Socio-economic status of trawl fishers in Prachuap Khiri Khan-Chumphon provinces and Fishers in Trat Province Thailand

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Strategies for trawl fisheries bycatch management project





Socio-economic status of trawl fishers in Prachuap Khiri Khan-Chumphon provinces and Fishers in Trat Province Thailand

Sirisuda Jumnongsong, PhD.
Department of Fishery Management
Faculty of Fisheries, Kasetsart University, Thailand

Strategies for trawl fisheries bycatch management
(REBYC-II CTI; GCP/RAS/269/GFF)

2016

Preparation of this report

This report was prepared as a deliverable for the project "Strategies for Trawl Fisheries Bycatch Management - REBYC-II CTI" (GCP/RAS/269/GFF) in Thailand. The project is funded by the Global Environment Facility (GEF) and executed by the Food and Agriculture Organization of the United Nations (FAO).

The aim of this report is to review existing socio-economic data as baseline information and to present a study of the socio-economic status of trawl fishers in Prachuap Khiri Khan province and Chumphon province and fishers in Trat province conducted via two surveys at the two project sites as following:

1. **PART I**: Socio-economic status of trawl fishers in Prachuap Khiri Khan province and Chumphon province, Thailand and
2. **PART II**: Socio-economic status of fishers in Trat province, Thailand

At the first site the study focused on trawl fisheries while at the second site small-scale and medium to large-scale fisheries were included. The results in this study can be used as supplementary information to support the implementation of the recommendations made on trawl fisheries management by the REBYC-II CTI Project in Thailand.

This report was written based on the following Terms of Reference:

1. Review of existing data and analysis of data from questionnaire survey (Two project sites- Data collection will be the responsibility of the Chumphon Marine Fisheries Research and Development Center (CMDEC) and the Eastern Marine Fisheries Research and Development Center (in Rayong) (EMDEC) staff)
    a. Review (report) of existing data (Prachuab Kiri Khan province and Chumphon province): Socio-economic data of otter board trawl (OBT) and (pair trawl) PT fishers including numbers of fishers and fishing boats, landing sites, fish price, and related socio-economic data of OBT and PT fisheries in Prachuab Kiri Khan province and Chumphon province. Existing data can be accessed from Department of Fisheries (DOF) at central and local offices, statistical records and other relevant agencies;
    b. Review (report) of existing data (Trat province): Socio-economic data of small-scale and commercial-scale fishers including numbers of fishers and fishing boats, landing sites, fish price, and related socio-economic data of fisheries in Trat province. Existing data can be accessed from DOF at central and local offices, statistical records and other relevant agencies;
    c. Analysis of data from survey on socio-economic aspects of trawl fisheries in Prachaub Kiri Khan province and Chumphon province;
    d. Analysis of data from survey on socio-economic aspects of small-scale and commercial-scale fisheries in Trat province;
2. Design the interview schedules for the socio-economic studies for trawl fisheries (OBT and PT) in Prachaub Kiri Khan province and Chumphon province and for small-scale and commercial-scale fisheries in Trat province;
3. Provide guidance for CMDEC and EMDEC staff in using the interview schedules;
4. Prepare the presentations for the Advisory Committee Meeting and Local Stakeholder Consultation Meetings; and
5. Draft final reports in English for review by the National Technical Officer (NTO) before submission to FAO.

Dr Sirisuda Jumnongsong

30 May 2016

Abstract

This report has been prepared to support the implementation of the recommendations made by the REBYC-II CTI Project (Strategies for Trawl Fisheries Bycatch Management - GCP/RAS/269/GFF) by focusing on socio-economic aspects of fisheries in the two project pilot sites in Thailand. The works consisted of the following studies: (1) Socio-economic status of trawl fishers in Prachuap Khiri Khan-Chumphon provinces and (2) Socio-economic status of fishers in Trat province.

The primary objective of these two studies was to review existing socio-economic data and to study the socio-economic status of trawl fishers in Prachuap Khiri Khan-Chumphon provinces and fishers in Trat province. The existing socio-economic data were collected from DOF central and provincial offices, statistical records and other relevant agencies. Two sets of structured interview schedules were translated into Thai and used for interview survey with fishers in the two sites.

In the first study in Prachuap Khiri Khan-Chumphon provinces, 30 respondents including otter board trawl (OBT) fishing (63.3 percent), beam trawl (BT) fishing (20 percent) and pair trawl (PT) fishing (16.7 percent) were interviewed by the officers of CMDEC during the period of August - November 2014 at three main fishing ports. Seventy percent of respondents in the study had no second occupation. The mesh size of codend in the trawl-net of 87 percent of respondents was less than 4 cm (2-2.5 cm for PT, 2-3 cm for OBT and 3.8-4 cm for BT). The average price of trash fish per kg was THB 5.5 and the estimated income per trip from selling trash fish caught by BT, OBT and PT were THB 550, THB 13 365, and THB 110 000 respectively. The cost of fuel was perceived to be the highest single operational cost of trawl fishing by the respondents (67 percent of total cost). Most respondents (83 percent) were satisfied with the benefit returned from trawl fishing (more than half of the respondents were slightly satisfied) and 77 percent of respondents mentioned that they could continue trawl fishing.

In the second study in Trat province, 233 respondents including small-scale fishery households (83 percent) and medium to large-scale fishery households (17 percent) were interviewed by EMDEC staff during the period of September - October 2014 at the respondents' houses. Most of the respondents (68 percent) had a single occupation, which was fishing. The main fishing gear used by small-scale households were shrimp trammel nets, crab gillnets and crab traps while for medium to large-scale households, push nets, trawls and purse seines were more common. Household incomes before deducting the cost of fishing were about seven times higher for medium to large-scale households compared to that for small-scale fishers households (THB 7 000 vs THB 1 000 per day). Nearly 60 percent of the respondents were moderately satisfied with the benefits from fishing in the study area. Most of the respondents (84 percent) believed that they could continue with their current fishing activities. An ordinal logistic regression was used to investigate differences in responses for the small-scale fishers and medium to large scale fishers for each of the 14 options and there were five options where there were statistically significant differences between the responses of the two groups. The small-scale fishery households were more likely to agree or strongly agree with option 5 (no use of some fishing gears in zone 2 and zone 3 in May-October), option 6 (No fishing in spawning season in zone 3 in February-May), option 7 (No use of any fishing gears having net mesh size smaller than 4.5cm), option 9 (Publicity campaign for no take fish larvae) and option 12 (Promote more and maintain crab bank project) than medium to large-scale fishery households.

The socio-economic status of fishers, and some key recommendations and lessons learned, are presented in this report. It is noted that the studies were conducted in 2014, prior the new fisheries law in Thailand entered into force in 2015. To compare the situations and examine the socio-economic impacts of the new fisheries law on fishers at the project sites, it is recommended that a similar study be conducted at a later period, using the results of these studies as a baseline. Some other results on

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Acronyms used

BT	beam trawl
CDD	Community Development Department
CMDEC	Chumphon Marine Fisheries Research and Development Center
DOF	Department of Fisheries
EMDEC	Eastern Marine Fisheries Research and Development Center (in Rayong)
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environment Facility
IUU	illegal, unreported and unregulated
MFRDB	Marine Fisheries Research and Development Bureau
NESDB	Office of National Economic and Social Development Board
NSO	National Statistics Office
NTO	National Technical Officer
OBT	otter board trawl
OBBT	otter board with boom trawl
PT	pair trawl
REBYC-II CTI	Strategies for Trawl Fisheries Bycatch Management (GCP/RAS/269/GFF) project
SEAFDEC	Southeast Asian Fisheries Development Center
THB	Thai Baht

Introduction

The "Strategies for Trawl Fisheries Bycatch Management - REBYC-II CTI" is a four-year collaborative project between the Department of Fisheries (DOF), Food and Agriculture Organization of the United Nations (FAO) and the Southeast Asian Fisheries Development Center (SEAFDEC). The project is funded by the Global Environment Facility (GEF) and executed by FAO with additional support by the governments of the five participating countries (Indonesia, Papua New Guinea, the Philippines, Viet Nam and Thailand), private sector, and regional and international organizations.

The key objective of the REBYC-II CTI Project is to build management approaches to trawl fishing that will result in sustainable marine resources and livelihoods and provide income, food security, and the balance of marine ecosystems within the project areas. The project activities focus on reducing trawl fisheries bycatch and the overall impact of trawl fisheries on biodiversity and environment through a participatory process of marine resources management by stakeholders in the project area.

Trawl bycatch includes juveniles of economically valuable fish species which are not in marketable size and are sold as trash fish (e.g. mackerel, threadfin bream and bigeye), true trash fish which are non-commercial species (e.g. *Siganus* spp., *Leiognathus* spp. and cardinal fish) and unwanted invertebrate species such as echinoderms and crustaceans (Noranarttragoon, 2014). Trash fish or 'Pla Ped' (local name) consists of small sizes of economic fish species, which are low quality because of fishing and harvest handling methods, in addition to small adult fish with low economic value that are used in preparation of fishmeal for animal feed and fish feed for aquaculture. The volume of trash fish sent directly to the fishmeal plants was not included in the Statistics of Marine Fish at Landing Place by DOF (DOF, 2013a).

During the Project, the following activities were conducted in two project sites in Thailand:

1. Experiment on enlarging trawl codend mesh size in the areas of Prachuap Khiri Khan and Chumphon provinces, conducted by Chumphon Marine Fisheries Research and Development Center in Chumphon (CMDEC); and
2. Survey and research for the purpose of demarcation of conservation zone for juvenile fish and breeding stocks in the area of Trat province, conducted by the Eastern Marine Fisheries Research and Development Center in Rayong (EMDEC).

This socio-economic study was conducted to support the implementation of the recommendations made by the REBYC-II CTI Project in the two project sites in Thailand. At the first site the project focused on trawl fisheries while at the second site small-scale fisheries and medium to large-scale fisheries were included. These respondent targets were set according to the different objectives and activities conducted at each site. The two case studies are presented in two parts, **PART I**: Socio-economic status of trawl fishers in Prachuap Khiri Khan province and Chumphon province, Thailand, and **PART II**: Socio-economic status of fishers in Trat province, Thailand. Lessons learned and recommendations for future socio-economic studies are presented.

1. Part I: Socio-economic status of trawl fishers in Prachuap Khiri Khan province and Chumphon province, Thailand

1.1. Overview of the project site

The first project site of the REBYC-II CTI for trawl fisheries management is in Prachuap Khiri Khan province and Chumphon province, which are located in the upper part of the Western Gulf of Thailand (**Figure 1-1** Prachuap Khiri Khan province has the longest coastline in Thailand (251km), while the length of the Chumphon coastline is 222 km (http://www.mkh.in.th/index.php/2010-03-22-18-06-15 (The neighboring provinces of Prachuap Khiri Khan are Phetchaburi to the north and Chumphon to the south, while the neighboring provinces of Chumphon are Prachuap Khiri Khan (north), Surat Thani (south) and Ranong (west). To the west there is a border with Myanmar while to the east is the Gulf of Thailand.

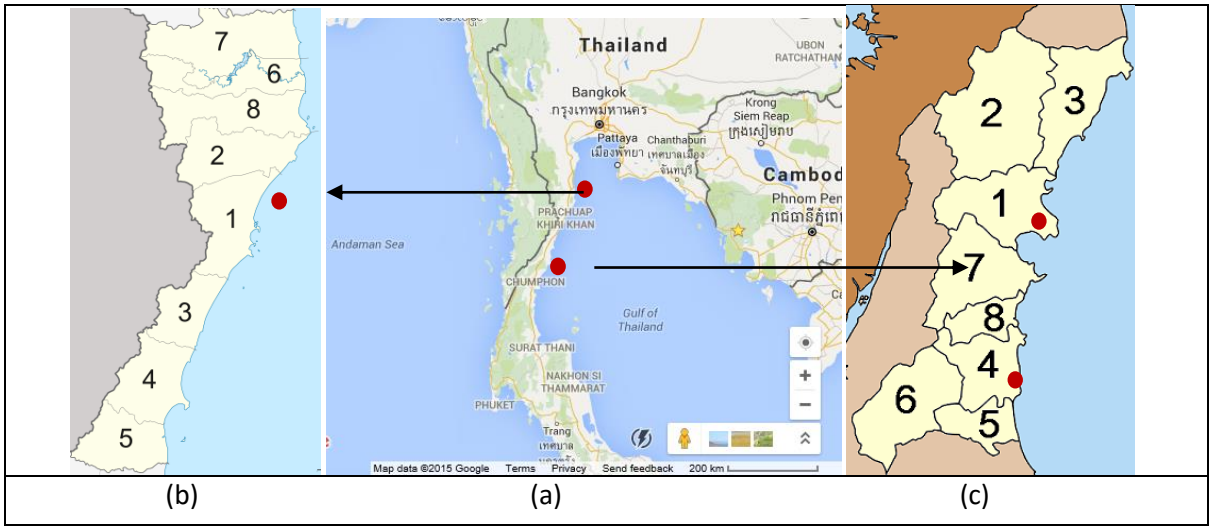


Figure 1-1: Study area of REBYC-II CTI project in Prachuap Khiri Khan and Chumphon Provinces.

a. Study area of REBYC-II CTI: Prachuap Khiri Khan province and Chumphon province in the southern Gulf of Thailand (google.co.th)
b. Mueang Prachuap Khiri Khan District (No.1) in Prachuap Khiri Khan province (source: wikipedia.org)
c. Mueang Chumphon District (No.1) and Lang Suan District (No.4) in Chumphon province (source: wikipedia.org)

1.2. Objectives of the study

This study was carried out to investigate the "Socio-Economic Status of Trawl Fishers in Prachuap Khiri Khan province and Chumphon province, Thailand". The specific objectives of this study are:

1. To review existing socio-economic data relating to trawl fisheries in Prachuab Khiri Khan and Chumphon provinces, Thailand.
2. To analyse the data from the survey on socio-economic status of trawl fishers in Prachaub Khiri Khan and Chumphon provinces.

