, p. 112

Notes: 1) Small-scale=Without boat, with unpowered boat, with outboard-powered boat or with inboard-powered boat of less than 5 GT

2) Medium-to large-scale = Inboard-powered boats of more than 5 GT

3) Tables by coastal zone and province cannot be tabulated, due to the lack of comparable data in the 1995 census

Table 3.5 Change in the proportion of marine capture and coastal aquaculture fishery households, 1985 and 1995

Coastal Zone	1985						1995					
	Marine Capture	%	Coastal Aquaculture	%	Total Households	%	Marine Capture	%	Coastal Aquaculture	%	Total Households	%
Coastal Zone I	7,071	91.2	686	8.8	7,777	100.0	6,042	55.5	4,835	44.5	10,877	100.0
Coastal Zone II	6,372	63.7	3,829	36.3	10,561	100.0	5,775	48.6	6,111	51.4	11,886	100.0
Coastal Zone III	7,329	91.3	696	8.7	8,025	100.0	7,247	71.5	2,892	28.5	10,139	100.0
Coastal Zone IV	15,711	96.1	631	3.9	16,342	100.0	16,516	62.7	9,811	37.3	26,327	100.0
Coastal Zone V	14,327	96.7	489	3.3	14,846	100.0	16,512	77.4	4,825	22.6	21,337	100.0
Whole Kingdom	51,220	89.0	6,331	11.0	57,551	100.0	52,092	64.7	28,474	35.3	80,566	100.0

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p. 182
 2) For 1995: *1995 Marine Fishery Census, Whole Country*, p. 112

Table 3.6 Changes in fisherman and fishery employee households by extent of dependence on fishery and size of management, 1985 and 1995

Size of Management	1985 Income Source							1995 Income Source							% Changes (1985–1995)			
	Sole	%	Major	%	Minor	%	Total	Sole	%	Major	%	Minor	%	Total	Sole	Major	Minor	Total
Fisher households	28,154	49.0	17,134	29.8	12,156	21.2	57,444	42,455	52.7	25,991	32.3	12,120	15.0	80,566	50.8	51.7	-0.3	40.3
Marine capture fishery	24,734	48.4	15,431	30.2	10,967	21.4	51,132	29,475	56.6	14,822	28.5	7,795	15.0	52,092	19.2	-3.9	-28.9	1.9
Small scale	18,169	43.8	12,743	30.7	10,598	25.5	41,510	23,491	53.4	12,961	29.5	7,529	17.1	43,981	29.3	1.7	-29.0	6.0
Medium/Large scale	6,565	68.2	2,688	27.9	369	3.8	9,622	5,984	73.8	1,861	22.9	266	3.3	8,111	-8.8	-30.8	-27.9	-15.8
Coastal aquaculture	3,420	54.2	1,703	27.0	1,189	18.8	6,312	12,980	45.6	11,169	39.2	4,325	15.2	28,474	279.5	555.8	263.8	351.1
Fish culture	364	42.7	209	24.5	279	32.7	852	560	32.8	719	42.1	427	25.0	1,706	53.8	244.0	53.0	100.2
Shrimp culture	2,745	63.2	1,212	27.9	389	9.0	4,346	11,194	46.4	9,619	39.9	3,305	13.7	24,118	307.8	693.6	749.6	454.9
Crab culture	22	30.6	18	25.0	32	44.4	72	70	41.4	57	33.7	42	24.9	169	218.2	216.7	31.3	134.7
Mollusc culture	289	27.7	264	25.3	489	46.9	1,042	811	45.8	484	27.3	477	26.9	1,772	180.6	83.3	-2.5	70.1
Other cultures	0		0		0		0	345	48.7	290	40.9	74	10.4	709	0.0	0.0	0.0	0.0
Employee households	14,629	54.5	7,387	27.5	4,840	18.0	26,856	17,642	60.2	8,627	29.4	3,033	10.4	29,302	20.6	16.8	-37.3	9.1
Whole Kingdom	42,783	50.8	24,521	29.1	16,996	20.2	84,300	60,097	54.7	34,618	31.5	15,153	13.8	109,868	40.5	41.2	-10.8	30.3

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p. 126

2) For 1995: *1995 Marine Fishery Census, Whole Country*, p. 88, p. 90, p. 186

Notes: 1) Small-scale= Without boat, with unpowered boat, with outboard-powered boat or with inboard-powered boat of less than 5 GT

2) Medium-to large-scale = Inboard-powered boats with more than 5 GT

3) 1985 Total excludes those households not reported their size or type of management

Table 3.7 Changes in fisherman and fishery employee households by extent of dependence on fishery, type of activity and coastal zone, 1985 and 1995

Zone/Size of Management	1985 Income from Fisheries							1995 Income from Fisheries							% Change			
	Sole	%	Major	%	Minor	%	Total	Sole	%	Major	%	Minor	%	Total	Sole	Major	Minor	Total
I Fishery households	3,875	49.8	1,858	23.9	2,044	26.3	7,777	6,054	55.7	3,184	29.3	1,639	15.1	10,877	56.2	71.4	-19.8	39.9
Marine capture fishery	3,681	51.9	1,693	23.9	1,717	24.2	7,091	3,642	60.3	1,583	26.2	817	13.5	6,042	-1.1	-6.5	-52.4	-14.8
Coastal aquaculture	194	28.3	165	24.1	327	47.7	686	2,412	49.9	1,601	33.1	822	17.0	4,835	1,143.3	870.3	151.4	604.8
Employee households	1,010	49.8	663	32.7	357	17.6	2,030	1,542	59.4	782	30.1	274	10.5	2,598	52.7	17.9	-23.2	28.0
II Fishery households	6,000	56.8	3,063	29.0	1,498	14.2	10,561	6,756	56.8	3,653	30.7	1,477	12.4	11,886	12.6	19.3	-1.4	12.5
Marine capture fishery	3,522	52.3	2,101	31.2	1,109	16.5	6,732	3,868	67.0	1,464	25.4	443	7.7	5,775	9.8	-30.3	-60.1	-14.2
Coastal aquaculture	2,478	64.7	962	25.1	389	10.2	3,829	2,888	47.3	2,189	35.8	1,034	16.9	6,111	16.5	127.5	165.8	59.6
Employee households	2,423	46.5	1,741	33.4	1,046	20.1	5,210	1,918	55.7	1,126	32.7	398	11.6	3,442	-20.8	-35.3	-62.0	-33.9
III Fishery households	4,156	51.8	2,220	27.7	1,649	20.5	8,025	6,620	65.3	2,593	25.6	926	9.1	10,139	59.3	16.8	-43.8	26.3
Marine capture fishery	3,906	53.3	1,970	26.9	1,453	19.8	7,329	4,856	67.0	1,716	23.7	675	9.3	7,247	24.3	-12.9	-53.5	-1.1
Coastal aquaculture	250	35.9	250	35.9	196	28.2	696	1,764	61.0	877	30.3	251	8.7	2,892	605.6	250.8	28.1	315.5
Employee households	1,915	49.6	1,045	27.0	904	23.4	3,864	2,747	62.2	1,194	27.0	476	10.8	4,417	43.4	14.3	-47.3	14.3
IV Fishery households	7,465	45.7	5,395	33.0	3,482	21.3	16,342	13,420	51.0	8,964	34.0	3,943	15.0	26,327	79.8	66.2	13.2	61.1
Marine capture	7,173	45.7	5,176	32.9	3,362	21.4	15,711	8,933	54.1	4,717	28.6	2,866	17.4	16,516	24.5	-8.9	-14.8	5.1

fishery																				
Coastal aquaculture	292	46.3	219	34.7	120	19.0	631	4,487	45.7	4,247	43.3	1,077	11.0	9,811	1,436.6	1,839.3	797.5	1,454.8		
Employee households	5,828	58.1	2,621	26.1	1,587	15.8	10,036	7,085	61.5	3,513	30.5	923	8.0	11,521	21.6	34.0	-41.8	14.8		
V Fishery households	6,658	44.8	4,598	31.0	3,590	24.2	14,846	9,605	45.0	7,597	35.6	4,135	19.4	21,337	44.3	65.2	15.2	43.7		
Marine capture fishery	6,452	44.9	4,491	31.3	3,414	23.8	14,357	8,176	49.5	5,342	32.4	2,994	18.1	16,512	26.7	18.9	-12.3	15.0		
Coastal aquaculture	206	42.1	107	21.9	176	36.0	489	1,429	29.6	2,255	46.7	1,141	23.6	4,825	593.7	2,007.5	548.3	886.7		
Employee households	3,453	59.9	1,317	22.8	994	17.2	5,764	4,350	59.4	2,012	27.5	962	13.1	7,324	26.0	52.8	-3.2	27.1		

Sources: 1) For 1985: *1985 Marine Fishery Census of Thailand*, p. 126

2) For 1995: *1995 Marine Fishery Census, Whole Country*, p. 88, p. 90, p. 186

Table 3.8 Fishery loan by source for marine capture fishery households and aquaculture households, 1985 and 1995

Sources of Loan	1985								1995											
	Marine Capture Fishery by Size of Management								Coastal		Marine Capture Fishery by Size of Management								Coastal	
	Small	%	Medium	%	Large	%	Total	%	Aquaculture	%	Small	%	Medium	%	Large	%	Total	%	Aquaculture	%
Total Households	45,965	100.0	4,050	100.0	1,182	100.0	51,197	100.0	6,335	100.0	47,620	100.0	4,010	100.0	1,482	100.0	53,112	100.0	30,528	100.0
A. No debt	27,939	60.8	1,101	27.2	269	22.8	29,309	57.2	3,063	48.4	27,649	58.1	1,090	27.2	285	19.2	29,024	54.6	11,864	38.9
B. In debt	18,026	39.2	2,949	72.8	913	77.2	21,888	42.8	3,272	51.6	19,971	41.9	2,920	72.8	1,197	80.8	24,088	45.4	18,664	61.1
Total No. of loans	18,026	100.0	2,949	100.0	913	100.0	21,888	100.0	3,272	100.0	23,007	100.0	4,161	100.0	1,911	100.0	29,079	100.0	24,343	100.0
Government agency	918	5.1	127	4.3	17	1.9	1,062	4.9	580	17.7	798	3.5	51	1.2	37	1.9	886	3.0	782	3.2
Government bank	1,889	10.5	357	12.1	246	26.9	2,492	11.4	935	28.6	4,429	19.3	450	10.8	105	5.5	4,984	17.1	8,463	34.8
Commercial bank	320	1.8	364	12.3	376	41.2	1,060	4.8	205	6.3	618	2.7	954	22.9	870	45.5	2,442	8.4	4,858	20.0
Middleman	9,429	52.3	1,308	44.4	138	15.1	10,875	49.7	588	18.0	8,892	38.6	1,311	31.5	382	20.0	10,585	36.4	967	4.0

Retailer	356	2.0	15	0.5	1	0.1	372	1.7	14	0.4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Moneylender	2,043	11.3	390	13.2	83	9.1	2,516	11.5	267	8.2	3,307	14.4	551	13.2	183	9.6	4,041	13.9	2,457	10.1
Relative/ friend	2,792	15.5	347	11.8	44	4.8	3,183	14.5	562	17.2	4,346	18.9	776	18.6	295	15.4	5,417	18.6	4,999	20.5
Other	279	1.5	41	1.4	8	0.9	328	1.5	121	3.7	617	2.7	68	1.6	39	2.0	724	2.5	1,817	7.5

Sources: 1) 1985 Marine Fishery Census of Thailand, p. 72–73

2) 1995 Marine Fishery Census, Whole Country, p.30–31, p. 72–73

Notes: 1) For marine capture fishery households:

small-scale = those without boat, with unpowered boat, with inboard-powered boat or with inboard-powered boat of less than 10 GT

medium-scale = those with boat of 10–49 GT

large-scale = those with inboard-powered boat of 50 GT and over

2) The 1985 Census also includes those who did not report whether they were in debt or not. This group is therefore included in the 1985 total households

3) As establishment may report more than one source of aquaculture loan in 1995

Table 3.9 Participation in social activities by type of social activity group and size of management, 1985 and 1995

Type of Households	1985 Social Activity Groups					1995 Social Activity Groups										% Change				
	A	B	C	D	Total	A	B	C	D	E	F	G	H	Total	A	B	C	D	Total	
Fishery households	1,834	1,867	896	2,024	6,621	2,541	2,481	1,473	2,085	567	313	160	579	10,199	38.5	32.9	64.4	3.0	54.0	
Marine capture fishery	1,170	1,610	229	1,976	4,985	1,573	2,051	106	1,919	458	23	14	67	6,211	34.4	27.4	-53.7	-2.9	24.6	
Small scale	489	750	194	272	1,705	1,024	1,408	88	492	250	16	6	51	3,335	109.4	87.7	-54.6	80.9	95.6	
Medium/Large scale	681	860	35	1,704	3,280	549	643	18	1,427	208	7	8	16	2,876	-19.4	-25.2	-48.6	-16.3	-12.3	
Coastal aquaculture	664	257	667	48	1,636	968	430	1,367	166	109	290	146	512	3,988	45.8	67.3	104.9	245.8	143.8	
Fish culture	57	57	125	12	251	39	33	83	11	4	4	1	13	188	-31.6	-42.1	-33.6	-8.3	-25.1	
Shrimp culture	584	167	475	23	1,249	894	324	1,247	140	97	225	131	483	3,541	53.1	94.0	162.5	508.7	183.5	
Crab culture	1	2	1	-	4	7	7	2	-	-	-	-	1	17	600.0	250.0	100.0	-	325.0	
Mollusc culture	22	31	66	13	132	28	64	35	15	8	60	14	14	238	27.3	106.5	-46.9	15.4	80.3	
Other cultures	0	0	0	0	0	-	2	-	-	-	1	-	1	4	0.0	0.0	0.0	0.0	0.0	
Employee households	133	124	17	223	497	67	105	19	95	14	2	3	5	310	-49.6	-15.3	11.8	-57.4	-37.6	
Whole Kingdom	1,967	1,991	913	2,247	7,118	2,608	2,586	1,492	2,180	581	315	163	584	10,509	33	30	63	-3.0	48	

Sources: 1) For 1985: 1985 Marine Fishery Census of Thailand, p. 132

2) For 1995: 1995 Marine Fishery Census, Whole Country, p. 94–99

Notes: 1) Small Scale = Without boat, with unpowered boat, with outboard-powered boat or with inboard-powered boat of less than 5 GT

2) Medium- to large-scale = Inboard-powered boat with over than 5 GT

3) Total percentage changes were calculated from 1985 and 1995 totals of Group A to D only

- 4) A= Fishery Cooperatives (สหกรณ์ประมง), B = Fishermen Group (กลุ่มเกษตรกรทำประมง), C = Fish Farmer Group (กลุ่มเกษตรกรทำการเพาะเลี้ยงสัตว์น้ำ)
D = Fishery Association (สมาคมประมง), E = Fishing Operator's Group (ชมรมประกอบการประมง), F = Aquaculture Cooperatives (สหกรณ์เพาะเลี้ยงสัตว์น้ำ)
G = Aquaculture Association (สมาคมเพาะเลี้ยงสัตว์น้ำ), H = Aquaculture Operator Group (ชมรมผู้เพาะเลี้ยงสัตว์น้ำ)
- 5) A household may report membership in more than one fishery activity group

1.4 Changes in fishing craft and gear

The previous two chapters examined the fishermen, the fishery employees and the characteristics of their households. This chapter will examine the fishing craft and fishing gear with which they exploit marine living resources. The main sources of data are the two marine fishery censuses and the statistics on Thai fishing vessels in various years, which provide data on registered boats and gear.

Fishing craft in the censuses are classified into unpowered boats, outboard-powered boats and inboard-powered boats of various gross tonnage. Inboard-powered boats of less than 10 GT are considered small-scale. Unpowered and outboard-powered boats are used in subsistence small-scale fishery, whereas inboard-powered boats of more than 10 GT are used in larger-scale, commercial fishing.

In the 1985 registration statistics, boats were classified by length (in metres), but, by 1995, they were classified by gross tonnage as well. The registered boats included both outboard-and inboard-powered boats, but the registration forms had no entry on boat type, which makes it impossible to know the proportion of each type of boat. The process of registration involves registration of the boat with the Harbour Department (Ministry of Transportation) for the navigation certificate and application for a fishing gear license from the Department of Fisheries of the Ministry of Agriculture and Co-operatives. Among the fishing gear, trawls (both otter boards and pair trawls) and seines play an important role in commercial fishing, while gill nets (for shrimp, crab and the like), push nets and squid cast nets are the dominant gear for small-scale fishing. However, a considerable number of fishing boats that operate with gill nets, push nets, hooks and lines, traps and other equipment are not registered with the Department of Fisheries and they are unpowered and outboard-powered boats (Somsak Chullasorn, 1988, p. 76). In addition, it is believed that inboard-powered fishing boats of high gross tonnage have been both under-recorded in the census and under-registered year on year (personal communication, Ruangrai Tokrisna and Somsak Chullasorn, July 1998). Indeed, the irony is that, though the census statistics are more realistic than the registration statistics, they are collected every ten years, whereas the registration statistics are compiled annually. Another peculiarity is that fishing boats can be registered in any coastal province, regardless of the province of residence of their owners. This makes comparison of changes by province meaningless.

The next section explores the changes in fishing craft in the 1985 and 1995 marine fishery censuses, focusing more closely on the changes in unpowered and outboard-powered boats. These changes concern primarily the small-scale fisherfolk living along the coast who are engaged in catching fish within the marine coastal zone and who should be definitely more interested in integrated coastal zone management programmes than those engaged in large-scale commercial fishing.

Census-recorded fishing craft

As fishing boats have been examined quite extensively in relation to the changes in the number of fishermen and fishery employees, the findings from the censuses will be only summarized here. Countrywide, the number of fishing vessels increased by only two percent between 1985 and 1995, from 53,265 to 54,538. Both in 1985 and in 1995, Zone IV and V had the largest

number (roughly 16,000–17,000 each), while each of the remaining zones had a little less than half the number in either Zone IV or Zone V (Table 2.5).

In terms of changes in number by zone, Zone V saw the highest increase, 15 percent, followed by Zone IV (four percent), whereas the other zones saw a decline. The decline was most pronounced in Zone II (-11 percent) and Zone I (-9 percent), and slight in Zone III (-3 percent).

When changes are examined by type of craft, one finds that countrywide the number of outboard-powered boats, which was a little over half of all fishing vessels in 1985, increased by 28 percent, so that by 1995 they amounted to almost 70 percent of all the boats. The increase in outboard-powered fishing boats was accompanied by a spectacular decline in unpowered boats (-65 percent) and a 10-percent decline in inboard-powered boats (Figure 4.1)

Unpowered craft

Figure 4.2 focuses on the changes in the number of unpowered boats and shows that a decline occurred in every coastal zone and that the rate of decline was highest in Zone I, followed closely by Zones III, I and V. In these four zones, the decline was very high (70–80 percent), while in Zone IV it was less than 50 percent. As the overall number of fisherfolk did not decline between the two censuses, the decline in the number of unpowered boats points to a process of modernization in which small-scale fisherfolk changed their craft from unpowered to outboard-powered ones. By 1995, there were only 2,826 unpowered fishing boats in Thailand, roughly 40 percent of which were in Zone V (Phangnga) and another 40 percent in Zone IV (Songkhla). The rest were in Zone I (about nine percent, mostly in Chanthaburi), Zone II (six percent, mostly in Samut Songkhram and Samut Sakhon), and Zone III (five percent, mostly in Chumphon). Thus, despite the decline, there were still sizeable numbers of very small-scale, subsistence fisherfolk engaged in near-shore marine capture fishery in Zone IV and V.

Outboard-powered craft

For the whole country, the number of outboard-powered fishing boats increased from 28,386 in 1985 to 36,430 in 1995, a 28-percent increase. Table 2.5 and Figure 4.2 show that in 1985, the largest number of them was to be found in Zone IV (Nakhon Si Thammarat and Songkhla), and almost as many in Zone V (mostly in Phangnga), and then Zones III (Surat Thani), I (Chanthaburi) and II (Phetchaburi and Samut Prakan). In 1995, the largest number of them was in Zones V (Phangnga), with Zone IV (Songkhla) a close second. Their number in the remaining zones was not high, and the ranking in descending order was again Zones III (Surat Thani), I (Chanthaburi) and II (Phetchaburi, Samut Songkhram and Samut Prakan). These data indicate that small-scale fishing activities further ashore were still prominent, particularly in Zones V and IV. There was a definite trend toward a very rapid growth in small-scale fishery using outboard-powered boats in Zone V, a moderate growth in Zones I and IV, but very slight growth in Zones III and II.

Inboard-powered craft

Regarding inboard-powered craft, they numbered 16,982 in 1985, but had declined to 15,282 by 1995. Table 2.5 and Figure 4.3 show that the largest number of them was to be found in Zone II, but in 1985 the provinces with the largest number were Chon Buri and Phetchaburi (about 1,100 each), whereas in 1995 they were Chon Buri and Samut Sakhon (almost 900 each), Samut Prakan and Phetchaburi (about 800 each) and Samut Songkhram (about 700). Though Zone II

as a whole saw a decline of about six percent, three of its provinces saw an increase, namely Samut Sakhon, Samut Songkhram and Samut Prakan.

Zone I had the second largest number of inboard-powered fishing boats: 3,652 in 1985 and 2,929 in 1995. In both years, Trat had the largest number, followed by Rayong. Zone IV ranked third both in 1985 and in 1995 (3,483 and 2,841, respectively, mostly to be found in Songkhla and Nakhon Si Thammarat provinces).

Zones III and V ranked fourth and last both in 1985 and in 1995. In Zone III, inboard-powered boats were mostly to be found in Prachuap Khiri Khan in 1985, but in Chumphon by 1995. In Zone V, the largest number was in Satun both in 1985 and 1995.

In summary, both in the 1985 and 1995 censuses, the largest numbers of inboard-powered boats were to be found in Zones II, I, IV, III and V, in descending order. The data further show that, though the number of inboard-powered craft declined between 1985 and 1995, it did so at the highest rates in Zones I and IV (almost 20 percent), at low rates in Zones II and III (less than 10 percent), and even increased by about five percent in Zone V.

The changes in unpowered, outboard-powered and inboard-powered boats indicate that though fishing activities in Zones IV and V have been dominated by small-scale operations using outboard-powered and unpowered boats, there is a trend, especially in Zone V, toward commercial operations using inboard-powered boats. Zones II, I and, to a lesser extent, IV have always engaged in commercial operations, but there is a trend toward a rapid decline in Zone I, most likely because of the growth in industries and aquaculture. The decline in the number of inboard-powered boats also occurred in Zone II, but at a slower rate. Given that the number of fisherfolk and level of aquaculture activities in that zone also declined, it means that a proportion of fisherfolk moved to the light-industry and service sectors, and the rest are commercial operators owning several inboard-powered boats each. The decline of commercial operations in Zone IV may be associated with the growth in aquaculture and tourism, as well as with the possibility that commercial-size inboard-powered boats declined in number but increased in tonnage.

So far inboard-powered boats have been compared by year and by zone only in terms of changes in number. Table 4.1 and Figure 4.4 show the number and changes in small-scale and commercial inboard-powered boats for the country as a whole. Those of less than 10 GT are classified as small-scale; those of 10 GT and over are classified as commercial. The decline in the total number of inboard-powered boats is accounted for by the decline in small-scale boats. The increase in the number of boats of 10 GT and over indicates a higher catch capacity for commercial inboard-powered boats as a whole.

Table 4.1 and Figure 4.5 show that the number of inboard-powered boats of less than 10 GT declined in every coastal zone, while Figure 4.6. (derived from Table 4.1) shows that the number of commercial inboard-powered boats of more than 10 GT increased in every zone except Zone I. We have seen that areas under coastal aquaculture in Zone II increased between the two censuses. Thus it is not surprising to find that both small-scale commercial and large-scale commercial boats in Zone II declined. In Zone I, the decline in the number of small-scale commercial boats corresponds to an increase in the number of large-scale commercial boats, indicating a very rapid increase of large-scale commercial operations. In Zones III and IV, the decline in the number of small-scale commercial boats was not compensated for to the same extent by an increase in the number of boats of 10 GT and over, because of the growth of

aquaculture and tourism in these two zones. Zone V seems to be the only zone with an overall growth in both small-scale and large-scale (commercial) fishing activities and in coastal aquaculture, despite the growth in tourism.

Table 4.2 and Figure 4.7 show that among commercial inboard-powered fishing boats (those of 10 GT and over), the great majority were medium-sized (10–49 GT), but that the number of large-scale vessels (of 50 GT and over) was increasing very rapidly.

Figures 4.8 and 4.9, also derived from Table 4.2, show that in Zones I and IV the number of medium-sized boats declined and that of large-scale craft increased, but less rapidly than in other zones. In Zones II, III and V, there was a small increase in medium-scale and a high increase in large-scale commercial boats. The increase of boats of 50 GT and over both in number and in rate was most impressive in Zones II and V, indicating rapid commercialization of fishing activities using boats of large gross tonnage.

Fishing boats in registration statistics

Table 4.3 shows the number of fishing boats registered from 1985 to 1995 on a yearly basis, together with the annual rate of change. The changes were very irregular from one year to the next. They ranged from 0.9 percent in 1987 to 35 percent in 1989 and showed declines of -0.3 percent in 1986 to -15.7 percent in 1991. The phenomenal increase of 35 percent in 1989 was due to an amnesty granted in an attempt to encourage registration. The success of this attempt was apparently short-lived, as the number of registrations in the following years tended to decline (Figure 4.10). A second amnesty was granted in 1997, and even though the statistics for that year are not yet published, it is of little doubt that they will show another spectacular increase in registration. This begs the question of the best way to improve registration statistics. We believe that granting an amnesty is detrimental to the ultimate aim of regulating the number and size of fishing boats. With the prospect of yet another amnesty, more fishing boats are likely to be built and operate illegally until the next amnesty. Encouraging owners of outboard-powered fishing boats to register their vessels may have to include such measures as tax exemptions, lower diesel and benzene prices, and better access to BAAC credit. For owners of inboard-powered fishing boats to register and be truthful about the gross tonnage of their vessels will be difficult, as the higher the tonnage, the higher the tax and other related costs (such as the cost of a mechanic required by law to maintain the engine, or the fees charged by fish landing piers). The number of fishing boats and their capacity influence, to a large extent, the rate of depletion of living marine resources. Therefore, they need to be studied and analysed separately, with the double aim of assessing their real number by type and size in order to regulate them, and of relating them both to fishery management and integrated coastal zone management.

Comparison of census and registration statistics on fishing boats

Table 4.4 presents the number of outboard- and inboard-powered fishing boats recorded and registered in 1985 and 1995. For the whole country, the number of boats registered was roughly one third of the number of boats listed by the censuses. The comparison by zone shows that Zone II was the only zone where the registered number came anywhere close to the census numbers both in 1985 and in 1995 (Figures 4.11 and 4.12). This is perhaps because it is the oldest fishing zone and fisherfolk there have come to see registration as an obligation. As for the other zones, there was no regular pattern. For example, in 1985, the number of registered boats in Zone IV was 35 percent of the census-recorded boats, but 22 percent only in 1995. In

Zone V, the percentages were more or less the same (21 percent in 1985 and 24 percent in 1995). Could this be due to the increase in outboard-powered fishing boats in Zones IV and V? If such were the case, the number of fishing boats as a percentage of the recorded boats in both zones should be the lowest in 1985 and lower in 1995, since most outboard-powered fishing boats are to be found in these zones. This is not supported by the data and no satisfactory explanation can be offered at this point.

Table 4.5 presents data only for 1995, because the census that year classified fishing boats by type and size, which the 1985 census did not. It reveals that countrywide, registered boats represented about one third of the boats recorded in the census (Figure 4.13). Small-scale fishing boats (of less than 10 GT, including both outboard- and inboard-powered boats) were grossly under-recorded (Figure 4.14). In addition, the census under-recorded the commercial-scale boats, especially those of 50 GT and over (Figures 4.15 and 4.16). This finding supports Dr Ruangrai Tokrisna's previously noted opinion and can be explained by assuming that the larger-scale boats were out in the high seas during the census period. The implication is that in reality the level of commercialization must be greater than that revealed by the census.

Fishing gear

The Southeast Asian Fishery Development Centre gives a guideline on the distinction between small-scale and large-scale fishing activities in terms of fishing gear (SEAFDEC, 1997). Large-scale fishery uses the following fishing gear: (1) otter board trawl, (2) pair trawl, (3) Thai purse seine, (4) Chinese purse seine, (5) luring purse seine, (6) anchovy purse seine, (7) Spanish mackerel gill net, (8) mackerel encircling gill net and (9) bamboo stake trap. Small-scale fishery uses the following gear: (1) pomfret gill net, (2) shrimp gill net, (3) other gill nets, (4) squid cast net with light, (5) cast nets, (6) acetes scoop net, (7) other scoop nets, (8) white board for catching shrimp, (9) white board for collecting shellfish, and (10) others.

This section starts with an examination of registered boats classified by fishing gear to see the type of gear used by most of the boats. Follows a comparison by coastal zone of the changes in fishing methods, using the data from the 1985 and 1995 censuses. The comparison uses data on inboard-powered boats only, because the 1985 census tabulated only the number of inboard-powered boats by fishing gear. Since the 1995 census provides data that can be used to tabulate both outboard- and inboard-powered boats by fishing gear, the last part focuses on the census data for 1995, comparing all fishing boats by type and gross tonnage in terms of fishing gear.

Fishing gear used by registered boats

Table 4.6 presents the annual statistics on registered fishing boats classified by fishing gear for the whole country from 1985 to 1995. It shows that, for large-scale fishery, the most popular fishing method is the otter board trawl: it was used by 44 percent of the boats registered in 1985 and by 37 percent of the boats registered in 1995. The second most popular fishing method is by shrimp gill net, which is used in small-scale fishery: it was used by 18 percent and 12 percent of the boats registered in 1985 and 1995, respectively. Pair trawl comes third, with eight percent and nine percent for the same years.

By 1995, the relative popularity of the various fishing gear altered somewhat. Though otter board trawl was still the most popular type by far, its use had declined by nine percent since 1985. During the same period, the use of pair trawl increased by 29 percent and that of shrimp

gill net declined by 24 percent. Shrimp gill nets still ranked second in terms of popularity, but their use by registered boats had declined by almost 30 percent. Other fishing methods that rapidly became more popular over the years were squid cast nets, crab gill nets and anchovy purse seines. The use of Thai purse seines also increased, but the rate of increase was not high.

The decline in popularity of the otter board trawl and the growing popularity of the pair trawl may be due to the fact that pair trawls can be used to catch both demersal and pelagic species, whereas otter board trawls are used only for demersal fish. The decline in shrimp gill net use and the increase in crab gill net use may be due to a greater demand for crabmeat for export and the fact that the demand for shrimp for export can be met by shrimp culture. The trend toward an increase in the use of anchovy purse seines may be due to larger stocks of anchovies because of the depletion of the bigger fish that feed on them. Or else, it is due to the higher demand for anchovies, which would be met easily as they can be caught day and night.

The annual statistics show that the boats that took the most advantage of the amnesty were those using push nets: the number of registered boats using this method increased by 827 percent, from 52 in 1988 to 482 in 1989. As it is one of the most destructive fishing practices, it is no surprise that the owners would want to see its use legalized. The other two types that benefited from the amnesty were boats using otter board trawls and pair trawls. Registration of otter board trawls increased by 81 percent, from 5,776 in 1988 to 10,438 in 1989. Registration of pair trawls increased by 94 percent, from 1,132 in 1988 to 2,193 in 1989 (Figure 4.17). These are the very gear that, according to FAO recommendations, should be reduced in number (Boonlert Phasuk, 1994, p. 113). It is further noted that all these fishing methods are used in large-scale fishery, and that the registration of all boats using methods associated with small-scale fishery was not affected at all by the amnesty. The implication is that the amnesty unintentionally encouraged and legalized fishing methods that very effectively exploit the already depleting fishery resources.

Methods used by inboard-powered fishing boats according to the censuses

Since the 1985 marine fishery census tabulates fishing gear only with inboard-powered fishing boats, it is possible to gauge the change in fishing methods that took place between 1985 and 1995 only among such boats. The data presented provide information at the national and zonal levels regarding the most popular fishing methods and how their popularity changed over time. Tables 4.7 and 4.8 should be examined together, as Table 4.7 presents data on large-scale fishing gear and Table 4.8 provides data on fishing methods associated with small-scale fishing activities.

In 1985, the most popular fishing methods countrywide were, in descending order: otter board trawl, crab gill net, shrimp gill net, push net, squid cast net with light, and pair trawl. By 1995, squid cast nets with light, pair trawls and traps became more important, to the point that the ranking changed to otter board trawl, squid cast net with light, pair trawl, crab gill net, push net and trap. In both years, the use of otter board trawls was the most popular method by far. Their number was of around 6,000 in 1985 and almost 5,000 in 1995, whereas the number of the second most popular method in both years was no more than 1,500.

Among the fishing methods associated with large-scale fishing, only pair trawl, Thai purse seine and anchovy purse seine increased in use countrywide, as did squid cast net with light, and traps, for small-scale fishery (Figure 4.18).

The examination of popularity and changes in fishing methods by zone yields the following information:

Zone I: In 1985, the three methods used by most inboard-powered boats were, in ranking order, otter board trawl, crab gill net, and trap. By 1995, the ranking had changed to crab gill net and otter board trawl in roughly equal numbers, followed by trap. The methods that were not used much in 1985, but grew nonetheless, were shrimp gill net and anchovy purse seine (Figure 4.18.1).

Zone II: In 1985, the three methods most employed were otter board trawl, pair trawl, and crab gill net. By 1995, otter board trawl and pair trawl were still the most popular, followed by push net. Of these three methods, the use of otter board trawl declined by 13 percent, but that of pair trawl and push net increased by half and by 14 percent respectively. Other methods that were not in significant use in 1985, but grew over the years, were trap and anchovy purse seine (Figure 4.18.2).

Zone III: In 1985, the three most popular methods were squid cast net with light, push net and otter board trawl. By 1995, they were still the most popular, but if the use of squid cast net with light increased by 54 percent, that of push net and otter board trawl declined by almost 40 percent and 17 percent respectively. The other methods that were used increasingly over the years were trap, Thai purse seine and anchovy purse seine (Figure 4.18.3).

Zone IV: Otter board trawl, shrimp gill net and hook and line were the three most popular methods employed by inboard-powered boats in 1985. By 1995, otter board trawl was still the most popular, followed by push net, and then by crab gill net and pair trawl in roughly equal numbers. Another method that was not popular in 1985 but has been picking up is Thai purse seine (Figure 4.18.4).

Zone V: The three most popular methods in 1985 were otter board trawl, shrimp gill net and push net. By 1995, the first two maintained their ranking, but push net had been outranked by Thai purse seine. Besides Thai purse seine, the methods that showed meaningful growth by 1995 were gill nets other than shrimp and crab gill nets, and squid cast net with light (Figure 4.18.5).

In short, the most popular fishing method used by inboard-powered fishing boats in Zone I was otter board trawl in 1985, but crab gill net in 1995. In Zone II, the most popular method in 1985 was otter board trawl and pair trawl in 1995. In Zone III, the most popular method throughout was squid cast net with light, as was otter board trawl in Zone IV. In Zone V, there was a tie-in all along between otter board trawl and shrimp gill net. There was a trend toward increasing use of shrimp gill nets and anchovy purse seines in Zone I, of traps and anchovy purse seines in Zone II, of traps, anchovy purse seines and Thai purse seines in Zone III, of crab gill nets and Thai purse seines in Zone IV, and of gill nets other than shrimp and crab gill nets, as well as squid cast nets with light, in Zone V.

Methods used by all fishing boats recorded in the 1995 census

The previous section could not provide any information on the fishing methods of boats that were not inboard-powered. Table 4.9 is the result of an attempt to bridge this gap, by cross-tabulating main fishing methods and boat types and sizes for the year 1995. The table uses the census definition of small-scale and commercial fishing and provides detailed information on the

type of gear used by unpowered boats, outboard-powered boats and inboard-powered boats of less than 10 GT, 10–49 GT and 50 GT and over.

The data reveal that the SEAFDEC guidelines on small-scale and large-scale fishing activities roughly coincide with the census classification, with some exceptions. The use of gear by each type and size of fishing boat as recorded in the 1995 marine fishery census is summarized in the following paragraphs.