1.3. Methodology

1.3.1. Review of existing socio-economic data on trawl fisheries in Prachuap Khiri Khan and Chumphon provinces, Thailand

Existing socio-economic data on trawl fisheries in Prachuap Khiri Khan and Chumphon provinces were collected from DOF at central and local offices, statistical records and relevant agencies. Socio-economic data of trawl fisheries included: the number of fishers and fishing boats; landing sites; fish prices; and related data on trawl fishers in Prachuab Khiri Khan and Chumphon provinces.

1.3.2. Survey on socio-economic status of trawl fishers in Prachaub Khiri Khan and Chumphon provinces

Activities undertaken prior to the study

The following activities were undertaken prior to the conduct of the study:

- REBYC-II CTI Advisory Board Meeting on 18 October 2013. In the meeting an overview and background of the project were presented. This enabled the researcher to develop a deeper understanding of the project and its goals.
- REBYC-II CTI Stakeholder Consultation Meeting in Chumphon on 7 November 2013. During the meeting, the researcher had the opportunity to meet with the key stakeholders, e.g. officers of the Fisheries Provincial Offices of the two provinces and Chumphon Coastal Research and Development Center, to discuss and introduce the objectives and scope of the study.
- Data collected on the number of fishing licences for trawl fishing gears recorded in Prachuap Khiri Khan province and Chumphon province that were provided by the officers of the Fisheries Provincial Officers in the two provinces. The number of fishing licenses issued was used for planning of sampling design.
- The interview schedule was developed based on the study objectives. This interview schedule was translated into Thai language by the researcher prior to the pre-test activity.
- The interview schedule was tested and enumerator training was conducted at CMDEC on 2 July 2014.
- The questionnaire was revised following field-testing (Appendix I).

Methods and coverage in terms of content

The data collection used a structured interview schedule (See Appendix I). Socioeconomic Monitoring Guidelines for Coastal Managers in Southeast Asia (SocMon SEA) (Bunce and Pomeroy, 2003) was used as a guideline for development of the interview schedule, which included three sections: (1) General background information on the respondents; (2) Fishing activities, catch, income, and cost of trawl fishing in the last year; and (3) Respondent's perceptions of fisheries resources conditions, threats, laws and regulations and participation in decision making, and their thoughts on trawl fishing in the future. The interviews were conducted by the officers of CMDEC during August - November 2014. Descriptive statistics were used for data analysis to summarize household responses to the interview schedule. The statistical analysis was done using SPSS 13.0 software (SPSS Inc., Chicago, Illinois, U.S.A.).

Methods and coverage in terms of area

There are four main landing sites/fishing ports in Prachuap Khiri Khan and Chumphon province (**see section 1.4.1**). The interviews with trawl fishers were conducted in three out of these four fishing ports. The three fishing ports were selected based on guidance from the fisheries officers of CMDEC.

Figure 1-1 (b) shows the location of Ao Noi Bay Fishing Port in Mueang Prachuap Khiri Khan District (No.1) in Prachuap Khiri Khan province and **Figure 1-1 (c)** shows the locations of Pak Nam Fishing Port in Mueang Chumphon District (No.1) and Pak Nam Fishing Port in Lang Suan District (No.4) in Chumphon province.

1.4. Findings

1.4.1. Review of existing socio-economic data on trawl fisheries in Prachuap Khiri Khan and Chumphon provinces, Thailand

Number of trawl fishers and numbers of fishing licenses for trawl fishing gear in Prachuap Khiri Khan and Chumphon provinces

The number of fishing boats registered for trawling in Prachuap Khiri Khan and Chumphon during 1990-2011 were reviewed by Noranarttragoon (2014) in the baseline report "Review of the Trawl Fisheries in Prachuap Khiri Khan and Chumphon province, Thailand", REBYC-II CTI; GCP/RAS/269/GFF. The total number of registered trawl boats has reduced from approximately 120 to 22 boats in Prachuap Khiri Khan and from 500 to 150 boats in Chumphon. Otter board trawlers (OBT) were the most common type of trawl boats registered in the two provinces compared to other types of trawl boats (pair trawlers (PT) and beam trawlers (BT). In 2013, the Marine Fisheries Research and Development Bureau (MFRDB), DOF investigated the difference in the number of registered boats and actual number of boats operating. For example, the number of registered OBT in the Gulf of Thailand was recorded at 1 875 boats while the number reported by MFRDB was 2 034 boats (MFRDB, 2013).

During the planning phase for the design of this socio-economic study (in 2014) the most recent records of fishing licences for trawl fishing gear including OBT and PT at the Fisheries Provincial Offices in Prachuap Khiri Khan province and Chumphon province for the fishing period between 1 April 2013 and 31 March 2014 showed 150 fishing licences for OBT (96.2 percent) and only 6 fishing licences for PT (3.8 percent). These OBT licences include OBT otter board with boom trawl (OBBT) and beam trawl (BT). The number of trawl fishers (or licensee/ person who is granted a licence to conduct or operate trawl) for OBT and PT was 113 (97.4 percent) and 3 (2.6 percent) respectively. It is noted that the number of trawl fishers (licences) described in දොස! යොමු මූලාශ්‍රය හමු නොවිණි. is smaller than he number of fishing licences for trawl because some of trawl fishers were granted more than one fishing licence to operate trawls. The total number of licences for all types of trawl in Chumphon is much higher than in Prachuap Khiri Khan (133 compared to 23) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.). ee figures of different types of trawl fisheries in **Appendix II**.

Table 1-1: Numbers of trawl fishers and numbers of fishing licences for OBT and PT recorded at Fisheries Provincial Offices in Phachuap Khiri Khan and Chumphon (1 April 2013 – 31 March 2014).

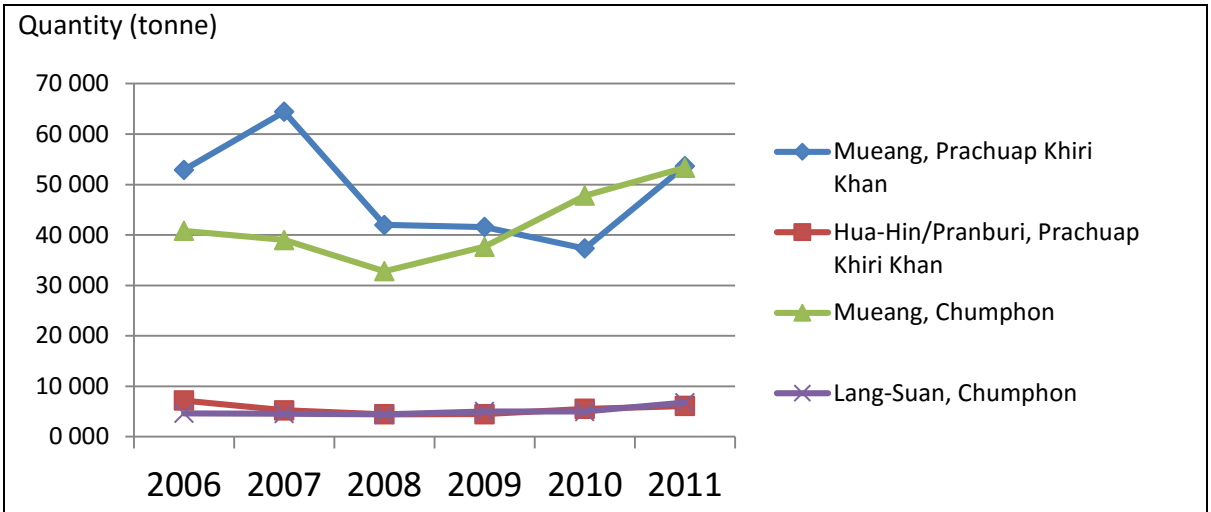
Fisheries Provincial Office	Types of trawl fishing gears licensed at Fisheries Provincial Offices					
	Otter board trawl (OBT)*		Pair trawl (PT)		Total (OBT & PT)	
	Number of trawl fishers	Number of fishing licenses for OBT	Number of trawl fishers	Number of fishing licenses for PT	Number of trawl fishers	Number of fishing licenses
Prochuap Khiri Khan	16 (13.8%)	21 (13.5%)	1 (0.9%)	2 (1.3%)	17 (14.7%)	23 (14.7%)
Chumphon	97 (83.6%)	129 (82.7%)	2 (1.7%)	4 (2.6%)	99 (85.3%)	133 (85.3%)
Total	113 (97.4%)	150 (96.2%)	3 (2.6%)	6 (3.8%)	116 (100.0%)	156 (100.0%)

* including Otter Board Trawl (OBT), Otter Board with Boom Trawl (OBBT), and Beam Trawl (BT)
Source: Prachuap Khiri Khan and Chumphon Fisheries Provincial Offices, DOF, 2014.

Landing sites in Prachuap Khiri Khan and Chumphon provinces

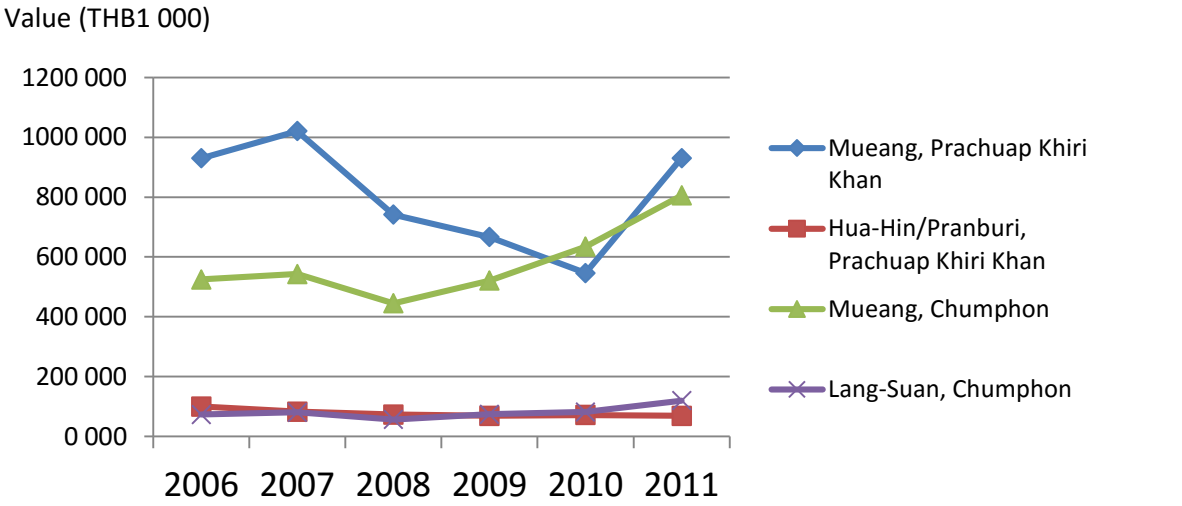
There are four main landing sites in Prachuap Khiri Khan and Chumphon provinces. The landing sites are Mueang - Prachuap Khiri Khan, Hua Hin/Pranburi - Prachuap Khiri Khan, Mueang - Chumphon, and Lang Suan - Chumphon. The total marine fish catch recorded by the landing sites in quantity (tonnes) and value (1 000 Thai Baht [THB] [1]) in 2006 - 2011 are presented in **Figure 1 2** and **Figure 1 3** (DOF, 2013c). It is noted that the total quantity and value of marine fish catch were calculated from a variety of different types of fishing gears, including trawl, landed at the main landing sites. In the period between 2006 and 2011, the quantity and value of marine fish recorded at landing places in Mueang - Prachuap Khiri Khan and Mueang - Chumphon were higher than the other two sites (approximately 30 000 - 64 000 tonnes, compared to less than 10 000 tonnes and THB 400 - 1 000 Million, and less than THB 200 Million) (for more details see Appendix III).