Unpowered boats: The majority of the 2 826 boats used lift nets (17.6 percent) and traps (17.1 percent), especially crab portable lift nets and crab traps. They also used shrimp gill nets (14.8 percent). The three types of fishing gear accounted for 49.5 percent of the fishing gear used by unpowered boats in 1995.

Outboard-powered boats: There were 36 430 boats in this category. They were very versatile, using several types of fishing gear. However, the majority of them used shrimp gill nets (23.3 percent), crab gill nets (15.9 percent) and traps (13 percent), especially crab traps and squid traps. Together they accounted for 52.2 percent of the fishing gear used by outboard-powered boats. Other methods used were push nets (6.7 percent), several kinds of gill nets besides shrimp and crab gill nets, such as mullet gill nets (five percent) and mackerel gill nets (four percent), as well as hook and line (4.8 percent).

Inboard-powered boats of less than 10 GT: There were 6 925 boats of this category in 1995. The majority of them used three types of fishing gear: otter board trawls (19 percent), crab gill nets (15.7 percent) and shrimp gill nets (14.2 percent). Other types of gear that were quite popular were traps (12.2 percent), especially squid traps and crab traps, squid cast nets with light (9.9 percent) and push nets (5.3 percent).

A number of fishing gear were used by both outboard-and inboard-powered boats under 10 GT, such as shrimp and crab gill nets, traps (squid and crab) and push nets. The question then is whether the fisherfolk using outboard-powered boats and those using small inboard-powered boats shared their fishing grounds or competed for them. The answer must be that there was a battle and the small inboard-powered boats lost, as the previous findings were that outboard-powered boats increased in all coastal zones whereas inboard-powered boats of less than 10 GT declined across all the zones. Inboard-powered fishing boats of more than 10 GT, especially those of 50 GT and over, also increased in all but Zone I. These findings indicate a process of polarization of fishing boats: coastal fishing activities tend to be dominated by outboard-powered boats and commercial fishing operations by boats of 50 GT and over. In terms of fishing gear, there seems to be a converging trend for certain gear types, as will be pointed out later.

Inboard-powered boats of 10–49 GT: There were 6 550 boats of this type, whose most popular fishing gear were otter board trawls, used by 42 percent of the boats. They also used squid cast nets (13.5 percent) and pair trawls (11.6 percent). These three types of gear accounted for about 67 percent of the gear employed by these boats.

Inboard-powered boats of 50 GT and over: There were 1 807 boats of this size in 1995 and the most popular fishing gear were otter board trawls (44.3 percent), pair trawls (29.2 percent) and Thai purse seines (11.5 percent). Together, they accounted for 85 percent of the gear employed. Other gear used were luring purse seines (3.6 percent), push nets (2.6 percent) and bonito purse seines (two percent).

As mentioned earlier, the SEAFDEC classification (based on type of gear) and the census classification (based on boat type and gross tonnage) roughly coincide. For example, trawls were used exclusively by inboard-powered boats, whereas traps were used almost exclusively by unpowered, outboard-and inboard-powered boats of less than 10 GT. However, some notable exceptions are squid cast nets and bamboo stake traps. According to the SEAFDEC guideline, the former belong to small-scale and the latter to large-scale fishery. The census data reveal that the largest number of boats using squid cast nets were inboard-powered boats of 10–49 GT (totalling 883), followed by inboard-powered boats of less than 10 GT (totalling 684) and outboard-powered boats (totalling 144). The same data also show that the majority of bamboo stake traps were employed by outboard-powered fishing boats (123 out of a total of 177). This is perhaps due to the use of small traditional bamboo stake traps called *mora* in the southern coastal provinces. Push nets are not included in the SEAFDEC guideline, but the data show that they can be used by both outboard- and inboard-powered boats of all sizes. Thus, while there is a process of polarization of fishing boats as previously mentioned, there seems on the other hand to be a process of convergence over the use of some types of fishing gear. This may be due to increasing demand for squid leading to bigger sizes and higher efficiency for squid cast nets, and to the lesser popularity of bamboo stake traps in large-scale fishing. One methodological implication is that the SEAFDEC classification may need to be periodically revised.

There is another methodological issue worth mentioning at this point, regarding trawlers and push nets. There have been a number of ministerial regulations to limit the current number and new entry of fishing craft and gear, particularly to reduce the use of trawls and to phase out push nets. Boonlert Phasuk (1994, pp. 111–122) claims that even though a large number of fishery regulations could not be enforced effectively, there were some achievements, the most significant of which was the ability to limit entry into fishing activities. This claim is based on the decline in registration of trawlers and pushnetters. Such a decline is open to question. To reiterate, when comparing fishing boats in the census and in the registration, one finds that the registration figures as a whole are about one third those of the census and that the under-registration of outboard-powered boats is extremely high. The pushnetters registered in 1995 numbered 634, while the census put their number at 3 591, most of them outboard-powered boats (Tables 4.6 and 4.9). The registered number represents only 17 percent of the census number, indicating that pushnetters may not have declined in reality. As for the trawlers, the registration statistics are closer to the census statistics. Nonetheless, when the changes in the number of otter board trawlers and pair trawlers are considered together, one finds that between 1985 and 1995, the combined registered number declined by only 3.6 percent, from 8 186 to 7 897 (Table 4.6). **Thus, it can be concluded that to assess the implementation of regulations concerning fishing boats one cannot go by registration statistics, at least until the registration system is improved to reflect reality in full, rather than one third of it.**

Summary and discussion

Between the 1985 and 1995 marine fishery censuses, the number of fishing boats in Thailand increased by only two percent. Outboard-powered boats, which comprised the majority of boats, increased moderately in number, whereas the number of unpowered boats declined spectacularly and that of inboard-powered boats declined to some extent. The increasing dominance of outboard-powered boats in coastal fishing activities was most likely the result of modernization.

The comparison by coastal zone indicates that, though fishing in Zones IV and V was dominated by small-scale operations using both outboard-powered and unpowered boats, there was a trend, especially in Zone V, toward commercial operations using inboard-powered boats. Zones II, I and, to a lesser extent, Zone IV engaged in commercial operations, but there was a trend toward a rapid decline in Zone I, most likely because of the rapid growth in industries and aquaculture. A decline in the number of inboard-powered boats in Zone II also occurred, albeit at a slower rate. Because the number of fisherfolk and coastal aquaculture in Zone II also declined, the data indicate that a proportion of the fisherfolk moved out of fishing activities and into the light-industry and service sectors and the rest were commercial operators owning several inboard-powered boats each. The decline of commercial operations in Zone IV may be due to the growth in both aquaculture and tourism, as well as to the possibility that, despite their decline in number, inboard-powered fishing boats increased in tonnage.

The comparison of inboard-powered boats in terms of changes in gross tonnage revealed that a decline in their number occurred among small-scale boats (under 10 GT) in every coastal zone. The boats of more than 10 GT increased in number in every coastal zone except Zone I. Of the boats of more than 10 GT, the great majority were in the 10–49 GT bracket, but the number of large-sized boats (of 50 GT and over) was increasing very rapidly. Such an increase was particularly spectacular in Zones II and V, indicating a rapid intensification of commercial fishing activities. Considered together with the change in coastal fishing increasingly dominated by outboard-powered boats, there seemed to be a process of polarization between coastal fishing activities and deep-sea commercial fishing operations.

The number of fishing boats in the registration statistics was about one third of the number recorded in the censuses. The annual registration rates between 1985 and 1995 tended to show negative or slow positive growth, except in 1989 when an amnesty was granted. **As only boats using trawls and push nets made the most use of the amnesty, we believe that there should not be any more amnesty, because it unintentionally encourages the use of fishing gear that can most effectively exploit already depleting fishery resources.**

Regarding the changes in fishing gear, the registration statistics show that otter board trawl is the most popular types of fishing gear in Thailand. In both 1985 and 1995, the second and third most popular gear were shrimp gill net and pair trawl. By 1995, the relative popularity of these three types of gear had altered somewhat. Though otter board trawls were still the most popular by far, they were used by a smaller proportion of fishing boats. This was also the case for shrimp gill nets, whereas a higher proportion of fishing boats used pair trawls. Other fishing gear that became rapidly more popular over the years were long lines and squid cast nets, crab gill nets and anchovy purse seines. The use of Thai purse seines also increased, but not at a high rate.

According to the census statistics on the changes of fishing gear used by inboard-powered fishing boats in 1985 and 1995, the most popular fishing method countrywide was also by otter board trawl. In 1985, the most frequently used fishing methods were, in descending order: (1) otter board trawl, (2) crab gill net, (3) shrimp gill net, (4) push net, (5) squid cast net and (6) trap. By 1995, squid cast net, pair trawl and trap had become more important. Among the fishing methods associated with large-scale fishery, only the use of pair trawl, Thai purse seine and anchovy purse seine increased countrywide. Among those associated with small-scale fishing activities, so did squid cast net and trap.

Comparison by zone of change in the use of fishing gear by inboard-powered fishing boats revealed that there had been a change only in Zones I and II. In Zone I, the most popular method was otter board trawl in 1985, but it was crab gill net by 1995. In Zone II, the most frequently used method was otter board trawl in 1985, but it was pair trawl by 1995. In Zone III, the favourite method was squid cast net. In Zone IV, it was otter board trawl. In Zone V, otter board trawl and shrimp gill net were the most popular methods. There was a perceptible trend toward increasing use of shrimp gill nets and anchovy purse seines in Zone I, of traps and anchovy purse seines in Zone II, of traps, anchovy purse seines and Thai purse seines in Zone III, of crab gill nets and Thai purse seines in Zone IV, and of gill nets other than shrimp and crab gill nets, as well as squid cast nets, in Zone V.

The above findings from the censuses pertain to changes in the fishing methods of inboard-powered boats, as other types of boats were not classified by fishing gear in the 1985 census. To find out what fishing methods unpowered and inboard-powered boats used, the 1995 census data on fishing boats by type and size were examined in terms of fishing gear. It was found that unpowered boats mostly used lift nets and traps, especially crab portable lift nets and crab traps, but shrimp gill nets were also used. The majority of outboard-powered boats used shrimp gill nets, crab gill nets and traps, in that order. Inboard-powered boats of less than 10 GT mainly used otter board trawls, crab gill nets and shrimp gill nets, in descending order of importance. Inboard-powered boats of 10–49 GT mostly used otter board trawls, squid cast nets and pair trawls, while those of 50 GT and over mostly used otter board trawls, pair trawls and Thai purse seines.

It was found that the SEAFDEC guideline for small-scale and large-scale fishing activities (based on fishing gear) and the census classification (based on boat type and size) roughly coincided. However, some discrepancies were noted regarding squid cast nets and bamboo stake traps. These may be due to increasing demand for squid resulting in improvements in the size and efficiency of squid cast nets and to the declining popularity of bamboo stake traps among large-scale fishing operations. The methodological implication is that the SEAFDEC classification may need to be periodically revised to keep up with the changes in size and efficiency of fishing gear.

Another methodological issue raised was the validity of assessing the implementation of regulations by using the registration statistics on fishing gear. Two findings from this chapter were that the registration statistics were about one third of the census statistics and that small-scale fishing boats (outboard- and inboard-powered of less than 10 GT) were grossly under-registered. Thus, an evaluation based on registration statistics claiming that the number of trawlers and pushnetters is under control may be misleading. **Until registration statistics are improved to more closely reflect the reality, they should not be used for any kind of assessment of policy implementation.**

Registration statistics on fishing boats and gear need to be improved forthwith, for the important reason that an accurate database updated annually is needed for planning marine capture operations. In addition, in any coastal zone management programme, information on small-scale coastal fisherfolk is needed, as they will be the main partners in the programme. However, the registration data, as we have found, grossly under-records outboard-powered boats, the type of boat which is used mostly and increasingly in coastal fishing activities.

The present study has focused on the changes in population and coastal resources, in the number of fishermen, fishery employees and their households, as well as in fishing craft and

gear. It has given the background for and overall profile of changes in the fishery sector of the economy between 1985 and 1995. All along, small-scale fisherfolk were part of the picture and the changes affecting them in various ways were revealed in comparison with large-scale commercial operators. Although it cannot be denied that the study has provided a wealth of useful information, the findings on the various changes do not add up to a full picture of small-scale fisherfolk. Given that the latter are to be the main partners in any kind of coastal zone management programme, a field study of fishing communities is required to focus on them. Such a field study will be able to piece together the various aspects of changes previously examined separately in the above study.

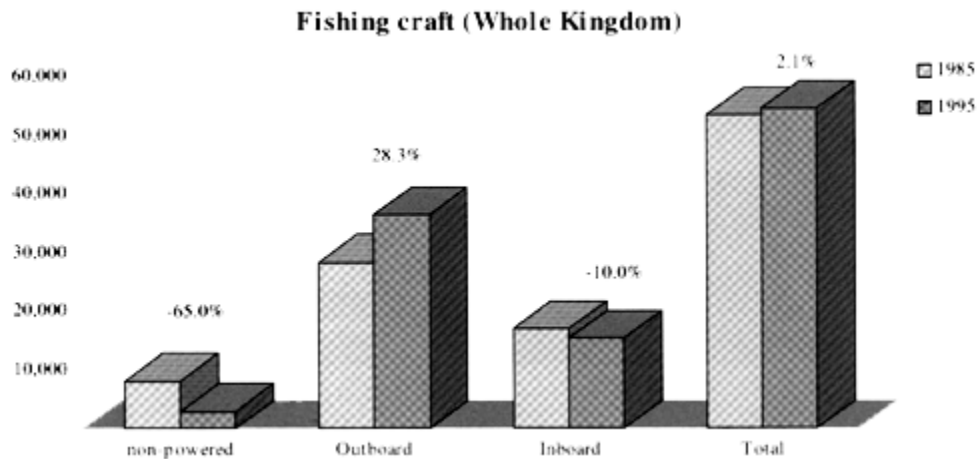


Figure 4.1 Fishing Craft by Type, 1985 and 1995

Source: Table 2.5.

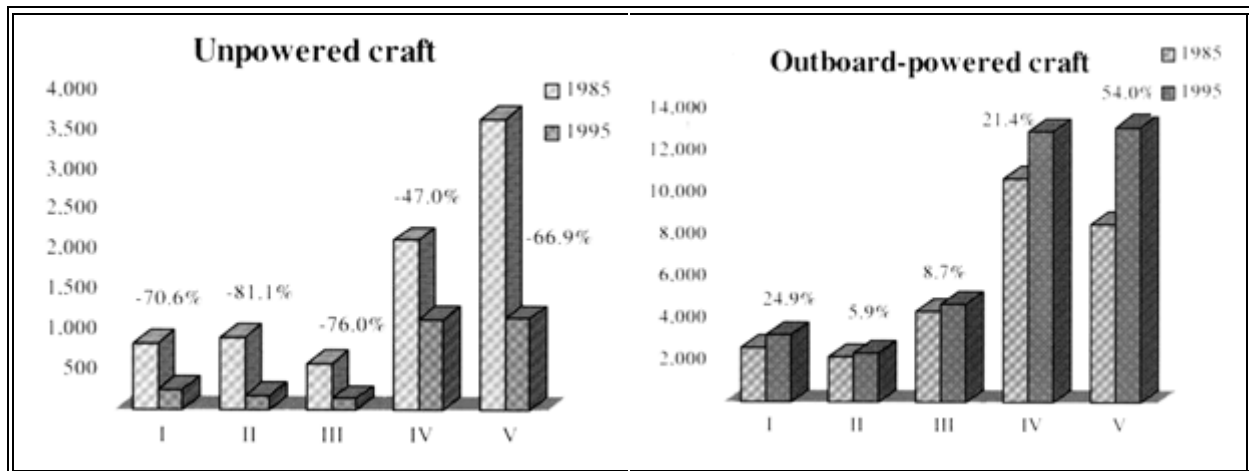


Figure 4.2 Unpowered and Outboard-powered Fishing Craft by Coastal Zone, 1985 and 1995

Source: Table 2.5.

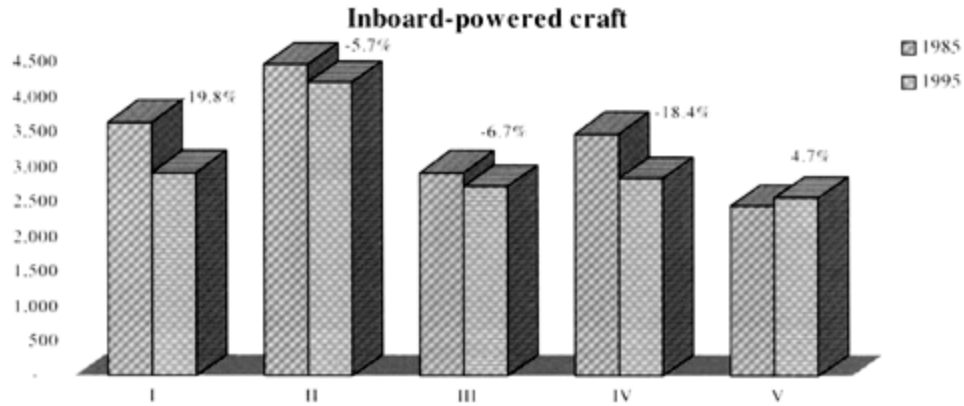


Figure 4.3 Inboard-powered Fishing Craft by Coastal Zone, 1985 and 1995

Source: Table 2.5.

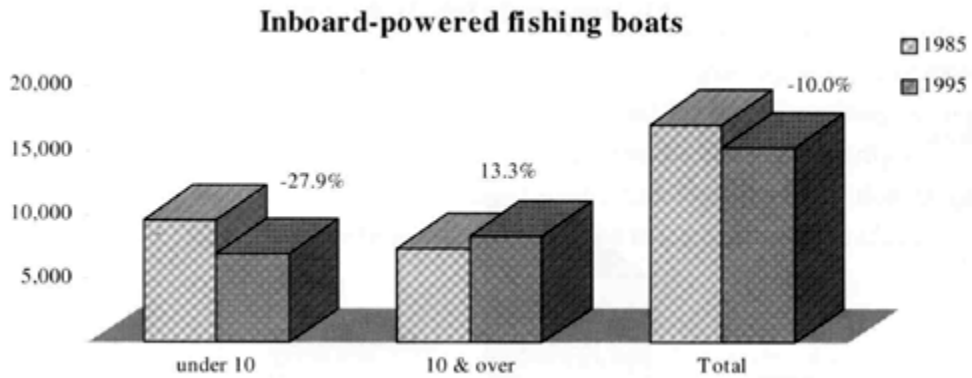


Figure 4.4 Recorded Inboard-powered Fishing Boats by Gross Tonnage, 1985 and 1995

Source: Table 4.1

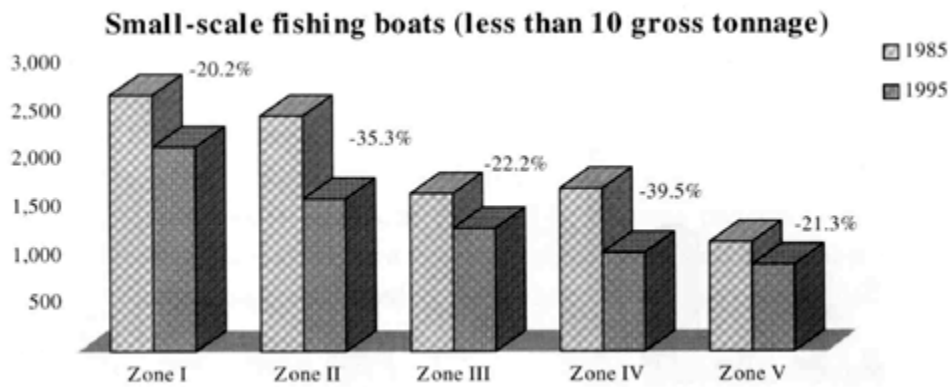


Figure 4.5 Recorded Small-scale Inboard-powered Fishing Boats by Gross Tonnage and Coastal Zone, 1985 and 1995

Source: Table 4.1

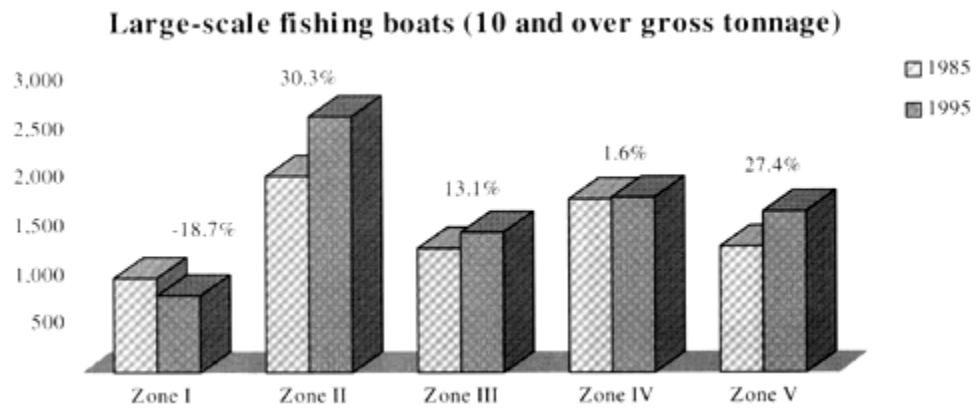


Figure 4.6 Recorded Large-scale Inboard-powered Fishing Boats by Gross Tonnage and Coastal Zone, 1985 and 1995

Source: Table 4.1

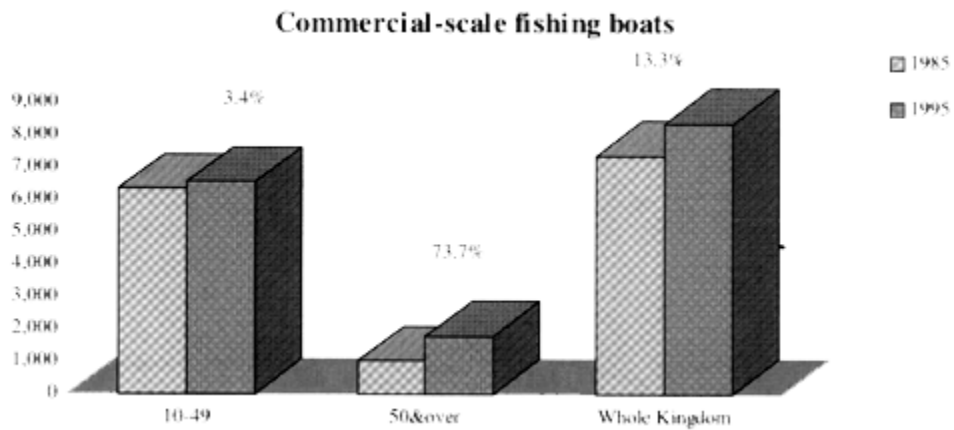


Figure 4.7 Recorded Commercial-scale Inboard-powered Fishing Boats by Gross Tonnage, 1985-1995

Source: Table 4.2

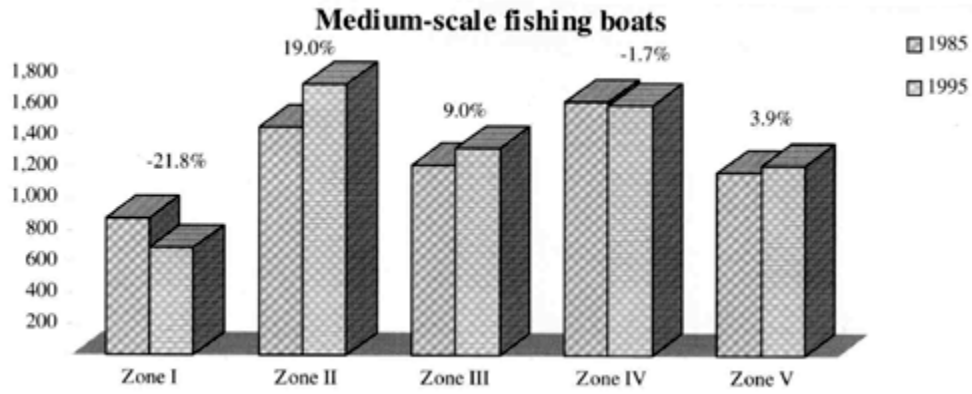


Figure 4.8 Recorded Medium-scale Inboard-powered Fishing Boats by Gross Tonnage and Coastal Zone, 1985–1995

Source: Table 4.2

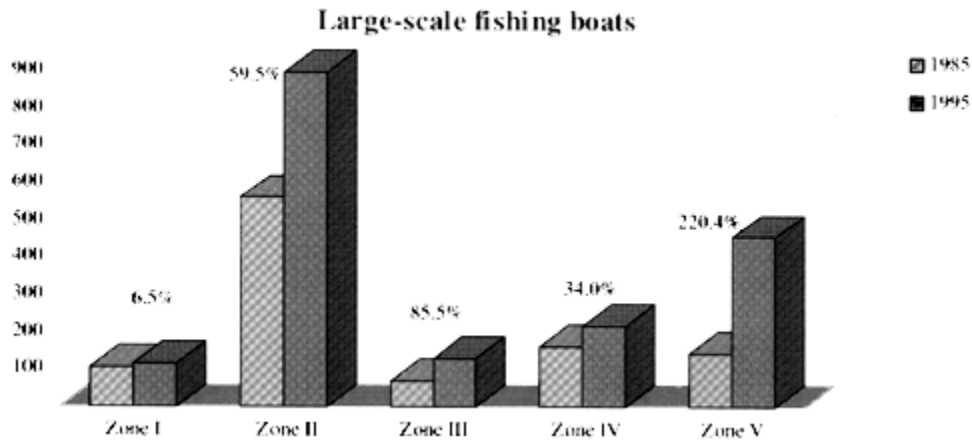


Figure 4.9 Recorded Large-scale Inboard-powered Fishing Boats by Gross Tonnage and Coastal Zone, 1985–1995

Source: Table 4.2

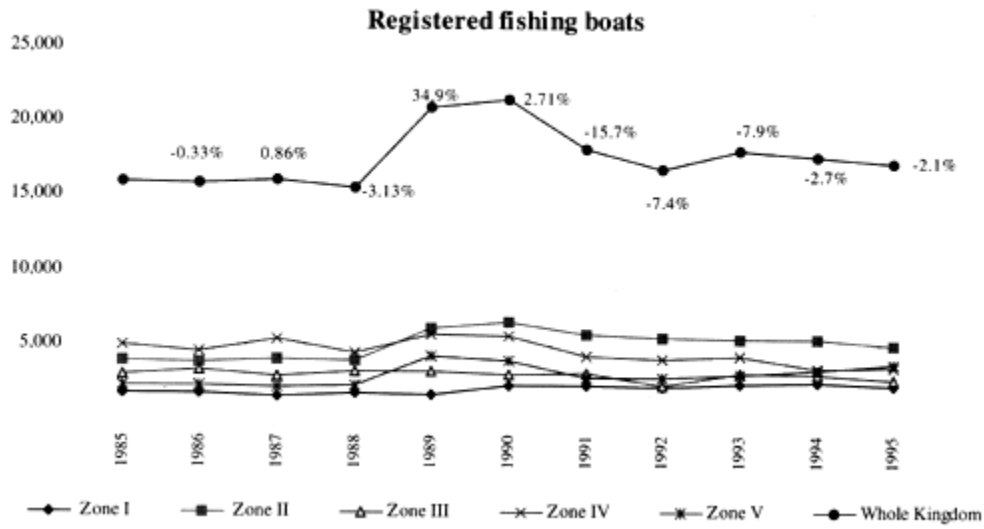


Figure 4.10 Registered Fishing Boats by Year and Coastal Zone, 1985–1995

Source: Table 4.3

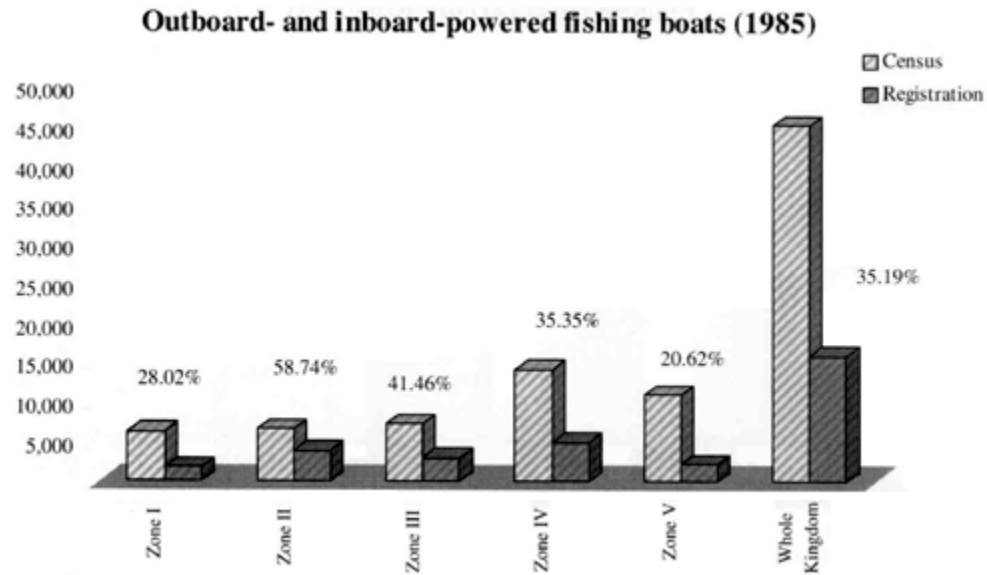


Figure 4.11 Census-recorded and Registered Outboard and Inboard-powered Fishing Boats, 1985

Source: Table 4.4

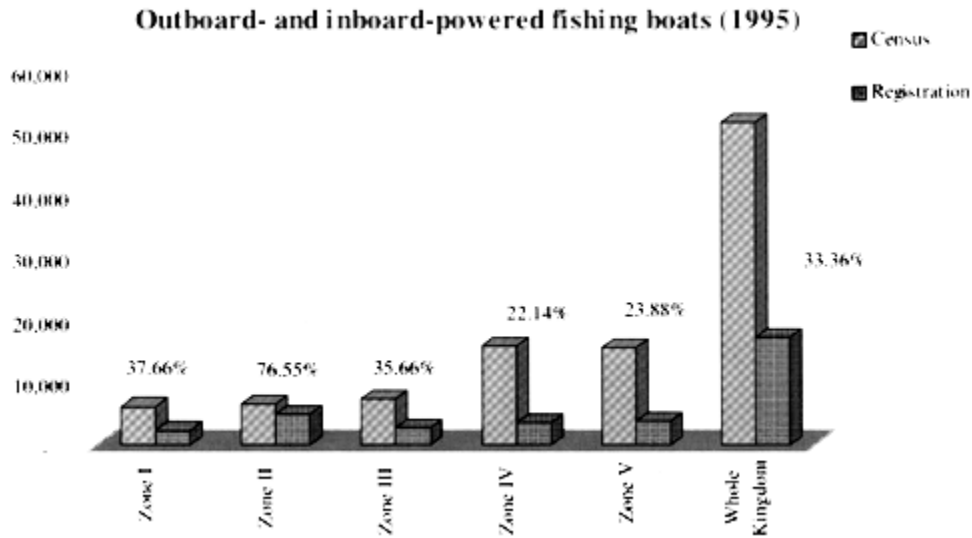


Figure 4.12 Census-recorded and Registered Outboard and Inboard-powered Fishing Boats, 1995

Source: Table 4.4

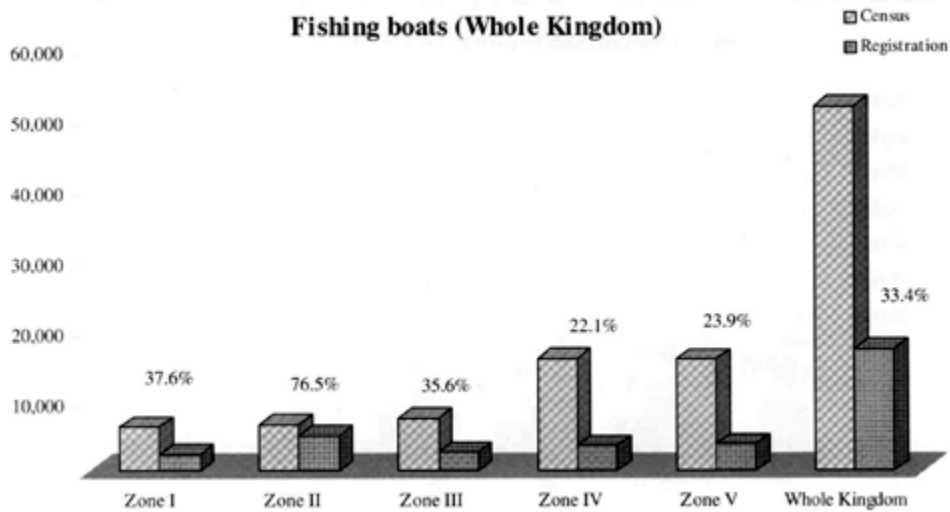


Figure 4.13 Comparison of the Number of Fishing Boats Census-recorded and Registered by Coastal Zone, 1995

Source: Table 4.5

Note: Percentages = number of registered boats as percent of censused boats.

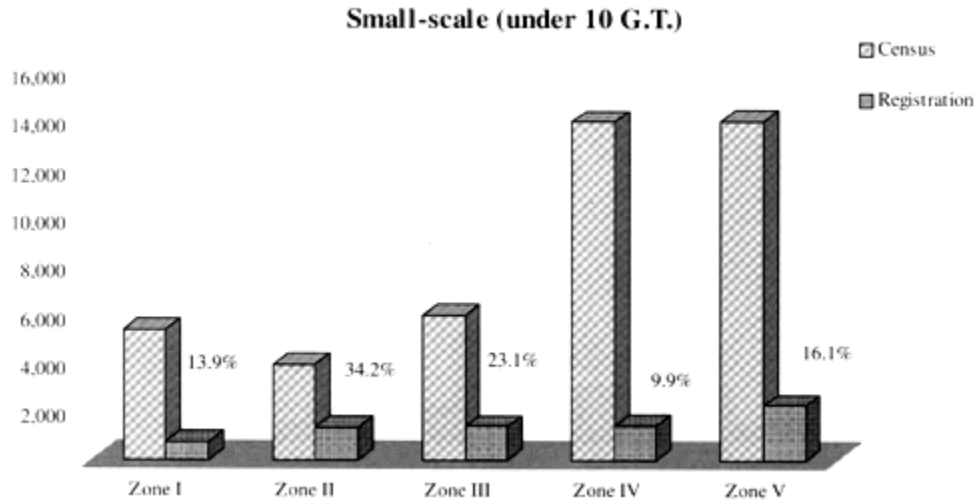


Figure 4.14 Comparison of the Number of Fishing Boats Under 10 GT Census-recorded and Registered by Coastal Zone, 1995

Source: Table 4.5
 Note: Percentages=number of registered boats as percent of censused boats.

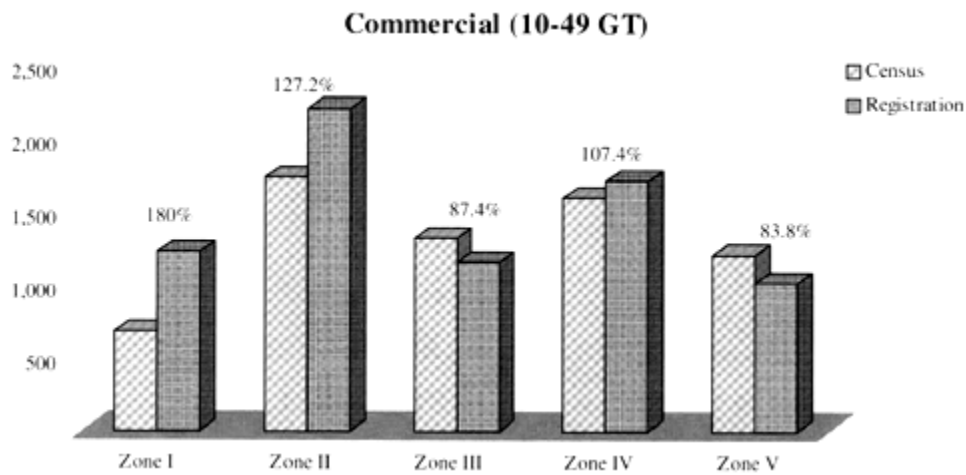


Figure 4.15 Comparison of the Number of Fishing Boats of 10–49 GT Census-recorded and Registered by Coastal Zone, 1995

Source: Table 4.5
 Note: Percentages=number of registered boats as percent of censused boats.

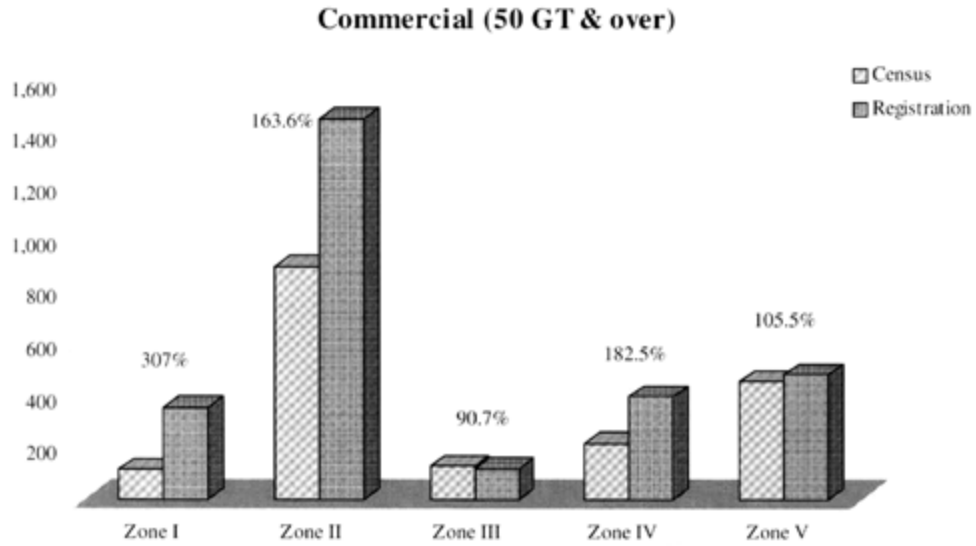


Figure 4.16 Comparison of the Number of Fishing Boats of 50 GT and over Census-recorded and Registered by Coastal Zone, 1995

Source: Table 4.5
 Note: Percentages=number of registered boats as percent of censused boats.

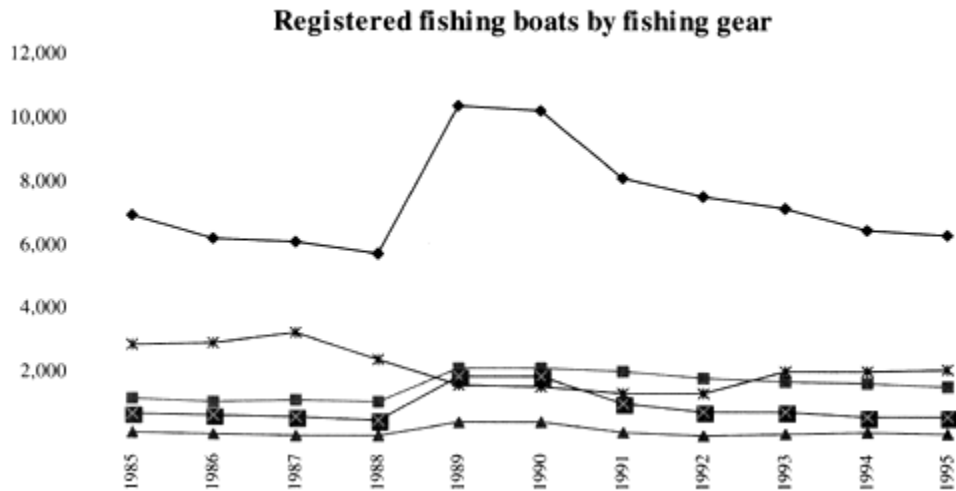
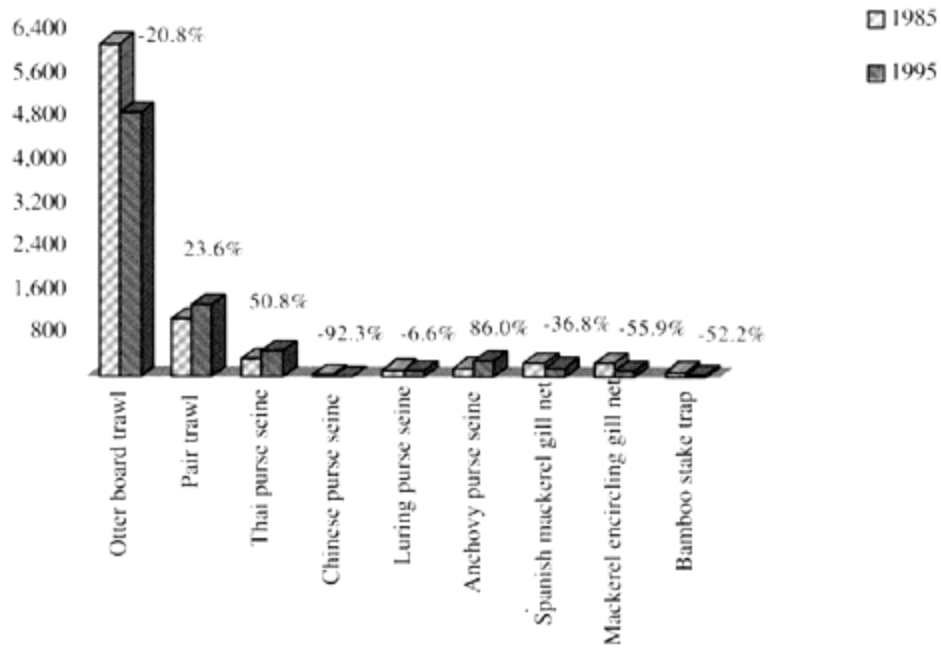


Figure 4.17 Number of Registered Fishing Boats by Type of Fishing Method, 1985–1995

Source: Table 4.6

Large-scale fishing gear (Whole Kingdom)



Source: Table 4.7

Small-scale fishing gear

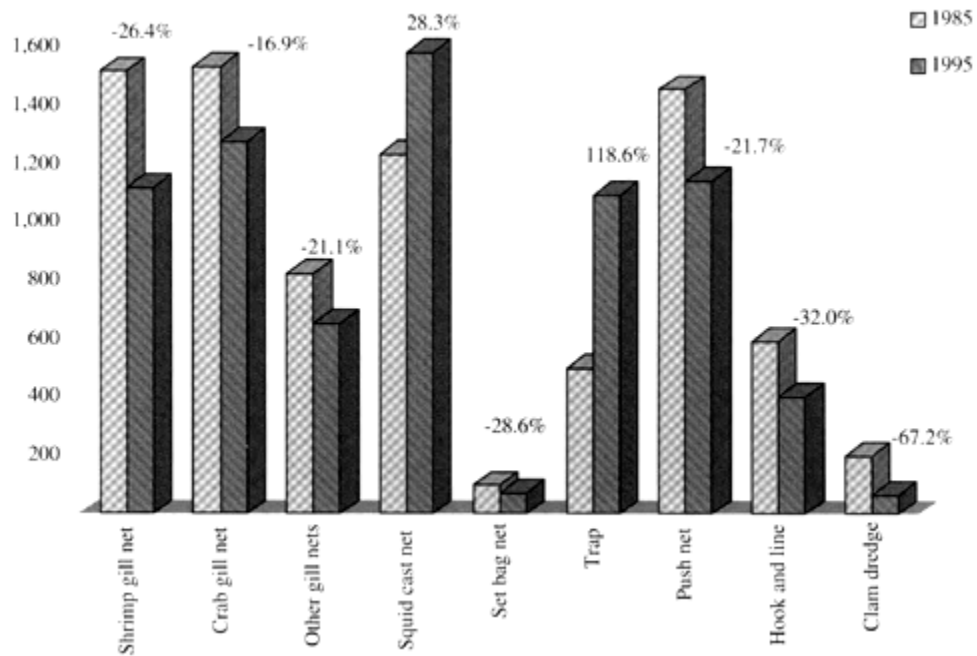
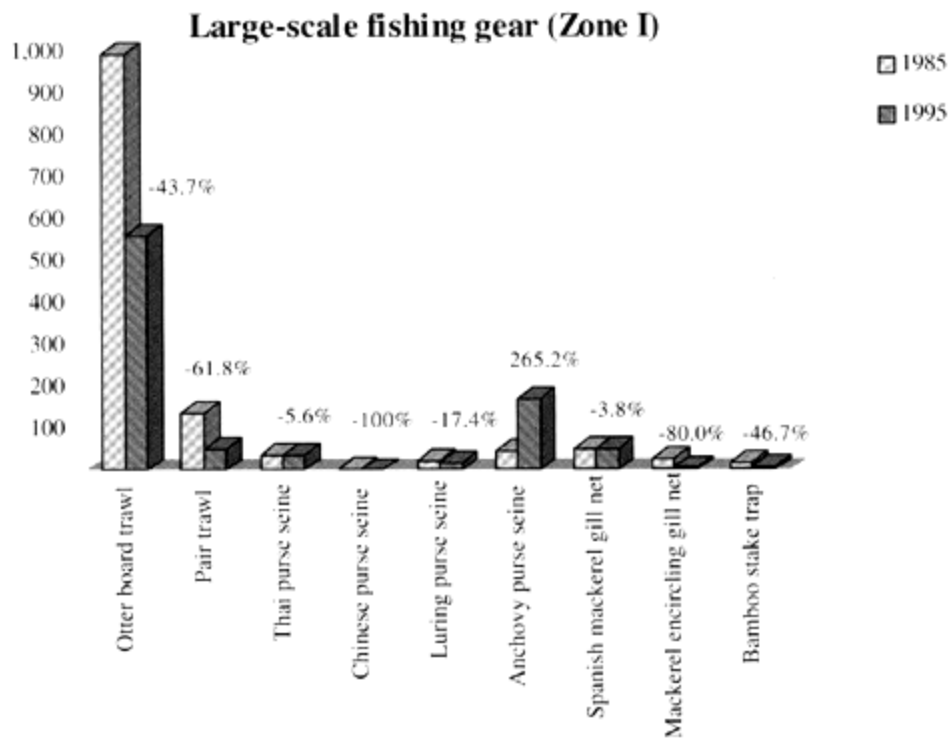


Figure 4.18 Inboard Powered Fishing Boats Using Large-scale and Small-scale Fishing Gears for the Whole Kingdom, 1985 and 1995

Source: Table 4.8



Source: Table 4.7

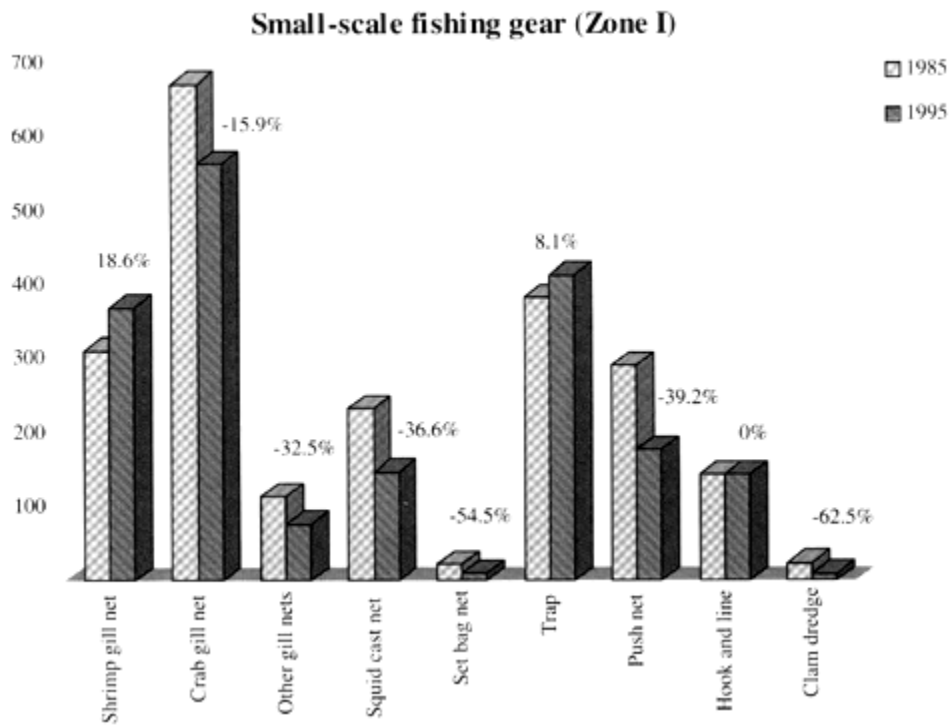
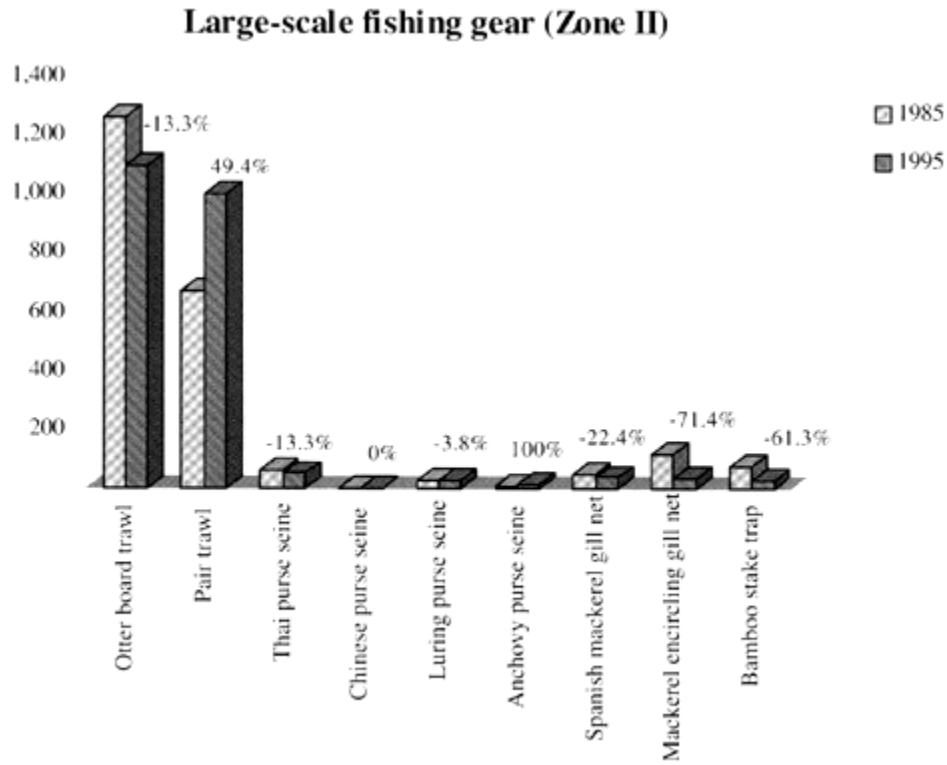


Figure 4.18.1 Inboard Powered Fishing Boats Using Large-scale and Small-scale Fishing Gears for Zone I, 1985 and 1995

Source: Table 4.8



Source: Table 4.7

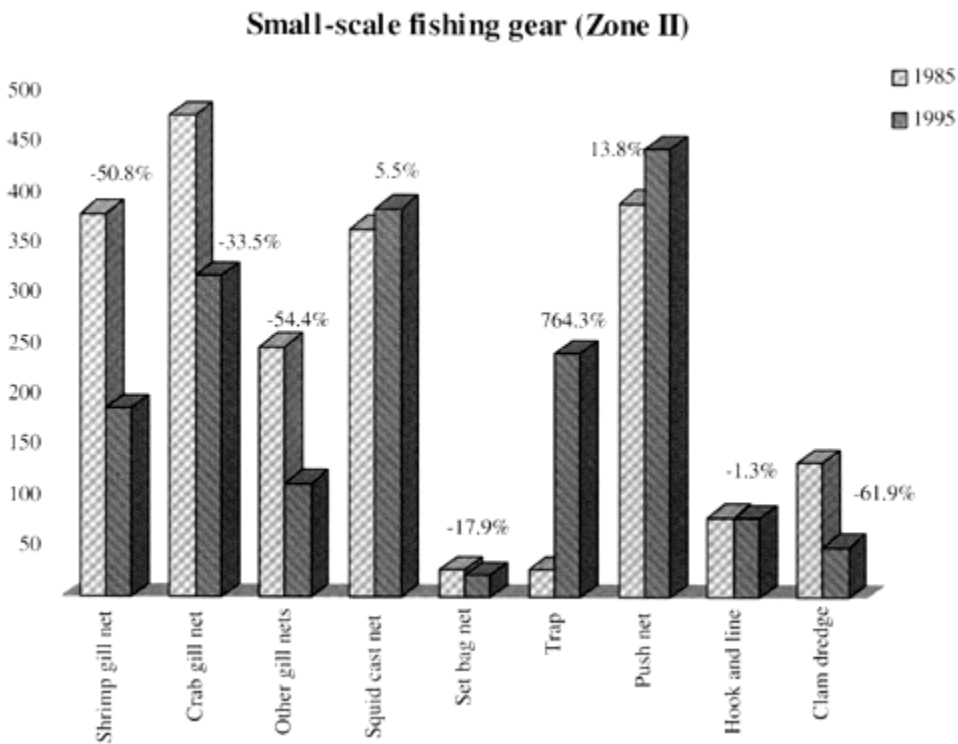
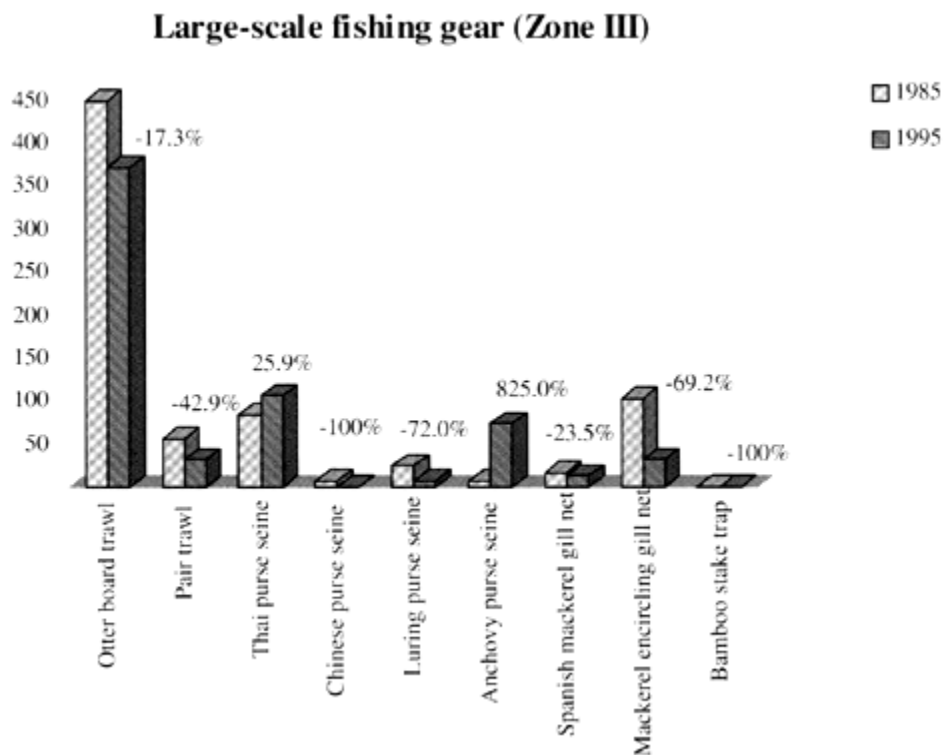


Figure 4.18.2 Inboard Powered Fishing Boats Using Large-scale and Small-scale Fishing Gears for Zone II, 1985 and 1995

Source: Table 4.8



Source: Table 4.7

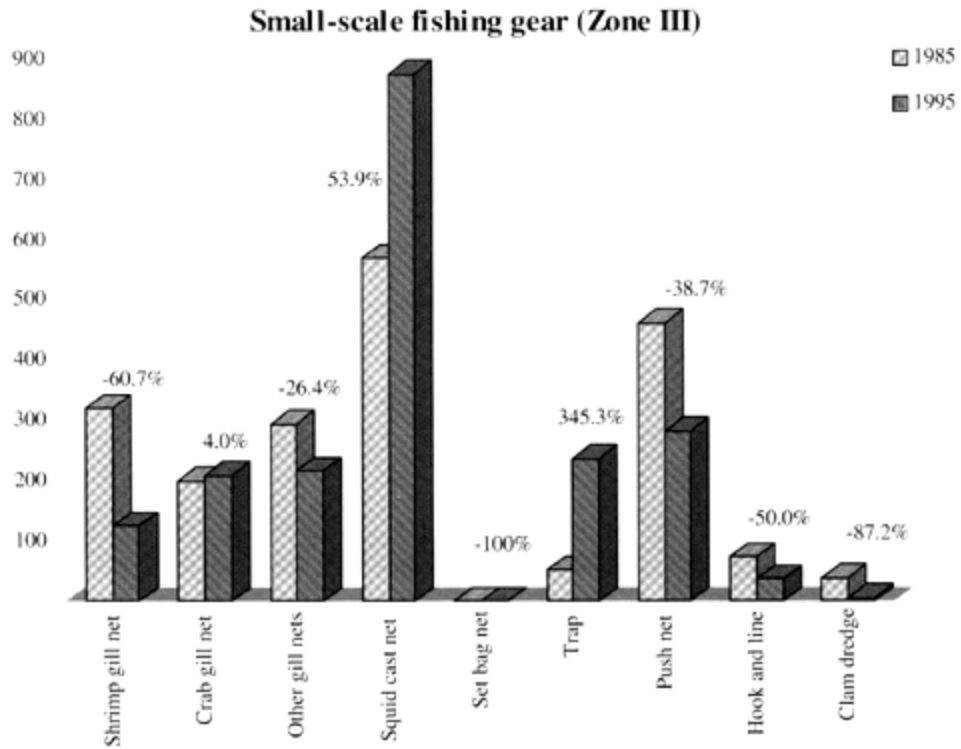
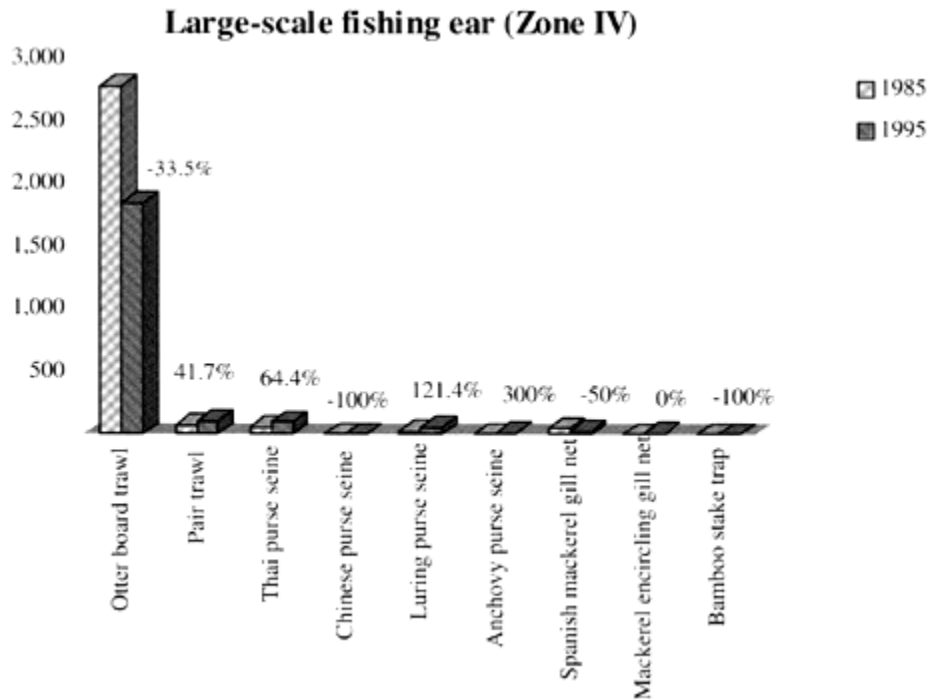


Figure 4.18.3 Inboard Powered Fishing Boats Using Large-scale and Small-scale Fishing Gears for Zone III, 1985 and 1995

Source: Table 4.8



Source: Table 4.7

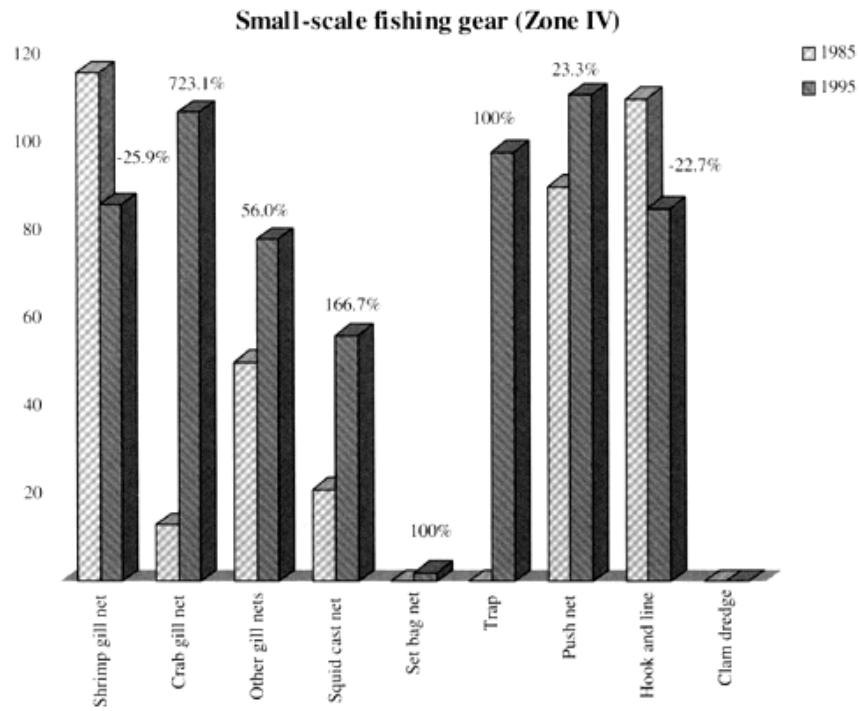
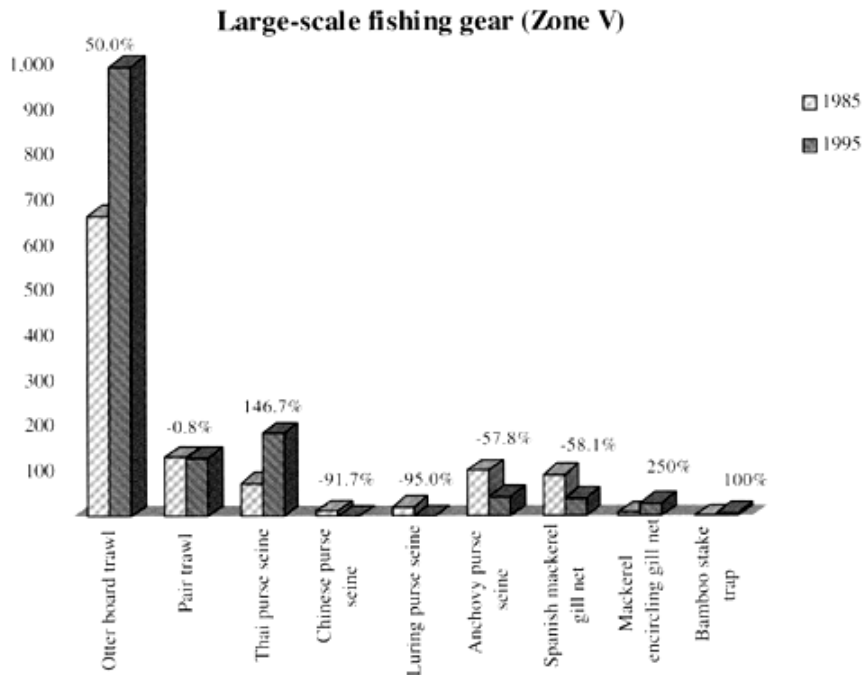


Figure 4.18.4 Inboard Powered Fishing Boats Using Large-scale and Small-scale Fishing Gears for Zone IV, 1985 and 1995

Source: Table 4.8



Source: Table 4.7

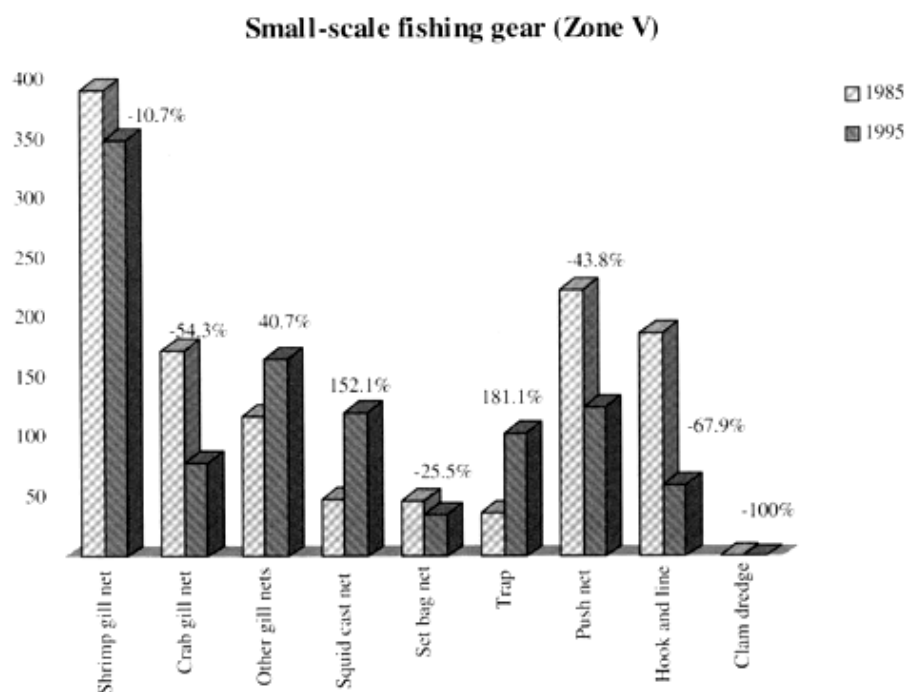


Figure 4.18.5 Inboard Powered Fishing Boats Using Large-scale and Small-scale Fishing Gears for Zone V, 1985 and 1995

Source: Table 4.8

Table 4.1 Census-recorded inboard-powered fishing boats by gross tonnage and coastal zone, 1985 and 1995

Region	Inboard-powered Fishing Boats (1985)					Inboard-powered Fishing Boats (1995)						
	<10 G.T.	%	10&over G.T.	%	Total	<10 G.T.	%	10&over G.T.	%	Total	%	
Coastal Zone I	2,674	73.2	978	26.8	3,652	100.0	2,134	72.9	795	27.1	2,929	100.0
Coastal Zone II	2,451	54.8	2,021	45.2	4,472	100.0	1,586	37.6	2,633	62.4	4,219	100.0
Coastal Zone III	1,646	56.3	1,280	43.7	2,926	100.0	1,281	46.9	1,448	53.1	2,729	100.0
Coastal Zone IV	1,696	48.7	1,787	51.3	3,483	100.0	1,026	36.1	1,815	63.9	2,841	100.0
Coastal Zone V	1,141	46.6	1,308	53.4	2,449	100.0	898	35.0	1,666	65.0	2,564	100.0
Whole Kingdom	9,608	56.6	7,374	43.4	16,982	100.0	6,925	45.3	8,357	54.7	15,282	100.0

Source: Table 2.7 in Chapter 2 of this report

Note: Small-scale=under 10 gross tonnage; commercial large-scale=10 and over gross tonnage

Table 4.2 Census-recorded commercial-scale inboard-powered fishing boats by gross tonnage and coastal zone, 1985 and 1995

Region	Commercial-scale Inboard-powered Fishing Boats (1985)					Commercial-scale Inboard-powered Fishing Boats (1995)					% Change				
	10–49 G.T.	%	50 & over G.T.	%	Total	%	10–49 G.T.	%	50 & over G.T.	%	Total	%	10–49 G.T.	50 & over G.T.	Total
Coastal Zone I	870	89.0	108	11.0	978	100.0	680	85.5	115	14.5	795	100.0	-21.8	6.5	-18.7
Coastal Zone II	1,460	72.2	561	27.8	2,021	100.0	1,738	66.0	895	34.0	2,633	100.0	19.0	59.5	30.3
Coastal Zone III	1,211	94.6	69	5.4	1,280	100.0	1,320	91.2	128	8.8	1,448	100.0	9.0	85.5	13.1
Coastal Zone IV	1,625	90.9	162	9.1	1,787	100.0	1,598	88.0	217	12.0	1,815	100.0	-1.7	34.0	1.6
Coastal Zone V	1,166	89.1	142	10.9	1,308	100.0	1,211	72.7	455	27.3	1,666	100.0	3.9	220.4	27.4
Whole Kingdom	6,332	85.9	1,042	14.1	7,374	100.0	6,547	78.3	1,810	21.7	8,357	100.0	3.4	73.7	13.3

Source: Table 2.7 in Chapter 2 of this report

Note: Medium-scale = 10–49 gross tonnage; commercial large-scale = 50 and over gross tonnage

Table 4.3 Number of registered fishing boats by year and coastal zone, 1985–1995

Zone	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	% Increase 1985–1995
Coastal Zone I	1,753	1,744	1,554	1,736	1,610	2,327	2,253	2,142	2,354	2,517	2,328	32.8
Coastal Zone II	3,920	3,874	4,050	3,918	6,159	6,573	5,704	5,495	5,345	5,353	5,014	27.9
Coastal Zone III	3,008	3,362	2,898	3,172	3,229	3,007	3,086	2,281	3,061	2,981	2,651	-11.9
Coastal Zone IV	5,010	4,601	5,366	4,424	5,696	5,628	4,264	4,052	4,277	3,449	3,502	-30.1
Coastal Zone V	2,267	2,288	2,178	2,285	4,270	3,966	2,847	2,831	3,005	3,290	3,755	65.6
Other Provinces	10	47	7	15	15	46	16	19	104	67	31	210.0
Whole Kingdom	15,968	15,916	16,053	15,550	20,979	21,547	18,170	16,820	18,146	17,657	17,281	8.2
Annual Increase (%)	-	-0.33	0.86	-3.13	34.91	2.71	-15.67	-7.43	7.88	-2.69	-2.13	

Sources: 1) *Thai Fishing Vessels Statistics 1989*, p.1

2) *Thai Fishing Vessels Statistics 1992*, p.1

3) *Thai Fishing Vessels Statistics 1995*, p.1

Table 4.4 Comparison of outboard-powered and inboard-powered fishing boats in the census and in the registration, 1985 and 1995

Zone	Outboard and Inboard Fishing Boats					
	1985			1995		
	Census Boats	Registered Boats	Registered Boats as % of Censused Boats	Census Boats	Registered Boats	Registered Boats as % of Censused Boats
Coastal Zone I	6,256	1,753	28.02	6,182	2,328	37.66
Coastal Zone II	6,673	3,920	58.74	6,550	5,014	76.55
Coastal Zone III	7,255	3,008	41.46	7,435	2,651	35.66
Coastal Zone IV	14,171	5,010	35.35	15,819	3,502	22.14
Coastal Zone V	10,995	2,267	20.62	15,726	3,755	23.88
Whole Kingdom	45,350	15,958	35.19	51,712	17,250	33.36

Source: Tables 2.5 and 4.3

Note: The total registered boats did not include the 10 & 31 boats registered in 1985 and 1995 in other provinces outside the five Coastal Zones

Table 4.5 Comparison of the number of fishing boats census-recorded and registered by gross tonnage and coastal zone, 1995

Region	Fishing Boats in the 1995 Census				Fishing Boats in the 1995 Registration Statistics				Registered boats as % of Censused Boats			
	Small-scale	Commercial		Total	Small-scale	Commercial		Total	Small-scale	Commercial		Total
	<10 G.T.	10–49 G.T.	50 & over G.T.		<10 G.T.	10–49 G.T.	50 & over G.T.		<10 G.T.	10–49 G.T.	50 & over G.T.	
Coastal Zone I	5,387	680	115	6,182	751	1,224	353	2,328	13.94	180.00	306.96	37.66
Coastal Zone II	3,917	1,738	895	6,550	1,340	2,210	1,464	5,014	34.21	127.16	163.58	76.55
Coastal Zone III	5,987	1,320	128	7,435	1,381	1,154	116	2,651	23.07	87.42	90.63	35.66
Coastal Zone IV	14,004	1,598	217	15,819	1,390	1,716	396	3,502	9.93	107.38	182.49	22.14
Coastal Zone V	14,060	1,211	455	15,726	2,260	1,015	480	3,755	16.07	83.82	105.49	23.88
Whole Kingdom	43,355	6,547	1,810	51,712	7,122	7,319	2,809	17,250	16.43	111.79	155.19	33.36