[1] Thai Baht or THB is the currency of Thailand. Annual average exchange rate between Thai Baht and US Dollar was 32.48 in 2014 (during the data collection period).



Source: DOF. 2013c. Statistics of Marine Fish at Landing Place 2011 (No. 12/2013). Fishery Statistics Analysis and Research Group, Information Technology Center, DOF, Bangkok, Thailand. 32 pages

Figure 1-2: Total landing of marine fish by landing place in quantity (tonnes) in 2006-2011.



Source: DOF. 2013c. Statistics of Marine Fish at Landing Place 2011 (No. 12/2013). Fishery Statistics Analysis and Research Group, Information Technology Center, DOF, Bangkok, Thailand. 32 pages

Figure 1-3: Total landing of marine fish by landing place in value (THB 1 000) in 2006-2011.

Fish prices

The price of marine fish at the landing sites for the years 2006 to 2011 are shown in ෙදාස! යොමු මූලාශ්‍රය හමු නොවිණි.. The average price of giant tiger prawn, banana shrimp, and green tiger prawn were higher than for other marine fish (THB 220-263 per kilogram). For fish such as tunas, snapper, and king mackerel the average prices were higher than for other fish (THB 88-188 per kilogram). The average price of crab was THB 73 per kg. The price of 'trash fish' ranged between THB 4.77 and 7.17 per kilogram - average price was THB 5.66 per kilogram. The 'trash fish' price has been increasing since 2006 (ෙදාස! යොමු මූලාශ්‍රය හමු නොවිණි.).

Table 1-2: Price of marine fish at landing place in 2006-2011 (THB per kg).

	2006	2007	2008	2009	2010	2011	Average**
Indo Pacific mackerel	30.21	30.51	32.87	32.44	36.29	38.65	33.50
Indian mackerel	26.18	26.07	25.56	27.71	31.20	36.31	28.84
King mackerel	86.53	87.44	87.90	83.62	88.01	92.56	87.68
Longtail tuna & Eastern little tuna	29.00	32.62	32.93	34.75	36.12	38.69	34.02
Round scads	18.51	20.88	19.11	19.39	22.60	31.28	21.96
Hardtail scads	18.72	18.28	18.80	20.15	21.32	22.45	19.95
Trrevallies	19.16	19.62	20.35	20.97	22.43	24.32	21.14
Sardines	9.35	9.50	11.02	11.24	12.25	14.58	11.32
Anchovies	6.66	7.23	8.32	9.05	10.76	10.35	8.73
Tunas*	-	-	192.81	192.53	190.20	174.32	187.47
Threadfin breams	23.06	23.21	24.00	25.62	26.99	27.42	25.05
Lizard fish	14.91	14.32	15.31	16.52	17.08	19.68	16.30
Snapper	91.56	88.62	88.75	95.54	100.35	105.53	95.06
Big-eyes	15.17	13.64	14.69	16.67	17.82	20.04	16.34
Other food fish	46.06	43.36	37.48	35.35	32.95	32.14	37.89
Trash fish	4.77	5.00	5.28	5.59	6.13	7.17	5.66
Banana shrimp	244.79	245.47	249.56	245.31	232.11	230.55	241.30
Giant tiger prawn	264.78	258.18	260.13	247.64	273.26	270.24	262.37
Green tiger prawn	240.86	238.26	226.59	220.23	200.30	209.93	222.70
School prawn	122.90	114.52	111.67	115.98	121.36	121.24	117.95
Other shrimp	59.53	63.91	64.56	67.76	63.61	71.12	65.08
Mantis shrimp & lobster	128.37	122.49	117.31	133.67	142.39	143.08	131.22
Crabs	62.36	57.47	70.47	75.17	86.65	88.52	73.44
Squid	68.11	66.93	63.68	60.11	65.51	76.58	66.82
Cuttlefish	65.04	60.48	60.62	57.19	64.51	72.63	63.41
Octopus	39.10	37.10	37.68	38.35	42.17	48.92	40.55
Bigfin reef squid	78.54	79.92	73.50	73.03	66.86	82.31	75.69
Shellfish	37.86	32.29	32.36	23.51	35.28	25.49	31.13

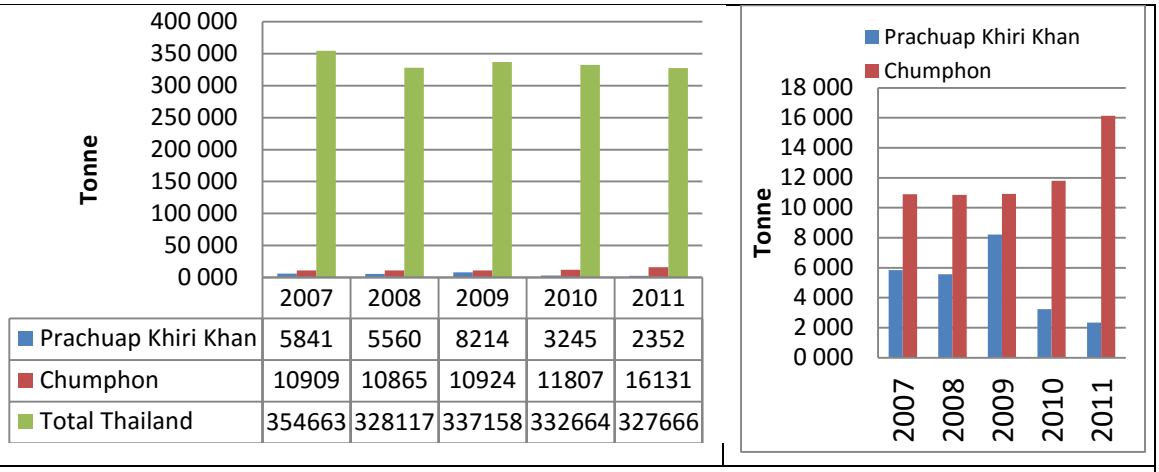
* Price of Tunas at Phuket landing place by Fish Marketing Organization.

** Average price was calculated from the prices recorded in 2006-2011.

Source: DOF. 2013c. Statistics of Marine Fish at Landing Place 2011 (No. 12/2013). Fishery Statistics Analysis and Research Group, Information Technology Center, DOF, Bangkok, Thailand. 32 pages.

Fishmeal

Figure 1-4 presents the production of fishmeal in Prachuap Khiri Khan, Chumphon and Thailand from 2007 to 2011. The production of fishmeal in the two provinces is very small contributing between 1.5-3.6 percent of the total fishmeal production in Thailand. Since 2007, the production of fishmeal in Prachuab Khiri Khan has been lower than in Chumphon, where the production has been increasing, while in Prachuap Khiri Khan, fishmeal production has been decreasing since 2007. Overall, the production of fishmeal in Thailand has slightly decreased since 2007 (DOF, 2013b).



	2007	2008	2009	2010	2011
Prachuap Khiri Khan	5841	5560	8214	3245	2352
Chumphon	10909	10865	10924	11807	16131
Total Thailand	354663	328117	337158	332664	327666

Source: DOF. 2013b. Statistics of Fisheries Factory 2011 (No. 13/2013). Fishery Statistics Analysis and Research Group, Information Technology Center, DOF, Bangkok, Thailand. 36 pages.

Figure 1-4: Production of fishmeal by province, 2007-2011

1.4.2. Survey on socio-economic status of trawl fishers in Prachaub Khiri Khan Province and Chumphon province

The objective of the survey was to study the socio-economic status and perceptions of trawl fishers in Prachuap Khiri Khan province and Chumphon province for informing sustainable trawl fisheries management. Key findings of the survey are described and discussed below.

Respondents

Thirty respondents were interviewed at the three main fishing ports by the officers of Chumphon Coastal Research and Development Center between August and November 2014: 24 respondents were interviewed at fishing ports in Chumphon (80 percent) and the remaining respondents were interviewed in Prachuap Khiri Khan (20 percent) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.). This is similar to he proportion of trawl fishers and trawl licences in Chumphon and Prachuap Khiri Khan, which is about 85:15 (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

Table 1-3: Number of respondents by fishing ports in study area.

Fishing ports	OBT*	BT	PT	Total
1. Ao Noi Fishing Port, Mueang Prachuap Khiri Khan, Prachuap Khiri Khan	5 (16.7%)	0 (0%)	1 (3.3%)	6 (20%)
2. Pak Nam Fishing Port at Mueang Chumphon, Chumphon	14 (46.7%)	0 (0%)	4 (13.3%)	18 (60%)
3. Pak Nam Fishing Port at Lang Suan District, Chumphon	0 (0%)	6 (20.0%)	0 (0%)	6 (20%)
Total	19 (63.3%)	6 (20.0%)	5 (16.7%)	30 (100%)

* including Otter Board Trawl (OBT), Otter Board with Boom Trawl (OBBT)

General information on the respondents

The average age of trawl respondents was 50 years with a range of 30-82 years. This implied that young people may not be interested in trawl fishing or they may have other options for supporting their livelihood. The average number of family members was 4.6 (2.6 male and 2.0 female members)

and the average number of family members who were involved in trawl fishing was 1.6 (1.2 male and 0.4 female members) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

Most respondents in all groups were male (73.3 percent). All respondents in the PT group and the majority of respondents in OBT group (73.7 percent) were male. However, half of the respondents in BT group were female. All of the respondents were Buddhists. The majority of the respondents in all groups had education to elementary level (66.7 percent). In BT a third of the respondents (33 percent) had attained bachelor degree level. Overall the main occupation of the respondents was OBT and OBBT fishing (63.3 percent), followed by BT fishing (20 percent) and PT fishing (16.7 percent). The majority of respondents across the three groups had no second occupation (70 percent). All PT respondents, the majority of OBT respondents (68.4 percent), and half of BT respondents, had no secondary occupation. The majority of the respondents owned their boat (70 percent for overall), particularly in BT respondents (83.3 percent) and OBT respondents (73.7 percent), while the majority of PT respondents were hired as captains (60 percent). More than half of the respondents or their family members (53.3 percent) were members of stakeholder organization such as Trawl Fisheries Association, Ruam Jai Fisheries Association, and Pak Nam Lang Suan Fisheries Association that participated in co-managing trawl fisheries (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

Table 1-4: General information on the respondents.

Items	OBT (n=19)	BT (n=6)	PT n=5)	Overall (233)
	Mean (Min-Max)			
Age	50.6 (30-64)	52.2 (35-82)	49.4 (37-66)	50.8 (30-82)
Number of household members (including respondent)				
• Total	5.1 (3-9)	3.8 (1-7)	3.8 (2-5)	4.6 (1-9)
• Male	3.0 (2-5)	2.0 (0-5)	1.8 (0-5)	2.6 (0-5)
• Female	2.1 (1-4)	1.8 (1-3)	2.0 (1-3)	2.0 (1-4)
Number of household members involved in trawl fishing (including respondent)				
• Total	1.7 (1-6)	1.7 (1-3)	1.2 (1-2)	1.6 (1-6)
• Male	1.2 (1-3)	1.2 (0-3)	1.2 (1-2)	1.2 (0-3)
• Female	0.5 (0-3)	0.5 (0-1)	0.0 (0-0)	0.4 (0-3)
	In percentages			
Gender				
• Male	73.7	50.0	100.0	73.3
• Female	26.3	50.0	0.0	26.7
Religion				
• Buddhist	100.0	100.00	100.0	100.0
Education				
• Elementary	78.9	50.0	40.0	66.7
• Secondary school or equivalent	10.5	0.0	20.0	10.0
• High school or equivalent	5.3	16.7	40.0	13.3
• Bachelor degree	5.3	33.3	0.0	10.0
Main occupation (based on time spent)				
• OBT & otter board with boom trawling	100.0	0.0	0.0	63.3
• Beam trawling	0.0	100.0	0.0	20.0
• Pair trawling	0.0	0.0	100.0	16.7
Secondary occupation(based on time spent)				

• None	68.4	50.0	100.0	70.0
• Pair trawl fishing	5.3	0.0	0.0	3.3
• Others (sellers, restaurant owners)	26.3	50.0	0.0	26.7
Relation to the boat owners				
• Owners	73.7	83.3	40.0	70.0
• Family members or relatives of owners	10.5	16.7	0.0	10.0
• Captains	15.8	0.0	60.0	20.0
Membership of stakeholder organizations managing trawl fisheries				
• No	36.8	50.0	60.0	43.3
• Yes	57.9	50.0	40.0	53.3
• No answer	5.3	0.0	0.0	3.3

Fishing activities, catch, income, and cost of trawl fishing of the last year by types of trawl fishing

a. Boat length, codend mesh size, and fishing activities by types of trawl fishing

The average length of trawlers was 17.5 meters. Pair trawls were, on average, larger (22.1 m) than otter board (16.9 m) and beam trawlers (15.8 m). The average mesh size of the codend was 2.8 cm (ranging from 2-4 cm). Average codend mesh sizes of PT and OBT were similar (2.4 and 2.5 cm) while the average codend mesh size of BT was larger (3.9 cm) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

The average number of trips in a month was 3.3. On a monthly basis, BT were operated more often than the other two types (4.8 trips per month compared with 3 trips by OBT and 3.4 trips by PT) but had fewer days per trip (5.6 compared to 7.4 days for PTs and 9.6 days for OBT). PT had fewer hauls per trip (23.2 compared with 38.6 and 41) but a longer time spent per haul (6.6 hours per haul compared with 2 hours by BT and 5.8 hours by OBT) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

The respondents operated their trawl fishing activities throughout the year with an average of 10.2 months. Almost all of the respondents who used BTs operated their trawls throughout the year. All of the thirty respondents operated their trawl fishing during the period between May and September (දොස! යොමු මූලාශ්‍රය හමු නොවිණි. and දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

Table 1-5: Boat length, codend mesh size, and fishing activities by types of trawl fishing (Mean (Min-Max)).