Sources: 1) For 1995 Census: *1995 Marine Fishery Census, Whole Country*, p. 154–155

2) For 1995 Registration: *Thai Fishing Vessels Statistics 1995*, p.5

Notes: 1) The comparison cannot be made by size for 1985 as the registered boats were not classified by gross tonnage

2) Those 31 boats registered in "Other Provinces" outside the coastal zones were excluded, reducing the total from 17,281 to 17,250

3) In the 1995 Census, "small-scale" includes unpowered, outboard-powered, and inboard-powered boats of less than 10 tonnage, while the "small-scale" registered boats do not include non-powered boats

Table 4.6 Registered fishing boats by type of fishing method, 1985–1995

Types of fishing method	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	% Increase 1985–1995
Otter board trawl	6,968	6,226	6,129	5,766	10,438	10,256	8,117	7,538	7,213	6,482	6,321	-9.3
Pair trawl	1,218	1,084	1,164	1,132	2,193	2,193	2,037	1,876	1,750	1,708	1,576	29.4
Beam trawl	139	97	50	52	482	456	144	51	123	156	98	-29.5
Push net	759	664	624	531	1,907	1,879	1,047	818	808	651	634	-16.5
Purse seine	819	836	1,043	1,241	1,079	1,250	1,243	1,128	1,173	1,163	1,022	24.8
Chinese purse seine	17	17	14	16	16	12	24	-	-	-	-	-100.0
Anchovy purse seine	197	143	117	199	348	367	347	324	336	348	375	90.4
King mackerel drift gill net	269	329	365	461	282	299	338	362	271	280	330	22.7
Pomfret gill net	18	9	17	34	20	33	59	82	134	91	100	455.6
Mackerel encircling gill net	227	203	223	146	114	101	88	72	94	99	82	-63.9
Mackerel gill net	179	153	181	156	24	143	107	137	257	328	279	55.9
Crab gill net	697	1,334	985	1,008	520	937	1,259	817	1,131	1,371	1,564	124.4
Sadinellas gill net	31	13	22	16	44	44	34	42	21	42	15	-51.6
Mullet gill net	25	23	16	31	45	40	34	8	45	25	15	-40.0
Threadfin gill net	15	24	6	18	5	3	8	24	12	34	52	246.7
Shrimp gill net	2,910	2,974	3,294	2,438	1,629	1,583	1,367	1,369	2,084	2,045	2,117	-27.3
Other gill nets	401	795	606	770	540	620	474	466	710	665	674	68.1
Other nets	362	287	351	222	187	195	33	47	30	74	80	-77.9
Long line	63	51	53	142	50	48	47	68	59	36	53	-15.9
Squid cast net	663	654	794	1,171	1,056	1,088	1,363	1,591	1,895	2,059	1,894	185.7
Total	15,977	15,916	16,054	15,550	20,979	21,547	18,170	16,820	18,146	17,657	17,281	8.2

Sources: 1) *Thai Fishing Vessels Statistics 1989*, p.2

2) *Thai Fishing Vessels Statistics 1992*, p.2

Table 4.7 Inboard-powered craft by large-scale fishing gear and coastal zone, 1985 and 1995

Types of Fishing Method	1985						1995						% Change					
	Coastal Zone						Coastal Zone											
	I	II	III	IV	V	Total	I	II	III	IV	V	Total	I	II	III	IV	V	Total
Otter board trawl	998	1,264	450	2,784	666	6,162	562	1,096	372	1,851	999	4,880	-43.7	-13.3	-17.3	-33.5	50.0	-20.8
Pair trawl	136	670	56	72	132	1,066	52	1,001	32	102	131	1,318	-61.8	49.4	-42.9	41.7	-0.8	23.6
Thai purse seine	36	60	85	59	75	315	34	52	107	97	185	475	-5.6	-13.3	25.9	64.4	146.7	50.8
Chinese purse seine	4	1	8	1	12	26	-	1	-	-	1	2	-	0.0	-	-	-91.7	-92.3
													100.0	100.0	100.0			
Luring purse seine	23	26	25	28	20	122	19	25	7	62	1	114	-17.4	-3.8	-72.0	121.4	-95.0	-6.6
Anchocy purse seine	46	6	8	2	102	164	168	12	74	8	43	305	265.2	100.0	825.0	300.0	-57.8	86.0
Spanish mackerel gill net	52	49	17	50	93	261	50	38	13	25	39	165	-3.8	-22.4	-23.5	-50.0	-58.1	-36.8
Mackerel encircling gill net	25	119	104	-	8	256	5	34	32	14	28	113	-80.0	-71.4	-69.2		250.0	-55.9
Bamboo stake trap	15	75	1	1	-	92	8	29	-	-	7	44	-46.7	-61.3	-	-		-52.2
															100.0	100.0		
Mackerel purse seine	-	-	-	-	-	-	14	37	31	13	47	142						
Anchocy stick held box net	-	-	-	-	-	-	50	4	61	2	5	122						
Whole Kingdom	1,335	2,270	754	2,997	1,108	8,464	898	2,288	637	2,159	1,434	7,416	-32.7	0.8	-15.5	-28.0	29.4	-12.4

Sources: 1) 1985 Marine Fishery Census of Thailand, p. 204-207

2) 1995 Marine Fishery Census, Whole Kingdom, p. 166-167

Notes: 1) The classification by SEAFDEC (1976) of small and large-scale fisheries is based on types of fishing gear.

The first nine types of gear in this table are listed under large-scale fishery

2) The outboard-powered and unpowered boats were not cross-tabulated with fishing gear in the 1985 census

Table 4.8 Inboard-powered craft by small-scale fishing gear and coastal zone, 1985 and 1995

Types of Fishing Method	1985 Coastal Zone						1995 Coastal Zone						% Change					
	I	II	III	IV	V	Total	I	II	III	IV	V	Total	I	II	III	IV	V	Total
Shrimp gill net	311	380	321	116	392	1,520	369	187	126	86	350	1,118	18.6	-50.8	-60.7	-25.9	-10.7	-26.4
Crab gill net	671	478	201	13	173	1,536	564	318	209	107	79	1,277	-15.9	-33.5	4.0	723.1	-54.3	-16.9
Other gill nets	114	248	295	50	118	825	77	113	217	78	166	651	-32.5	-54.4	-26.4	56.0	40.7	-21.1
Squid cast net with light	232	365	570	21	48	1,236	147	385	877	56	121	1,586	-36.6	5.5	53.9	166.7	152.1	28.3
Set bag net	22	28	1	-	47	98	10	23	-	2	35	70	54.5	-17.9	100.0	-	-25.5	-28.6
Trap	382	28	53	-	37	500	413	242	236	98	104	1,093	8.1	764.3	345.3	-	181.1	118.6
Push net	291	391	462	90	224	1,458	177	445	283	111	126	1,142	-39.2	13.8	-38.7	23.3	-43.8	-21.7
Lift net	-	-	-	-	-	-	37	33	8	22	32	132	-	-	-	-	-	-
Hook and line	143	80	74	110	187	594	143	79	37	85	60	404	0.0	-1.3	-50.0	-22.7	67.9	-32.0
Clam dredge	24	134	39	-	1	198	9	51	5	-	-	65	-62.5	-61.9	-87.2	-	-	-67.2
Whole Kingdom	2,190	2,132	2,016	400	1,227	7,965	1,946	1,876	1,998	645	1,073	7,538	11.1	-12.0	-0.9	61.3	-12.6	-5.4

Sources: 1) 1985 Marine Fishery Census of Thailand, p. 204-207

2) 1995 Marine Fishery Census, Whole Kingdom, p. 166-167

Note: The classification by SEAFDEC (1976) of small-scale fishery is of the following gear:

(1) pomfret gill net, (2) shrimp gill net, (3) other gill nets, (4) squid cast net, (5) cast net, (6) acetes scoop net, (7) scoop net, (8) white board for catching shrimp, (9) collecting shellfish, (10) others

Table 4.9 Main fishing gear by type and size of fishing boats, 1995

Main Fishing Gears	Unpowered Boats		Outboard-powered Boats		Inboard-powered Boats						Total	%
		%		%	Under 10 G.T.	%	10–49 G.T.	%	50 G.T. & over	%		
1) Trawl nets			1,028	2.82	1,349	19.48	3,521	53.78	1,328	73.49	7,226	13.25
Otter board trawl	-		-		1,320	19.06	2,760	42.16	800	44.27	4,880	8.95
Pair trawl	-		-		29	0.42	761	11.62	528	29.22	1,318	2.42
Beam trawl	-		1,028	2.82	0	0.00	0	0.00	0	0.00	1,028	1.89
2) Surrounding nets	5	0.18	191	0.52	180	2.60	543	8.29	369	20.42	1,288	2.36
Anchovy purse seine	-		109	0.30	108	1.56	169	2.58	28	1.55	414	0.76
Mini Thai purse seine	5	0.18	82	0.23	1	0.01	1	0.02	0	0.00	89	0.16
Thai purse seine	-		-		17	0.25	250	3.82	208	11.51	475	0.87
Luring purse seine	-		-		14	0.20	35	0.53	65	3.60	114	0.21
Mackerel purse seine	-		-		34	0.49	76	1.16	32	1.77	142	0.26
Chinese purse seine	-		-		0	0.00	2	0.03	0	0.00	2	0.00
Bonito purse seine	-		-		1	0.01	9	0.14	36	1.99	46	0.08
Rocky fish surrounding net	-		-		5	0.07	1	0.02	0	0.00	6	0.01
3) Beach seine	47	1.66	107	0.29	0	0.00	0	0.00	0	0.00	154	0.28
4) Clam dredge	1	0.04	60	0.16	19	0.27	46	0.70	0	0.00	126	0.23
5) Lift nets	498	17.62	1,572	4.32	64	0.92	67	1.02	1	0.06	2,202	4.04
Anchovy stick held lift net	-		19	0.05	40	0.58	41	0.63	1	0.06	101	0.19
Black pomfret lift net	-		32	0.09	4	0.06	20	0.31	0	0.00	56	0.10
Crab portable lift net	452	15.99	1,177	3.23	14	0.20	2	0.03	0	0.00	1,645	3.02
Acetes dip net	24	0.85	71	0.19	0	0.00	1	0.02	0	0.00	96	0.18
Fish lift net	2	0.07	46	0.13	2	0.03	0	0.00	0	0.00	50	0.09
Other lift nets	20	0.71	227	0.62	4	0.06	3	0.05	0	0.00	254	0.47

6) Falling nets	205	7.25	708	1.94	749	10.82	940	14.36	22	1.22	2,624	4.81
Squid falling net	-		144	0.40	684	9.88	883	13.49	19	1.05	1,730	3.17
Anchovy stick held box net	-		1	0.00	62	0.90	57	0.87	3	0.17	123	0.23
Other cast nets	205	7.25	563	1.55	3	0.04	0	0.00	0	0.00	771	1.41
7) Gill nets and entangling nets	1,038	36.73	21,584	59.25	2,624	37.89	666	10.17	34	1.88	25,946	47.58
King mackerel gill net	-		46	0.13	27	0.39	119	1.82	19	1.05	211	0.39
Mackerel gill net	13	0.46	1,534	4.21	254	3.67	63	0.96	0	0.00	1,864	3.42
Mullet gill net	191	6.76	1,852	5.08	49	0.71	5	0.08	0	0.00	2,097	3.85
Whiting gill net	20	0.71	1,017	2.79	65	0.94	21	0.32	0	0.00	1,123	2.06
Crab gill net	110	3.89	5,797	15.91	1,085	15.67	192	2.93	0	0.00	7,184	13.17
Shrimp gill net	417	14.76	8,476	23.27	984	14.21	134	2.05	0	0.00	10,011	18.36
Cuttle fish trammed net	1	0.04	323	0.89	14	0.20	12	0.18	0	0.00	350	0.64
Mackerel encircling gill net	1	0.04	188	0.52	31	0.45	69	1.05	13	0.72	302	0.55
Other gill nets	285	10.08	2,351	6.45	115	1.66	51	0.78	2	0.11	2,804	5.14
8) Traps	489	17.30	4,793	13.16	842	12.16	249	3.80	2	0.11	6,375	11.69
Fish trap	107	3.79	795	2.18	32	0.46	12	0.18	0	0.00	946	1.73
Squid trap	2	0.07	1,214	3.33	585	8.45	228	3.48	2	0.11	2,031	3.72
Shrimp trap	84	2.97	886	2.43	1	0.01	0	0.00	0	0.00	971	1.78
Crab trap	252	8.92	1,251	3.43	204	2.95	6	0.09	0	0.00	1,713	3.14
Small grouper trap	31	1.10	606	1.66	16	0.23	1	0.02	0	0.00	654	1.20
Other traps	13	0.46	41	0.11	4	0.06	2	0.03	0	0.00	60	0.11
9) Bamboo stake trap	10	0.35	123	0.34	23	0.33	18	0.27	0	0.00	174	0.32
10) Set bag net	202	7.15	1,533	4.21	57	0.82	13	0.20	0	0.00	1,805	3.31
11) Push net	-		2,449	6.72	648	9.36	448	6.84	46	2.55	3,591	6.58
12) Hook and line	227	8.03	1,733	4.76	364	5.26	35	0.53	5	0.28	2,364	4.33
13) Miscellaneous	104	3.68	549	1.51	6	0.09	1	0.02	0	0.00	660	1.21
Whole Kingdom	2,826	100.00	36,430	100.00	6,925	100.00	6,547	100.00	1,807	100.00	54,535	100.00

Source: 1995 Marine Fishery Census, Whole Country, p. 36-41

- Notes: 1) According to the Marine Fishery Census, small-scale fishery use no boats, unpowered boats, outboard-powered boats and inboard-powered boats of under 10 gross tonnage, whereas commercial fishery use inboard-powered boats of 10 and higher gross tonnage;
- 2) According to the SEAFDEC guideline, small-scale fishery use the following gear: (1) pomfret gill net, (2) shrimp gill net, (3) other gill nets, (4) squid cast net, (5) cast net, (6) acetes scoop net, (7) scoop net, (8) white board for catching shrimp, (9) collecting shellfish, (10) other. Large-scale fishery use the following gear: (1) otter-board trawl, (2) pair trawl, (3) Thai purse seine, (4) Chinese purse seine, (5) luring purse seine, (6) anchovy purse seine, (7) Spanish mackerel gill net, (8) mackerel encircling gill net, (9) bamboo stake trap.

PART II

The Field Study

II.1 The field study

The analysis of the 1985 and 1995 marine fishery censuses yields a wealth of information on the changes in the fishery sector as a whole. Information on small-scale fishermen and their households is part of the picture: it is unavoidably fragmentary and excludes qualitative information. As small-scale fishermen and their households comprise the majority of fisherfolk and of marine capture fishery households in Thailand, a field study of two fishing communities were carried out in early 1998 to supplement the information culled from the censuses. It consists of field surveys and individual interviews.

The objectives of the surveys and of the interviews were: to provide current information on small-scale fishermen and their households, especially the social and demographic aspects that are not adequately covered by the censuses; to provide qualitative information on small-scale fisherfolk which cannot be obtained from the censuses; and to gauge the likelihood of their effective participation in integrated coastal zone management programmes.

Sites of the field study

Two villages were selected for the field study: Sai Dang village in Ranong province and Koh Maphrao village in Phuket province. The main criterion of selection was that, studied together, they should provide a dynamic profile of fishing communities in Thailand and an indication of future developments in the characteristics of fishing communities in Thailand.

Sai Dang village was selected at the recommendation of a former provincial fishery officer in Ranong, to represent a rapidly changing fishing community. Koh Maphrao village was selected for the purpose of comparison, as it is a more stable fishing community. Both villages are in Coastal Zone V, which excludes differences between zones, admittedly at the expense of neglecting other zones. Nonetheless, Zone V is the zone where small-scale fisherfolk predominate and where marine capture fishery is rapidly growing. The locations of the villages in their respective province are shown in Figures 1.1 and 1.2.

Sai Dang is a coastal village about 23 km north of the town of Ranong and is within the Muang Ranong district. It is bisected North-South by the Petchkasem inter-provincial highway. The eastern section is adjacent to a range of hills and consists exclusively of agricultural households, whereas the western section forms the eastern side of the Kra Buri estuary, the western shore of which is Burmese territory (Figure 1.3). This estuary is part of the Andaman Sea and the majority of households there are fishing households. The population is exclusively Buddhist. There are about 144 households in all, only half of which were randomly selected. The survey was carried out on 9–10 February 1998 with the assistance of 10 interviewers from the public health office of Ranong province.

Koh Maphrao is an island village situated about 10 minutes by outboard-powered boat away from the main island of Phuket. It has a total of 116 households clustered into three groups, one along the western shore adjacent to Phuket Island, one in the middle part of Koh Maphrao and one near the eastern shore. The population is exclusively Muslim and the majority of

households earn their living from fishing or from rubber orchards or from both. Efforts were made to survey all the households during the survey period (4–6 March 1988), but only 94 were eventually surveyed because of the inability to reach some heads of household who were out fishing or at the sites of their green mussel cultures. The survey was conducted with the assistance of 10 interviewers from the provincial health office of Phuket.

The survey of both communities was based on two sets of questionnaires, one for the heads of household, the other for married women aged 15–44 within the households. The survey was supplemented by systematic interviews of a small number of villagers. Before the survey findings are presented in the following chapters, the provincial context of the surveyed villages needs to be explained.

Provincial context of the field study

Ranong province, where Sai Dang village is located, is in the upper southern region of Thailand, 568 km from Bangkok. It has an area of 3,298 sq km, 14 percent of which is coastal land and 86 percent mountainous area, and it includes 62 islands of various sizes. The coastline extends for 69 km. Adjacent to Ranong province are Chumphon to the north, Chumphon and Surat Thani to the west, Phangnga to the south and the Andaman Sea as well as Myanmar to the west.

Ranong has four districts (Muang, Kra Buri, La-un and Kapoe) and one sub-district (Suk Samran). It has 28 *tambons*, 147 villages and the total population was 137,544 in 1995. The people engage in agriculture, fishery, commerce, services and tourism. According to a 1994 village survey, there were 28,549 households in the non-municipal area, 21 percent of which earned less than B10000, another 21 percent earned between B10 000 and B19,999, 16 percent earned between B20,000 and B29,999, 17 percent earned between B30 000 and B49,999 and 16 percent earned B50,000 and higher per year (NSO, 1996a, p. 101).

Regarding capture fishery, one of the two problems identified by the Office of Environment Policy and Planning is the depletion of fishery resources caused by the declining quality of the seawater, greater use of more effective fishing gear, and illegal fishing (OEPP, 1997b). The second problem is decreased fishing grounds, caused by the extension of the exclusive economic zone to 200 nautical miles and by Myanmar's decision to stop further concessions to Thai vessels to fish in its territorial waters.

The mangrove area is deteriorated and declining due to encroachment for residential purpose and aquaculture. Coral reefs are being further destroyed by dynamite fishing and other unsuitable fishing methods as well as by sediments from mining. Seagrass tends to decline in quantity due to unsuitable conditions for growth.

As for Phuket province, it is the only island province of Thailand. It is situated in the Andaman Sea, about 867 km south of Bangkok. The area covers about 534 sq km and has 224 km of coastline, which is suitable for both fishing activities and tourism. About 70 percent of the province is mountainous, the rest coastal plains. The eastern part of the province consists of mangrove forests, whereas the western part has beautiful beaches.

The province has three districts (Muang, Thalang and Katu), 17 *tambons* and 107 villages and its population numbered 196 625 in 1993. The main economic activity and source of income is tourism. The other economic activities are marine capture fishery and coastal aquaculture, fishery-related processing industries, and mining. According to the latest NSO survey, there

were 30,793 rural households in 1994. Of these, 12 percent earned less than B10,000, 12 percent earned between B10,000 and B19,999, 19 percent earned between B20,000 and B29,999, 21.7 percent earned between B30,000 and B49,999, and 19 percent earned B50,000 or more per year (NSO, 1996b, p. 99).

The two main problems in marine capture fishery are depleting fishery resources and declining catches. The depletion of fishery resources is caused by overfishing and by unsuitable use of fishing gear. The decrease in catches is caused by higher benzene and diesel costs, depleting fishery resources and lack of local labour (OEPP, 1997b). Coastal aquaculture faces the problem of declining production and profitability due to the higher cost of land, incorrect methods of culture, high prices of feed and chemicals and lack of group efforts. The mangrove area is declining due to encroachment for residence and aquaculture purposes. The coral reefs are deteriorating because of destructive fishing activities, mining and such an apparently innocuous tourist activity as sea walking.

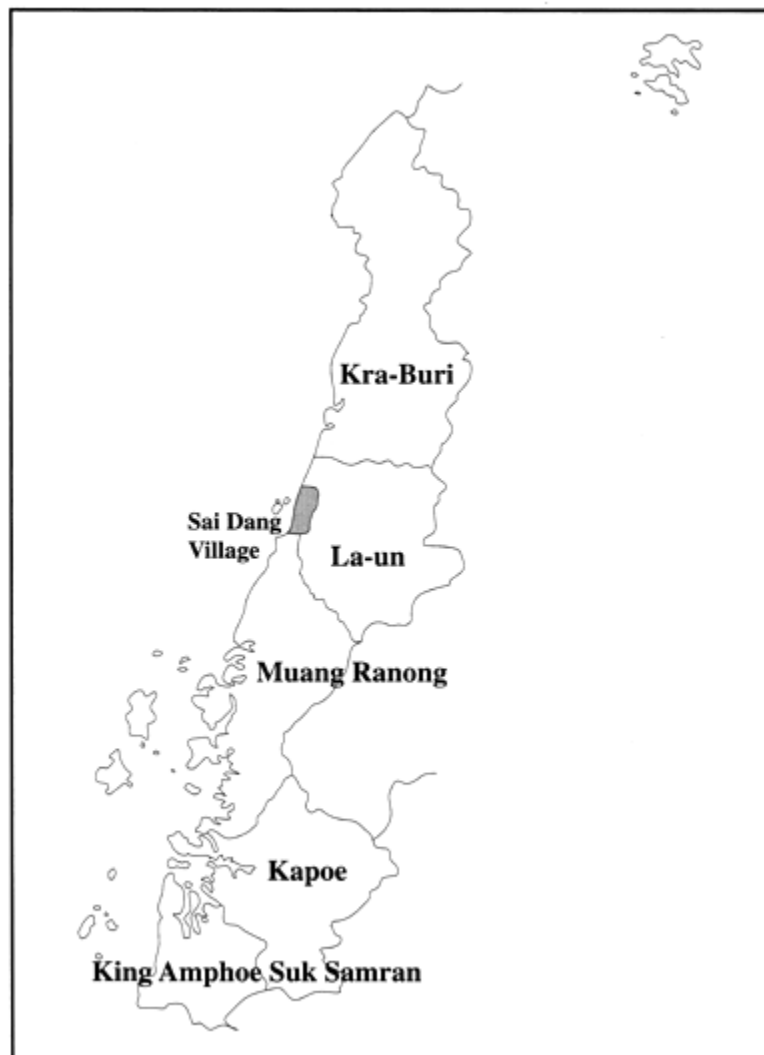


Figure 1.1 Location of Sai Dang village in Ranong province

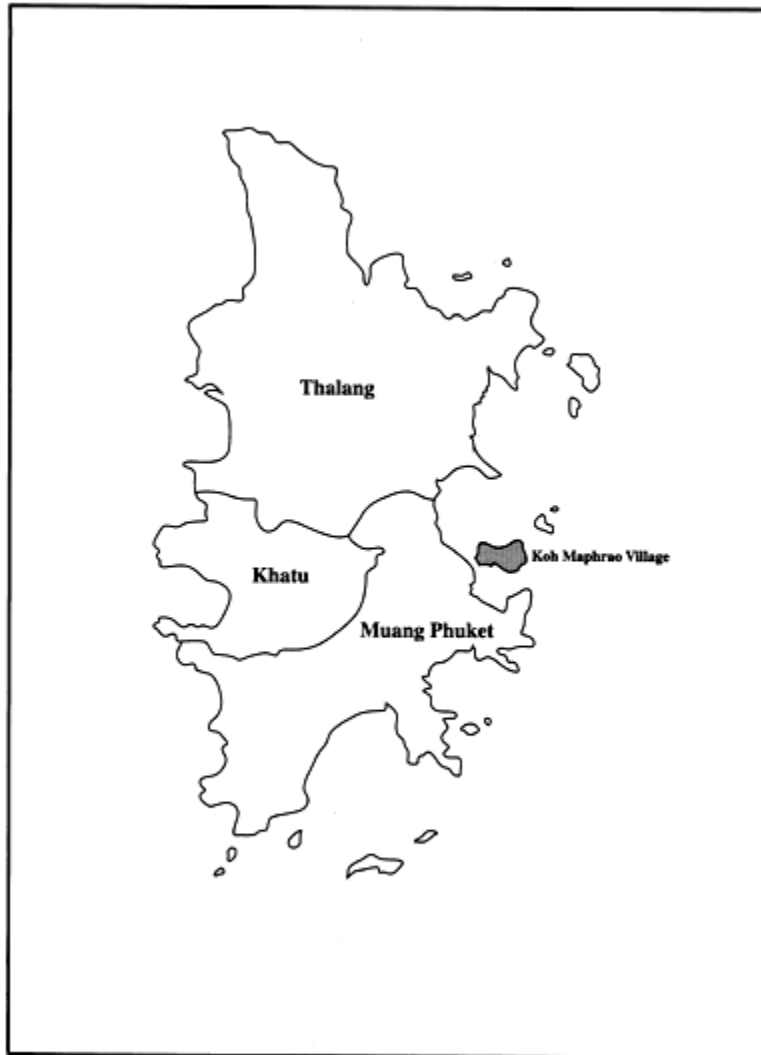


Figure 1.2 Location of Koh Maphrao village in Phuket province

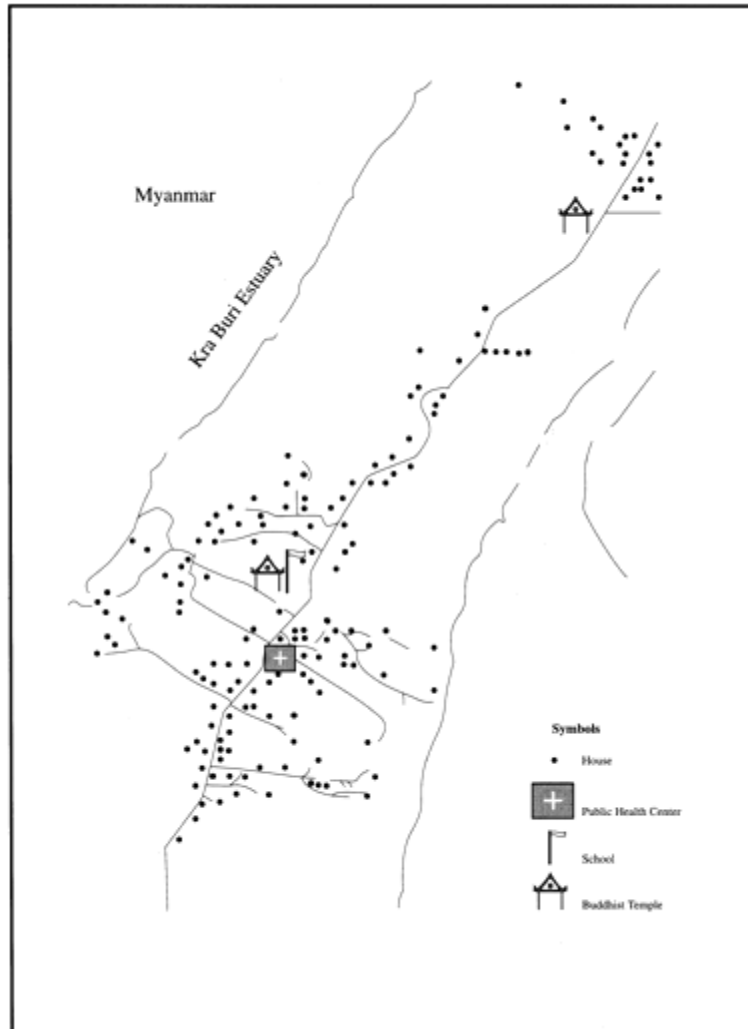


Figure 1.3 Map of Sai Dang village

II.2 The surveyed households

The survey of Sai Dang and Koh Maphrao villages was based on two sets of questionnaires, one for the heads of household and the other for the women aged 15–44 in the households. The household questionnaire consists of questions pertaining to the social and demographic characteristics of household members, of the head of the household and of the household itself. The questionnaire for women of fertile age consists of questions regarding fertility and family planning practice. This chapter is divided into the following sections: general characteristics, age and sex structure, social and demographic characteristics of household members; heads of household; household income and debts; and fertility and family planning.

General household characteristics

In terms of source of drinking water, 65 percent of the 79 households in Sai Dang village depend on private wells, as more households than in Koh Maphrao village depend on mixed

farming. About 20 percent of the households, all of them located on the eastern side of the village, depend on water that runs down from the small hill bordering the village to the east. Half of the households in Koh Maphrao use water from private wells and the other half water from public wells. Sai Dang and Koh Maphrao cannot be compared in terms of electricity because the latter village does not have public electricity and has to depend on electricity generators (Table 2.1).

Regarding the treatment of drinking water, there is a significant difference between the two villages. Only 10 percent of the households in Sai Dang boil water for drinking, but 20 percent of the households in Koh Maphrao do so. This is due to the salinity of the water in the latter village, which is located on an island. The percentage of Sai Dang households that never boil water for drinking is more than twice that of Koh Maphrao households that don't either, also because of the availability of pipe water and water from the hill. A smaller percentage of the households in Sai Dang than in Koh Maphrao boil or filter their drinking water only some of the time for the same reasons (Table 2.2).

The availability of toilets is higher in Sai Dang than in Koh Maphrao. About 92 percent of the Sai Dang households have toilets, compared to about 83 percent in Koh Maphrao. This is due to the fact that in several cases in Koh Maphrao, recently married young people who are still having their houses built temporarily share the toilet in the home of their parents or use dug toilets. The toilets in Sai Dang, however, are not as sanitary as those in Koh Maphrao. About seven percent of toilets in Sai Dang and about two percent in Koh Maphrao are unsanitary toilets (ส่วนหลุม) (Table 2.3).

Being in the mainland with better access to public utilities and consumer goods, Sai Dang has more varied sources of fuel for cooking. About 40 percent of the households use gas for cooking, 30 percent use both gas and electricity and about 20 percent use charcoal. In Koh Maphrao, about 80 percent of the households use gas for cooking and the rest use charcoal (Table 2.4).

In terms of rubbish disposal, households in Sai Dang are less aware of the need to keep the seawater unpolluted than are the households in Koh Maphrao. Almost 76 percent of the households in Sai Dang burn their rubbish, compared to about 90 percent in Koh Maphrao. What is alarming is that 17 percent of Sai Dang households dispose of their rubbish into the sea, whereas only one percent of those in Koh Maphrao do so (Table 2.5). The interview of two pairs of individuals of two generations in each of the villages will later confirm the lack of awareness in Sai Dang fishery households of the need to keep the coastal seawater unpolluted.

Age and sex structure

Families are smaller in Sai Dang than in Koh Maphrao. In Sai Dang village, almost 40 percent of the 79 surveyed households have four members. In Koh Maphrao, household size varies greatly, ranging from households with one member to one household with 12 members (Table 2.6). There are 320 household members in the 79 households sampled in Sai Dang, with an average of 4.1 persons per household. There are 414 members in the 94 households surveyed in Koh Maphrao, with an average of 4.7 persons per household. If the outlying value of the one household with 12 members is disregarded, the average declines to 4.3 persons per household (Table 2.7). Yet, the same table also indicates a wider variation in Koh Maphrao than in Sai

Dang. That is, 59 percent of the 320 persons surveyed in Sai Dang are in households of four or five members, but only 41 percent in the case of the 414 persons sampled in Koh Maphrao.

Table 2.8 and Figures 2.1 and 2.2 show the age and sex structure of each fishing community. The Sai Dang demographic structure is much more irregular than that of Koh Maphrao, indicating that there may be quite a bit of migration in and out of Sai Dang. The age and sex distribution in Koh Maphrao indicates no such trend, but shows clearly that the birth rates are declining, resulting in a lower proportion of the population under 10 years of age.

Social and demographic characteristics of household members

In terms of marital status, there is a higher percentage of married household members in Sai Dang than in Koh Maphrao, and a lower percentage of single members. There is also a lower percentage of widowed or divorced persons. These different marital patterns are characteristic of the less developed and younger population of Sai Dang compared to that of Koh Maphrao. An indicator of this is the different age and sex structure already presented; another is the higher proportion of married members in the 20–29 age group in Sai Dang (Tables 2.9 and 2.10).

The level of education completed by the members of both communities is not high. Excluding those too young or studying, 71 percent and 76 percent of household members in each community completed only elementary education (Tables 2.11 and 2.12). Over 10 percent of the members in both communities did not receive any schooling.

Regarding the main occupation, household members in Sai Dang engage in more various activities than their counterparts in Koh Maphrao. They are also less involved in fishing activities, either as self-employed or as employees. Table 2.13 shows that in Sai Dang, 'other occupations' accounts for the highest proportion, followed by 'housewife', 'agriculture' and 'fishery', in that order. Table 2.14 shows that, in Koh Maphrao, the majority are engaged in fishing activities and that the other important occupation is agriculture (exclusively rubber orchards).

The majority of members of both communities (roughly 70 percent) have no minor occupation. Those in Sai Dang who do are engaged in agriculture, 'other occupations' and fishery, respectively (Table 2.15); in Koh Maphrao, they are engaged in 'other occupations', fishery or agriculture, in that order (Table 2.16).

Heads of household

About 90 percent of Sai Dang households and 93 percent of Koh Maphrao households are headed by men (Table 2.17). Regardless of gender, there is an equal proportion (24 percent) of households in Sai Dang headed by persons in the 30–39 and in the 40–49 age groups. In Koh Maphrao, 35 percent are in the 30–39 age group and 27 percent in the 40–49 age group. The average age of heads of household in Sai Dang is 43.5 years and 42.5 years in Koh Maphrao. This is due to the facts that a greater number of Sai Dang families are of the nuclear type and that there is a higher proportion of long established farming households. Those in Koh Maphrao are usually extended families, where relatives are taken as household members as well.

Without classifying the households into fishery or non-fishery households, the highest proportion of household heads in both communities report that, in terms of main occupation and

employment status, they are fishermen or fishery employees (Table 2.18). In Sai Dang, both groups account for 29 percent of all the heads of household, while in Koh Maphrao, they account for 46 percent.

Only about one third of the heads of household in Koh Maphrao have a secondary occupation, but the proportion is higher in Sai Dang, mainly because of the greater variety of jobs available due to the proximity of the town of Ranong. Table 2.19 shows that about 63 percent of heads of household in Sai Dang and 67 percent in Koh Maphrao had no secondary occupation in 1997. Among those who did, the second jobs taken in Sai Dang were, by order of importance, agriculture, fishing activities and general labour, while in Koh Maphrao, they were fishing activities, agriculture and general labour.

The average annual income of the heads of household in Sai Dang is higher than that of their counterparts in Koh Maphrao, because the non-fishery occupations in Sai Dang are more varied and earn more regular income than in Koh Maphrao. Table 2.20 shows that, in 1997, heads of household in Sai Dang earned about B75,000 a year, compared to about B62,200 in Koh Maphrao. However, the heads of fishery households in Sai Dang earned about B60,000, i.e. roughly B13,000 less than their counterparts in Koh Maphrao. On the contrary, Sai Dang heads of non-fishery households earned about B84,000, almost double what their counterparts earned in Koh Maphrao. This is because almost all of the non-fishery households in Koh Maphrao depend on rubber orchards, whose production period lasts only three to four months per year.

Household incomes and debts

The actual gross annual household income in 1997 was higher in Sai Dang than in Koh Maphrao, for the same reasons given regarding the income of heads of household (Table 2.21). In Sai Dang, the total gross annual household income then was roughly B87,000; in Koh Maphrao, it averaged B74,500. Considering that the gross annual household income in the rural areas of the Southern Region was B84,528 in 1994, the inflation rates of 5.8 percent, 5.9 percent and 5.6 percent of the next three years (Bangkok Bank, 1998, p. 14) would have increased the average to around B 100,000 in 1997, a figure noticeably higher than the average income in the two villages under survey.

Nonetheless, the fishery households in Sai Dang earned less than their counterparts in Koh Maphrao, whereas the non-fishery households earned more. Fishery households in Sai Dang earned about B79,700, while their counterparts in Koh Maphrao earned B83,500. For the non-fishery households, the gross annual household income was B91,800 in Sai Dang and B63,900 in Koh Maphrao. Compared to the regional average, fishing households in both communities earned less, and much less in the case of Sai Dang fishing households.

Despite the actually higher household income in Sai Dang, a higher proportion of the households of both types in that village must have spent more of their gross income than was the case for those in Koh Maphrao. Table 2.22 shows interviewee opinions in both villages regarding household income sufficiency. In Sai Dang, almost 50 percent of the fishery households report that their household income is sufficient, but only 44 percent of the non-fishery households do so. In Koh Maphrao, 73 percent of the fisherfolk interviewed feel that their income is sufficient, but only 54 percent of the non-fishery interviewees report likewise. Examining all households that report income sufficiency, one finds that less than half of the interviewees in Sai Dang feel that their income was sufficient, compared to about 64 percent in Koh Maphrao.

It is only to be expected then that the proportion of households able to save is lower in Sai Dang than in Koh Maphrao. Table 2.23 shows that as a whole, 33 percent of the households in Sai Dang are able to save some of their income, while 47 percent of those in Koh Maphrao are able to do so. Examining the households by type, it becomes clear that roughly 30 percent of the households of both types in Sai Dang are able to save some income, but the rest are not. In Koh Maphrao as a whole, 47 percent of the households are able to save, while about 50 percent are unable to do so. However, if examined by household type, it is very notable that while more than 60 percent of the fishery households are able to save, less than 30 percent of the non-fishery households are able to do likewise. Because Koh Maphrao was not affected by the Zeta monsoon in 1997 but Sai Dang was, the comparison indicates as in the previous table that fishery households in Koh Maphrao are better off economically than the non-fishery households.

Despite the information from the two previous tables, it is surprising that a high percentage of the households in both Sai Dang and Koh Maphrao did not borrow. Table 2.24 shows that about 60 percent of the households in Sai Dang and about 70 percent in Koh Maphrao did not borrow in 1997 and that only about 35 percent in Sai Dang and 29 percent in Koh Maphrao did borrow. This finding supports the census finding that small-scale fishermen are less likely than medium- to large-scale fishermen to borrow (Table 3.9 in Part I).

Among those households that borrowed, Sai Dang households borrowed mainly from BAAC or other banks (43 percent) and from friends and relatives (35 percent). In Koh Maphrao, the majority of the households that borrowed did so from a local co-operative called Savings Group for Occupational Purposes (Table 2.25).

The amounts borrowed were not high in either communities, but they were higher in Sai Dang than in Koh Maphrao. In Sai Dang, about 43 percent of the households borrowed less than B10,000, compared to about 48 percent in Koh Maphrao. The average amount borrowed was about B21,000 in Sai Dang and B13,400 in Koh Maphrao (Table 2.26). In both communities, fishery households borrowed less than non-fishery households on average, most probably due to the fact that the former need to spend less on food. In Sai Dang, fishery households borrowed about B19,500, while the non-fishery households borrowed about B22,000 on average. In Koh Maphrao, the respective amounts were B10,400 and B16,750.

Table 2.27 shows the purpose of borrowing. The information about the purpose of borrowing among the fishery households was found to be not entirely reliable in the Sai Dang community. By later probing, it was found that a number of the interviewees who had borrowed from BAAC for the stated purpose of occupational investment used the loans for household consumption and payment of goods by instalment. In Koh Maphrao, 50 percent of the fishery households borrowed for occupational investment, but still quite a high percentage (42 percent) borrowed for household use. In terms of current debts, Table 2.28 shows that in Sai Dang as a whole, about 36 percent of households owe B20,000 or more, while in Koh Maphrao the percentage is eight percent. In both communities, however, about 40 percent of all households have no more debts.

Nonetheless, for both Sai Dang and Koh Maphrao, the data on the number of households borrowing money and subsequent related topics should be treated with extreme caution, as the cases are small. It is also likely that interviewees are unwilling to respond truthfully to these sensitive questions.

Fertility and family planning

To reiterate, the field study sampled 79 households in Sai Dang and 94 households in Koh Maphrao. Two sets of questionnaires were used, one for the households and the other for the women of fertile age within each household. Women of fertile age are defined as of 15 to 44 years of age. Because of the small number of households studied in each village and the necessity to classify women by age group, the distinction between fishing and non-fishing households was discarded. The decision is also based on the observation by a number of public health officials that there is hardly any difference any longer between the two types of households regarding fertility and family planning.

Social characteristics

There are 68 women of fertile age in the Sai Dang community and the same number in Koh Maphrao. All but one woman in Sai Dang are Thai Buddhists, the one exception being a Burmese Buddhist. In Koh Maphrao all are Thai Muslims (Table 2.29). Almost 90 percent of the women in both communities speak the Southern Thai dialect at home (Table 2.30). However, more women in Sai Dang than in Koh Maphrao speak standard Thai fluently (Table 2.31).

Fertility

The age distribution of fertile women in each community indicates a younger age structure in Sai Dang compared to Koh Maphrao. The majority of Sai Dang women are in the 20–29 age group, whereas the majority of the Koh Maphrao women are in the 30–39 age group. The proportion of Sai Dang women in the 15–19 age group is almost six times as high as that of Koh Maphrao women.

Table 2.32 shows the number of live births per woman by age group. Discounting age considerations, the majority of women in Sai Dang have either one child (31 percent) or two children (27 percent). In Koh Maphrao, there are variations and no clear majority: 28 percent have one child, 21 percent have two children and 25 percent have three. This finding is not surprising, given the younger age structure of fertile women in Sai Dang compared to Koh Maphrao. The average number of live births in Sai Dang is 1.78 per woman, while that of Koh Maphrao is 2.40 per woman.

Desired family size

The women interviewed were asked how many children they would like to have if they could start their married life again. Table 2.33 shows that, in Sai Dang, the majority of them (66 percent) would want two children and 19 percent would prefer three. In Koh Maphrao, the comparable percentages were 38 percent and 25 percent. In other words, 85 percent of the Sai Dang women would like two or three children, while only 63 percent of Koh Maphrao women expressed the same wish.

While there is no relationship between age and desired family size among the under 40 years old in Sai Dang (over 60 percent wishing for two children), there is a positive relationship between the two variables and women in the 20–29 and 30–39 age groups in Koh Maphrao. That is, those in the younger age group wish for two children while those in the older age group wish for two or three.

To gauge the sex preference for one's children, women stating that they wished for three children were selected and then classified by sex preference. Though their number was small,

they did indicate a preference for male children, more strongly among Sai Dang women than among Koh Maphrao women. Almost 70 percent of the Sai Dang women would like two boys and one girl, but only 53 percent of the women in Koh Maphrao made the same choice.

Family planning

The women interviewed were asked about their knowledge of various methods of family planning. Table 2.34 shows the responses in each village. The methods listed are the pill, injections, sterilization, IUD, condom, Norplant, safety period and external ejaculation. They were first asked without any prompting and then with prompting, i.e. a method was mentioned and they were asked for a brief description to check if they really knew about it. It was found that for the women of both communities, the two best-known methods were the pill and injections.

Without prompting, the pill and injections are the two methods known to most women in Sai Dang. The pill is known by 97 percent of the women interviewed and injections by 86 percent. Female sterilization is known by 63 percent of the women. Other methods that are known to more than 50 percent of the women are condom, IUD, Norplant and male sterilization, in that order. The method known to the lowest percentage of women in Sai Dang is the safety-period method, which is the least reliable method. After prompting, less than 20 percent of the women interviewed did not know about the most effective methods.

Table 2.34 also shows that the pill and injections are also the two methods known, without prompting, to most of the women interviewed in Koh Maphrao, 97 percent for the pill and 88 percent for injections. The other methods known to about 70 percent of the women are female sterilization, male sterilization and IUD. Some 60 percent knew about Norplant. Again, the least known method was the safety-period method; only about 12 percent of the women knew about it.

Regarding the attitude to family planning, Table 2.35 shows that roughly 95 percent of the interviewed women of all ages in both communities have a positive attitude toward family planning. The examination by age group also results in the same conclusion that the overwhelming majority (more than 80 percent in each age group) have a positive attitude toward family planning.

In terms of practice of family planning, Table 2.36 shows the responses of the women in each community when asked whether they had ever used the contraceptive methods listed in the previous paragraphs. As expected, the two methods ever used by the majority of women in both communities were the pill and injections.

In terms of current practice, the women were asked which method they were currently using. Tables 2.37 and 2.38 show the response of the women in Sai Dang and in Koh Maphrao respectively. In Sai Dang, the pill, female sterilization and injections are used by the highest percentages of women, i.e. 36.7 percent, 24.5 percent and 18.4 percent, respectively. Nineteen respondents were not using any method of contraception at the time, mainly women in the 20–29 age group hoping to get pregnant. In Koh Maphrao, the majority of women (62.5 percent) were taking the pill. Twenty respondents were not using any method of contraception at the time, mainly women in the 20–39 age group wishing for a child. The other reasons were allergy to contraceptives, being in the post-natal period, being infertile or, in a few cases, being past menopause.

Table 2.39 illustrates the sources of contraceptives. About 66 percent and 84 percent of the women in Sai Dang and in Koh Maphrao respectively obtain their contraceptives from the village public health centre. The higher percentage of women in Koh Maphrao using the family planning services provided by the centre is due to its proximity as well as to constant surveillance by the two public health officers there.

Summary and discussion

The households in Sai Dang have access to public electricity, piped water and relatively clean water from the hills. They are thus more likely to have many sources of drinking water and less likely to have to boil water to drink. Being on the mainland with better access to public utilities and consumer goods, Sai Dang households also have more varied sources of fuel for cooking. Though more households in Sai Dang than in Koh Maphrao have toilets, the proportion of households in Sai Dang having unsanitary dug toilets is higher than in Koh Maphrao. Sai Dang households are not as aware as those in Koh Maphrao of the need to keep the sea clean; a higher proportion of them dispose of their rubbish by throwing it into the sea. This relative lack of environmental awareness seems to be due to the fact that many fishing households in Sai Dang were established recently and their members still have to be granted full Thai citizenship. Field observation confirms that many households have just been set up and are of Burmese immigrants from the other side of the Kra Buri estuary.

The average household size is smaller in Sai Dang than in Koh Maphrao - 4.1 persons per household compared to 4.3. Sai Dang households are more likely to be of the nuclear type and Koh Maphrao households of the extended type comprised of members of three generations. The education attainment in both communities is not high; the majority completed only elementary education. The household members in Sai Dang engage in more varied occupations than those in Koh Maphrao and a lower proportion of them are involved in fishing activities, either as fishermen or as fishery employees.

The heads of household in both communities are almost exclusively male. In Sai Dang, their average age is 43.5 years, whereas in Koh Maphrao it is 42.5 years. This one-year difference is due to two facts: the higher proportion of long-established farming households in Sai Dang and the presence of more ageing relatives in Koh Maphrao households. About 29 percent of the heads of households in Sai Dang and about 46 percent in Koh Maphrao are fishermen or fishery employees. The heads of household in Sai Dang earn higher annual income on average than those in Koh Maphrao, because the non-fishery occupations in Sai Dang are more varied and provide more regular income. However, considering only fishery households, their heads in Sai Dang earn less than their counterparts in Koh Maphrao.

The actual gross annual household income in Sai Dang is higher than in Koh Maphrao for the reason already given regarding the differential income of the heads of household. Nevertheless, Sai Dang households seem to spend more of their gross income than those in Koh Maphrao, because the majority of them report that their household income is barely sufficient or insufficient, whereas the majority of Koh Maphrao households find their income sufficient. It follows that a smaller proportion of Sai Dang households are able to save on their income and a larger proportion have to borrow. The main sources of loan for Sai Dang households are BAAC, and friends and relatives. The majority of Koh Maphrao households that borrow do so from the locally established savings co-operative. In both communities, the loans are small, mostly under B10,000, but the average loan in Sai Dang is higher than it is in Koh Maphrao, no matter whether the borrowers are fishery or non-fishery households.

Considering only the fishery households, we found that one third of them in Sai Dang borrowed, but only one quarter in Koh Maphrao. This finding supports the census data that a small proportion of the small-scale marine capture fishery households were in debt, compared to medium- to large-scale households. However, the field data regarding the source of loan are not very consistent with those from the marine fishery censuses, which show that the main source of loan for small-scale fishermen is not BAAC but the middlemen. In the case of Sai Dang, it was found that BAAC was the main source but in the case of Koh Maphrao, the locally established savings co-operative was. The discrepancy may be due to data variability because the number of fishery households that borrowed was very small. In any case, this shows that Koh Maphrao households have been able to set up and successfully maintain an occupation-oriented organization. The implication of this ability in relation to an integrated coastal zone management programme is that such a programme would have a higher chance of success in Koh Maphrao than in Sai Dang.

The age structure in Sai Dang is younger than in Koh Maphrao and this reflected in the case of women of fertile age. The majority of Sai Dang women are in the 20–29 age group, while the majority of Koh Maphrao women are in the 30–39 age group. Being in the midst of their childbearing years, Sai Dang women have on average 1.78 children each. Being in the later part of their childbearing period, Koh Maphrao women have on average 2.4 children. The women in both communities have a very good knowledge of family planning methods, the most widely known of which are the pill and injections. They also display positive attitude toward family planning and use contraceptives to regulate the size of their families. As the desired family size of the women in both communities is of either two or three children, the future trend is that actual family size will stay the same as, or will be lower than, the desired family size, which is also the national trend. The implication of the trend toward lower fertility is that the population pressure on food, including fish and fishery products, will lessen over time. Future demand for seafood will arise more from the national and global trend toward health food, in which fish is the main source of white meat, and from rising export demand for fish and fishery products.

The findings about the two communities provide an indication that fishing communities in Thailand are in transition. Koh Maphrao village is a traditional fishing village where the majority of the households engage in fishery as their main occupation and derive sufficient income therefrom. The villagers are homogeneous in terms of occupation and related by kinship ties. They tend to live in extended households and are more or less self-sufficient in terms of food. Given the process of modernization and continuous exploitation of natural resources, there is a trend that Koh Maphrao will become similar to Sai Dang. The latter village is characterized by occupational diversification in which fishing households do not comprise the majority and are less self-sufficient. The members of the community tend to live in nuclear households and, due to migration, they are not related by kinship ties. Because of lower returns from primary occupations such as agriculture and fishery compared to those from industrial and service-related occupations, the fishing community is transforming itself into a primarily non-fishing community. **In short, there is an indication that small fishing communities will gradually diversify economically because fishery as an occupation will be less sustainable. This trend could be reversed only if coastal fishery resources are more abundant and their exploitation is better managed and regulated.**

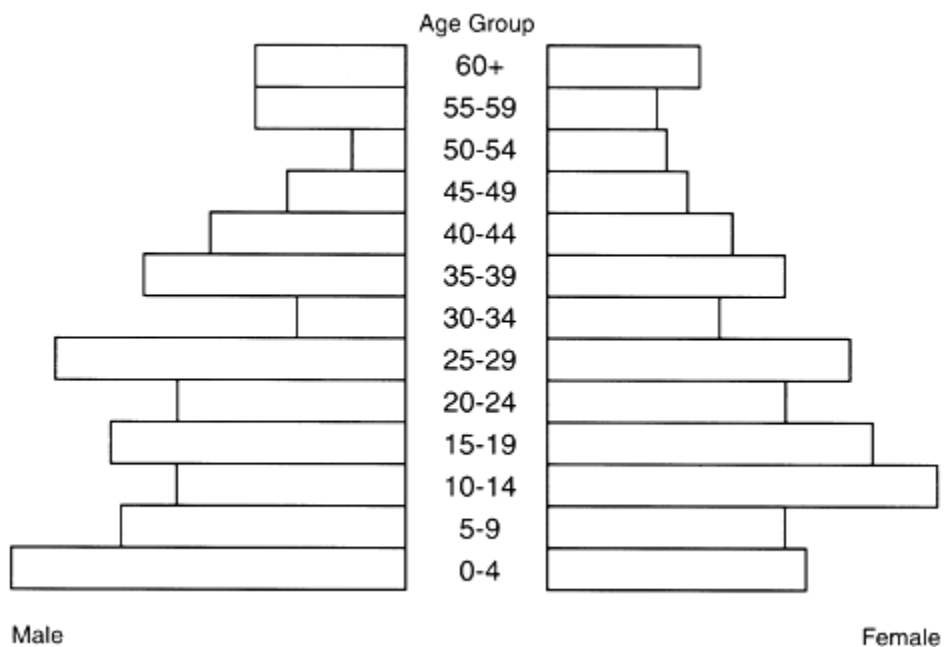


Figure 2.1 Age and sex structure of Sai Dang, 1998

Source: Table 2.8



Figure 2.2 Age and sex structure of Koh Maphrao, 1998

Source: Table 2.8

Table 2.1 Source of household drinking water, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Source of Drinking Water	Sai Dang Village		Koh Maphrao Village	
	Number	%	Number	%
Private pipe water	-	0.0	-	0.0
Public pipe water	9	11.4	-	0.0
Private well	51	64.6	47	50.0
Public well	4	5.1	46	48.9
Rain water	-	0.0	1	1.1
Others	15	19.0	-	0.0
Total	79	100.0	94	100.0

Table 2.2 Treatment of household drinking water, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Treatment of Drinking Water	Sai Dang Village		Koh Maphrao Village	
	Number	%	Number	%
Always boiled/filtered	8	10.1	19	20.2
Never boiled/filtered	57	72.2	31	33.0
Sometimes boiled/filtered	14	17.7	44	46.8
Total	79	100.0	94	100.0

Table 2.3 Availability of toilets, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Availability of Toilet	Sai Dang Village		Koh Maphrao Village	
	No. of Households	%	No. of Households	%
Not available	6	7.6	6	6.4
Available	73	92.4	88	93.6
Flush toilet	-	0.0	-	0.0
Squattered toilet	68	86.1	86	91.5
Dug toilet	5	6.3	2	2.1
Total	79	100.0	94	100.0

Table 2.4 Source of cooking fuel, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Source of Cooking Fuel	Sai Dang Village		Koh Maphrao Village	
	No. of Households	%	No. of Households	%
Electricity	3	3.8	-	0.0

Gas	31	39.2	76	80.9
Charcoal	15	19.0	18	19.1
Electricity & Gas	24	30.4	-	0.0
Others	6	7.6	-	0.0
Total	79	100.0	94	100.0

Table 2.5 Methods of rubbish disposal of the households, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Rubbish Disposal Methods	Sai Dang Village		Koh Maphrao Village	
	No. of Households	%	No. of Households	%
Burying	4	5.3	4	4.3
Burning	58	76.3	83	89.2
Throwing into the Sea	13	17.1	1	1.1
Burying + Burning	1	1.3	1	1.1
Others	-	0.0	4	4.3
Total	76	100.0	93	100.0

Table 2.6 Household size in Sai Dang village and Koh Maphrao village, 1998

Household Size	Sai Dang Village		Koh Maphrao Village	
	Households	%	Households	%
1	1	1.3	2	2.1
2	10	12.7	7	7.4
3	14	17.7	22	23.4
4	31	39.2	21	22.3
5	13	16.5	19	20.2
6	5	6.3	15	16.0
7	3	3.8	5	5.3
8	1	1.3	2	2.1
9	1	1.3	-	0.0
12	-	0.0	1	1.1
Total	79	100.0	94	100.0

Table 2.7 Household size and number of household members in Sai Dang village and Koh Maphrao village, 1998

Household Size	Sai Dang Village		Koh Maphrao Village	
	Household Members	%	Household Members	%
1	1	0.3	2	0.5

2	20	6.3	14	3.4
3	42	13.1	66	15.9
4	124	38.8	84	20.3
5	65	20.3	95	22.9
6	30	9.4	90	21.7
7	21	6.6	35	8.5
8	8	2.5	16	3.9
9	9	2.8	-	0.0
12	-	0.0	12	2.9
Total	320	100.0	414	100.0
Mean	4.05		4.66	

Table 2.8 Age and sex structure of Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Age	Sex		Sai Dang Village				Koh Maphrao Village					
	Male	%	Female	%	Total	%	Male	%	Female	%	Total	%
0–4	21	6.6	15	4.7	36	11.3	22	5.3	18	4.4	40	9.7
5–9	15	4.7	14	4.4	29	9.1	21	5.1	23	5.6	44	10.7
10–14	12	3.8	22	6.9	34	10.6	21	5.1	26	6.3	47	11.4
15–19	17	5.3	18	5.6	35	10.9	22	5.3	16	3.9	38	9.2
20–24	12	3.8	14	4.4	26	8.1	16	3.9	24	5.8	40	9.7
25–29	19	5.9	17	5.3	36	11.3	17	4.1	18	4.4	35	8.5
30–34	6	1.9	10	3.1	16	5.0	17	4.1	17	4.1	34	8.2
35–39	15	4.7	14	4.4	29	9.1	14	3.4	20	4.8	34	8.2
40–44	11	3.4	11	3.4	22	6.9	12	2.9	9	2.2	21	5.1
45–49	7	2.2	8	2.5	15	4.7	13	3.1	6	1.5	19	4.6
50–54	3	0.9	7	2.2	10	3.1	3	0.7	6	1.5	9	2.2
55–59	9	2.8	5	1.6	14	4.4	7	1.7	7	1.7	14	3.4
60 & over	9	2.8	9	2.8	18	5.6	18	4.4	20	4.8	38	9.2
Total	156	48.8	164	51.3	320	100.0	203	49.2	210	50.8	413	100.0

Table 2.9 Age by marital status, Sai Dang village, 1998

Age	Marital Status									
	Single	%	Married	%	Widowed	%	Separated/Divorced	%	Total	%
Under 15	99	71.7	3	1.8	-	0.0	-	0.0	102	31.9
15–19	27	19.6	5	3.0	-	0.0	-	0.0	32	10.0
20–29	11	8.0	51	30.2	-	0.0	-	0.0	62	19.4
30–39	-	0.0	43	25.4	2	16.7	-	0.0	45	14.1

40–49	1	0.7	35	20.7	1	8.3	-	0.0	37	11.6
50–59	-	0.0	22	13.0	2	16.7	-	0.0	23	7.2
60 & over	-	0.0	10	5.9	7	58.3	1	100.0	19	5.9
Total	138	100.0	169	100.0	12	100.0	1	100.0	320	100.0

Table 2.10 Age by marital status, Koh Maphrao village, 1998

Age	Marital Status								Total	%
	Single	%	Married	%	Widowed	%	Separated/Divorced	%		
Under 15	131	66.2	-	0.0	-	0.0	-	0.0	131	31.7
15–19	34	17.2	3	1.7	-	0.0	1	10.0	38	9.2
20–29	28	14.1	41	22.7	1	4.2	5	50.0	75	18.2
30–39	3	1.5	63	34.8	2	8.3	-	0.0	68	16.5
40–49	2	1.0	37	20.4	-	0.0	1	10.0	40	9.7
50–59	-	0.0	19	10.5	3	12.5	1	10.0	23	5.6
60 & over	-	0.0	18	9.9	18	75.0	2	20.0	38	9.2
Total	198	100.0	181	100.0	24	100.0	10	100.0	413	100.0

Table 2.11 Level of education completed, Sai Dang village, 1998

Age	Too Young	%	Studying	%	Elementary	%	Secondary	%	Tertiary	%	No education	%	Total	%
Under 5	28	96.6	9	10.2	-	0.0	-	0.0	-	0.0	-	0.0	37	11.6
5–9	1	3.4	27	30.7	-	0.0	-	0.0	-	0.0	-	0.0	28	8.8
10–19	-	0.0	52	59.1	11	7.7	4	15.4	-	0.0	2	6.9	69	21.6
20–29	-	0.0	-	0.0	42	29.4	16	61.5	1	25.0	2	6.9	61	19.1
30–39	-	0.0	-	0.0	36	25.2	2	7.7	3	75.0	4	13.8	45	14.1
40–49	-	0.0	-	0.0	28	19.6	2	7.7	-	0.0	7	24.1	37	11.6
50–59	-	0.0	-	0.0	15	10.5	2	7.7	-	0.0	7	24.1	24	7.5
60 & over	-	0.0	-	0.0	11	7.7	-	0.0	-	0.0	7	24.1	18	5.6
Total	29	100.0	88	100.0	143	100.0	26	100.0	4	100.0	29	100.0	319	100.0

Table 2.12 Level of education completed, Koh Maphrao village, 1998

Age	Too Young	%	Studying	%	Elementary	%	Secondary	%	Tertiary	%	No education	%	Total	%
Under 5	1	100.0	38	27.1	-	0.0	-	0.0	-	0.0	-	0.0	39	9.4
5-9	-	0.0	45	32.1	-	0.0	-	0.0	-	0.0	-	0.0	45	10.9
10-19	-	0.0	56	40.0	17	8.3	12	41.4	-	0.0	-	0.0	85	20.6
20-29	-	0.0	1	0.7	55	26.7	13	44.8	4	100.0	2	6.1	75	18.2
30-39	-	0.0	-	0.0	62	30.1	2	6.9	-	0.0	4	12.1	68	16.5
40-49	-	0.0	-	0.0	39	18.9	1	3.4	-	0.0	-	0.0	40	9.7
50-59	-	0.0	-	0.0	17	8.3	1	3.4	-	0.0	5	15.2	23	5.6
60 & over	-	0.0	-	0.0	16	7.8	-	0.0	-	0.0	22	66.7	38	9.2
Total	1	100.0	140	100.0	206	100.0	29	100.0	4	100.0	33	100.0	413	100.0

Table 2.13 Main occupation and employment status, Sai Dang village, 1998

Main Occupation	Current Age Group												Total	%
	10-19	%	20-29	%	30-39	%	40-49	%	50-59	%	60 & over	%		
Agriculture	-	0.0	5	8.1	4	8.9	4	10.8	7	29.2	7	38.9	27	13.2
Fishery	3	16.7	13	21.0	4	8.9	8	21.6	1	4.2	1	5.6	30	14.7
Trade	-	0.0	4	6.5	3	6.7	6	16.2	2	8.3	1	5.6	16	7.8
Services	1	5.6	5	8.1	3	6.7	-	0.0	1	4.2	1	5.6	11	5.4
Agricultural Labourer	-	0.0	-	0.0	4	8.9	1	2.7	-	0.0	1	5.6	6	2.9
Fishery Labourer	-	0.0	1	1.6	-	0.0	-	0.0	1	4.2	-	0.0	2	1.0
Industrial Labourer	1	5.6	2	3.2	-	0.0	-	0.0	-	0.0	-	0.0	3	1.5
Service Labourer	1	5.6	2	3.2	3	6.7	2	5.4	1	4.2	-	0.0	9	4.4
General Labourer	3	16.7	2	3.2	4	8.9	5	13.5	2	8.3	-	0.0	16	7.8
Other	6	33.3	10	16.1	8	17.8	5	13.5	8	33.3	6	33.3	43	21.1
Housewife	3	16.7	18	29.0	12	26.7	6	16.2	1	4.2	1	5.6	41	20.1
Total	18	100.0	62	100.0	45	100.0	37	100.0	24	100.0	18	100.0	204	100.0

Note: The total does not amount to 320 because those who are children (35) and those studying (81) are excluded.

Table 2.14 Main occupation and employment status, Koh Maphrao village, 1998

Main Occupation	Current Age Group												Total	%
	10–19	%	20–29	%	30–39	%	40–49	%	50–59	%	60 & over	%		
Agriculture	-	0.0	1	1.4	12	17.6	9	22.5	2	8.7	6	15.8	30	11.3
Fishery	4	16.0	13	18.3	20	29.4	10	25.0	2	8.7	3	7.9	52	19.6
Trade	-	0.0	4	5.6	2	2.9	1	2.5	3	13.0	3	7.9	13	4.9
Services	1	4.0	1	1.4	2	2.9	1	2.5	-	0.0	-	0.0	5	1.9
Agricultural Labourer	1	4.0	11	15.5	17	25.0	8	20.0	7	30.4	2	5.3	46	17.4
Fishery Labourer	8	32.0	10	14.1	2	2.9	2	5.0	-	0.0	-	0.0	22	8.3
Industrial Labourer	-	0.0	1	1.4	-	0.0	-	0.0	-	0.0	-	0.0	1	0.4
Service Labourer	-	0.0	5	7.0	3	4.4	2	5.0	-	0.0	-	0.0	10	3.8
General Labourer	1	4.0	4	5.6	2	2.9	1	2.5	1	4.3	2	5.3	11	4.2
Other	6	24.0	5	7.0	1	1.5	-	0.0	4	17.4	16	42.1	32	12.1
Housewife	4	16.0	16	22.5	7	10.3	6	15.0	4	17.4	6	15.8	43	16.2
Total	25	100.0	71	100.0	68	100.0	40	100.0	23	100.0	38	100.0	265	100.0

Note: 1) Missing 1 case

2) The total does not amount to 420 because those who are children (39) and those studying (109) are excluded.

Table 2.15 Secondary occupation and employment status, Sai Dang village, 1998

Secondary Occupation	Current Age Group												Total	%
	10–19	%	20–29	%	30–39	%	40–49	%	50–59	%	60 & over	%		
Agriculture	1	5.6	2	3.2	7	15.6	4	10.8	3	12.5	-	0.0	17	8.3
Fishery	-	0.0	3	4.8	3	6.7	2	5.4	3	12.5	-	0.0	11	5.4
Trade	-	0.0	2	3.2	-	0.0	-	0.0	-	0.0	1	5.6	3	1.5
Services	-	0.0	1	1.6	-	0.0	2	5.4	-	0.0	2	11.1	5	2.5
Agricultural Labourer	-	0.0	-	0.0	-	0.0	-	0.0	2	8.3	-	0.0	2	1.0
Fishery Labourer	-	0.0	-	0.0	-	0.0	1	2.7	-	0.0	-	0.0	1	0.5
General Labourer	-	0.0	1	1.6	2	4.4	1	2.7	2	8.3	-	0.0	6	2.9
Other	4	22.2	3	4.8	1	2.2	2	5.4	-	0.0	2	11.1	12	5.9
No Secondary Occupation	13	72.2	50	80.6	32	71.1	25	67.6	14	58.3	13	72.2	147	72.1
Total	18	100.0	62	100.0	45	100.0	37	100.0	24	100.0	18	100.0	204	100.0

Note: The total does not amount to 320 because those who are children (35) and those studying (81) are excluded.

Table 2.16 Secondary occupation and employment status, Koh Maphrao village, 1998

Secondary Occupation	Current Age Group												Total	%
	10-19	%	20-29	%	30-39	%	40-49	%	50-59	%	60 & over	%		
Agriculture	-	0.0	2	2.8	2	2.9	3	7.5	1	4.3	5	13.2	13	4.9
Fishery	-	0.0	1	1.4	10	14.7	1	2.5	1	4.3	-	0.0	13	4.9
Trade	-	0.0	-	0.0	4	5.9	-	0.0	-	0.0	-	0.0	4	1.5
Services	-	0.0	-	0.0	-	0.0	1	2.5	-	0.0	-	0.0	1	0.4
Agricultural Labourer	-	0.0	-	0.0	1	1.5	-	0.0	1	4.3	-	0.0	2	0.8
Fishery Labourer	-	0.0	2	2.8	-	0.0	2	5.0	1	4.3	-	0.0	5	1.9
General Labourer	-	0.0	1	1.4	2	2.9	2	5.0	-	0.0	1	2.6	6	2.3
Other	3	12.0	3	4.2	1	1.5	2	5.0	3	13.0	16	42.1	28	10.6
No Secondary Occupation	22	88.0	62	87.3	48	70.6	29	72.5	16	69.6	16	42.1	193	72.8
Total	25	100.0	71	100.0	68	100.0	40	100.0	23	100.0	38	100.0	265	100.0

Note: 1) Missing 1 case

2) The total does not amount to 420 because those who are children (39) and those studying (109) are excluded.

Table 2.17 Age and sex of heads of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Age of Household Head	Sai Dang Village						Koh Maphrao Village					
	Male	%	Female	%	Total	%	Male	%	Female	%	Total	%
Under 20	1	1.4	-	0.0	1	1.3	-	0.0	-	0.0	-	0.0
20-29	15	21.1	-	0.0	15	19.0	13	14.9	-	0.0	13	13.8
30-39	19	26.8	-	0.0	19	24.1	30	34.5	3	42.9	33	35.1
40-49	16	22.5	3	37.5	19	24.1	24	27.6	1	14.3	25	26.6
50-59	12	16.9	2	25.0	14	17.7	9	10.3	-	0.0	9	9.6
60 & over	8	11.3	3	37.5	11	13.9	11	12.6	3	42.9	14	14.9
Total	71	100.0	8	100.0	79	100.0	87	100.0	7	100.0	94	100.0

Note: Average age of Sai Dang is 43.5 and of Koh Maphrao is 42.5 years.