Items	OBT (n=19)	BT (n=6)	PT (n=5)	Overall (n=30)
Boat length (Overall length)(m)	16.9 (15-22.5)	15.8 (15-18)	22.1 (21-23)	17.5 (15-23)
Codend mesh size (cm) (<4 cm = 87%, 4 cm = 13%)	2.5 (2-3)	3.9 (3.8-4)	2.4 (2-2.5)	2.8 (2-4)
Total number of months fishing undertaken by the trawl vessel (month/year)	9.4 (7-12)	11.8 (11-12)	11 (9-12)	10.2 (7-12)
Number of trips per month (trip/month)	3 (2-4)	4.8 (4-7)	3.4 (3-4)	3.3 (2-7)
Number of days per trip (day/trip)	9.6 (4-19)	5.6 (4-7)	7.4 (7-8)	8.8 (4-19)
Number of hauls per trip (haul/trip)	38.6 (20-70)	41 (30-60)	23.2 (21-25)	37.1 (20-70)
• Day time (haul/day)	2.0 (2-2)	3.8 (2-5)	2.0 (2-2)	2.3 (2-5)
• Night time (haul/day)	2.0 (2-2)	3.8 (3-5)	1.0 (1-1)	2.2 (1-5)

Number of hours per haul (hour/haul)	5.8 (5-6)	2 (2-2)	6.6 (5-8)	5.2 (2-8)
• Day time (hour/haul)	5.8 (5-6)	2 (2-2)	5.6 (5-6)	5.0 (2-6)
• Night time (hour/haul)	5.8 (5-6)	2 (2-2)	8.6 (8-10)	5.5 (2-10)

Table 1-6: Months fishing undertaken by each type of trawler.

Months fishing undertaken by the trawl vessel	OBT (n=19)	BT (n=6)	PT (n=5)	Overall (n=30)
- January	16 (84.2%)	6 (100%)	4 (80%)	26 (86.7%)
- February	9 (47.4%)	5 (83.3%)	5 (100%)	19 (63.3%)
- March	8 (42.1%)	6 (100%)	5 (100%)	19 (63.3%)
- April	8 (42.1%)	6 (100%)	5 (100%)	19 (63.3%)
- May	19 (100%)	6 (100%)	5 (100%)	30 (100%)
- June	19 (100%)	6 (100%)	5 (100%)	30 (100%)
- July	19 (100%)	6 (100%)	5 (100%)	30 (100%)
- August	19 (100%)	6 (100%)	5 (100%)	30 (100%)
- September	19 (100%)	6 (100%)	5 (100%)	30 (100%)
- October	17 (89.5%)	6 (100%)	5 (100%)	28 (93.3%)
- November	13 (68.4%)	6 (100%)	3 (60%)	22 (73.3%)
- December	13 (68.4%)	6 (100%)	3 (60%)	22 (73.3%)

Shaded areas represent months when 100% of respondents of each fishing gear type were fishing.

b. Target species by types of trawl fishing

The median total catch of target species was 6 850 kg per trip. The total catch of target species caught by PT was larger than for the other two types of trawl (5 times compared to OBT and 23 times compared to BT). The minimum total catch amount of target species (kg/trip) were 550 kg in beam trawling and the maximum 54 600 kg in otter board trawling (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.). he target species of OBT and PT were threadfin breams, Indian mackerel and other food fish while the target species of BT were shrimps including banana shrimp and school prawn. Squid was caught more by PT and scallop was more likely to be caught by OBT than by the other types of trawl.

Table 1-7: Total catch amount of target species by types of trawl fishing (kg/trip).

Total catch amount of target species (kg/trip)	OBT (n=19)	BT (n=6)	PT (n=5)	Overall (n=30)
Median*	6 900	1 425	33 500	6 850
Mean	10 775	1 266	35 000	12 911
Min	3 750	550	19 000	550
Max	54 600	1 700	50 000	54 600
SD	12 934	447	11 897	15 443

*used median as the central value to represent the data

c. 'Trash fish' by types of trawl fishing

The average ''trash fish' catch by trawl fishing was 2 465 kg/trip. The overall percentage (by weight) of 'trash fish' in the total catch for each trawling trip was 42 percent. The percentage of 'trash fish'

caught by pair trawling was higher than for other types of trawling (53 percent compared to 38 percent by otter board trawling and 14.5 percent by beam trawling) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.). he average price of 'trash fish' was THB 5.5 per kg (Min = 4.5 and Max = 7). The 'trash fish' catch included juveniles of economic fish, such as threadfin breams and mackerel, as well as juveniles of shrimp.

Table 1-8: Percentage of trash fish catch and average trash fish catch amount (kg) by different types of trawl fishing.

	OBT (n=19)	BT (n=6)	PT (n=5)	Overall (n=30)
Trash fish catch amount (% of total catch (by weight) from each trip)				
Median*	38	14.5	53	42
Mean	41.3	14.5	54.2	41.7
Min	22	6	43	6
Max	70	23	70	70
SD	14.4	12	10.8	16.2
Average trash fish catch amount (kg/trip)				
Median*	2 430	100	20 000	2 465
Mean	4 693	100	19 200	7 129
Min	1 200	100	10 000	100
Max	25 000	100	30 000	30 000
SD	6 419	0	7 981	8 801

*Used median as the central value to represent the data

දොස! යොමු මූලාශ්‍රය හමු නොවිණි. shows the main operating costs of trawling, which includes abor, fuel, and ice, and the average income per trip.

Pair trawling required the most labour for operating (18-20 persons per trip). Generally, for trawling, there were more foreign workers hired than Thai nationals and there were more permanent workers hired than temporary workers. The average salary for a captain and other workers were THB 25 000 and THB 8 000 per month, respectively. A captain usually received approximately 6.3 percent (range from 5 to 10 percent) of the total amount of money received from selling fish caught per trip as an extra income.

All respondents perceived the cost of fuel as the highest single cost in trawl fishing operations (67 percent of the total cost). The average fuel cost was about THB 60 000 per trip. This was much higher for pair trawlers compared to the other two types (THB 350 000 per trip per boat compared to THB 60 000 and THB 65 875 for otter board trawlers and beam trawlers). The average cost of ice was THB 8 000 per trip and pair trawlers spent more on ice than other types of trawlers (THB 12 000 per trip compared with THB 4 000 by BT and THB 7 600 by OBT) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

The average income of trawl fishing was THB 140 000 per trip. PT fishers received the highest income (THB 800 000/trip) compared with THB 140 000 for OBT fishers and THB 130 000 for BT fishers (දොස! ොමු මූලාශ්‍රය හමු නොවිණි.).

Table 1-9: Main operating costs and income by types of trawl fishing (Mean (Min-Max)).

Items	OBT (n=19)	BT (n=6)	PT (n=5)	Overall (n=30)
Total number of workers hired for trawl fishing (person/trip)	7.9 (5-20)	6.3 (5-7)	19.6 (18-20)	9.6 (5-20)

Nationality				
• Thai nationals (persons)	2.7 (1-7)	1.5 (1-2)	4.6 (2-6)	2.8 (1-7)
• Foreigners (persons)	5.3 (0-15)	4.8 (4-5)	15 (12-18)	6.8 (0-18)
Type of workers				
• Permanent (persons)	6.3 (1-20)	4 (1-7)	11.4 (5-20)	6.7 (1-20)
• Temporary (persons)	1.6(0-9)	2.3 (0-5)	8.2 (0-15)	2.9 (0-15)
Position				
• Captain (persons)	1.1(1-2)	1 (1-1)	1.8 (1-2)	1.2 (1-2)
• Others(persons)	6.9(4-18)	5.3 (4-6)	15.8 (8-19)	8.1 (4-19)
Salary of workers hired for trawl fishing				
• Salary for captain (THB/month/person)	23 333* (15 000-30 000)	18 000 (18 000-18 000)	30 000* (25 000-30 000)	25 000* (15 000-30 000)
• % of product for captain	6.5 (5-10)	5.6 (5-8)	6.3 (5-10)	6.33 (5-10)
• Salary of other workers (THB/month/person)	7 600* (7 000-8 500)	7 750* (6 500-9 000)	8 000* (8 000-8 500)	8 000* (6 500-9 000)
Fuel cost (THB/trip)	60 000* (31 500-400 000)	65 875* (27 300-96 000)	350 000* 245 000-367 500)	60 000* (27 300-400 000)
• Total quantity fuel used (litre/trip)	2 500* (1 500-20 000)	3 000* (1 300-4 000)	15 000* (9 800-17 500)	3 000* (1 300-20 000)
• Fuel price (THB/litre)	23.6 (20-26)	22.4 (20.5-24)	23.8 (20-25)	23.4 (20-26)
• % of the total cost	66.9 (60-70)	62.5 (50-80)	72 (70-75)	66.9 (50-80)
Ice cost (THB/trip)	7 600* (5 100-32 000)	4 000* (2 400-8 000)	12 800* (12 000-20 000)	8 000* (2 400-32 000)
• Total quantity of ice used (kg/trip)	7 600* (4 800-32 000)	4 000* (1 600-8 000)	12 800* (12 000-20 000)	8 000* (2 400-32 000)
• Ice price (THB/kg)	1 (1-1.2)	1.1 (1-1.52)	1 (1-1)	1.04 (1-1.5)
Average income per trip (THB/trip) (income before deducting expense)	140 000* (100 000-800 000)	130 000* (80 000-200 000)	700 000* (700 000-800 000)	140 000* (80 000-800 000)

*Used median as the central value to represent the data.

Most of the respondents perceived that the costs and incomes from their trawl fishing were either equal or very similar (66.7 percent). Only two respondents, who operated otter board trawlers, reported that their income was less than the costs. However, 83.3 percent of respondents were satisfied with the benefits from trawling and only 16.7 percent were not satisfied. The level of satisfaction of most of respondents (53 percent) was slightly satisfied (ඉදාස! යොමු මූලාශ්‍රය හමු නොවීණි.).

Table 1-10: Comparison between income and cost and respondent's satisfaction on the benefit returned based on respondents' perceptions.