Table 2.18 Main occupation and employment status of heads of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Main Occupation and Employment Status	Sai Dang Village						Koh Maphrao Village					
	Fishery		Non Fishery		Total Households		Fishery		Non Fishery		Total Households	
	Number	%	Number	%	Total	%	Number	%	Number	%	Total	%
Agriculture	4	12.9	6	12.5	10	12.7	6	11.8	8	18.6	14	14.9

Fishery	21	67.7	-	0.0	21	26.6	37	72.5	1	2.3	38	40.4
Trade	1	3.2	5	10.4	6	7.6	1	2.0	3	7.0	4	4.3
Services	-	0.0	5	10.4	5	6.3	-	0.0	3	7.0	3	3.2
Agricultural Labourer	-	0.0	2	4.2	2	2.5	2	3.9	14	32.6	16	17.0
Fishery Labourer	2	6.5	-	0.0	2	2.5	3	5.9	2	4.7	5	5.3
Industrial Labourer	1	3.2	8	16.7	9	11.4	-	0.0	-	0.0	-	0.0
Service Laborer	1	3.2	13	27.1	14	17.7	1	2.0	5	11.6	6	6.4
General Labourer	-	0.0	5	10.4	5	6.3	1	2.0	3	7.0	4	4.3
Other	1	3.2	2	4.2	3	3.8	-	0.0	2	4.7	2	2.1
Not Working	-	0.0	2	4.2	2	2.5	-	0.0	2	4.7	2	2.1
Total	31	100.0	48	100.0	79	100.0	51	100.0	43	100.0	94	100.0

Table 2.19 Secondary occupation and employment status of heads of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Secondary Occupation and Employment Status	Sai Dang Village						Koh Maphrao Village					
	Fishery		Non Fishery		Total Households		Fishery		Non Fishery		Total Households	
	Number	%	Number	%	Total	%	Number	%	Number	%	Total	%
Agriculture	1	3.2	10	20.8	11	13.9	3	5.9	3	7.0	6	6.4
Fishery	6	19.4	-	0.0	6	7.6	8	15.7	3	7.0	11	11.7
Trade	-	0.0	1	2.1	1	1.3	1	2.0	1	2.3	2	2.1
Services	-	0.0	1	2.1	1	1.3	-	0.0	-	0.0	-	0.0
Agricultural Labourer	1	3.2	-	0.0	1	1.3	3	5.9	-	0.0	3	3.2
Fishery Labourer	-	0.0	-	0.0	-	0.0	3	5.9	-	0.0	3	3.2
Industrial Labourer	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0
Service Laborer	1	3.2	-	0.0	1	1.3	-	0.0	-	0.0	-	0.0
General Labourer	5	16.1	1	2.1	6	7.6	2	3.9	4	9.3	6	6.4
Other	1	3.2	1	2.1	2	2.5	-	0.0	-	0.0	-	0.0
No Secondary Occupation	16	51.6	34	70.8	50	63.3	31	60.8	32	74.4	63	67.0
Total	31	100.0	48	100.0	79	100.0	51	100.0	43	100.0	94	100.0

Table 2.20 Annual income of heads of household by community, 1997

Heads of Household Income (baht)	Sai Dang Village						Koh Maphrao Village					
	Fishery		Non Fishery		Total Households		Fishery		Non Fishery		Total Households	
	Number	%	Number	%	Total	%	Number	%	Number	%	Total	%
Under 25,000	4	12.9	4	8.3	8	10.1	5	9.8	11	25.6	16	17.0
25,000–49,999	10	32.3	15	31.3	25	31.6	15	29.4	17	39.5	32	34.0
50,000–74,999	11	35.5	14	29.2	25	31.6	11	21.6	8	18.6	19	20.2
75,000–99,999	3	9.7	7	14.6	10	12.7	9	17.6	2	4.7	11	11.7
100,000–124,999	1	3.2	4	8.3	5	6.3	6	11.8	3	7.0	9	9.6
125,000–149,999	-	0.0	-	0.0	-	0.0	2	3.9	-	0.0	2	2.1
150,000 & over	2	6.5	4	8.3	6	7.6	3	5.9	2	4.7	5	5.3
Total	31	100.0	48	100.0	79	100.0	51	100.0	43	100.0	94	100.0
Average	60,662		84,331		75,043		73,392		49,092		62,276	

Table 2.21 Gross annual household income by community, 1997

Gross Household Income (baht)	Sai Dang Village						Koh Maphrao Village					
	Fishery		Non Fishery		Total Households		Fishery		Non Fishery		Total Households	
	Number	%	Number	%	Total	%	Number	%	Number	%	Total	%
Under 25,000	3	9.7	1	2.1	4	5.1	2	3.9	5	11.6	7	7.4
25,000–49,999	9	29.0	10	20.8	19	24.1	14	27.5	16	37.2	30	31.9
50,000–74,999	8	25.8	15	31.3	23	29.1	12	23.5	13	30.2	25	26.6
75,000–99,999	5	16.1	9	18.8	14	17.7	9	17.6	4	9.3	13	13.8
100,000–124,999	1	3.2	6	12.5	7	8.9	6	11.8	3	7.0	9	9.6
125,000–149,999	1	3.2	2	4.2	3	3.8	2	3.9	-	0.0	2	2.1
150,000–199,999	3	9.7	5	10.4	8	10.1	4	7.8	1	2.3	5	5.3
200,000 & over	1	3.2	-	0.0	1	1.3	2	3.9	1	2.3	3	3.2
Total	31	100.0	48	100.0	79	100.0	51	100.0	43	100.0	94	100.0
Average	79,657		91,840		86,998		83,545		63,884		74,551	

Table 2.22 Income sufficiency by household type, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province

Sufficiency of Household Income	Sai Dang Village (1997)						Koh Maphrao Village (1998)					
	Fishery Households		Non-Fishery Households		Total		Fishery Households		Non-Fishery Households		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Sufficient	15	48.4	21	43.8	36	45.6	37	72.5	23	53.5	60	63.8
Barely sufficient	6	19.4	8	16.7	14	17.7	7	13.7	8	18.6	15	16.0
Insufficient	10	32.3	19	39.6	29	36.7	7	13.7	12	27.9	19	20.2
Total	31	100.0	48	100.0	79	100.0	51	100.0	43	100.0	94	100.0

Table 2.23 Ability to save household income by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province

Ability to Save Household Income	Sai Dang Village (1997)						Koh Maphrao Village (1998)					
	Fishery Households	%	Non-Fishery Households	%	Total	%	Fishery Households	%	Non-Fishery Households	%	Total	%
Yes	10	32.3	16	33.3	26	32.9	32	62.7	12	27.9	44	46.8
No	20	64.5	32	66.7	52	65.8	17	33.3	31	72.1	48	51.1
No answer	1	3.2	-	0.0	1	1.3	2	3.9	-	0.0	2	2.1
Total	31	100.0	48	100.0	79	100.0	51	100.0	43	100.0	94	100.0

Table 2.24 Borrowing by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province

Borrowing Practice	Sai Dang Village (1997)						Koh Maphrao Village (1998)					
	Fishery Households	%	Non-Fishery Households	%	Total	%	Fishery Households	%	Non-Fishery Households	%	Total	%
Yes	11	35.5	17	35.4	28	35.4	12	23.5	13	30.2	25	26.6
No	18	58.1	31	64.6	49	62.0	39	76.5	29	67.4	68	72.3
No answer	2	6.5	-	0.0	2	2.5	-	0.0	1	2.3	1	1.1
Total	31	100.0	48	100.0	79	100.0	51	100.0	43	100.0	94	100.0

Table 2.25 Source of borrowing by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province

Source of Borrowing	Sai Dang Village (1997)						Koh Maphrao Village (1998)					
	Fishery Households	%	Non-Fishery Households	%	Total	%	Fishery Households	%	Non-Fishery Households	%	Total	%
BAAC or other Banks	4	36.4	8	47.1	12	42.9	-	0.0	1	7.7	1	4.0
Co-operatives	-	0.0	-	0.0	-	0.0	7	58.3	8	61.5	15	60.0
Moneylender	3	27.3	-	0.0	3	10.7	2	16.7	1	7.7	3	12.0
Relative/Friend	3	27.3	7	41.2	10	35.7	-	0.0	2	15.4	2	8.0
Employer	1	9.1	-	0.0	1	3.6	1	8.3	1	7.7	2	8.0
Other	-	0.0	2	11.8	2	7.1	2	16.7	-	0.0	2	8.0
Total	11	100.0	17	100.0	28	100.0	12	100.0	13	100.0	25	100.0

Table 2.26 Amount of money borrowed by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province

Amount	Sai Dang Village (1997)						Koh Maphrao Village (1998)					
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Borrowed (baht)	Fishery Households		Non-Fishery Households		Total		Fishery Households		Non-Fishery Households		Total	
		%		%		%		%		%		%
1–9,999	6	54.5	6	35.3	12	42.9	6	50.0	6	46.2	12	48.0
10,000–19,999	1	9.1	2	11.8	3	10.7	4	33.3	2	15.4	6	24.0
20,000–29,999	0	0.0	1	5.9	1	3.6	1	8.3	2	15.4	3	12.0
30,000–39,999	1	9.1	6	35.3	7	25.0	1	8.3	1	7.7	2	8.0
40,000 & over	3	27.3	2	11.8	5	17.9	-	0.0	2	15.4	2	8.0
Total	11	100.0	17	100.0	28	100.0	12	100.0	13	100.0	25	100.0
Average	19,463.64		22,029.41		21,021.43		10,416.67		16,754.54		13,447.78	

Notes: 1) In Sai Dang village: 11 out of 31 fishery households (35.48%) borrowed.
2) In Sai Dang village: 17 out of 48 non-fishery households (35.41%) borrowed.
3) In Koh Maphrao village: 12 out of 51 fishery households (23.53%) borrowed.
4) In Koh Maphrao village: 13 out of 43 non-fishery households (30.23%) borrowed.

Table 2.27 Reason for borrowing by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province

Reason for Borrowing	Sai Dang Village (1997)						Koh Maphrao Village (1998)					
	Fishery Households	%	Non-Fishery Households	%	Total	%	Fishery Households	%	Non-Fishery Households	%	Total	%
Household Use	4	36.4	9	52.9	13	46.4	5	41.7	4	30.8	9	36.0
Occupational Investment	6	54.5	6	35.3	12	42.9	6	50.0	2	15.4	8	32.0
Children's Education	-	0.0	-	0.0	-	0.0	-	0.0	3	23.1	3	12.0
Household Use & Occupational Investment	-	0.0	2	11.8	2	7.1	-	0.0	-	0.0	-	0.0
Other	1	9.1	-	0.0	1	3.6	1	8.3	4	30.8	5	20.0
Total	11	100.0	17	100.0	28	100.0	12	100.0	13	100.0	25	100.0

Table 2.28 Current debts of household by type of household, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Current Debts (baht)	Sai Dang Village						Koh Maphrao Village					
	Fishery Households	%	Non-Fishery Households	%	Total	%	Fishery Households	%	Non-Fishery Households	%	Total	%
No more	3	27.3	2	11.8	5	17.9	1	8.3	2	15.4	3	12.0

debt												
1–4,999	2	18.2	5	29.4	7	25.0	4	33.3	2	15.4	6	24.0
5,000–9,999	1	9.1	-	0.0	1	3.6	5	41.7	2	15.4	8	32.0
10,000–14,999	-	0.0	-	0.0	-	0.0	2	16.7	3	23.1	5	20.0
15,000–19,999	1	9.1	4	23.5	5	17.9	-	0.0	1	7.7	1	4.0
20,000 & over	4	36.4	6	35.3	10	35.7	-	0.0	3	23.1	2	8.0
Total	11	100.0	17	100.0	28	100.0	12	100.0	13	100.0	25	100.0

Table 2.29 Nationality and religion by community, 1998

Nationality & Religion	Sai Dang Village		Koh Maphrao Village	
	Number	%	Number	%
Thai Buddhist	67	98.5	-	0.0
Thai Muslim	-	0.0	68	100.0
Burmese Buddhist	1	1.5	-	0.0
Other	-	0.0	-	0.0
Total	68	100.0	68	100.0

Table 2.30 Language spoken at home by community, 1998

Language Spoken at Home	Sai Dang Village		Koh Maphrao Village	
	Number	%	Number	%
Standard Thai	6	8.8	5	7.4
Northeastern Thai	2	2.9	2	2.9
Southern Thai	60	88.2	61	89.7
Total	68	100.0	68	100.0

Table 2.31 Fluency in spoken standard Thai by community, 1998

Fluency in Standard Thai	Sai Dang Village		Koh Maphrao Village	
	Number	%	Number	%
Fluent	41	60.3	36	52.9
Not Fluent	24	35.3	29	42.6
Unable to speak Standard Thai	3	4.4	3	4.4
Total	68	100.0	68	100.0

Table 2.32 Number of live births by age of woman and community, 1998

Number of Live Births	Age Group (Sai Dang Village)								Age Group (Koh Maphrao Village)											
	15–19	%	20–29	%	30–39	%	40–44	%	Total	%	15–19	%	20–29	%	30–39	%	40–44	%	Total	%
0	5	83.3	4	14.3	3	13.0	1	9.1	13	19.1	1	100.0	2	7.7	-	0.0	-	0.0	3	4.4
1	1	16.7	13	46.4	4	17.4	-	0.0	18	26.5	-	0.0	15	57.7	3	8.8	1	14.3	19	27.9
2	-	0.0	9	32.1	9	39.1	3	27.3	21	30.9	-	0.0	5	19.2	8	23.5	1	14.3	14	20.6
3	-	0.0	2	7.1	5	21.7	2	18.2	9	13.2	-	0.0	3	11.5	13	38.2	1	14.3	17	25.0
4	-	0.0	-	0.0	2	8.7	2	18.2	4	5.9	-	0.0	1	3.8	8	23.5	2	28.6	11	16.2
5 & over	-	0.0	-	0.0	-	0.0	3	27.3	3	4.4	-	0.0	-	0.0	2	5.9	2	28.6	4	5.9
Total	6	100.0	28	100.0	23	100.0	11	100.0	68	100.0	1	100.0	26	100.0	34	100.0	7	100.0	68	100.0

Table 2.33 Women's desired family size by age and community, 1998

Desired Family Size	Age Group (Sai Dang Village)								Age Group (Koh Maphrao Village)											
	15–19	%	20–29	%	30–39	%	40–44	%	Total	%	15–19	%	20–29	%	30–39	%	40–44	%	Total	%
0	-	0.0	1	4.0	-	0.0	-	0.0	1	1.6	-	0.0	3	12.5	2	6.3	1	16.7	6	9.5
1	-	0.0	2	8.0	1	4.3	-	0.0	3	4.8	-	0.0	2	8.3	-	0.0	2	33.3	4	6.3
2	4	100.0	18	72.0	14	60.9	5	45.5	41	65.1	1	100.0	12	50.0	12	37.5	1	16.7	26	41.3
3	-	0.0	4	16.0	5	21.7	4	36.4	13	20.6	-	0.0	4	16.7	11	34.4	2	33.3	17	27.0
4	-	0.0	-	0.0	2	8.7	2	18.2	4	6.3	-	0.0	2	8.3	4	12.5	-	0.0	6	9.5
5 & over	-	0.0	-	0.0	1	4.3	-	0.0	1	1.6	-	0.0	1	4.2	3	9.4	-	0.0	4	6.3
Total	4	100.0	25	100.0	23	100.0	11	100.0	63	100.0	1	100.0	24	100.0	32	100.0	6	100.0	63	100.0

Notes: 1) For Sai Dang village, there are 5 respondents who are uncertain.

2) For Koh Maphrao village, there are 2 respondents who are uncertain and 3 cases who stated that it depends on the husband.

Table 2.34 Knowledge about family planning methods by community, 1998

Family Planning Methods	Sai Dang Village								Koh Maphrao Village							
	Yes (without prompting)	%	Yes (with prompting)	%	Don't know	%	Total	%	Yes (without prompting)	%	Yes (with prompting)	%	Don't know	%	Total	%
Pill	63	96.9	1	1.5	1	1.5	65	100.0	66	100.0	-	0.0	-	0.0	66	100.0
IUD	36	55.4	17	26.2	12	18.5	65	100.0	46	69.7	15	22.7	5	7.6	66	100.0
Injections	56	86.2	9	13.8	-	0.0	65	100.0	60	90.9	5	7.6	1	1.5	66	100.0
Condom	38	58.5	19	29.2	8	12.3	65	100.0	51	77.3	13	19.7	2	3.0	66	100.0
Norplant	36	55.4	20	30.8	9	13.8	65	100.0	43	65.2	19	28.8	4	6.1	66	100.0
Female sterilization	41	63.1	20	30.8	4	6.2	65	100.0	49	74.2	16	24.2	1	1.5	66	100.0
Male sterilization	35	53.8	24	36.9	6	9.2	65	100.0	48	72.7	16	24.2	2	3.0	66	100.0
Safety period	3	4.6	15	23.1	47	72.3	65	100.0	8	12.1	21	31.8	37	56.1	66	100.0
External ejaculation	6	9.2	15	23.1	44	67.7	65	100.0	9	13.6	19	28.8	38	57.6	66	100.0

Table 2.35 Attitudes toward family planning by age group and community, 1998

Attitude toward Family Planning	Age Group (Sai Dang Village)										Age Group (Koh Maphrao Village)									
	15-19	%	20-29	%	30-39	%	40-44	%	Total	%	15-19	%	20-29	%	30-39	%	40-44	%	Total	%
Very positive	2	33.3	12	42.9	13	56.5	3	27.3	30	44.1	1	100.0	12	46.2	13	38.2	5	71.4	31	45.6
Positive	4	66.7	14	50.0	10	43.5	6	54.5	34	50.0	-	0.0	13	50.0	18	52.9	2	28.6	33	48.5
Uncertain	-	0.0	2	7.1	-	0.0	1	9.1	3	4.4	-	0.0	1	3.8	2	5.9	-	0.0	3	4.4
Negative	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	1	2.9	-	0.0	1	1.5
Very negative	-	0.0	-	0.0	-	0.0	1	9.1	1	1.5	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0
Total	6	100.0	28	100.0	23	100.0	11	100.0	68	100.0	1	100.0	26	100.0	34	100.0	7	100.0	68	100.0

Notes: 1) For Sai Dang village, there are 3 missing cases.

2) For Koh Maphrao village, there are 2 missing cases.

Table 2.36 Contraceptive methods ever used by community, 1998

Family Planning Methods	Sai Dang Village						Koh Maphrao Village					
	Ever used	%	Never used	%	Total	%	Ever used	%	Never used	%	Total	%
Pill	48	73.8	17	26.2	65	100.0	56	84.8	10	15.2	66	100.0
IUD	6	9.2	59	90.8	65	100.0	3	4.5	63	95.5	66	100.0
Injections	30	46.2	35	53.8	65	100.0	27	40.9	39	59.1	66	100.0

Condom	5	7.7	60	92.3	65	100.0	8	12.1	58	87.9	66	100.0
Norplant	11	16.9	54	83.1	65	100.0	5	7.6	61	92.4	66	100.0
Female sterilization	12	18.5	53	81.5	65	100.0	6	9.1	60	90.9	66	100.0
Male sterilization	-	0.0	65	100.0	65	100.0	-	0.0	66	100.0	66	100.0
Safety period	2	3.1	63	96.9	65	100.0	5	7.6	61	92.4	66	100.0
External ejaculation	1	1.5	64	98.5	65	100.0	7	10.6	59	89.4	66	100.0

Notes: 1) For Sai Dang village, there are 3 missing cases.

2) For Koh Maphrao village, there are 2 missing cases.

Table 2.37 Contraceptive methods in current use, Sai Dang village, 1998

Family Planning Methods	Age Group (Sai Dang Village)								Total	%
	15-19	%	20-29	%	30-39	%	40-44	%		
Pill	3	75.0	6	28.6	8	44.4	1	14.3	18	36.7
Injections	1	25.0	6	28.6	2	11.1	-	0.0	9	18.4
Norplant	-	0.0	2	9.5	2	11.1	2	28.6	6	12.2
Female sterilization	-	0.0	4	19.0	6	33.3	2	28.6	12	24.5
Male sterilization	-	0.0	-	0.0	-	0.0	1	14.3	1	2.0
IUD	-	0.0	1	4.8	-	0.0	-	0.0	1	2.0
Condom	-	0.0	1	4.8	-	0.0	-	0.0	1	2.0
Safety period	-	0.0	-	0.0	-	0.0	1	14.3	1	2.0
External ejaculation	-	0.0	1	4.8	-	0.0	-	0.0	-	0.0
Total	4	100.0	21	100.0	18	100.0	7	100.0	49	100.0

Note: 19 cases = Not applicable

Table 2.38 Contraceptive methods in current use, Koh Maphrao village, 1998

Family Planning Methods	Age Group (Sai Dang Village)								Total	%
	15-19	%	20-29	%	30-39	%	40-44	%		
Pill	1	100.0	13	76.5	15	62.5	1	16.7	30	62.5
Injections	-	0.0	4	23.5	1	4.2	-	0.0	5	10.4
Norplant	-	0.0	-	0.0	2	8.3	1	16.7	3	6.3
Female sterilization	-	0.0	-	0.0	4	16.7	2	33.3	6	12.5
Male sterilization	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0
IUD	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0
Condom	-	0.0	-	0.0	2	8.3	1	16.7	3	6.3
Safety period	-	0.0	-	0.0	-	0.0	1	16.7	1	2.1
External ejaculation	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0
Total	1	100.0	17	100.0	24	100.0	6	100.0	48	100.0

Note: 20 cases = Not applicable

Table 2.39 Source of contraceptive by community, 1998

Place	Sai Dang Village		Koh Maphrao Village	
	Number	%	Number	%
Hospital	26	32.1	14	17.3
Village Public Health Centre	45	55.6	57	70.4
Private Hospital	1	1.2	1	1.2
Private Clinic	6	7.4	-	0.0
Province Health Office	-	0.0	3	3.7
Drugstore	2	2.5	2	2.5
Other	1	1.2	4	4.9
Total	81	100.0	81	100.0

II.3 The fishery households

Of the 79 sampled households in Sai Dang village, 31 households (39.2 percent) are engaged in fishing activities regardless of whether their working members are fishermen or fishery employees (Figure 3.1). Of the 94 households in Koh Maphrao village, 51 (54.3 percent) are thus engaged (Figure 3.2).

Main and secondary occupations

Some households have more than one person engaged in fishing activities. Of the 31 households in Sai Dang, there are 39 persons and of the 51 households in Koh Maphrao, there are 66 persons who are engaged in fishing activities (Table 3.1). In Sai Dang, among those thus employed, 66.7 percent are fishermen, 7.7 percent are employees and the rest (25.6 percent) engage in fishing activities as a secondary occupation. In Koh Maphrao, those engaged in fishing activities are mainly fishermen (80.3 percent) and employees whose main occupation is fishing (7.6 percent), while the rest (12.1 percent) engage in fishing activities only as a supplementary occupation. Put another way, among the 36 fisherfolk in Sai Dang, 26 (72 percent) engage in fishing as their main occupation, whereas among the 66 fisherfolk in Koh Maphrao, 53 (80 percent) engage in fishing as their main occupation.

The same table also shows the proportion of persons engaged in fishing as their minor occupation. It is notable first that Sai Dang has a lower percentage than Koh Maphrao of people fully employed with no secondary occupation, i.e. 51 percent compared to 74 percent, respectively. Second, a higher proportion of fishermen in Sai Dang than in Koh Maphrao also have secondary occupations other than fishing, i.e. 23 percent compared to 14 percent. That is to say, Sai Dang fisherfolk in fishing households have more varied occupations than those in Koh Maphrao, who are more dependent on fishing activities.

Social and demographic characteristics

As is usually the case, the overwhelming majority of persons engaged in fishing activities are men (Table 3.2). In both Sai Dang and Koh Maphrao, the sex ratio is 18 females for every 100 males. In other words, fisherwomen account for only 15.4 percent of all fisherfolk in both communities. In Sai Dang, the highest percentage (41 percent) of those who are engaged in

fishing are in the 20–29 age group, but in Koh Maphrao, the highest percentage (38 percent) are in the 30–39 age group. The average age of persons engaged in fishing activities is the same in both villages - about 35 years. The average age, however, masks the fact revealed by field observation that in Sai Dang, there are two distinct groups engaged in fishing activities: a small group of older local fisherfolk and a large group of younger Burmese fishing families who have recently settled in Sai Dang. In contradistinction, fishing activities in Koh Maphrao village are carried out by successive generations of fisherfolk.

The overwhelming majority of those who are engaged in fishing activities attained a very low level of formal education. Table 3.3 shows the level of education attained by persons engaged in fishing activities. It indicates that regardless of age group, a higher percentage (10.3 percent) of fisherfolk in Sai Dang have no education, compared to those in Koh Maphrao (4.5 percent). This is most likely due to the influx of Burmese immigrants. However, considering the low level of education attained by the majority of them, the finding conforms to the data found in the 1985 and 1995 censuses (Table 2.14 in Part I). That is, in Sai Dang, about 56 percent completed lower primary and 28.2 percent completed upper primary education. In Koh Maphrao, the percentages are 64 percent and 27 percent, respectively. If lower and upper primary education levels are combined, then about 85 percent of those engaged in fishing activities in Sai Dang and 91 percent of those in Koh Maphrao went through primary education.

Fishing activities

Fisherfolk in Koh Maphrao spend more years in fishing activities than their Sai Dang counterparts. Table 3.4 shows that Sai Dang fisherfolk engage in them for an average of 8.1 years and their Koh Maphrao counterparts for 12.8 years on average. This is due to the fact that many young household members in Koh Maphrao start helping their parents in their fishing activities as soon as they finish compulsory education.

Concerning the availability of boats in the fishermen and fishery employee households, roughly 90 percent of fishing households in both villages own one fishing boat, while the rest either rent one or do not have any boat (Table 3.5). The boats are almost exclusively outboard-powered and the few that are inboard-powered are small-scale. Out of the 31 households surveyed in Sai Dang, there is one without a boat, one with a rented boat and 29 have their own boat or boats (eight of these have two). In Koh Maphrao, out of the 51 households surveyed, five have no boat, one has a rented boat and the rest have their own boat. The one household in Sai Dang without a boat is that of a fishery employee, and three of the five households without a boat in Koh Maphrao engage in coastal aquaculture (cage culture of mussels and grouper); the other two are fishery employee households.

Tables 3.6 and 3.7 show boat length and horsepower (HP) in the two villages. In Sai Dang, it should be stated first that there are two boats without engines, one 4.5 metres long and the other of 5 metres in length, and second that one boat is being built and one has gone missing. Thus there remain 33 boats to consider. Table 3.6 indicates that 21 out of the 33 boats (63.4 percent) are of 5 to 7.4 metres in length and most of them (71.4 percent) have between 5 and 9 HP. Table 3.7 shows similar data for Koh Maphrao: of the 45 boats there, 18 (40 percent) are 5 to 7.4 metres long, all of 5 to 9 HP, 15 (33.4 percent) are 5 to 7.4 metres long, all of 7.5 to 9.9 HP, and 10 (22.2 percent) are of 10 metres or more in length, and 70 percent of these are of 5 to 9 HP.

Thus, the two tables on boat length and horsepower show that the majority of boats in Sai Dang (63.4 percent) are 5 to 7.4 metres long and 66.7 percent have between 5 and 9 HP. In Koh Maphrao, the majority of boats (88.4 percent) also have 5 to 9 HP, but boat length varies somewhat. That is, 40 percent are 5.7 metres long, 33 percent are 7.5 to 9.9 metres long and 18 percent are 10 to 12.4 metres long. In short, taken altogether, the boats in Koh Maphrao are longer and more powerful than the boats in Sai Dang.

Table 3.8 compares the distance from the coast within which fishing boats operate. It is apparent that boats in Sai Dang operate much closer to the coast than do those in Koh Maphrao, and that the distances covered vary greatly among fishing boats in Koh Maphrao. About 26 percent of the fishing households in Sai Dang and about two percent of those in Koh Maphrao do not go farther than one kilometre from the shore. About 42 percent in Sai Dang and 20 percent in Koh Maphrao operate at the range of one to four kilometres. On average, fishing boats in Sai Dang go out about five kilometres from shore, while those in Koh Maphrao go out about 19 km into the high sea to fish. One obvious reason for the difference is the coastal geography: Sai Dang is very close to Myanmar and situated on the eastern side of a narrow, deep estuary, the part that is called the Kra Buri River; Koh Maphrao is facing the open sea.

Table 3.9 is a comparison of fishing gear between the two communities. It is apparent from the gear used that Sai Dang fishing households engage more in shallow water than in deepwater fishing. The gear used most often are crab traps (26.5 percent), hand push nets (23 percent) and long lines (16 percent). Gill nets and surrounding nets are also used, though much less (12 percent each). In Koh Maphrao, sand whiting gill nets are the most popular; 53 percent of all the fishing gear used are of this type. About 18 percent of the gear used are other gill nets, and 10 percent are long lines for rays. There are also four households that engage in culture of green mussels and grouper.

Table 3.10 lists the problems that first come to the interviewees' minds. Those reporting that they have no problem are proportionally higher in Koh Maphrao (57 percent) than in Sai Dang (about 25.8 percent). Among those reporting problems, the majority in Sai Dang mention border-related problems as their first concern. These problems range from being shot at by Burmese patrol boats, being caught for ransom, fear of unintentionally trespassing into Burmese waters and fear of being caught. Their second main concern is the high operating costs, especially the cost of petrol. In Koh Maphrao, the majority report two equally important worries: the high operating costs (high price of fuel) and problems related to fishing gear and fishing craft as well, such as gear being destroyed by pushnetters (Figure 3.9). They also report that their boats are stolen or often have engine problems.

Table 3.11 lists the problems mentioned by the interviewees upon reflection. In Sai Dang, three equally worrisome problems mentioned are border-related hassles, diminishing fishery resources and higher competition. In Koh Maphrao, there is hardly any major problem even as an afterthought.

Annual income

Table 3.12 compares the net annual income from fishing activities in 1997 between the two village communities. Of the 30 fishing households in Sai Dang, eight (23 percent) earned less than B20,000 in 1997, 10 (33.4 percent) were in the B60,000–79,999 income group and only one (3.3 percent) earned more than B100,000. In Koh Maphrao, 18 percent earned less than B20,000 in 1997, 22 percent earned between B20,000 and B39 999, 20 percent earned

between B40,000 and B59,999 and 18 percent earned more than B100,000. The average income from fishing activities in Sai Dang was lower than in Koh Maphrao (B47,910 compared to B62,866). This is only to be expected, as the fishing boats in Sai Dang are smaller, the fishing gear not as varied and the fishing distance not as long.

Table 3.12 compares the total net annual income per household engaged in fishing activities in 1997 between the two communities. Sai Dang households did not earn as much as Koh Maphrao households did. There was no notable difference if examined by income group, except for those under B25,000. In this category, the proportion of Sai Dang households was almost twice that of Koh Maphrao households. The average annual incomes of the two communities were quite different: B73,644 for Sai Dang, B82,380 for Koh Maphrao.

Table 3.14 shows the income from fishing activities as a percentage of the total annual household income in 1997 in each community. Sai Dang households were found to be less dependent on income from fishing than were the households of Koh Maphrao. This is due to the fact that the members of fishing households in Sai Dang engaged more frequently in secondary occupations while the only secondary occupation in Koh Maphrao is rubber tapping and processing (Table 3.1).

Role of women in coastal fishing

Table 3.15 reports the role of women in fishing activities. In both communities, roughly 42 percent of the women in the fishing households report that they do not assist in any fishing activities. Among those who help, the majority (55.6 percent) in Sai Dang do so by going out fishing with their husbands, while the rest engage in processing or selling processed products, or both, or selling fresh catches. In Koh Maphrao, women engage in more various activities related to fishing than do the women in Sai Dang. About 34.5 percent of them help mending fishing gear, 31 percent help by going out fishing and 20.7 percent help by doing both. The rest (13.8 percent) engage in selecting and selling fresh catches, fishing and selling the catches, selling the catches and mending gear, or all of the above. The engagement of Sai Dang women in fishing activities consists mainly in laying crab traps and collecting the catches. The women in Koh Maphrao go out into outboard-powered boats with their husbands and help controlling the boat while their husbands set up the gill net and later help dragging in the net and selecting the catches. It is notable that many women are not aware of their role in fishing activities and tend not to mention it unless probed. Thus, we believe that the actual role of women in fishing activities is more extensive than has been reported and, to do them justice, it is worth looking more closely into the role of women in fishing activities in Thailand.

Summary and discussion

In Sai Dang village, there were 31 households engaged in fishing activities in early 1998, accounting for 39 percent of the surveyed households. In Koh Maphrao village, 51 households engaged in fishing activities, i.e. 54 percent of the households surveyed there. Most of those who were engaged in fishing activities were self-employed males and reported these activities as their main occupation. The average age of fishermen and fishery employees was about 35 years in both communities. The great majority of fisherfolk (over 80 percent) had completed only primary education and only about 5 percent of them attained higher than primary education. Those in Sai Dang had spent an average of eight years in fishing activities, whereas those in Koh Maphrao had spent an average of almost 13 years. Roughly 90 percent of those engaged in fishing activities in both communities had their own boat, almost exclusively of the outboard-

powered type. The boats in Koh Maphrao were larger and tended to operate further from shore. The fishing gear used in Sai Dang were more rudimentary than those used in Koh Maphrao and were not as varied. The most frequently used gear were crab traps in Sai Dang and sand whiting gill nets in Koh Maphrao. A higher proportion of fishermen and fishery employees in Sai Dang than in Koh Maphrao reported having problems. In Sai Dang, the primary concerns were border-related hassles and high operating costs. In Koh Maphrao, the majority reported two equally bothersome worries: high operating costs and problems related to fishing gear and damage from pushnetters.

The level of dependence on income from fishing activities was lower in Sai Dang than in Koh Maphrao fishing households. The average annual income derived from such activities was lower in Sai Dang than in Koh Maphrao, due mainly to the type of fishing gear used and the distance to the fishing grounds. This was also the case with the average total annual household income. The income of the fishing households in the two communities was lower than the regional average. As the regional average was calculated as gross household income and included non-fishing households, it is more appropriate to make the comparison with the average of the whole community regardless of household type. The conclusion derived, given inflation rates, was that in both communities, the average gross annual household income was lower than the regional average (of about B100 000) in 1997. In other words, if one may extrapolate, small fishing communities in Thailand are poorer than rural communities in general. However, examination of the data on gross annual household income by household type (Table 2.21) leads to the conclusion that in communities where occupations are diversified, fishing households are poorer than non-fishing households, and that the reverse is true in communities in which fishing households predominate.

The role of Sai Dang women in coastal fishing activities as reported were limited to laying crab traps, collecting small shrimps, processing them into shrimp paste and selling the processed products. The role of Koh Maphrao women was more varied, but their two main activities were fishing and mending fishing gear. **The women were not aware of the importance of their role in fishing activities and tended not to mention their involvement until they were specifically asked about it. To get the true picture of the extent of women's involvement in fishing activities, a separate research is recommended.**

Field observation and casual conversations in addition to the questions asked in the questionnaires indicated that the fishing households in Sai Dang were in a state of flux, while those in Koh Maphrao were very stable. On the one hand, there were fishing households whose members had recently migrated into Sai Dang from Myanmar; they were holding household registration cards that would eventually allow them to attain full Thai citizenship. On the other hand, there were long-established fishing households which had been impoverished over time due to fishery resource depletion and border problems, and some of their members were thinking of giving up fishing activities to become employees in the town of Ranong. In Koh Maphrao, the fishing households have been engaging in fishing activities from one generation to the next. Thus, it is likely that the proportion of local fishing households in Sai Dang will shrink because of the greater occupational opportunities in Ranong. No such tendency is apparent in Koh Maphrao in the immediate future, but it is likely to appear within a generation, as parents encourage their children to get as high an education as possible in order to move to white-collar jobs. Thus, it seems that in the next ten years, Sai Dang is likely to change from a fishing to a non-fishing community, as fishing as an occupation will become unsustainable. Meanwhile, Koh Maphrao will remain a predominantly fishing community, though the proportion of fishing households will decline as the younger generations increasingly turn to white-collar occupations.

Should any integrated coastal zone management programme be set up, it would have to involve all households in the communities, including the new migrant fishing households in Sai Dang and veteran local fishing households in Koh Maphrao. In both cases, the programme must take into account the fact that fisherfolk are poorly educated and not likely to manage the programme by themselves, so that outside support, such as that from non-governmental organizations, would be required. In addition, the programme would have to make certain that women have an opportunity to participate in it.



Figure 3.1 Fishing households in Sai Dang



Figure 3.2 Fishing households in Koh Maphrao



Figure 3.3 A poor fishing household in Koh Maphrao



Figure 3.4 A typical squatter toilet in Koh Maphrao



Figure 3.5 Outboard-powered boat in Sai Dang



Figure 3.6 Outboard-powered boat in Koh Maphrao



Crap portable lift nets



Acetes set bag net



Figure 3.7 Fishing gear used in Sai Dang



Figure 3.8 Fishermen using a fish gill net in Koh Maphrao



Figure 3.9 Outboard-powered boat using a push net, Phuket province



A juvenile crab



Bycatch from push net

Figure 3.10 Bycatch of an outboard-powered pushnetter, Pukhet province



Figure 3.11 Woman processing shrimp paste in Sai Dang



Figure 3.12 Women cleaning green mussels in Koh Maphrao





Figure 3.13 Women repairing and making nets in Koh Maphrao

Table 3.1 Main and secondary occupations of household members engaged in fishery activities by employment status, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Occupational Status	Sai Dang Village				Koh Maphrao Village			
	Main Occupation		Secondary Occupation		Main Occupation		Secondary Occupation	
	Persons	%	Persons	%	Persons	%	Persons	%
Fishermen/women	26	66.7	10	25.6	53	80.3	7	10.6
Fishery Employees	3	7.7	-	0.0	5	7.6	1	1.5
Other	10	25.6	9	23.1	8	12.1	9	13.6
No Secondary Occupation	n.a.	n.a.	20	51.3	n.a.	n.a.	49	74.2
Total	39	100.0	39	100.0	66	100.0	66	100.0

Notes: 1) Sai Dang village has 31 households engaged in fisheries.

2) Koh Maphrao village has 51 households engaged in fisheries.

Table 3.2 Age and sex of persons engaged in fishery, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Age	Sex	Sai Dang Village				Koh Maphrao Village			
		Male	Female	Total	%	Male	Female	Total	%
15-19		1	1	2	5.1	4	-	4	6.2
20-24		5	-	5	12.8	6	3	9	13.8
25-29		10	1	11	28.2	7	1	8	12.3
30-34		2	-	2	5.1	11	1	12	18.5
35-39		3	-	3	7.7	10	3	13	20.0
40-44		5	1	6	15.4	4	-	4	6.2

45–49	2	2	4	10.3	8	1	9	13.8
50–54	2	-	2	5.1	-	-	-	0.0
55–59	2	1	3	7.7	3	-	3	4.6
60 & over	1	-	1	2.6	2	1	3	4.6
Total	33	6	39	100.0	55	10	65	100.0

Notes: 1) At Koh Maphrao, there is one woman with unknown age group.

2) Mean age at Sai Dang village = 35.7; and Koh Maphrao village = 35.4

Table 3.3 Age by education of persons engaged in fishery, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Age	Sai Dang Village				Koh Maphrao Village			
	Educational Level Completed				Educational Level Completed			
	No Education	Early Primary	Late Primary	Higher than Primary	No Education	Early Primary	Late Primary	Higher than Primary
15–19	-	-	2	-	-	2	-	2
20–29	-	7	7	2	-	11	7	-
30–39	-	4	1	-	1	13	10	1
40–49	2	7	1	-	-	12	1	-
50–59	2	3	-	-	1	2	-	-
60 & over	-	1	-	-	1	2	-	-
Total	4	22	11	2	3	42	18	3

Table 3.4 Years engaged in fishery by age group, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Age	Sai Dang Village						Koh Maphrao Village					
	Under 5	5–9	10–19	20 & over	Total	%	Under 5	5–9	10–19	20 & over	Total	%
15–19	1	1	-	-	2	5.9	3	1	-	-	4	7.0
20–29	5	8	1	-	14	41.2	6	3	7	-	16	28.1
30–39	3	-	1	1	5	14.7	4	4	5	8	21	36.8
40–49	-	2	6	1	9	26.5	-	-	5	6	11	19.3
50–59	1	1	-	1	3	8.8	1	-	-	2	3	5.3
60 & over	-	1	-	-	1	2.9	-	1	-	1	2	3.5
Total	10	13	8	3	34	100.0	14	9	17	17	57	100.0

Notes: 1) Average number of years engaged in fishery in Sai Dang are 8.1 years.

2) Average number of years engaged in fishery in Koh Maphrao are 12.8 years.

Table 3.5 Availability of boats in fishery households, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Number of Boats	Sai Dang Village		Koh Maphrao Village	
	Number of Fishery Households	%	Number of Fishery Households	%
None	2	6.5	5	9.8
Rented	1	3.2	1	2
Owned	28	90.3	45	88.2
Total	31	100	51	100

Table 3.6 Boat length and horsepower, Sai Dang village, Ranong province, 1998

Boat Lengths (meter)	Horsepower					Total	%
	Under 5	5–9	10–14	15–19	20 & over		
Under 5	-	3	-	-	-	3	9.1
5.0–7.4	-	15	5	1	-	21	63.6
7.5–9.9	-	3	3	-	-	6	18.2
10.0–12.4	-	1	-	1	1	3	9.1
12.5–14.9	-	-	-	-	-	-	0.0
15.0 & over	-	-	-	-	-	-	0.0
Total	-	22	8	2	1	33	100.0
%	0.0	66.7	24.2	6.1	3.0	100.0	

Notes: 1) There are two unpowered boats, one is 4.5 and the other is 5 meter in length.

2) There is one boat being built, the length of which is 7.0 meters.

Table 3.7 Boat length and horsepower, Koh Maphrao village, Phuket province, 1998

Boat Lengths (meter)	Horsepower					Total	%
	Under 5	5–9	10–14	15–19	20 & over		
Under 5	2	-	-	-	-	2	4.4
5.0–7.4	-	18	-	-	-	18	40.0
7.5–9.9	1	13	-	1	-	15	33.3
10.0–12.4	-	7	-	1	-	8	17.8
12.5–14.9	-	-	-	-	-	-	0.0
15.0 & over	-	-	1	-	1	2	4.4
Total	3	38	1	2	1	45	100.0
%	6.7	84.4	2.2	4.4	2.2	100.0	

Table 3.8 Distance from coast to fishing grounds, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Distance (Km.)	Sai Dang Village		Koh Maphrao Village	
	Number of Households	%	Number of Households	%
Under 1	8	29.6	1	2.4
1-4.9	13	48.1	10	23.8
5-9.9	1	3.7	2	4.8
10-19.9	3	11.1	7	16.7
20-29.9	-	0.0	10	23.8
30-39.9	-	0.0	4	9.5
40-49.9	1	3.7	5	11.9
50 & over	-	0.0	1	0.0
Not applicable	1	3.7	2	4.8
Total	27	100.0	42	100.0

Notes: 1) Average distance in Sai Dang village was 5.02 km. in 1997.
2) Average distance in Koh Maphrao village was 18.9 km. in 1997.

Table 3.9 Fishing gear, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Fishing Gear	Sai Dang Village		Koh Maphrao Village	
	Number of Households	%	Number of Households	%
Snapper gill net	-	0.00	-	0.00
Seabass gill net	2	4.08	-	0.00
Sand whiting gill net	1	2.04	32	53.33
Other gill net	12	24.49	12	20.00
Shrimp trap	-	0.00	1	1.67
Crab trap	13	26.53	-	0.00
Long line	8	16.33	2	3.33
Long line for rays	-	0.00	6	10.00
Hand push net	5	10.20	-	0.00
Other	8	16.33	3	5.00
Aquaculture	-	0.00	4	6.67
Total	49	100.00	60	100.00

Table 3.10 Problems mentioned first by persons engaged in fishery, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1997

Type of Problems	Sai Dang Village		Koh Maphrao Village	
	Number of Households	%	Number of Households	%
High operating costs	6	19.35	7	13.73
Diminished fishery resources	5	16.13	3	5.88
Natural calamities	1	3.23	2	3.92

Border problems	7	22.58	-	0.00
Problems related to fishing gear & craft	-	0.00	7	13.73
Other	3	9.68	3	5.88
No problem	8	25.81	29	56.86
Not applicable	1	3.23	-	0.00
Total	31	100.00	51	100.00

Table 3.11 Other problems mentioned by persons engaged in fishery, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1997

Type of Problems	Sai Dang Village		Koh Maphrao Village	
	Number of Households	%	Number of Households	%
High operating costs	2	6.45	2	3.92
Diminished fishery resources	4	12.90	1	1.96
Natural calamities	1	3.23	-	0.00
Border problems	4	12.90	-	0.00
Higher competition	4	12.90	-	0.00
Other	1	3.23	-	0.00
No problem	14	45.16	48	94.12
Not applicable	1	3.23	-	0.00
Total	31	100.00	51	100.00

Table 3.12 Annual net income from fishery in 1997, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Annual Income from Fishery Activities (1997)	Sai Dang Village		Koh Maphrao Village	
	Number of Households	%	Number of Households	%
Under 20,000	7	23.3	9	18.0
20,000–39,999	4	13.3	11	22.0
40,000–59,999	6	20.0	10	20.0
60,000–79,999	10	33.3	6	12.0
80,000–99,999	2	6.7	5	10.0
100,000 & over	1	3.3	9	18.0
Total	30	100.0	50	100.0

Note: 1) Average income from fishery activities in 1997 in Sai Dang village was 47,909.7 baht.

2) Average income from fishery activities in 1997 in Koh Maphrao village was 62,865.7 baht.

Table 3.13 Total net annual income per household engaged in fishery in 1997, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Total Net Annual	Sai Dang Village	Koh Maphrao Village
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Income per Household (1997)	Number of Households	%	Number of Households	%
Under 25,000	2	6.45	2	3.92
25,000–49,999	9	29.03	14	27.45
50,000–74,999	8	25.81	12	23.53
75,000–99,999	6	19.35	9	17.65
100,000–124,999	2	6.45	7	13.73
125,000–149,999	1	3.23	2	3.92
150,000–199,999	2	6.45	3	5.88
200,000 & over	1	3.23	2	3.92
Total	31	100.00	51	100.00

Note: 1) Average annual income in Sai Dang village was 73,644.35 baht. in 1997
2) Average annual income in Koh Maphrao village was 82,379.65 baht. in 1997

Table 3.14 Fishery income in fishing households as percentage of total annual household income, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Fishery Income as % of Total Annual Income	Sai Dang Village		Koh Maphrao Village	
	Number of Households	%	Number of Households	%
Under 20	4	13.33	5	10.00
20–39	3	10.00	3	6.00
40–59	4	13.33	6	12.00
60–79	3	10.00	8	16.00
80–99	3	10.00	13	26.00
100%	13	43.33	15	30.00
Total	30	100.00	50	100.00

Table 3.15 Women's roles in fishery, Sai Dang village, Ranong province, and Koh Maphrao village, Phuket province, 1998

Women's Role	Sai Dang Village		Koh Maphrao Village	
	No. of Households Engaged in Fishery	%	No. of Households Engaged in Fishery	%
None	13	41.94	22	43.14
Fishing	10	32.26	9	17.65
Selling fresh products	1	3.23	1	1.96
Mending fishing gear	1	3.23	10	19.61
Fishing & Selling	-	0.00	1	1.96
Fishing & Mending gear	-	0.00	6	11.76

Selling & Mending gear	-	0.00	1	1.96
Fishing, Selling & Mending gear	-	0.00	1	1.96
Processing	3	9.68	-	0.00
Selling processed products	2	6.45	-	0.00
Processing & Selling processed products	1	3.23	-	0.00
Total	31	100.00	51	100.00

II.4 Qualitative case study

In this report, quantitative interviews of household members in the two fishing communities are supplemented by extensive interviews with four individuals from each community. In each community, two pairs of individuals are compared in terms of their perceptions concerning changes in various aspects of their lives and their natural environment. Each pair is of opposite sex and the two pairs are of different generations. Interviews with a number of provincial government officers responsible for fishery and coastal land use add further information.

Interviews in Sai Dang village, Ranong province

First informant

Occupational and socio-economic profile

Phraew Charoen-Odsod, a 57-year-old farmer, is the village headman. This key informant said that the main occupation of Sai Dang villagers used to be agriculture, i.e. mixed farming of stink bean (*Parkia speciosa Hassk.*), coconut, mangosteen and durian. After the Zeta monsoon in September 1996, however, the population had to shift to fishing or to find employment in other activities, or both.

In the old days, fishery resources were more abundant and income derived from their exploitation was sufficient for the family, but at present, the resources were dwindling, making fishing only a subsistence occupation. Current fishing gear and methods were very different from the past. For example, hand push nets to catch acetes used to be used very near to the coast, but now, nets with small mesh attached to four squared poles (ချိပ်နှစ်) had to be used instead. Fisherfolk also used to have long lines with bent nails for hooks and roasted dried coconut pieces as bait to catch small shrimps later collected at low tide by dip net, and they also had long lines for rays. At present, besides the nets attached to four poles for catching small shrimps to be processed as shrimp paste, they had started to use crab traps and, in the last few years, gone into coastal aquaculture. They went for cages, not shrimp farms, as they realized shrimp farming destroys coastal resources and pollutes the water.

Role of women

The respective roles of men and women had also changed. In the old days, the quality of life was much better than at present. There was no need for a woman to go out to work because

the income brought back by the head of the household was sufficient. Now, economic hardship made it necessary for women to do extra work to supplement household income. Women in farming families had to help their husbands in farming activities or work as employees in food freezing factories in the city. Those in fishing households needed to process shrimp paste and sell it as well, rather than keeping it for household consumption as in the old days.

Income distribution

Income and income distribution were difficult to assess in terms of changes. In the old days, economic status was measured in terms of land ownership, but now the criteria were home ownership, occupation, and vehicle ownership. Previously, about 20 percent of the families were considered poor, 50 percent were of middle income and 30 percent rich. At present, the respective percentages were 10, 70 and 20 percent. Fishing families were considered poorer than non-fishing families.

State of the coastal environment

The coastal environment too had changed drastically. Mangrove forests had shrunk considerably, mainly because around 1986 the government granted investors the right to make use of land 200 metres from the coast as well as of the coastal resources that went with the land. The decision affected the 9 km-long coastal line extending from Lam Takua to La-un. Of the previous 9 000 *rai* of mangrove forests, only 200 to 300 *rai* remained, Headman Phraew said. The villagers were very angry and on 20 May 1986, they protested against the decision, which was bound to destroy the coastal resources. The protest was caused by their awareness of not only the impending deterioration of the coastal environment but also of the direct negative impact the measure would have on their economic activities by reducing the land they had access to. Fortunately, a member of the Royal Family visited the village to assess the state of mangrove forests and, at her behest, the decision was rescinded and a Royal Project to increase mangrove forests was started, with the participation of the villagers.

In the old days, the government also granted concessions for making charcoal from trees in the mangrove forests, but this was no longer allowed. Now, the villagers were more aware of the need to protect the mangrove and conserve coastal resources in general, Headman Phraew stated.

He agreed that fishing had become an almost unprofitable occupation, because of the dwindling fishery resources and of the Thai-Burmese border-related problems. Thus, those engaged in fishing should diversify their activities to include aquaculture, such as cage culture of sea bass, grouper or shellfish. These cage cultures would not pollute the coastal seawater or mangrove forests as shrimp farms did. Headman Phraew repeatedly stressed that shrimp farms should not be promoted.

Marriage, family size and sex preference

In terms of marriage and family size, he noted that in the old days, people married at a later age than was now the case. Men had to be ordained at the age of 20 and spend some time in the monkhood before getting married, and they usually married by the time they were 25 or older. At present, the average age at marriage was lower, i.e. a little over 20. Without family planning, couples of the older generations usually had six or seven children, compared to the present family size of two or three children. The smaller family size at present was due to the

acceptance of family planning, and the most popular method was the pill. In his younger days, male children were preferred for religious reasons, but nowadays such a preference for sons was not strong, as people were more concerned about the size of the family and generally aware that the larger the number of children, the more economic hardship they were likely to face.

People's organizations at village level

Regarding grassroots organizations, there were none in the old days. People just helped each other when there were problems, and actually did not face any large-scale problems that would affect most of them or even the nation, Headman Phraew asserted. At present, there were two organizations: the Housewives' Group for Development and the Support Group for National Security.

The housewives' group had been established in June 1994 and was actually a savings co-operative that aimed at self-help and solving the problems of the villagers as a group. It had 172 members, all of them women. The Division of Agricultural Extension of Ranong province and the village administrative organization, which both assisted the villagers in occupational problems and development efforts, supported the group. There were meetings of housewives and their spouses to discuss familial and communal problems and ways and means to solve them with as little help from outside as possible. The structure of the Housewives' Group for Development was formal and consisted of a chairperson, a vice-chairperson, a committee, an accountant and the members. Two activities that had been carried out were an informal education programme to generate information on fishery and a programme to save water and dig water wells. The first programme had been abandoned after the Zeta monsoon due to lack of time and will to organize, and the second programme was still uncompleted due to lack of funds to dig wells.

The Support Group for National Security had been established as recently as March 1998 by the Fourth Army and consisted in 71 men and 54 women. Headman Phraew felt that it was a useful organization, because it would lead to a wider participation of people than would the housewives' group. The support group was to assist villagers in farming, cattle raising and fishery, but would also remind them that they must try to help themselves first. Headman Phraew added that national security too was very important, especially in these parts, considering the ways the crews of Burmese patrol boats treated Thai fisherfolk.

When asked whether there was any plan to organize occupational groups for self-help and development, he stated that there had been an attempt to organize a group of fishermen a few years ago. However, because of the Zeta monsoon, fisherfolk were discouraged and with the economic hardship that followed, they had been too preoccupied with the survival of their families to organize as a group. Nonetheless, the desire was still there.

Village problems

Asked what were the main problems in the village, the headman said that they related to fishery activities and were also a national security concern. A number of fishermen were caught for ransom and had to pay B3 000–5 000 each. If they could not pay, their boats were confiscated. Seven years earlier, a fisherwoman had been raped, and in December 1997, seven fishermen were caught in Burmese waters. Thanks to the intervention of the Fourth Army, they had all been released. Asked if the fishermen trespassed into Burmese waters deliberately, he said it

was necessary for them to do so because they were poor and there was not enough fish to catch in Thai waters to make a living.

Another problem was the increase of the village population due to both natural growth and illegal immigration of Burmese fishermen and their families. This, combined with the decrease in fishery resources and with natural disasters, made it more difficult for everyone to make ends meet.

Second informant

The interview with the female informant of the same generation (Kim, 57 years of age) showed that she had similar perceptions in every aspect, even though her knowledge was understandably not as extensive as that of the first male informant.

She too said that previously the main occupations were agriculture and then fishery. Now, occupations were more diverse because agriculture and fishing did not bring in income as easily as in the past. The majority of the villagers were employed in the city or around the district.

Like the first informant, she said that the quality of life in the old days was much better. Life was easy then and there was no need for women to do extra work because one income earner in the family was enough. Fishermen's wives, however, did process small shrimps into paste for consumption, and some did go out fishing with their husbands. Women now needed to go out to work as employees to supplement the household income. Even though there were many more public utilities at present, there were too many people and it was difficult to earn a decent living due to low income and the high cost of basic necessities.

In terms of income distribution, she believed that in the past, about five percent of the families were materially poor, but families did help one another. In fact, she felt it was difficult to differentiate the economic status of families in the past: they were all the same, more or less. She perceived that there was now a higher proportion of the poor than when she was young.

Coastal resources had diminished to a great extent. Wild animals and mangrove forests were abundant in the past. Now, there were no more wild animals, and most of the mangrove had been destroyed. Efforts to recover mangrove forests were not enough to bring back past luxuriance.

Regarding the age at marriage, she said that it used to be well over 20, but now it was lower. Families in the past were much larger, seven or eight children compared to two or three these days. It was only natural that there used to be a higher proportion of the young than of the aged, whereas now you got the impression it was the other way round.

Third informant

Sontaya Boonraksa is 31 years old and a lorry driver. He said that in the past, families in Sai Dang engaged in agriculture or fishery. For the past four or five years, the main occupation had been employment in transport, communications and freezing works. The change in the occupational structure was due to the difficulty among fishing families to derive sufficient income from fishing within Thai waters. This led to the need to fish in Burmese waters, which was unlawful and dangerous. Thus quite a number of fisherfolk had given up fishing to find

employment elsewhere. The change was also due to the draughts, the monsoon, as well as the lack of capital, as farming needed one or two years at least before produce could be harvested.

Fishing in the past was a self-sufficient subsistence occupation as fish were abundant and there were hardly any costs involved. Fisherfolk used such simple gear as hand push nets for small shrimps, push nets, hooks, surrounding nets, and other handmade gear to catch crabs. At present, there were long lines and crab traps, as well as coastal aquaculture of shellfish and crab. There were hardly any fish left in Thai waters. Because of the difficulty to survive economically through fishing and coastal aquaculture, parents tried very hard to give their children as many chances as they could afford to have them complete higher education, so that they would not have to take up fishing for a living. He understood that in the future the hardships associated with fishing as an occupation would increase, as fishery resources had been diminishing drastically.

As to the role of women, in the past fishermen's wives helped process the day's catch, made shrimp paste and selected and sold the bigger fishes. Farmers' wives helped their husbands with farming. At present, most women and men in Sai Dang were unemployed, because fish freezing factories preferred to hire Burmese labour, which came cheaper.

In the past, it was difficult to tell the rich from the poor, as all families were more or less the same, economically speaking, because natural resources were then more than sufficient in relation to the population. He perceived that there were at present about 30 percent poor families, 50 percent middle-income families and 20 percent well-to-do families. The differentiation came about with the change from subsistence to a monetary economy and the fact that there were now unemployment and draughts, as already mentioned.

As for natural resources and the state of the coastal environment, Sontaya remembered seeing wild animals as a child and being told that before he was born, villagers used only small patches of the mangrove forests. However, as far back as he could remember, mangrove forests had been in a continuous state of decline, qualitatively and quantitatively. Now that there was this Royal Project to conserve and grow more mangrove forests, maybe they would, in the long run, escape total destruction.

Age at marriage, family size, and sex preference regarding the progeny, had also changed. In the past, the lowest age at marriage was 18, but the usual age was over 20. Nowadays, the majority married before the age of 20. The family size in the past was seven or eight children, compared to two or three now. This was due to the promotion of family planning by the Ministry of Public Health and to the general belief of parents that having fewer children would give them a better chance to attain a higher level of schooling.

Fourth informant

Kosum ChiaoChan, a 35-year-old woman selling food for a living, said that in the past the two main occupations were fishing and agriculture, with about half of the families engaged in either occupation. At present, the main occupation had changed to employment in various activities. Few families engaged in fishing or agriculture any longer, due to high costs and low returns. Farming now was mixed farming of stink bean, durian and coffee.

People in Sai Dang these days, she said, had a negative attitude toward fishing as their main occupation, which had not been the case in the past. Fisherfolk then did not need to have lots of

costly gear or to go far out at sea to catch enough fish to eat or sell. Now the catch was not worth the costs, or the risk of venturing into Burmese waters. She believed fisherfolk would eventually have to change their occupation.

The role of women had also changed, even during her lifetime. Her perception of the changes was similar to the three other informants - women nowadays had to participate more in economic activities to obtain extra income for the family. In the past, they did not need to work outside the home as one income earner earned enough to feed the family. She pointed out, however, that in the case of fishermen's wives, it was actually the other way round: most of them no longer went out fishing with their husbands, because of the risks associated with the Thai-Burmese frictions.

As for the economic status of families, Kosum shared Sontaya's and Kim's perception that, in the past, all families were in the same boat, as it were, and it was hardly possible to say which were rich and which poor. At present, she felt that maybe 10 percent of the families were poor, 5 percent were rich and the rest were in between.

Regarding coastal resources and the state of the coastal environment, mangrove forests used to be plentiful, but now they were much reduced and deteriorated. One factor had been the use of mangrove wood for charcoal, which was now prohibited.

In terms of marriageable age and family size, her answers were similar to those of the other informants.

Interviews in Koh Maphrao village, Phuket province

First informant

Nab Petdee, a 61-year-old imam, had the following perceptions regarding life in his village.

Occupational and socio-economic profile

The main occupation of the families in Koh Maphrao had always been fishing. Agriculture had always been less important. There were now rubber trees, which had long since replaced coconuts. He believed that 60 percent of the families engaged in fishing and 40 percent in rubber growing.

All the families were of the Islamic faith and all spoke the Southern Thai dialect. The children attended Thai elementary school on the island and had to go to the main island (Phuket) for higher education. The younger women did not observe the religious tenets very seriously, but the older generation did. For example, he said, it was sinful to use contraceptives, but the younger women used them nonetheless.

Fishery as an occupation had always been well accepted. He himself had started to go out at sea with his father to fish when he was only ten. In those days you used only hook, long line and fish trap, and there was no aquaculture. Now, there were gill nets, sand whiting gill nets, long lines for rays, and coastal aquaculture (green mussels, cage culture of prawn, grouper, snapper or sea bass). Coastal aquaculture had only been introduced by the Department of Fisheries three or four years earlier. In the past, marine resources were abundant, and thus it did not take long to gather enough fish. Now, fishermen had to go further and further out because of less fish

yet more boats. Nonetheless, even if the catches were less abundant than in the past, they fetched higher prices, which still made the occupation a profitable one.

Role of women

Traditionally, a woman's place was in the home, cooking, cleaning and looking after her brood and her man. There was no need for women to do any work outside the home because food was easy to find and life was easy. Now, however, women were more involved in economic activities. Those who worked engaged mainly in tapping rubber trees and processing latex into unsmoked sheets, or were hired to repair or make gill nets. They also collected shellfish at low tide. Some went out fishing with their father or husband, while others helped select and clean the green mussels or were hired to do so.

Income distribution

For this informant, economic status was measured in terms of land ownership. He believed that in the past, 20 to 30 percent of the families were poor, about 60 percent were getting by and the rest were well off. At present, the families in Koh Maphrao as a whole were better off economically: about 10 percent were poor, 40 percent were earning enough to live on and 50 percent were rather well off, with rubber orchards and more than one boat.

State of the coastal environment

The wild boars, mouse deer and monkeys that used to roam the island were now a thing of the past. Twenty years ago, the mangrove was almost completely untouched: only a small proportion of it was cut down to build houses. A decade ago, there was noticeably less mangrove forest because quite a bit of it had been cut down for charcoal. He believed that now there was only about 30 percent of the mangrove cover left.

Marriage, family size and sex preference

In his days women had seven or eight children, but now they had two or three. People used to marry when they were about 20, but now they married even younger. He believed getting married at too young an age should not be condoned, as the couples were not mature enough and thus were likely to create family problems. As for sex preference for one's children, people of his generation preferred sons to daughters, because once married, daughters would leave their parents. He did not think this mattered much any longer, as both male and female children would leave home after higher education anyway.

He did not believe that the increase in population would weaken food security. For him, a larger population only meant that more efforts had to be made to obtain food from the sea.

People's organizations

There were none in the past, but now there were three organizations: a Savings Group for Occupational Purposes, a Demonstration Centre for Marketing and a Coastal Fishing Group.

The savings group had been established in 1986 by a district development worker, village leaders and villagers. It started with 48 members. Its objectives were to implement the

government's policy to establish savings groups, and to raise capital to loan to members for occupational investment and for the welfare of their families. At present, there were 140 members (89 men and 51 women). There were two group activities. The first was to collect monthly savings from members. The total monthly savings of B6,400 were deposited at Krung Thai Bank and the savings account of the group amounted so far to B682,130. As of June 1998, 52 members had received loans amounting altogether to B439,000. Some of these loans were for fishing activities. The group was considered a strong savings group with clear-cut rules closely followed by the members.

The Demonstration Centre for Marketing was an extension of the savings group. Its purpose was to provide basic daily commodities to members. The working capital was raised through the sale of shares worth B100 each. So far there were 339 shares. Profit was redistributed to members once a year.

The Coastal Fishing Group had been established in 1994 with 42 fishermen. The membership fee was B15. The members could ask for a loan of fishing gear such as sand whiting nets and could also apply for loans from a revolving fund provisioned by selling shares.

Village problems

There were no major problems except for the facts that there was no electricity and that the children who went to school on the main island, Phuket, had to walk in the mud at low tide in the morning to get on the boats to the main island.

Second informant

Hubsu Pantip, 61, owns a grocery store and is a devout Thai Muslim. She said that the main income of Koh Maphrao households came from fishing and the secondary income from rubber orchards. She added that most men engaged in fishery and most women in rubber tapping and processing. Rubber trees had been introduced into Koh Maphrao some twenty years earlier.

Fishing as an occupation had changed little. The gear had increased from only long lines to gill nets, surrounding nets, long lines for rays, and sand whiting gill nets. The boats had changed from unpowered to outboard-powered and had grown bigger, as they had to go out further and further away from the shore. And a few years ago, coastal aquaculture had been introduced (green mussel and cage culture of grouper or shrimp).

Regarding the role of women, she had the same perception as our first informant. In the past, women played the traditional role in the home, but nowadays, they also earned extra household income by rubber tree tapping and latex processing. The tapping took place from about 5 a.m. to 9 a.m., and another three hours were spent processing the latex. Women in fishery households also repaired nets and made new ones when necessary or hired other women to do so. She believed women now worked more than men, who just fished and sold the catch at Sapum pier. "The men go out to sea at about 4 a.m. to catch sand whiting and other fish, come home around three in the afternoon and do nothing else but rest and socialize," she claimed.

In terms of income distribution, she believed there was not, and never had been, much difference among the families. "Every family can afford to have fish to eat and every family has similar household conditions." The small differences she saw were the amount of money they had and the land they owned. However, she said that most families were middle-income

families, and that they could afford to buy as many commodities as other households had. The only question was whether they really wanted to keep up with the Joneses or not. Her perception of poverty was lack of home and land. 'Middle-income' to her meant owning some land (five to 10 *rai*), but no savings. The better-off families were perceived as having more land of their own and some savings.

Regarding the state of the coastal environment, she said that trees in mangrove forests used to be very big. At present, the mangrove was in a sorry state, as many trees had been hacked down illegally by people from nearby villages. She too mentioned the previous existence of wild animals such as wild boars and monkeys that were now extinct.

Marriage age, family size and sex preference for one's children had changed over time. In the past women married at 15 or 16, but now they married at an older age. Families used to have five or six children; now they had a few children only and started using contraceptives after having their first child, as more children also meant greater poverty and lesser ability to have them carry on beyond primary schooling. Unlike the first informant, she believed that daughters were preferred because at least the youngest female child would stay with her parents after marriage.

Third informant

Yunobe Petdee is a 37-year-old fisherman and the village headman. He shared our second informant's opinion regarding the occupations and income of families in Koh Maphrao. In the past, fishing was the main economic activity and the main source of income, but now most families engaged both in fishing and in tending rubber orchards. One family usually engaged in both, with the man fishing and the woman tapping rubber trees and processing the latex. This was the main sexual division of labour in the family in terms of occupation.

Fishing as an occupation had always been well accepted. The men were the main source of labour, while the women played the role of helpers. For example, in using the heavy sand whiting gill net, the men would handle the net while the women would keep the boat on course. This had been the case both in the past and at present. In the last twenty years, there had been significant changes in terms of the quantity of fish available and caught, fishing areas, and fish prices. The fish were less available these days, so less were being caught, but prices were higher, as were the costs. Nonetheless, fishing brought in sufficient income when supplemented by the women's earnings from rubber orchards. Fishing was a good occupation as you were independent and free to work or call it a day when you felt like it.

In terms of income distribution, Headman Yunobe said that about 20 percent of the families were poor, about 50 percent were average and about 30 percent were well off. For him, too, the criterion of economic status was land ownership. In the past, he said, there had been little economic differentiation as the economy was more of the subsistence type.

He also shared the opinion of the first two informants regarding the role of women, i.e. in the past women played only the traditional role at home, except for some fishermen's wives who also went out fishing with their husbands. He added that this practice reduced labour costs and thus increased total earnings. At present, besides the traditional role and economic roles related to rubber orchards, women in fishery households also repaired or made nets, or both. If they were able to make their own net, they would save about B400. As the nets needed to be changed twice a month, the fishing families whose women could make their own nets could

save at least B800 a month. A woman hired to make nets would earn about B400 for a sand whiting gill net and about B300 for a net to catch swimming crabs. Headman Yunobe too thought that these days, women worked harder than men did.

Regarding the state of the coastal environment, he was very conscious of the need for coastal resource conservation. In his words: "The changes have been caused mostly by boats using push nets, which destroy the coastal seagrass and other resources on the seabed. Thus, our next generations won't be able to survive by being fishermen. Moreover, there has been a significant loss of mangrove. Just imagine if five *rai* of mangrove are destroyed, how many fishery habitats will also be lost and how many species will be lost or decimated. Small shrimps and crabs do need the mangrove to grow and survive."

Concerning age at marriage, family size, and sex preference for one's children, he stated that age at marriage was about 20 in the past, and about 18 at the minimum, whereas now the average age tended to go up because most teenagers were still at school. He shared the perception of the first two informants regarding the change in family size: from six or seven children at least on average in the past to two or three per family now. He thought that daughters were preferred, as they were less likely to misbehave and worry their parents.

Regarding the relationship between population and food, the headman stated that he was well aware that as the population grew, more food resources were needed, and that without determined efforts to increase fish stocks, in the future fishing families would not be able to survive.

Fourth informant

Nidi Nokda - a 38-year-old housewife and rubber tapper and processor - shared the perception of all three previous informants in the village regarding the main income and occupation of the majority of households, i.e. fishing. The secondary occupation, she said, had to do with rubber orchards, either as owner, share worker or employee.

Fishery had always been considered a good occupation, because it was independent and brought in better and steadier income than other lines of work. In the past, there was only capture fishery, but now coastal aquaculture had also been introduced. There was also cage culture of snapper, grouper and king prawn, and culture of green mussels and bloody cockles. In the past, long lines and surrounding nets made from cotton were used. Fishing gear now were mostly sand whiting gill nets, and also shrimp gill nets and crab gill nets. These days, the nets were made of nylon with narrower mesh, which was an improvement, because nets made from nylon could be repaired whereas those made from cotton could not. She did not think the smaller mesh size was a good thing, though, but she had to admit it was necessary because the fish were now of smaller size and there was also a need to catch them in sufficient quantity both for consumption and for sale. During the rainy season, fishing had to take place close to shore in case of storms. During the dry season, an outing could yield more catch as the boats could operate further out, as far as Yao and Kai islands. Because of the reduction of marine resources during the past twenty years, the catches were poorer, but operating costs were high and getting higher. This, however, was compensated for by higher prices for the fish, and fisherfolk could still make a profit.

The quality of life was good twenty years ago but was no longer as good, because of the need to struggle more to earn a living and get the children an education. However, no family was

destitute; there was always enough seafood for everyone if you were willing to collect shellfish at low tide, which was a woman's task.

Women's role had not changed during her lifetime, the housewife-cum-rubber tapper said. Women did the household chores, and if needed, engaged in work related to rubber orchards. Fishermen's wives repaired the nets or made new ones. Twenty years ago, women collected shellfish at low tide to eat at home, but now they also collected them for sale. She herself worked in a rubber orchard that belonged to her mother and had a share of the profits. She earned about B200 per day from rubber tapping and latex processing, but the income was not steady, as the work could be done only during the three months of the rainy season and only on those mornings when it did not rain.

This informant classified economic status and economic differentiation in terms of occupation, income, household size and assets. She said that in the past there were more poor families than at present. She estimated that now some five percent of the families were poor, being employed in rubber orchards, having no land and with gross earnings of about B3,000 per month. Middle-income families, earning B6,000–7,000 a month, would represent about 15 percent. The rest (80 percent) were the better-off families, earning about B10,000–25,000 a month. Poor families usually borrowed from moneylenders on the mainland, at an interest rate of about 10 per cent per month.

As for the state of the coastal environment, she and her husband, who was present during the interview, were well aware of the importance of coastal resource conservation. Besides, she was the only informant who talked about the state of coral reefs. When she was young, there had been no damage or reduction of the coral reefs, which are located on the eastern side of the island. The mangrove forests had not shrunk to any significant extent because trespassers were afraid of being caught. There was no use of cyanide to poison fish of all sizes, only the occasional use of an herb to stun them and then only the ones of suitable size were collected. She believed that this was one way to increase the fish resources. Dynamite was not used at Koh Maphrao either, as villagers knew it would destroy the coral reefs. Her awareness of the need to protect juvenile fish was also apparent. She said that most people were willing to go further away from the coast for a number of reasons and one of them was to let the small fish grow and multiply for the next generations to harvest.

Regarding age at marriage, family size and sex preference for one's children, she and her husband agreed that women married later than they used to. In the past, they tied the knot when they were about 15 or 16, but now they did so at 18 or thereabouts. She too believed that the suitable age for marriage should be about 20. In terms of family size, the average number of children per family in the past was six or seven. At present, family planning was widely accepted despite the religious teaching against it. Parents in the past preferred daughters because they were more docile and would help with the work round the house. Now, they preferred sons, as sons would help with the work outside the home and the upkeep of daughters had become more expensive, especially in terms of clothing.

On the topic of population and food, she did not perceive any negative correlation between these two variables. To her, more children merely meant fishing more earnestly. She did believe that extra work would bring in sufficient seafood for larger fishing families.

Fifth informant

Because of the difference in perception among the informants in Koh Maphrao regarding sex preference for the progeny, it was decided that interviewing a public health officer working full-time there might throw some light on the subject.

Pirapong Cheep-lek (31 years of age) gave much useful information and insights. He said that the present average family size was of two children, but that the desired family size varied between two and three children. He was not sure about the sex preference in general, but thought that sons would be preferred because once grown up they would be better able to help with fishing activities than daughters would.

Concerning changes in the state of the coastal environment, he said that fisherfolk now went out much further away from the coast, because of more competition and of the fact that the fish near the shore could not grow quickly enough to be worth catching. He talked about the traditional practice of fisherfolk at Koh Maphrao of not catching certain species of fish during their spawning period. This, to him, was an indirect way of conserving marine resources. He said that one fisherman had told him he preferred to go further out at sea and thus incur higher fuel costs than to catch small fishes, thus given them a chance to grow to be caught by his children in the future. While small-scale fisherfolk were conscious of the need to conserve marine resources, the large-scale commercial fishing operations using push nets within the 3-km protected zone were the main factor accounting for the rapid depletion of these resources.

As for mangrove forests, there used to be illegal cutting of wood to make charcoal. However, after fishery department officials had explained that the right to use forest land would not be granted to private interests and that there was a need for all concerned to conserve and rehabilitate the mangrove, and after village leaders had made a real effort to raise people's awareness of such need, he felt that the villagers had stopped cutting trees in mangrove forests.

At present, about 70 percent of the women married between the ages of 18 and 22, with 20 as the average. No child of less than twelve months of age had died in 1997. There were no children under four years of age with third-degree malnutrition, but three children suffered from second-degree malnutrition.

Family planning was well accepted, the most popular methods being the pill and injections, respectively. The decision to use contraceptives was made by the wife for the purpose of child spacing, the interval between births being of about two years on average.