Cost and income	OBT (n=19)	BT (n=6)	PT (n=5)	Overall (n=30)
Comparison between income and cost of respondent's trawl fishing in the past 12 months				
• Income more than cost	4 (21.1%)	3 (50.0%)	1 (20.0%)	8 (26.7%)
• Income equal/very similar to cost	13 (68.4%)	3 (50.0%)	4 (80.0%)	20 (66.7%)
• Income less than cost	2 (10.5%)	-	-	2 (6.7%)
Total	19 (100%)	6 (100%)	5 (100%)	30 (100%)
Level of satisfaction on the benefit returned from respondent's trawl fishing the past 12				
• Not satisfied	5 (26.3%)	-	-	5 (16.7%)
• Slightly satisfied	9 (47.4%)	3 (50.0%)	4 (80.0%)	16 (53.3%)
• Moderately satisfied	4 (21.1%)	2 (33.3%)	1 (20.0%)	7 (23.3%)
• Highly satisfied	1 (5.3%)	1 (16.7%)	-	2 (6.7%)
Total	19 (100%)	6 (100%)	5 (100%)	30 (100%)

Respondent's perceptions of fisheries resource conditions, threats, laws and regulations and participation in decision making, and their trawl fishing in the future

a. Perceived fisheries resource conditions

Most of the respondents from all trawl groups perceived that the conditions of resources of fish (83.3 percent), shrimp (70 percent) and cephalopod (76.6 percent) were 'bad' or 'not good & not bad' (scale 2-3). Crab (33.3 percent) and Acetes shrimp (16.7 percent) resources were perceived to be in a 'very bad' condition (scale 1). Only shellfish (particularly scallop) was perceived to be in a 'very good' condition (scale 5). The perceptions of trawl respondents in each group were similar for conditions of fish (scale 2-3, which were 'bad' to 'not good & not bad'). Most BT respondents were more optimistic about the conditions of fish, shrimp, Acetes shrimp and crab than the other two trawl groups. Cephalopod was perceived to be in better condition by PT respondents than the conditions perceived by other two groups (80 percent compared to 26.3 and 66.7 percent for medium condition). OBT and PT respondents (40-42 percent) perceived shell/clam was to be in 'good' to 'very good' condition (scale 4-5) while no one in BT respondents perceived that shell/clam was in good condition (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

b. Perceived threats to fisheries resources

An increase in number of fishers and fishing gears was perceived as the most severe threat to fisheries resources by most respondents in all groups (56.7 percent for overall, 80 percent in PT, 57.9 percent in OBT, and 33.3 percent in BT). Other threats that were perceived to be the severe threats included marine pollution (20 percent), illegal fishing (6.7 percent) and others (16.7 percent) (e.g. threats by some fishing activities such as anchovy surrounding nets with light and anchovy falling nets with light) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

c. Perceived laws and regulations and participation in decision making

All trawl respondents perceived that they know about the regulations and laws related to trawl fishing in their main fishing ground. Most respondents in all groups thought that trawl fishers complied with trawl fisheries regulations and laws (66.6 percent - ranked 4-5). Most PT respondents (80 percent) thought that most fishers fully complied (ranked 5) with fisheries law, while the largest proportion of respondents in OBT (36.8 percent) and BT (50 percent) perceived that most fishers highly complied with fisheries laws (ranked 4). The enforcement of the trawl fisheries laws was ranked 3-4 by most respondents in all groups (76.7 percent). This perceived level of enforcement (ranked 3-4) was the same for perceptions of most OBT (79 percent) and BT respondents (100 percent), but the majority of PT respondents (80 percent) perceived that the enforcement level was low to moderate (ranked 2-3) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

Most respondents in all groups (80-89.5 percent) participated in decision making processes for trawl fisheries management such as participating in public hearings. A public hearing is one of the requirements when the decision makers plan to change or introduce a new fisheries law or regulation into the area. However, the level of participation in decision-making was perceived to be low (ranked 2-3) by most respondents (70 percent). This is similar for all three groups (66.7-80 percent). Most respondents in all groups had attended meetings or listened to information about trawl fisheries management (60 percent). Most of OBT (63.2 percent) and PT (80 percent) respondents had attended the meetings while most BT respondents (66.7 percent) had never attended such meetings (දොස! ොමු මූලාශ්‍රය හමු නොවිණි.).

d. Perceived future of their trawl fishing activities

When talking to the respondents about the future of their trawl fishing activities, it was found that more than two-thirds of the respondents (76.7 percent) mentioned that they could be able to continue with their trawl fishing activities. However, 26.3 percent of OBT and 40 percent of PT respondents thought that they could not continue with their activities (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

Table 1-11: Perceived fisheries resource condition in the respondent's main fishing ground.

Types of resources	Respondent group*	Fishery resource condition scale** (%)						
		1	2	3	4	5	No answer	Total
Fish	OBT	21.1	31.6	47.4	0	0	0	100
	BT	0	16.7	83.3	0	0	0	100
	PT	20.0	40.0	40.0	0	0	0	100
	Total	16.7	30.0	53.3	0	0	0	100
Shrimp	OBT	31.6	31.6	31.6	5.3	0	0	100
	BT	0	16.7	83.3	0	0	0	100
	PT	20	40	20	0	0	20	100
	Total	23.3	30.0	40.0	3.3	0	3.3	100
Acetes shrimp	OBT	21.1	5.3	5.3	0	0	68.4	100
	BT	0	0	33.3	0	0	66.7	100
	PT	20	20	20	0	0	40.0	100
	Total	16.7	6.7	13.3	0	0	63.3	100
Crab	OBT	36.8	42.1	10.5	0	0	10.5	100
	BT	16.7	16.7	66.7	0	0	0	100
	PT	40.0	40.0	20.0	0	0	0	100
	Total	33.3	36.7	23.3	0	0	6.7	100
Cephalopod	OBT	21.1	42.1	26.3	10.5	0	0	100

	BT	16.7	16.7	66.7	0	0	0	100
	PT	0	20.0	80.0	0	0	0	100
	Total	16.7	33.3	43.3	6.7	0	0	100
Shell/calm	OBT	15.8	15.8	0	15.8	26.3	26.3	100
	BT	0	16.7	33.3	0	0	50	100
	PT	0	40.0	20.0	0	40.0	0	100
	Total	10.0	20.0	10.0	10.0	23.3	26.7	100

*Respondent group: OBT=Otter Board Trawl (n=19), BT=Beam trawl (n=6), PT=Pair trawl (n=5) and Total (n=30)

**condition scale: 1=very bad, 2=bad, 3=not good & not bad, 4=good, 5=very good

Table 1-12: Ranking of perceived threats to fisheries resources.

Types of perceived threats to fisheries resources	Ranking of perceived threats to fisheries resources (%)											
	First most severe				Second most severe				Third most severe			
	OBT	BT	PT	Total	OBT	BT	PT	Total	OBT	BT	PT	Total
Increase in number of fishers & fishing gears	57.9	33.3	80	56.7	10.5	33.3	20.0	16.7	26.3	16.7	0	20.0
Illegal fishing	0	33.3	0	6.7	31.6	16.7	40.0	30.0	36.8	33.3	20.0	33.3
Natural disaster	0	0	0	0	0	16.7	0	3.3	0	0	0	0
Marine pollution	26.3	16.7	0	20.0	47.4	33.3	20.0	40.0	21.1	16.7	40.0	23.3
Others	15.8	16.7	20	16.7	5.3	0	20.0	6.7	0	0	0	0
No answer	0	0	0	0	5.3	0	0	3.3	15.8	33.3	40.0	23.3
Total	100	100	100	100	100	100	100	100	100	100	100	100

Respondent group: OBT=Otter board trawl (n=19), BT=Beam trawl (n=6), PT=Pair trawl (n=5) and Total (n=30)

Table 1-13: Perceived laws and regulations and participation in decision making.

	OBT (n=19)	BT (n=6)	PT (n=5)	Total (n=30)
Awareness of rules and regulations				
• No (Not aware/Don't know)	0	0	0	0
• Yes (Aware/Know)	100	100	100	100
Compliance on a scale of 1 to 5 (to what extent do most fishers comply with trawl fisheries regulations & laws?				
• 1 = No compliance	0	0	0	0
• 2 = Low compliance	5.3	16.7	0	6.7
• 3 = Moderate compliance	31.6	16.7	20.0	26.7
• 4 = High compliance	36.8	50.0	0	33.3
• 5 = Full compliance	26.3	16.7	80.0	33.3
Enforcement: on a scale of 1 to 5, to what extent are the trawl fisheries laws enforced?				
• 1 = No enforcement	5.3	0	0	3.3
• 2 = Low enforcement	10.5	0	40.0	13.3
• 3 = Moderate enforcement	47.4	66.7	40.0	50.0
• 4 = High enforcement	31.6	33.3	0	26.7
• 5 = Full enforcement	5.3	0	20.0	6.7

Participation in decision making: on a scale of 1 to 5, to what extent do <u>you</u> participate in trawl fisheries management decision-making?				
• 1 = No participation	10.5	16.7	20.0	13.3
• 2 = Low participation	15.8	50.0	40.0	26.7
• 3 = Moderate participation	52.6	16.7	40.0	43.3
• 4 = High participation	5.3	0	0	3.3
• 5 = Full participation	15.8	16.7	0	13.3
Participation in a meeting or listening to information related to fisheries management				
• No (Never participated)	36.8	66.7	20.0	40.0
• Yes (Have participated)	63.2	33.3	80.0	60.0
Do you think that you can continue with current fishing activities forever?				
• No (cannot continue)	26.3	0	40	23.3
• Yes (can continue)	73.7	100	60	76.7

1.5. Conclusions and recommendations

Based on the review of existing data and survey results, the following conclusions and recommendations can be formulated.

- In the survey about 70 percent of respondents were boat owners and 20 percent were captains. This may have positively contributed to the level of reliability of the data collected during the survey. The respondents were likely to have good knowledge of fishing activities in their province given their responsibilities.
- Most of the respondents (70 percent) had no second occupation (50 percent of BT, 68.4 percent of OBT and 100 percent of PT respondents). Based on this finding, when the government introduces any measure that might have impact on trawl fishing-based livelihoods, the government should prepare some compensation or other mitigation steps that can reduce the socio-economic impacts of the proposed measures.
- The increase of trawl codend mesh size would help to reduce the share of juveniles and trash fish in the catches. According to the National Council for Peace and Order's (NCPO) Order No. 24/2558 (24/2015) for additional measures for combating illegal, unreported and unregulated (IUU) fishing issued by the NCPO and entered into force on 5 August 2015, the possession of a trawl net with codend mesh sizes less than 5 cm is prohibited, as it was considered a destructive fishing gear. Nonetheless, according to the Notification of DOF, promulgated in the Royal Thai Government Gazette on 30 December 2015, this regulation was revised from 5 cm to 4 cm. In effect, the codend mesh size of the trawl-net of most respondents (87 percent) in this study was less than 4 cm (2-2.5 cm for PT, 2-3 cm for OBT and 3.8-4 cm for BT), around 2-4 cm in overall. As a consequence most of the fishers should increase their current codend mesh sizes to comply with the new law.
- According to existing DOF data, the increase in trash fish price in Thailand may be one of the major challenges for the DOF when implementing the proposed measure to enlarge trawl codend mesh size. The survey results showed that the average price of trash fish per kg is THB 5.5. Therefore, the estimated income from selling trash fish catch of BT, OBT and PT were approximately THB 550, THB 13 365 and THB 110 000 per trip (average trash fish catch amount by BT, OBT and PT were recorded as 100, 2 430 and 20 000 kg per trip, respectively).

The potential reduction of this income due to enlargement of trawl codend mesh size should be considered when implementing this measure in the country.

- The highest share of the operating cost in trawl fishing is from fuel (66.9 percent of total cost overall, 62.5 percent of total cost for BT, 66.9 percent of total cost for BT, and 72 percent of total cost for PT). Any measures that reduce this cost would therefore be of benefit to trawler operators, and might thereby help the introduction of a larger minimum mesh size.
- Considering the socio-economic benefits returned from trawl fishing in the study area, most respondents were satisfied (although more than half of the respondents only claimed to be slightly satisfied). This result is consistent with the final question about the future of trawling. Most of the respondents (76.7 percent) said that they could continue with their trawling activities. This suggests that trawl fishing activities in the study area still provide benefits to the local community.
- In general, the condition of fisheries resources was perceived to be not good and the main threats to these resources were mainly an increase in number of fishers and fishing gear (i.e., increasing overall fishing effort). In addition, illegal fishing and marine pollution were also perceived as threats to fisheries resources. Rehabilitation measures for fisheries resources in addition to measures that prevent the impacts of these threats should be considered, implemented or strengthened.
- Issues about law enforcement and participation in decision-making should be strengthened in order to sustain trawl fisheries in the study area, for the future.

2. PART II: Socio-economic status of fishers in Trat province, Thailand

2.1. Overview of the project site

The REBYC-II CTI project's study area for demarcation zone for juvenile fish and breeding stocks is in Trat province in the upper Gulf of Thailand (ඉදාස! යොමු මූලාශ්‍රය හමු නොවිණි.). Twenty four rovinces (out of 77 provinces in Thailand) are grouped into five coastal zones. Trat is in Coastal Zone No. 1 along with Chantaburi and Rayong. The length of the Trat coastline is 184 km (DMCR, 2014). Trat province includes 7 districts (Mueang Trat, Klong Yai, Khao Saming, Bo Rai, Laem Ngop, Ko Kut and Koh Chang), 38 sub-districts and 261 villages. Six out of seven districts are located on the coast (the exception being Bo Rai District). The total population in 2012 was 222 855, which is equivalent to 0.35 percent of the total population of Thailand) (Trat Provincial Office Website, 2015). Trat province has 66 islands including Koh Chang, which is the third largest island in Thailand. In Trat, the total area of mangrove forests, seagrass beds and coral reefs are approximately 9 916 ha, 737 ha and 2 822 ha, respectively (DMCR: Central Database System and Data Standard for Marine and Coastal Resources Website, 2015).