The average household income of all the families was around B7,000 per month, and 70 percent of the households earned about that much, 10 percent were poor and about 20 percent were well-off by local standards. His classification was based on his house visits, observation of household assets, conversations with household members, and the quality of their clothing.

Regarding population growth and food availability, he felt that the older generations were not aware of the inverse relationship between the two. They would keep saying, "Fish have always been there in the sea and animals have always been there in the forest." The younger generations did not seem to directly relate food availability and population size either, but considered a large family as an economic burden. They did not think in terms of food security, of more mouths to feed, but rather of expenses for clothing and education. They seemed to believe that, no matter how many children, parents would be able to provide sufficient food for them.

Further information at the provincial level

Before the field surveys and interviews, information was obtained from a number of government officials responsible for fishery and coastal resources in Ranong and Phuket provinces.

In Ranong, the provincial fishery officer said that the depletion of marine resources in the Andaman Sea had been caused by several factors. The first factor was the prevalent illegal use of mechanized push nets and trawl nets within three kilometres of the coastline. This destroyed seagrass beds, juvenile fish, spawning fish and coral reefs, and damaged small-scale surrounding nets.

The second factor was the rapid increase of large-scale commercial fishing, with boats of 50 GT and over equipped with sophisticated technology to locate and catch schools of fish, including juvenile commercial fish. Anchovy purse seines caught not only anchovies but also juvenile mackerels. Clam dredges damaged the ecosystem and polluted the water by leaving behind rotten fish and clams.

The third factor was the inability of provincial authorities to control the number and operations of large-scale commercial vessels. Their inability stemmed from the fact that the Department of Fisheries was responsible for the licensing of fishing gear, while the Harbour Department was responsible for the registration of fishing craft. For instance, there was gross under-licensing of fishing gear. In 1997, 74 boats using push nets were registered in the province, but the fishery officer in charge of statistics estimated that there were 100 to 200 boats with push nets that were not registered. However, it was noted that fishing gear could be registered in any coastal province, not necessarily in the province where boats with such gear operated.

The fourth factor was urbanization, which resulted in sewage from household use being released untreated into the sea. When asked if there was any inspection and monitoring of wastewater treatment at shrimp farms, the provincial fishery officer said that he had just been transferred to Ranong, but since his arrival, his office had not looked into this aspect, because of lack of personnel.

“A large area of mangrove forests in Ranong has been replaced by shrimp farms”, Sophon Havanond, head of the Research Centre on Mangrove Forests, was quoted in the local newspaper as saying. “Further replacement of mangrove forests by shrimp farms, which not only destroy the forests, the fish habitats therein and subsequent stock of fish, but also pollute the coastal seawater, must immediately be stopped” (*Siang Ranong*, 6/12/97–1/1/98, p. 10). He had added that recently a large number of people had illegally turned the mangrove areas into shrimp farms.

The provincial head of the Ministry of Industry was responsible only for the treatment of water used in fishmeal factories, freezing works and ice-making factories. The official showed a set of statistics that indicated that the inspection of water treatment in those factories was sporadic and made only during the dry season when the seawater level was low. Regarding wastewater from hospitals, he said there was no inspection or monitoring though there should be. When asked about the inspection of wastewater treatment in hotels, he stated that it was the responsibility of the Ministry of Public Health and of the Provincial Administrative Office. He added that the inspection of water treatment at shrimp farms was the responsibility of the Department of Fisheries, but as far as he knew, there had never been any. What was usually the case was that fishery officials and the police would go to a shrimp farm only when the owner

of an adjacent farm accused the former of releasing untreated wastewater into the sea. Ranong people's opinion was that the main problem regarding seawater pollution was the release into the sea of untreated water from over 300 shrimp farms.

A meeting with the head of the Provincial Administrative Office did not yield any useful data on the inspection of wastewater treatment at hotels, except that small, older hotels (with 30 to 40 rooms) were known to be unlikely to treat their used water. However, the new, larger hotels (80 rooms and over) had to have a method of water treatment acceptable to the provincial representative of the Public Works Department of the Ministry of Interior before permission for the hotel to be built was granted.

A conversation with two commercial fishermen yielded the opinion that the depletion of marine resources in the Andaman Sea was rapid during the 1960s and 1970s due to the introduction of trawl nets and push nets. The older of the two, a man in his fifties, said that the idea of extending from three to 10 km from the coast the expanse of water prohibited to boats using push nets and trawl nets for the benefit of small-scale fisherfolk would not work at Ranong, because the seabed was too steep. The younger fisherman said that the human population and fishery resources were not growing at the same pace. Sustainable development of fishing activities did not depend on slowing down population growth but on finding efficient ways and means of increasing fishery resources within Thai waters. At present, while sustainability could not be achieved, one solution already practised by large-scale fishing operations was to buy the right to fish in Burmese waters.

In Phuket, the provincial fishery officer said that the problems related to fishing activities did not differ from those of Ranong. They were the increasingly frequent trespassing of boats with push nets and trawl nets into the 3-km protected area along the shoreline and the rapid disappearance of mangrove forests. Boats with push nets operating illegally were hard to catch and even when they were caught, the judicial process took too long and punishment was infrequent or too lenient. There were also the problems of water pollution caused by shrimp farming and of the high soil salinity of rubber tree orchards close to the shrimp farms further up behind the coastal land areas. In addition, villagers whose households were close to the new shrimp farms around the Phangnga Bay Hotel had started to complain that their well water had become brackish. The last problem mentioned was the almost total dependence of small-scale fisherfolk on the owners of the fish piers, who were both providers of capital and buyers of the catches.

An official at the Provincial Fishery Office said that there were three main problems these days. The first was encroachment into mangrove areas by the Phuket municipality, the Fish Marketing Organization and a school. The second was the old problem of illegal take-over of mangrove forests by shrimp farms. The last was the failure of the Royal Forestry Department to replant mangrove forests during the past three years, which had led to a 25-percent budget cut.

An official from the Ministry of Industry said that there had been little inspection of air and water pollution caused by industrial facilities. Nonetheless, newly registered factories were to be inspected and monitored every month. Samples of wastewater from each factory were being collected for later examination. According to this official, about 25 percent of factories of all types within the municipality had acceptable methods of wastewater treatment.

Summary and discussion

The interviews with a number of province-level government officials were an attempt to identify the factors affecting the depletion of fishery resources and the use of coastal resources. The consensus was that the depletion of fishery resources was mainly due to the excessive number of highly efficient, large-scale commercial fishing operations. In addition, there was the prevalent, if illegal, use of push nets and trawls within the protected 3-km-deep coastal area and the inability of the powers that be to stop the practice. The Department of Fisheries and the Harbour Department were unable or unwilling to co-operate to control the number of fishing boats, and consequently, there was a lack of accurate information about the extent of illegal harvests. There was also a consensus that the depletion of mangrove forests was mainly due to two factors. The first was the unwise decision of a previous government to grant usufruct rights over mangrove forests to private investors, despite the proviso that the forests would have to be replanted. The second was government promotion of shrimp farming for export, which had led to illegal encroachment upon mangrove forests by shrimp farms. The expansion of shrimp farming, in turn, was the main factor accounting for coastal water pollution. The natural growth of tourism further impinged on coastal land, including mangrove forests, and destroyed coral reefs. The current promotion of tourism would but exacerbate the problems.

The interviews carried out with individual villagers did not yield similar responses regarding the depletion of fishery resources and mangrove forests. Out of six villagers with any opinion on mangroves, three only mention woodcutting by villagers for charcoal or house building, and only two specifically blame shrimp farms and the like. The remaining topics covered are summarized in the following paragraphs. It should be noted that the interviews were based on individual perceptions, which may not accurately reflect reality, and that they focused on the changes that had occurred during the past twenty to fifty years in the two fishing communities.

The economy

Both villages used to depend on a subsistence economy, now replaced by a monetary economy. The village of Sai Dang in the province of Ranong used to derive its income mainly from agriculture, followed by fishery. Over time, natural calamities have gradually reduced the profitability of both occupations, more farmers and fisherfolk had turned to employment in various activities in town, and the economy is now more diversified. In the village of Koh Maphrao in Phuket province, fishing has always been the main occupation, both well accepted and profitable. However, families are not as segregated in terms of occupation as in Sai Dang. A family usually engages both in fishery and in rubber tapping and processing. In the past, it was difficult to differentiate the economic status of the families both in Sai Dang and in Koh Maphrao. At present, the economic status in Sai Dang is classified in terms of occupation, income and ownership of assets, and fishing families are the worst off. The economic status of the families in Koh Maphrao is classified in terms of land ownership and occupation, and fishing families are believed to be better off than non-fishing families. The role of women in both communities has expanded: they are more involved in the economy, as extra income earners.

Society

Sai Dang villagers are Buddhists, whereas Koh Maphrao villagers are Muslims. People in both communities speak the Southern Thai dialect. In both villages, the older generations have only four to six years of schooling, but the education level is rising among the younger generations. The population of the two villages must have grown rapidly until the last 10 to 15 years. Previously, the average number of children per family was six or seven, whereas the present size is about two or three, due to family planning. Perceptions regarding age at marriage differ

and cannot be reconciled. It may however be conjectured that Sai Dang, as a Buddhist community, has a preference for male children. Direct questioning in Koh Maphrao yields inconclusive responses from both generations and both genders, regardless of whether they refer to past or present preference. In the old days, there was no people's organization in either village, because people had fewer problems and the community took care of them. There are now formal people's organizations, usually occupation-based, promoted and supported by government organizations. They tend to be non-sustainable without outside support, due to lack of knowledge and funding. There is a desire to have a fishermen's group at Sai Dang.

Population and food

In the past, the abundance of fishery and forestry resources in both villages did not raise the question of imbalance between population and food. At present, the interviewees in Sai Dang are aware of such an imbalance, unlike those at Koh Maphrao, who still think that there are enough fish in the sea and that, if greater efforts are made, there will always be enough to feed even large families. Such a view may be due to their high level of awareness of the need to increase fishery resources for the next generations and to their efforts to sustain them.

In conclusion, the interviews indicate that the villagers of Koh Maphrao would be more ready to embrace the notion of having an integrated coastal zone management programme than would those of Sai Dang. They are more aware of, and more concerned with, marine coastal resource conservation and already have a strong desire to restock coastal fishery resources. The facts that they belong to a closely knitted community and that they can manage three formal organizations successfully are also in favour of their welcoming such a programme and making it work.

PART III

Conclusion and recommendations

The findings in Part I and Part II of this report are derived from two very different data sources, one a study mainly of the 1985 and 1995 marine fishery censuses, the other a field study that involved household surveys and interviews. Both studies are complementary, however. The study of the census data provides a general scenario of changes in the fishery sector, while the field study provides a dynamic profile of fishing communities in Thailand. Part III is an effort to synthesize the main findings, which will be divided into five parts: changes in fishing communities; changes in fishery resources and the coastal environment; implications of demographic changes; integrated coastal zone management for Thailand; and suggested further studies.

Changes in fishing communities

Traditionally, fishing communities did not comprise exclusively of fishing families. For example, fishing households in Sai Dang, Ranong province, accounted for only half of all households; farming households accounted for the other half. In Koh Maphrao, Phuket province, fishing households have always represented the majority of the households, while the minority were involved in coconut and, lately, rubber orchards. Not only was the economy relying exclusively on the agricultural sector, it was also subsistence in nature. The villagers produced whatever they could to sustain their families; whatever was left was bartered for other produce. The standard of living was more or less the same for all, as was the quality of life. There was no formal organization at village level. The communities were closely knitted, and the villagers related by kinship.

Women did not need to play an active economic role besides assisting their families in farming or in processing fish and shrimp. Family planning was unknown. Most families had six or seven living children and infant mortality was high. The steady growth in population was sustained by abundant natural resources, including fishery resources. Due to the limited technology, exploitation of fishery resources was not such as to deplete them.

Around the time the first National Economic and Social Development Plan was introduced in 1961, the rural economy started to change gradually from a subsistence to a monetary economy. Just before the introduction of family planning in the early 1970s, population growth was high due to high fertility but lower mortality induced by better public health care. As there was little economic growth in the non-agricultural sector, rapid population growth and accelerated industrialization were the main factors causing intensive exploitation of natural resources, including fishery resources. Forests were cut down, wild animals were hunted, fish became less abundant. Meanwhile, the introduction of new technologies gave rise to medium-to large-scale fishing vessels and efficient fishing gear, such as trawl nets, which accelerated the process of exploitation of fishery resources.

Better transportation linked fishing communities with urban areas, which offered economic opportunities other than agriculture and fishery. As the case of Sai Dang shows, economic diversification has occurred, and villagers are no longer only fisherfolk and farmers, but also employees in transportation, in ice factories, in fish freezing and processing works. With economic diversification has come income differentiation. Agriculture and coastal fishery have become less profitable and, as the service and industrial sectors grow, the proportion of fishing

households in once predominantly fishing villages has started to diminish. In fishing communities where contacts with urban areas are not easy, change in the economic structure of the community is less pronounced. In Koh Maphrao, for example, it is only recently that travel between the island and Phuket Island has become more convenient and that young villagers have started to find tourism-related work on the main island.

Better transportation encourages population movement and tends to weaken family ties. The tradition of mutual help in times of hardship is replaced by the promotion of formal organizations that are economic in nature, such as agricultural or fishery co-operatives. These organizations are promoted by government officials and tend to be short-lived if they are not continuously supported by outsiders or by the villagers' feelings of kinship obligations.

Since the introduction of family planning in the early 1970s, fertility has started to decline. The acceptance of family planning has resulted in smaller families. Families in fishing communities are able to control their size and usually wish for two or three children.

With the advent of the cash economy have come greater expectations of material comfort and of better education for the children. Coupled with the inability of fishing households to rely on one income earner, women have started to play an active economic role to supplement family income. In Sai Dang, they have become sellers of processed seafood or workers in the central district of Ranong town, or both. In Koh Maphrao, they go out fishing with their husbands or work in rubber orchards, as full owners, partners or employees.

The future of fishing communities in Thailand is uncertain. The income gap between households in each surveyed fishing community is quite perceptible. It is very likely that poor fishing households will become non-fishing households and that the others, whose income from fishery is still good, will see that income grow. A change of occupation among small-scale fishing families at nearly subsistence level and simultaneous growth of the remaining better off, small-scale fishing households into more intense coastal and deep-sea fishing have already been observed. It is very likely that fishing communities in the Andaman Sea will follow the path trod by those in the inner Gulf of Thailand. There, small-scale fishery has been replaced by large-scale commercial fishery, and both subsistence fisherfolk and fishery employees have been absorbed into the non-fishery, urban sector and replaced by foreign labour.

The poorer fishing households have fought for economic survival by participating in non-fishery occupations. To ensure their survival, we recommend that the government give them an opportunity to shift from fishery to other occupations that provide higher incomes. Hotta (1994) maintains that to facilitate such occupational transfer, there is a need to formulate and implement rural enterprise development programmes in order to promote and diversify local rural economies.

In the case of the better-off fishing households, there is also a natural trend toward commercial fishery. This trend should be promoted, so as to reduce the proportion of fisherfolk in coastal fishery and increase catches per capita. It is further recommended that this category of fisherfolk be monitored in terms of their fishing grounds. They should not operate within the 3km protected zone any longer.

The exit from fishing of very poor artisan fisherfolk and the entry of richer fisherfolk into commercial fishing imply that the medium-income artisan fisherfolk will be the group to benefit

most from integrated coastal zone management. It is thus recommended that they be the main participants in such programmes.

Changes in marine resources and in the coastal environment

Lack of adequate and accurate data makes it difficult to gauge the changes in marine resources and the coastal environment. It is generally believed that marine living resources have been depleted beyond a sustainable level, but how much beyond has yet to be assessed. Statistics on catches include an unknown proportion of fish caught outside of Thai waters. The declining catch rates per unit effort indicate that fishery resources are depleting but the paucity of statistics prevents reliable estimates of the stocks remaining in Thai waters.

Data on coral reefs and seagrass beds too are found to be fragmentary and outdated. Efforts are being made to carry out scientific research on the resources but the data are unavailable at present, because of the time-consuming nature of the research as well as of the lack of expert manpower. It can only be stated that coral reefs and seagrass beds are being damaged and deteriorating due to such man-made activities resulting in coastal water pollution, silting and reef damage as urban sewage, untreated water from shrimp farms, construction, mining and tourism.

Mangrove forests have been diminishing during the past two decades, albeit at a slower rate lately due to government efforts to replant them. Most mangrove areas have been lost to shrimp farms. Due to the unsustainable nature of shrimp farming in the inner Gulf area, derelict shrimp farms have been turned into residential areas. In other coastal zones as well, mangrove areas are being turned into shrimp farms, especially in the eastern and southern parts of the Gulf and the Andaman Sea. Because of increasing external demand and subsequent profitability of shrimp farming, the encroachment of shrimp farms on mangrove areas will continue. In fact, the enterprise has become so profitable that not only mangrove areas are used. Recently, shrimp farms have encroached upon rice farming areas in coastal areas, on arable land in the Central Region and even in uphill rubber orchard areas in the South. Although the Cabinet ruled in early July 1998 that such encroachment was detrimental to the environment and was to be stopped, the effective implementation of such a ruling has yet to be seen.

The pattern of land use in coastal zones, besides the use of mangrove areas for shrimp farms, is not adequately documented to provide a database for planning integrated management there. There is first the technical problem of defining what a coastal zone is, and second the unavoidable fact that coastal land is used for multiple purposes, particularly in urban coastal areas. What came out clearly from the interviews with provincial officers representing various ministries was that the land use pattern in urban coastal areas is constantly changing and coastal land use plans usually lag behind spontaneous land use, due to bureaucratic delays and ineffectual implementation. Coastal land use in rural areas will not be difficult to plan and manage. Rural coastal land is mainly used by villagers as their place of abode and the only land use conflict has been the encroachment of mangrove areas by outside investors to turn them into shrimp farms. Unfortunately, it is in the urban coastal areas that management is urgently needed. There is competition for coastal land to be put under conservation, to be used as residential area, tourist resorts, shrimp farms, fish landing piers and fishery-related processing plants. Each type of activity not only competes with the others for land, but also impinges on the offshore environment. In the future, with the promotion of tourism and the unregulated growth of deep-sea fishery, urbanization and industrialization in coastal provinces will accelerate, and along with them will come more serious and extensive coastal land use conflicts. Unless

provincial administrators are more capable of coastal land use planning and effective, proactive management, the changes in coastal land use will continue to be spontaneous and largely detrimental to the offshore environment.

The above conclusions lead to the recommendation that relevant government agencies be made aware of the urgent need for adequate, accurate and up-to-date databases. In relation to the exploitation of marine living resources, efforts should be made to estimate fish stocks and the number and capacity of the various types of fishing craft and gear, and to find effective means to control and regulate large-scale fishing operations. Regarding other marine coastal resources, there is still a need to obtain up-to-date data on mangrove areas, seagrass beds and coral reefs. Reliable databases are a prerequisite for the effective management of these resources. The information on coastal land use is also inadequate for integrated coastal zone management planning. This is particularly true in the case of urban coastal land use.

Implications of demographic changes

In recent years, the Thai population has been increasing at slower rates than in the past. In 1985, the natural population growth rate was 1.74 percent. In 1995, the crude birth rate of 17.9 per 1000 and the crude death rate of 6.02 per 1000 resulted in a natural growth rate of 1.18 percent. This implies that though the population will increase, the rate of growth will in the long run play a minor role in the food security equation of the country, because Thailand has always been a net exporter of food. The country ranks second only to the United States as the top rice exporter and is among the top ten countries in terms of fishery export. The sheer size of the Thai population will not make Thailand a food-deficit country because its food requirements will be met by the growth of pig and poultry farms on a commercial scale, of coastal aquaculture, of deep-sea commercial fishery and, of course, of rice farming.

Assuming no massive foreign migration into Thailand, the population pressure on food will start to lessen in the next few decades, as the population growth will be reaching its replacement level. As the population becomes more educated and westernized, there will be a greater national demand for seafood, especially fish, as the western trend toward health food is embraced.

The assumption of no immigration is not supported by reality. In the future, the single most important demographic factor will be the large-scale immigration of labour from neighbouring countries due to political turmoil there and Thailand's preference for cheap foreign labour. In September 1996, the phenomenon of illegal migrant labour from neighbouring countries, especially Myanmar, Lao PDR and Cambodia, led the Thai government to grant two-year work permits to foreign labourers who had entered the country illegally. Upon the expiry date, the issue of migrant labour was raised and a National Committee on the Issue of Migrant Labour was set up. Within that committee, only the Department of Fisheries of the Ministry of Agriculture and Co-operatives insisted that the Burmese migrants be exempted from repatriation and legally employed in the fishery sector. At present, fishery employees in Thailand consist mainly of Burmese migrants.

The direct economic impact of the employment of Burmese fishery labourers is the lower labour cost, as they are paid about half the wages their Thai counterparts receive. Other things being constant, the Thai fishery sector and related industries will grow rapidly, given the higher profitability caused by lower labour cost and higher demand for seafood.

The epidemiological impact of immigrant labour is the recurrence of certain diseases which had long disappeared such as elephantiasis and tuberculosis. As the immigration of Burmese fishery employees is followed inevitably by Burmese commercial sex workers who are relatively ignorant of AIDS, the spread of AIDS among the Burmese migrants is believed to be alarming.

The direct demographic impact is caused by the high fertility of Burmese migrants, which will put a pressure on limited resources for public health care and education. Socio-culturally, Thailand will become more diversified. Language and cultural barriers will make integration of immigrant fishery labour into Thai culture and society an unlikely or at the very least a long-drawn process.

Hence, the demographic changes point to the need to focus more on the migration factor. At the provincial level, it is worth looking into unregistered migration toward coastal areas, which affects the pattern of urban land use in coastal provinces. **At the national level, the role and long-term impact of the Burmese migrant labour in the Thai fishery sector and Thai society should be closely examined.**

The demographic changes in coastal fishing communities characterized by low fertility and mortality but increasing migration imply that these communities will be less cohesive and that interpersonal relationships will be based less on kinship ties. This lack of cohesion among community members will be heightened by occupational diversification. Thus, it will be more difficult to mobilize and organize community members into cohesive groups with common interests. It is therefore recommended that in selecting sites for integrated coastal zone management, fishing communities that are in the state of occupational transition be left out and poor fishing households in those communities be encouraged to engage in rural undertakings. Integrated coastal zone management should be introduced in the fishing communities where middle-income fishing households predominate and where there is a high level of community integration.

Integrated coastal zone management in Thailand

As mentioned in the first part of the study, the structure of the Thai bureaucracy is not conducive to integrated management at the national level, because of the lack of horizontal co-ordination among line agencies. In fact, it was stated in a discussion on community-based fishery management in Phang-nga Bay as recently as 1996 that Thailand does not have the institutional framework needed to fully apply such a programme (FAO, 1998, p. 8). As community-based fishery management constitutes one half of integrated coastal zone management (ICZM), which has to deal with both the sea and coastal land, it follows that ICZMs in Thailand will have to wait for its formulation at the national level. Provincial-level ICZMs will be extremely difficult because of the bureaucratic preference for top down planning, which cannot take into full account the various problems and issues faced by different fishing communities. Provincial administrators in coastal provinces could play a leading role in laying a foundation for effective ICZM programmes. They should be aware that, if they do not take decisive measures now to manage urban coastal land use and its negative impact on near-shore resources, they are the ones who will have to tackle the problems in the long run.

For the time being, it is more appropriate to formulate ICZM programmes at community level in order to tailor them to the specific problems and needs of the rural fishing communities, and to leave out the urban coastal zones. The interviews with provincial government officers revealed clearly the lack of co-ordination and of effective implementation concerning urban land use. Unless provincial administrators are more willing to collaborate across bureaucratic lines and

able to implement urban land use plans in a timely and effective manner, the use of urban coastal land will remain a free-for-all. Provincial administrators could facilitate the ICZM programmes in rural coastal areas by providing information and institutional support via the *tambon* administration.

If ICZM programmes are to be introduced into rural fishing communities, they should be dovetailed into the existing community-based fishery management pilot projects, for the practical reason that half of the management plans, implementation strategies and support services have already been worked out and identified. Not only are these pilot projects already in place, but they are facilitated by the Department of Fisheries, which belongs to the same ministry as the Department of Land Development and the Royal Forestry Department, which are the most suitable facilitators for coastal land use management. This fact should ensure smoother collaborative efforts among programme facilitators. Local non-governmental organizations, too, would be better able to participate as facilitators in community-level projects.

According to the Department of Fisheries, a potential framework for community-based fishery management in Thailand will consist of a national committee and community-level committees. The community-level “local committees for coastal fishing” would comprise small-scale fisherfolk whose role and responsibility would include managing marine resources and permitting fishing and culturing activities (FAO, *ibid.*). If ICZM is to be included into community-based fishery management, then the local committees will have to manage coastal land use as well, which means that the Thai government will have to explore the idea of granting exclusive coastal land rights to coastal fishing communities. If the communities could manage both coastal land and marine resources, the community-based fishery management projects would eventually become community-based ICZM projects.

The difficulty in achieving a successful ICZM programme at grassroots level in Thailand stems from the fact that fisherfolk are poorly educated, relatively powerless in relation to the middlemen, outside investors and government bureaucrats, and lack a sense of political solidarity. The field study and interviews also revealed that they do not have much trust in the efficacy of the government in protecting their interests.

One certain advantage is that small-scale fisherfolk are by now very much aware of the depletion of fishery resources and of the need for resource conservation. Hence, given their awareness and willingness to protect their long-term interests, introducing ICZM programmes into fishing communities should not be difficult. Yet it is difficult for a committee of relatively powerless fisherfolk and local leaders to implement a programme. The difficulty will have to be overcome by providing them with support services, such as institutional credit, information on supplementary income-earning activities, technical know-how on such simple but lucrative activities as green mussel or bloody cockle culture, and informal education on management and organization. These support services will gradually reduce the shortcomings of the fisherfolk and increase their political solidarity and management capability.

In short, ICZM programmes cannot be formulated or implemented at the national or provincial level at the present time. In the light of the recent introduction of community-based fishery management into the Eighth National Economic and Social Development Plan (1997–2001) and the subsequent community-based fishery management pilot projects, it is recommended that the actual formulation of ICZM at the national level be delayed. Meanwhile, community-level ICZM programmes could be formulated and implemented at the same sites as the community-based fishery management pilot projects. Despite the low initial capability of

small-scale fisherfolk to play the key management role in ICZM programmes, the provision of support services will help them become effective participants in the programmes. **Given the political will of the Thai government, the support of non-governmental organizations and the vested interest of small-scale fisherfolk themselves in protecting and conserving their source of livelihood, formulating ICZM programmes at the national level in Thailand should not be an impossible task.**

Suggestions for further studies

The desk study and the field survey presented here raise a number of questions and issues that merit further study. They are, *inter alia*,

1. An assessment of the registration statistics on fishing vessels and fishing gear of Thailand;
2. A study on the evolution of fishery organizations in Thailand;
3. The occupational and income differentiation among small-scale fishing households in Thailand;
4. The occupational differentiation in fishing communities in Thailand;
5. The economic and social impact of Burmese migrant labour on the Thai fishery sector and Thai society;
6. The role of women in coastal fishery in Thailand;
7. Institutional measures for the sustainability of shrimp culture in Southern Thailand;
8. The state of coastal land use in the urban coastal areas of Thailand: baseline data for integrated coastal zone management;
9. An assessment of community-based fishery management pilot projects in Thailand; and
10. A feasibility study on incorporating coastal land use management into community-based fishery management pilot projects in Thailand.

Epilogue: Sai Dang and Koh Maphrao revisited

The mass protest of small-scale fisherfolk in Songkhla province in mid 1999 against anchovy fishing with luring lights seems to indicate that they are powerful enough to organize themselves to protect their interests in a collective manner. Their mass protest and demands were serious and persistent enough to draw attention at the national level and finally led to the government's decision to set up a national-level committee to solve the conflicts between them and commercial fishing operators over the use of luring lights.

This new visit to Sai Dang and Koh Maphrao arose mainly from the above events, as they raised the question whether small-scale fisherfolk were as powerless as is generally believed. If they are not powerless, the question that follows, in relation to the subject of integrated coastal zone management, is whether they now have a greater ability to manage their coastal and land-based resources collectively in an integrated and sustainable manner. Our second visit was also meant to be a follow-up on the changes and problems of the two villages.

The visit took place from 7 to 10 December 1999, first to Sai Dang and then to Koh Maphrao. The methodology used, besides field observation, was the interview of two fishermen, two fishermen's wives and a public health volunteer in Sai Dang and of the same number of fishermen and their wives as well as the assistant chairperson of the Coastal Fishermen's Group in Koh Maphrao.

The information obtained is reported in two parts. The first part pertains to the changes and problems one year after the first field study was conducted in late 1997 and early 1998. The second part concerns the villagers' current ability to participate in or set up any integrated coastal zone management programme.

Changes and problems

In Sai Dang village, illegal migration of Burmese labour resulted in a group of Border Patrol Police being stationed in Ranong province. One of the unintended effects of their presence was a reduction in the use of dynamite for fishing by "outsiders". Another change was a small increase in the number of fishing boats (typically 4- to 8-metre-long, with a 5 HP Honda engine). This change was a solution to the problem of unemployment of the children of poorer fishing families who could not afford to attend secondary school. The total cost of a boat with an outboard motor is around B20,000, and father and son share the fishing gear. The third change was the beginning of catfish cage culture, which seemed likely to spread. One other change was the increase in fishing gear to enable fisherfolk to engage in fishing activities all year round. Crab traps were still the most often used type of gear, but by the end of 1999, there were also pomfret gill nets and fyke nets.

One change in Sai Dang apparent both through field observation and in the interviews was that the level of solidarity among villagers was lower than only one year earlier. The coastal side of Sai Dang village where the fishing community is situated comprises two clusters of households. One cluster consists of Thai fisherfolk who have been fishing for generations, the other of quite a number of newcomers who hold both Burmese and Thai citizenship. These newcomers use a type of fishing gear the Thai fisherfolk do not approve of because it catches only juvenile fish.

Alongside the changes were a number of problems, whose priority in people's minds too had changed. The survey carried out in Sai Dang in December 1997 had found that the most frequently mentioned problem among fisherfolk was the high operating costs. Exactly one year later, this came second to complaints over the use of push nets, perhaps because by working harder you could offset those costs, yet what could you do about pushnetters. Fisherfolk had a feeling that the government was not sufficiently responsive to this problem, even though pushnetters have posed the most serious threat to small-scale fisherfolk for over ten years. Interviewees did not mention the conflict over anchovy fishing with lights. The only one who did said that the mass protest of small-scale fisherfolk was possible only because of support from non-governmental organizations.

Small-scale fisherfolk, at least in Sai Dang, appeared to have little faith left in the government. Their requests seemed to be ignored and whatever projects officialdom initiated were not followed through. Interviewees mentioned that there had been no response to their requests to the government, through the Sub-district Administrative Organization, to be provided with technical training in aquaculture. Through the local administrative organization, a fund had been made available to promote shrimp paste processing and to obtain fish fingerlings for cage culture, but there had been no further technical assistance, follow up or evaluation. Their resignation and sense of powerlessness are, we feel, a very serious problem and a threat to any efforts, including integrated coastal zone management programmes, to conserve and manage their own coastal and land-based resources.

The fourth problem mentioned in 1999 was the lower quantity of planktonic shrimps caught in bamboo-screened traps called *chanta* and used to make shrimp paste. Fishermen as well as their wives put the decrease down to the high level of rain that year and to the untreated water from shrimp farms released into the sea from further inland. Because Sai Dang is close to the Burmese border, it has little space for fishing activities. These are carried out in shallow waters near to shore, where the depletion of fishery resources translates into dwindling income from year to year, so much so that the processing of shrimp paste has become more important as a supplementary source of income.

The last problem was the lower quality of water. This may well be caused primarily by the release of wastewater from shrimp farms, but it was definitely made worse by the rubbish dumped into the sea by another village up along the coast. The Sai Dang villagers had tried to talk to the headman of that village and to the Sub-district Administrative Organization, but to no avail. When the interviewees talked about their problems and lack of effective solutions, they did so in such a manner as clearly indicated they believed they had little power over their own lives.

In Koh Maphrao village, there had been more changes and fewer problems than in Sai Dang during 1999. There had been no change in fishing gear, but a significant increase (70 to 80 percent) in raft culture of green mussels. This was mostly in response to the increasing demand from Phuket Island and partly to the Agro Tour Project being introduced by the Department of Agricultural Extension, which was then in preparation and would be in operation by October 2000. The project will consist of: first, a demonstration centre of green mussel culture and fish culture, together with floating restaurants within the location of the green mussel culture; second, a demonstration centre for rubber tapping and processing; third, such tourist facilities as a food centre, bungalows and tents, as well as mountain bikes for touring the island. Fourth, tourists will have the opportunity to go out with fisherfolk in their boats to observe their fishing operations. Fifth and last, there will be tours to small islands near Koh Maphrao.

There was an increase in the number of boats in Koh Maphrao, as more young adults married, set up their own families and became income earners, and as a few rich fishermen could afford more boats. Fishery was still the most valued main occupation as it brought in food for the family, and green mussel culture was considered only a secondary occupation. However, one of the main conclusions reached in Part III was still valid, that small-scale fishing communities were in a state of transition. In the case of Koh Maphrao, there were clear signs of further diversification of secondary occupations and of greater income disparity. One reason was the introduction of the Agro Tour Project, which would benefit only a small number of villagers. Another was that the Miyazawa loans had allegedly been given only to those who were close to the members of the Sub-district Administrative Organization, regardless of the real needs of other poor villagers.

One change that was not reported by interviewees but was derived from conversations and observation was that the more pressing need for economic survival seemed to be overcoming their awareness of the need for coastal resource conservation. A few months earlier, when fisherfolk had found a large site of short-necked clams, the clams had been dredged within a very short time and no efforts had been made to replace them.

As for problems, two were reported. One was the small size and dwindling numbers of sand whiting around the island. This was believed to be due to overfishing, as sand whiting gill nets have been the most popular fishing gear of Koh Maphrao. Fisherfolk now had to go out as far away as Phangnga, which unavoidably raised their operating costs. To make the outing worthwhile, they had to harvest 10 to 15 kilograms of commercial fish. The second problem that was mentioned by all interviewees was the further depletion of fishery resources. They still blamed this on the pushnetters, which now came as close as less than five hundred metres from shore and even trespassed into the conservation area around Rang Island. A fisherman mentioned the possibility that the lights used to lure anchovies also attracted the fish from the 3-km coastal zone. Neither fishermen nor their wives nor any of the local officials in the village, however, mentioned the anchovy controversy. All seemed to distance themselves from it and to be preoccupied instead with their own problems and the economic survival of their households.

Possibility of integrated coastal zone management programmes

The conclusion from our return visit to Sai Dang is that small-scale fisherfolk are still powerless. Even when they protest against such incidents as rubbish dumping from up the coast or request local government assistance for some occupation-related activities, they are still unable to organize themselves to solve these fishery and community problems in an effective, organized manner. Asked point-blank if they would be able to organize a coastal resource management programme on their own, they answered that they would need outside help, either from the government or from non-governmental organizations. Thus, any integrated coastal zone management programme involving villagers as active participants will take a long time to be fostered. The villagers' distrust of the government and the inefficiency of the concerned provincial bureaucracy also do not bode well for any such programme taking off in the near future.

The conclusion from our return visit to Koh Maphrao is that there too, small-scale fisherfolk are powerless. They could not initiate any project by themselves. The Agro Tour Project was introduced by the Department of Fisheries, and most of the villagers just accepted it as a given. They had not really bothered to figure out whether they liked it or not and how it would affect

their community in the long run. The questions concerning integrated coastal zone management programmes unsurprisingly brought the same negative answers.

The overall conclusion from the visit of both communities this time is that increased economic hardship for the majority of the fisherfolk there unavoidably makes them more concerned with their own survival first and foremost. Any integrated coastal zone management programme will not be able to be established so long as they still have to struggle for their own economic survival and so long as the concerned government agencies are not restructured to facilitate such programmes.

In short, the evidence gathered in Sai Dang and Koh Maphrao villages one year later confirms the conclusions and recommendations made in Part III.

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This study involves both a desk study of two Marine Fishery Censuses of Thailand and a field study of two small fishing communities: Sai Dang Village, Ranong Province and Koh Maphrao Village, Phuket Province, Thailand.

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