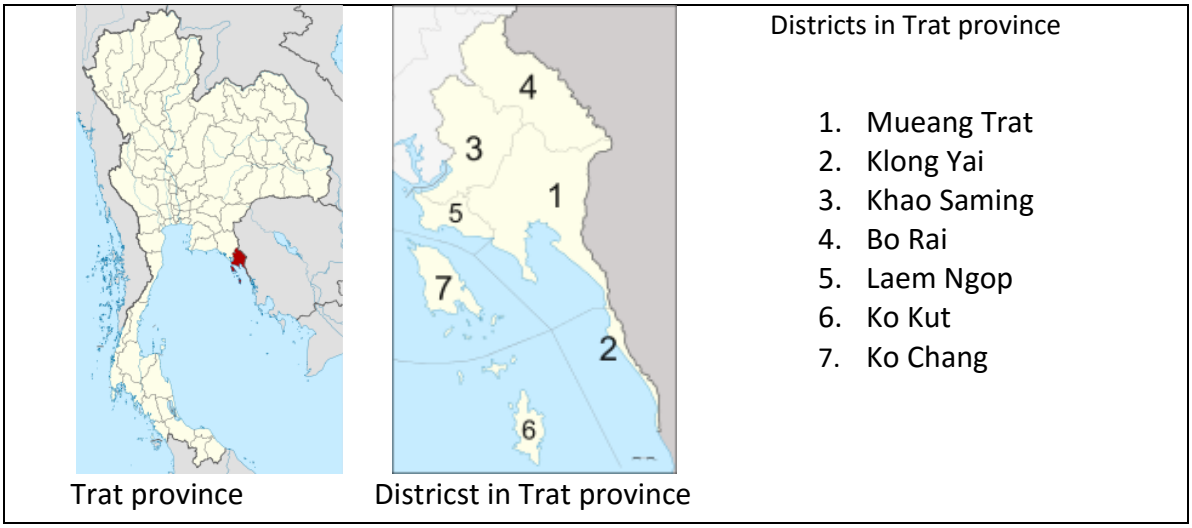


Figure 2-1: Study area of REBYC-II CTI in Trat Province, Thailand.

2.2. Objectives of the study

This study was carried out to investigate the "Socio-Economic Status of fishers in Trat province, Thailand". The specific objectives of this study are:

1. To review existing socio-economic data of small-scale and commercial fishers in Trat province, Thailand
2. To analyse the data from the questionnaire survey on socio-economic status of fishers (small-scale and commercial scale) in Trat province

2.3. Methodology

2.3.1. Review of existing socio-economic data of small-scale and commercial fisheries in Trat province, Thailand

Existing socio-economic data on small-scale and commercial fishers in Trat province was collected and collated from the Thai Department of Fisheries (DOF), at central and local offices, statistical records and from other relevant agencies. Socio-economic data included the number of fishers and fishing boats, landing sites, fish prices and related socio-economic data.

2.3.2. Survey on socio-economic status of fishers in Trat province

Activities undertaken prior to the survey:

- The following activities were undertaken prior to the start of the study:
- REBYC-II CTI Advisory Board Meeting on 18 October 2013. In the meeting an overview and background of the project were presented. This enabled the researcher to develop a deeper understanding of the project and its goals.
- REBYC-II CTI Stakeholder Consultation Meeting in Trat province on 29 October 2013. During the meeting, the researcher had the opportunity to meet with key stakeholders, e.g. officers of the Trat Fisheries Provincial Office and EMDEC, to discuss and introduce the objectives and scope of the study.
- Data on the number of small-scale and commercial fishing households recorded at village level in Trat were collected from the Community Development Department (CDD) website (CDD, 2013). This was considered to be the most recent information, providing greater detail about fishers in Trat and was used for planning the sampling design. Another source of data on number of fishery household was from the '2000 Inter-censal Survey of Marine Fishery' by Office of the Prime Minister, National Statistical Office (NSO, 2000), although this was not used in the sampling design for this study as the data were considered to be out of date.
- According to the definitions of CDD (2013), small-scale fishery households are households whose fishing boats are not longer than 10 meters. Medium to large-scale fishery households are households that have fishing boats longer than 10 meters. In this study, the total number of fishery households in Trat in 2013 was 2 333. The sample size or the number of target household respondent in Trat (which was 219) was calculated by using an online sample size calculator based on the 95 percent Confidence level and Confidence interval of 6.31 (www.surveysystem.com Accessed on 8 September 2014). The target household respondent number of medium to large-scale fishery households was set as 35 to get sufficient data about the medium to large-scale fishery households. The remainder of the target respondents was 184 small-scale fishery households. These two fishery household groups were in different districts and stratified sampling was used to select the number of households in each district separately for each group. This sampling plan was provided to the EMDEC staff who conducted the data collection. The final number of fishery household respondents in this study was 233, including 193 small-scale fishery households and 40 medium to large-scale fishing households (Confidence level = 95 percent and Confidence interval = 6.09) (*දොස! යොමු මූලාශ්‍රය හමු නොවීණි.*).
- The interview schedule was developed based on the study objectives and the aims of REBYC-II CTI Project.
- The details of the interview schedule that was translated into Thai by the researcher were discussed with EMDEC staff at DOF office in Bangkok in September 2014. The interview schedule is presented in Appendix IV. The expert evaluation was used as a method for pre-test of this interview schedule. The subject matter experts included National Technical Officer (NTO) and EMDEC staff (who conducted and led the interviews).

Table 2-1: Number of fishery households and number of respondents by district.

District	Small-scale fishery households			Medium-Large-scale fishery households			Total in Trat		
	N*	n_1**	n_2***	N*	n_1**	n_2***	N*	n_1**	n_2***
Mueang Trat	911	76	70	120	32	33	1031	108	103
Klong Yai	587	49	51	0	0	4	587	49	55
Khao Saming	198	17	19	0	0	0	198	17	19
Laem Ngop	250	21	28	11	3	2	261	24	30
Ko Kut	88	7	10	0	0	1	88	7	11
Ko Chang	168	14	15	0	0	0	168	14	15
Total	2202	184	193	131	35	40	2333	219	233

*N = Recorded fishery households by CDD (2013)

**n_1 = Target household respondent number

***n_2 = Household respondent number

Methods and coverage in terms of content

A structured interview schedule was used for data collection (see **Appendix IV**). Socioeconomic Monitoring Guidelines for Coastal Managers in Southeast Asia (SocMon SEA) (Bunce and Pomeroy, 2003) was used as a guideline for questionnaire development. The interview schedule included four sections: (1) general background information on the respondents; (2) fishing activities, catch, income and cost of fishing in the previous year; (3) respondent's perceptions of fisheries resources conditions, threats, laws and regulations and participation in decision making and their thoughts on fishing in the future; and (4) measures and options for fisheries management in Trat. The interviews were conducted by officers of EMDEC during September to October 2014. Descriptive statistics were used for the majority of the data analysis to summarize household responses to the interview schedule. Ordinal logistic regression analysis was used to identify the differences in respondents' perceptions on measures and options for fisheries management in Trat province (significance level set as $\alpha = 0.05$ and 0.01). The statistical analysis was done using SPSS 13.0 software (SPSS Inc., Chicago, Illinois, U.S.A.).

2.4. Findings

2.4.1. Review of existing socio-economic data of fisheries in Trat province, Thailand

Number of fishery households in Trat province

The numbers of small-scale and medium to large-scale fishing households are presented in ඉදාඇ! ොමු මූලාශ්‍රය හමු නොවිණි.. The total number of fishery households in Trat, reported by CDD (2013), was 2 333, including 2 202 small-scale fishery households and 131 medium to large-scale fishing households. The number of small-scale fishing households was higher in Mueang Trat District compared to the other districts (41 percent for small-scale fishing households and 92 percent for medium-large-scale fishing households).

Table 2-2: Number of fishery households in Trat Province (CDD, 2013).

	District	Sub-district	Small-scale households		Medium to Large-scale households	
			Number	% (n=2 202)	Number	% (n=131)
1	**Mueang Trat**	Nhong Samet	42	1.91	0	-
		Nhong Sano	7	0.32	0	-

		Nhong Khansong	130	5.90	0	-
		Houng Nam Khao	140	6.36	0	-
		Ao Yai	310	14.08	0	-
		Wang Kra Jae	99	4.50	120	91.60
		Ta Kang	28	1.27	0	-
		Cham Rak	8	0.36	0	-
		Laem Klad	147	6.68	0	-
	Total		**911**	**41.37**	**120**	**91.60**
2	**Klong Yai**	Klong Yai	284	12.90	0	-
		Mai Root	303	13.76	0	-
	Total		**587**	**26.66**	**0**	**-**
3	**Khao Saming**	Saen Toong	59	2.68	0	-
		Tha Some	139	6.31	0	-
	Total		**198**	**8.99**	**0**	**-**
4	**Laem Ngop**	Laem Ngop	38	1.73	1	0.76
		Bang Pid	142	6.45	3	2.29
		Klong Yai	70	3.18	7	5.34
	Total		**250**	**11.35**	**11**	**8.40**
5	**Ko Kut**	Ko Mak	28	1.27	0	-
		Ko Kut	60	2.72	0	-
	Total		**88**	**4.00**	**0**	**-**
6	**Ko Chang**	Koh Chang	59	2.68	0	-
		Koh Chang Tai	109	4.95	0	-
	Total		**168**	**7.63**	**0**	**-**
Total	**6 Districts**	**20 Sub-districts**	**2 202**	**100.00**	**131**	**100.00**

There are five coastal zones in Thailand. Trat is in Coastal Zone 1 along with Chantaburi and Rayong. The 2000 Inter-censal Survey of Marine Fishery, reported by the Fisheries Statistics of Thailand 2011 (DOF, 2013a), recorded the number of fishery households, fishing boats and fishermen as presented in **දොස! යොමු මූලාශ්‍රය හමු නොවිණි.**. There were 6 389 fishers (during peak season) (3.8 percent of otal number of fishers in Thailand) in Trat. Nearly 3 000 fishery households were recorded in Trat in 2000 (5 percent of fishery households in Thailand and 47 percent of fishing households in Coastal zone 1) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.). The number of fishing households decreased by about 21.16 ercent between 2000 and 2013 (from 2 959 (DOF, 2013a) to 2 333 (CDD, 2013), possibly as a result in decline in the productivity of the fishery.

Fishing gears in Trat

In 2000, there were 2 729 fishing boats in Trat (4.7 percent of total number of fishing boats in Thailand) (**දොස! යොමු මූලාශ්‍රය හමු නොවිණි.**). The DOF recorded the number of fishing boats in Trat in 2011 nd published the number on the 2011 Fishing Boat Survey Website managed by MFRBD (2016); this data is presented in දොස! යොමු මූලාශ්‍රය හමු නොවිණි.. The total number of fishing boats in Trat in 011 was 3 204, which can be grouped into 11 types of fishing boats. Gillnetters were the most common type of fishing boat (1 473 boats corresponding to 46 percent of total number of fishing boats in Trat), followed by those using fish trap (583 boats or 18 percent), and longline & handline gears (276 boats or 9 percent). There were 200 trawlers (6 percent) and 112 push netters (4 percent). The number of fishing boats increased by about 17.4 percent between 2000 and 2011 (from 2 729 (DOF, 2013a) to 3 204 (MFRBD, 2016), despite the decline in the number of households involved in fishing (see **දොස! යොමු මූලාශ්‍රය හමු නොවිණි.**).

Table 2-3: Excerpts of the 2000 Inter-censal Survey of Marine Fishery by NSO: Number of fishery households, fishing boats and fishermen during peak season in Trat, Coastal Zone 1, and Thailand.

		Trat	Coastal Zone 1	Total for Thailand
No. of fishery households		2 959	6 351	57 801
No. of fishing boats	Total	2 729	6 200	58 119
	Non-powered boat	12	60	2 639
	Outboard powered boat	1 377	3 296	42 217
	Inboard powered boat	1 340	2 844	13 263
No. of fishers during peak season	Total	6 389	14 267	168 140
	Family member	3 842	8 402	80 857
	Employee	2 547	5 865	87 283

Source: DOF. 2013a. Fisheries Statistics of Thailand 2011: No. 11/2013. Information Technology Center, Department of Fisheries, Ministry of Agriculture and Cooperatives. 91 pages.

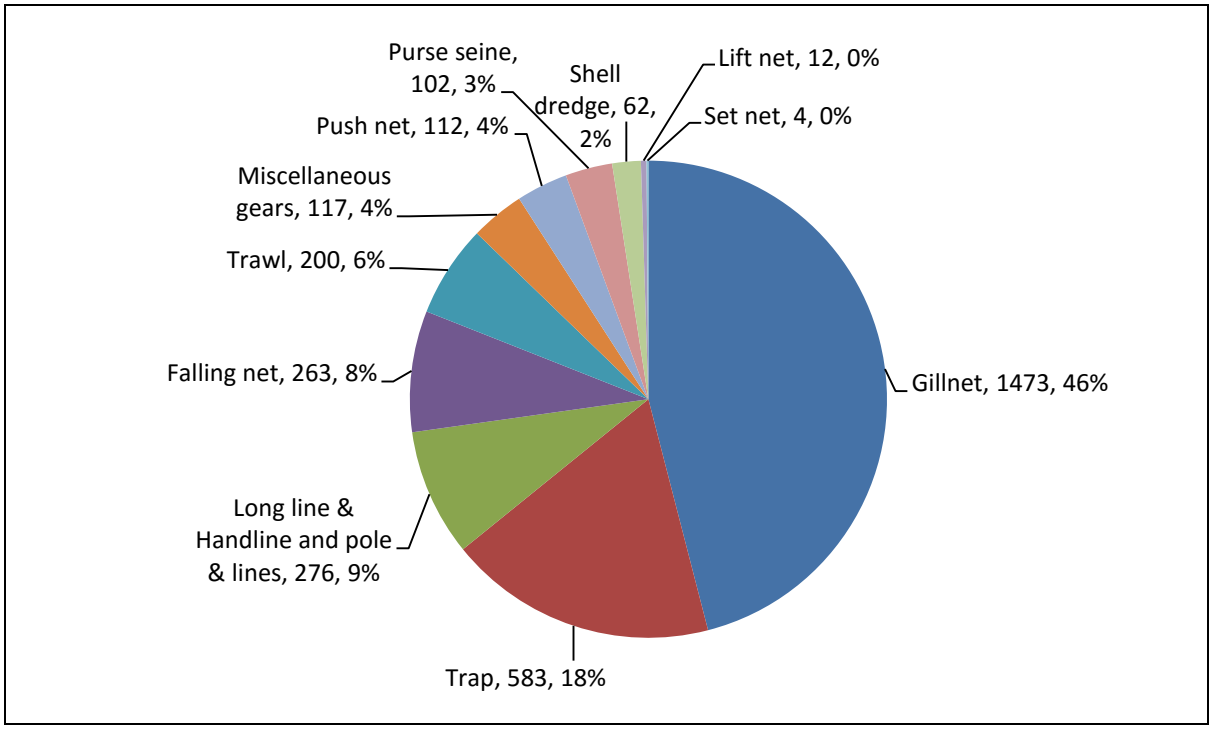


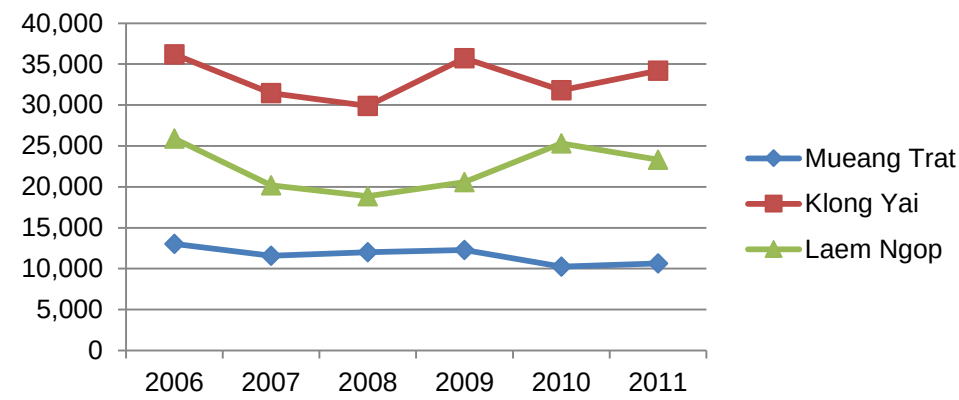
Figure 2-2: Types of fishing boats in Trat Province in 2011.

MFRBD website (2016) <http://www.platalay.com/boatsurvey2554/prvsearch.php>, Accessed on 20 Feb 2016

Landing sites in Trat province

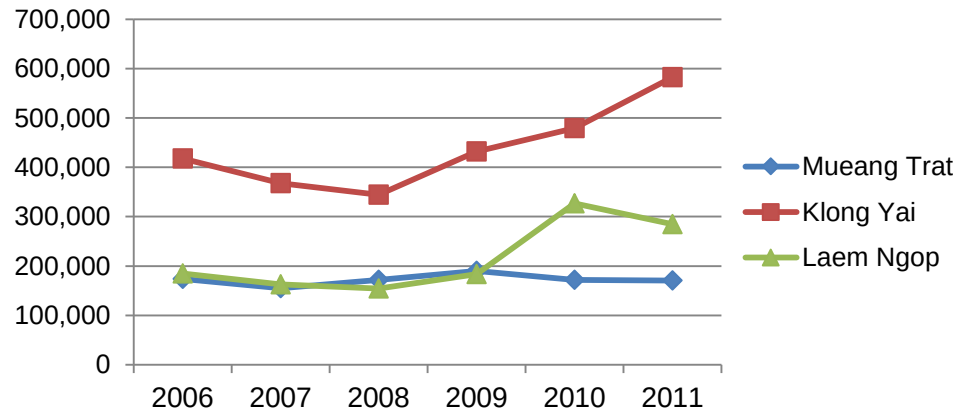
There were three main landing sites in Trat: Mueang Trat, Klong Yai and Laem Ngop. The total marine fish catch recorded by landing sites in quantity (tonne) and value (THB 1 000) between 2006 and 2011 are presented in දොස! යොමු මූලාශ්‍රය හමු නොවිණි. and දොස! යොමු මූලාශ්‍රය හමු නොවිණි.. Data total quantity and value of marine fish from a variety of fishing gears landed at the main landing sites were collected by DOF. However the marine fish sent directly to freezing or processing plants was not recorded at the landing site by DOF. In the period between 2006 and 2011, the quantity and value of marine fish recorded at the landing site in Klong Yai was higher than the other two sites (31 460-36 180 tonnes in Klong Yai compared to 10 263-25 894 tonnes at the other two sites and THB 345-583 million

in Klong Yai compared to THB 155-327 million) at the other two sites (For more details see **Appendix V**). It is noted that Klong Yai had higher quantity of marine fish landed (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.) but had fewer fishery households than Mueang Trat (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.). The data of marine fish landed at main landing sites recorded by DOF in the period between 2006 and 2011 was collected from both Thai fishing vessels and foreign fishing vessels. Klong Yai is located closer to the border between Thailand and Cambodia than the other districts. The imported marine fish from Cambodian fishing vessels landing at Klong Yai could be an explanation for the higher quantity of marine fish landed at Klong Yai compared to Mueang Trat District.



Source: DOF 2013c. Statistics of Marine Fish at Landing Place 2011 (No. 12/2013). Fishery Statistics Analysis and Research Group, Information Technology Center, DOF, Bangkok, Thailand. 32 pages

Figure 2-3: Total landing of marine fish by landing place in quantity (tonne) in Trat (2006-2011).



Source: DOF 2013c. Statistics of Marine Fish at Landing Place 2011 (No. 12/2013). Fishery Statistics Analysis and Research Group, Information Technology Center, DOF, Bangkok, Thailand. 32 pages

Figure 2-4: Total value (THB 1 000) of marine fish landings by place in Trat in 2006-2011.

2.4.2. Survey on socio-economic status of fishers in Trat province

The objective of the survey was to study the socio-economic status and perceptions of fishers in Trat province for demarcating a fishery conservation zone for juvenile fish and breeding stocks and for sustainable fisheries management. Key findings from the survey are described and discussed below.

Respondents

The total number of respondents was 233 including 193 from small-scale fishery households and 40 from medium to large-scale fishery households. Most of the respondents lived in Mueang Trat District (44.2 percent), followed by Klong Yai District (23.6 percent), and Laem Ngop District (12.9 percent), respectively. The interviews were conducted by EMDEC staff between September and October 2014 (දොස! යොමු මූලාශ්‍රය හමු නොවිණි. and දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

Table 2-4: Number of respondents by sub-district and district.

District	Sub-district	Small-scale fishery households	Medium to Large scale fishery households	Total (n)	%
1. Mueang TratDistrict		**70**	**33**	**103**	**44.2**
	Nhong Samet	4	0	4	1.7
	Nhong Sano	0	5	5	2.1
	Nhong Khansong	9	11	20	8.6
	Houng Nam Khao	11	2	13	5.6
	Ao Yai	25	3	28	12.0
	Wang Kra Jae	2	1	3	1.3
	Cham Rak	2	0	2	0.9
	Laem Klad	13	10	23	9.9
	Nern Sai	2	0	2	0.9
	Tha Prik	2	1	3	1.3
2. Klong Yai District		**51**	**4**	**55**	**23.6**
	Klong Yai	20	2	22	9.4
	Mai Root	26	2	28	12.0
	Had Lek	5	0	5	2.1
3. Khao Saming District		**19**	**0**	**19**	**8.2**
	Saen Tung	8	0	8	3.4
	Tha Som	11	0	11	4.7
4. Laem Ngop		**28**	**2**	**30**	**12.9**
	Laem Ngop	3	1	4	1.7
	Bang Pid	12	0	12	5.2
	Klong Yai	13	1	14	6.0
5. Ko Kut		**10**	**1**	**11**	**4.7**
	Ko Kut	10	1	11	4.7
6. Ko Chang		**15**	**0**	**15**	**6.4**
	Ko Chang	6	0	6	2.6
	Ko Chang Tai	9	0	9	3.9
Total		**193**	**40**	**233**	**100**
%		**82.8**	**17.2**	**100**	

General information on the respondents

Most respondents were male (92.3 percent) and the average age of respondents was 47 years with a range of 19 and 83 years. The majority of respondents were Buddhists (98.3 percent). Most respondents only had elementary level education (78.1 percent). The average number of family members was 4.5 (2.3 male and 2.2 female members) and the average number of family members

who were involved in fisheries work was 1.6 (1.3 male and 0.2 female members) (දොස! යොමු මූලාශ්‍රය මූ නොවිණි.).

Fisheries work was the main occupation of 93 percent of the households surveyed. Most of the respondents had only one occupation (67.8 percent) but about one-third (28.8 percent) had two occupations. The majority of the respondents owned their fishing boat (86.3 percent) and 11 percent of respondents were captains. More than half of the respondents or their family members (59.4 percent) were members of stakeholder organizations involved in co-managing fisheries **(**දොස! යොමු ූලාශ්‍රය හමු නොවිණි.).**

Fishing activities, catch, income, and cost of fishing of the last year

a. Main fishing gears operated by households of respondents

The main fishing gears operated by small-scale and medium to large-scale groups varied between respondents. The three main fishing gears for small-scale respondents were shrimp trammel nets (25.9 percent of total number of small-scale respondents); crab gillnets (25.4 percent); and crab traps (20.2 percent). The three main fishing gears for medium to large-scale respondents were push nets (32.5 percent of total number of medium-large-scale respondents), OBTs (22.5 percent), and purse seines (10 percent) (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

b. Secondary fishing gears operated by households of respondents

The most common fishing gears used as secondary fishing gears for small-scale respondents were shrimp trammel nets (36.6 percent of total number of small-scale respondents), crab gillnets and fish gillnets (22.6 percent each). For medium to large-scale respondents, short-necked clam dredge (33.3 percent of total number of medium to large-scale respondents), crab gillnets, fish gillnets, crab traps, and push nets (16.7 percent each) were mentioned as secondary fishing gears (දොස! යොමු මූලාශ්‍රය මූ නොවිණි.).

Table 2-5: General information of the respondents.

Items	**Small-scale fishery households (n=193)**	**Medium to Large-scale fishery households (n=40)**	**Total (n=233)**
	Mean (Min-Max)		
Age	46.2	46.98	46.71 (19-83)
No. of household members (including respondent)			
• Total	4.46	4.68	4.50 (1-12)
• Male	2.31	2.32	2.31 (0-8)
• Female	2.15	2.41	2.19 (0-6)
No. of household members involved in fishing (including respondent)			
• Total	1.58	1.55	1.58 (1-6)
• Male	1.30	1.37	1.31 (0-6)
• Female	0.25	0.18	0.24 (0-3)
	In percentages		
Gender			
• Male	93.8	85.0	92.3
• Female	6.2	15.0	7.7

Religion			
• Buddhist	98.4	97.5	98.3
• Islamic	1.6	2.5	1.7
Education			
• No formal education	9.3	5.0	8.6
• Elementary	78.2	77.5	78.1
• Secondary school or equivalent	7.8	10.0	8.2
• High school or equivalent	4.1	5.0	4.3
• Bachelor degree	0.5	2.5	0.9
Main occupation(based on time spent)			
• Fisheries	92.2	97.5	93.1
• Business	3.1	2.5	3.0
• Wage earner	2.1	-	1.7
• Others (Orchard garden, rubber planting, etc)	2.6	-	2.1
Numbers of occupations			
• One	66.8	72.5	67.8
• Two	29.5	25.0	28.8
• Three - Four	3.6	2.5	3.4
Relation to the boat owners			
• Owners	91.7	60.0	86.3
• Family members/owner's relatives	7.3	27.5	10.7
• Captains	0.5	12.5	2.6
Membership of stakeholder organizations managing fisheries			
• No	61.6	48.7	59.4
• Yes	38.4	51.3	40.6

Table 2-6: Main fishing gears of respondents' households (in percentages).

Fishing gears	Small-scale fishery households (n=193)	Medium-Large-scale fishery households (n=40)	Total (n=233)
Shrimp trammel net	25.9	2.5	21.9
Crab gillnet	25.4	2.5	21.5
Fish gillnet	14.5	2.5	12.4
Crab trap	20.2	7.5	18.0
Squid trap	2.6	5.0	3.0
Push net	4.7	32.5	9.4
Otter board trawl	0.0	22.5	3.9
Beam trawl	0.0	5.0	0.9
Pair trawl	0.0	2.5	0.4
Purse seine	0.5	10.0	2.1
Light luring squid	1.0	0.0	0.9
Short-necked clam dredge	0.0	7.5	1.3
Handline	3.6	0.0	3.0
Long line	0.5	0.0	0.4
Others	1.0	0.0	0.9

Total	100.0	100.0	100.0

Table 2-7: Secondary fishing gears of respondents' households (in percentages).

Fishing gears	Small-scale fishery households (n=193)	Medium-Large-scale fishery households (n=40)	Total (n=233)
Shrimp trammel net	36.6	-	34.3
Crab gillnet	22.6	16.7	22.2
Fish gillnet	22.6	16.7	22.2
Crab trap	4.3	16.7	5.1
Squid trap	3.2	-	3.0
Fish trap	1.1	-	1.0
Push net	-	16.7	1.0
Otter board trawl	1.1	-	1.0
Short-necked clam dredge	3.2	33.3	5.1
Handline	5.4	-	5.1
Total	100.0	100.0	100.0

c. Main fishing areas in different zones in Trat (proposed zones for discussion in stakeholder meeting)

During the first stakeholder meeting organized by REBYC-II CTI project in Trat in October 2013, there was a discussion about the proposed zones for fishery conservation and fisheries management activities around Trat. There were 141 participants including representatives from fishers, local fishery authorities, local fishery associations, fishery experts, DOF and DMCR who attended the stakeholder meeting. The five zones (zone 1-5) were drafted by DOF prior to the meeting and they were agreed by the participants for further discussion about the fishery conservation and management measures in Trat. Zone 6 and zone 7 were subsequently added by the researcher and included in the interview schedule for the questions regarding the fishing areas of the respondents (දැනස! යොමු මූලාශ්‍රය හමු නොවිණි.). The main fishing areas of the small-scale respondents in order of responses were: zone 4 (29 percent), zone 1 (19.7 percent), zone 3 (17.1 percent), and zone 5 (16.1 percent), while the main fishing areas of medium to large-scale respondents were in zone 7 (40 percent) and zone 6 (27.5 percent) (දැනස! යොමු මූලාශ්‍රය හමු නොවිණි.). The fishing activities were prohibited in the Strait of hang Island for the whole year in Zone 4 and in the June to November period every year in Zone 5. These two zones were conserved to protect larvae of aquatic animals of economic value and the eggs of such animals from being caught or destroyed in an excessive amount to ensure such resources were sustainable. This excessive fishing would have a negative effect on marine resources and marine environment. The survey responses showed that 29 percent of small-scale fishery and 5 percent of medium to large-scale fishery respondents used Zone 4 as their main fishing areas, and 16 percent of small-scale and 10 percent of medium to large-scale fishery respondents used Zone 5. The issue with compliance to the law should be improved, and education on fisheries law and law enforcement should be strengthened.

d. Fishing days and month

The number of fishing days per month of the respondents ranged from 2 to 30 (average 19). The number of fishing days per month for small-scale fishing households was slightly lower than for medium and large-scale fishing households (18.8 and 20.8 respectively). The respondents carried out their fishing activities between 2 and 12 months of the year with an average of 10.9 months per year (**Table 2-8**).

e. Income and cost from fishing activities

The median household income of respondents for all types of fishing gears by all household members was THB 1 000 per day before accounting for fishing costs. Medium to large-scale fishery households had a much higher income than small-scale fishery households (THB 7 000 compared to THB 1 000 per day). The household income of small-scale households were between THB 130-5 520 per day, while household income of medium to large-scale fishing households ranged from THB 850-20 000 per day (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.). When considering income per person per day, it is estimated hat small-scale fishers earned THB 500 while medium to large-scale fishers earned THB 3 500. This estimation is based on the average number of household members involved in fishing, which was about 1.6 for both groups or about 2 persons per household (see දොස! යොමු මූලාශ්‍රය හමු නොවිණි.). n 2014, the national poverty line of Thailand was THB 2 647 per month per person (approximately THB 88 per day) (NESDB, 2015) and the minimum wage in Thailand was THB 300 per day in 2014. The household incomes of both groups of respondents were higher than the national poverty line as well as the minimum wage in Thailand.

All medium- to large-scale fishery household respondents considered the cost of fuel as the single highest cost of financing their fishing operations, while two-thirds of small-scale fishery household respondents also considered the cost of fuel as the highest cost. These results were based on the respondents' perceptions about the highest costs associated with fishing. The cost of fishing gear was considered by 24.1 percent of small-scale fishing household respondents to be the highest cost for their fishing activity. Most of the respondents said that costs and incomes from their fishing were either equal or very similar (69.5 percent). However, 30 percent of respondents claimed to have incomes greater than the costs of their fishing operation (42.5 percent of medium to large-scale and 27.5 percent for small-scale fishing households). Approximately 90 percent of respondents were satisfied with the benefits from their fishing. The level of satisfaction of most of respondents (59 percent) was moderate (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

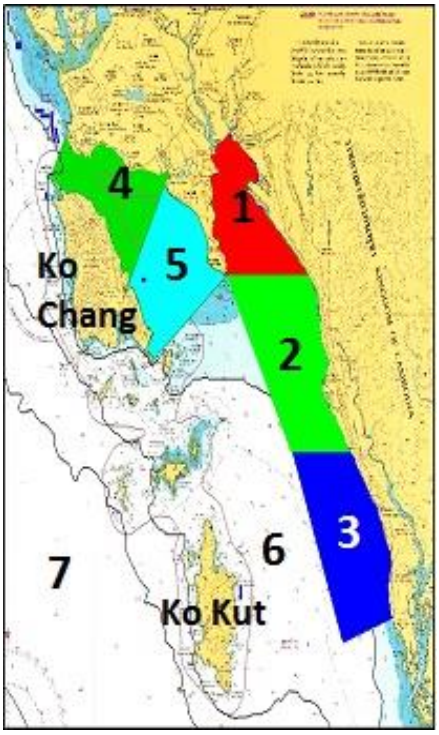


Figure 2-5: Fishing zones.

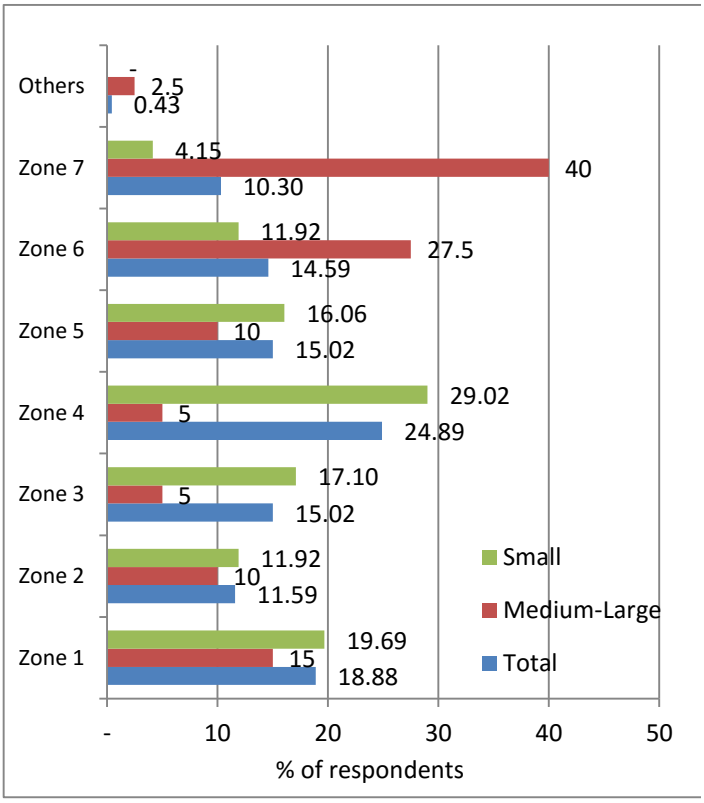


Figure 2-6: Main fishing areas of respondents.

Table 2-8: Fishing days and month.

	Small-scale fishery households (n=193)	Medium-Large-scale fishery households (n=40)	Total (n=233)
Number of fishing days per month			
• Average	18.8	20.8	19.1
• Minimum	3	15	3
• Maximum	30	25	30
Number of fishing month per year			
• Average	10.8	11.2	10.9
• Minimum	2	5	2
• Maximum	12	12	12

Table 2-9: Household income per day from fishing activities (before deducting the cost).

Household Income (THB per day)	Small-scale fishery households (n=193)	Medium-large-scale fishery households (n=40)	Total (n=233)
Median*	1 000	7 000	1 000
Mean	1 167	7 457	2 112

SD	950.3	4 630	2 995
Min	130	850	130
Max	5 520	20 000	20 000

*used median as the central value to represent the data

Table 2-10: Main fishing cost and comparison between income and cost and respondent's satisfaction on the benefit returned, based on respondents' perceptions.

Cost and income	Small-scale fishery households (n=193)	Medium-large-scale fishery households (n=40)	Total (n=233)
Main fishing cost	%	%	%
• Fuel	66.8	100	72.6
• Labour	4.3	0.0	3.5
• Baits	2.1	0.0	1.8
• Fishing gears	24.1	0.0	19.9
• Boat & maintenance cost	2.7	0.0	2.2
Comparison between income and cost of fishing in the past 12 months			
• Income more than cost	27.5	42.5	30.0
• Income equal/very similar to cost	72.0	57.5	69.5
• Income less than cost	0.5	0.0	0.4
Level of satisfaction on the benefit returned from fishing in the past 12			
• Not satisfied	8.3	20.5	10.3
• Slightly satisfied	21.8	10.3	19.8
• Moderately satisfied	58.0	64.1	59.1
• Highly satisfied	11.9	5.1	10.8

Respondent's perceptions of fisheries resource conditions, threats, laws and regulations and participation in decision making, and their fishing in the future

a. Perceived fisheries resource conditions

In general, most of respondents perceived the conditions of fishery resources as being between 'bad' and 'not so good & not so bad' (42-61 percent) except for Acetes shrimp, which was perceived to be in a 'very bad' or 'bad' condition (44.6%). The perceptions on the condition of fisheries resources were similar for the two groups (දොස! යොමු මූලාශ්‍රය හමු නොවිණි.).

b. Perceived threats to fisheries resources

An increase in number of fishers and fishing gears as well as illegal fishing were perceived as the first two most severe threats to fisheries resources. Other threats included marine pollution, natural disasters and other factors such as too much freshwater from rivers, climate change, and increase of jelly fish. Most respondents in two groups perceived that increase in number of fishers and fishing gears was the first most severe threat to fishery resources (37.7 percent of small-scale fishery households and 50 percent of medium to large-scale fishery households). Nearly 30 percent of small-scale fishery households and only about 10 percent of medium-large scale fishery households perceived illegal fishing as the second most severe threat to fishery resource (දොස! යොමු මූලාශ්‍රය මූ නොවිණි.).

Table 2-11: Perceived fisheries resource condition in the respondent's main fishing ground.

Types of resources	Fishery household group*	Fishery resource condition scale** (%)						
		1	2	3	4	5	No answer	Total
Fish	S	15.7	24.6	30.9	13.1	2.6	13.1	100
	M-L	2.4	35.7	31.0	28.6	0.0	2.4	100
	Total	13.3	26.6	30.9	15.9	2.1	11.2	100
Shrimp	S	16.8	20.4	31.4	11.0	2.1	18.3	100
	M-L	4.8	38.1	33.3	21.4	0.0	2.4	100
	Total	14.6	23.6	31.8	12.9	1.7	15.5	100
Acetes shrimp	S	22.5	22.0	17.8	9.4	1.0	27.2	100
	M-L	31.0	14.3	14.3	19.0	2.4	19.0	100
	Total	24.0	20.6	17.2	11.2	1.3	25.8	100
Crab	S	15.2	28.3	34.0	12.6	1.6	8.4	100
	M-L	9.5	31.0	23.8	21.4	0.0	14.3	100
	Total	14.2	28.8	32.2	14.2	1.3	9.4	100
Cephalopod	S	15.7	26.2	23.0	11.0	0.5	23.6	100
	M-L	0.0	38.1	28.6	23.8	0.0	9.5	100
	Total	12.9	28.3	24.0	13.3	0.4	21.0	100
Shell/calm	S	18.8	22.0	19.4	14.1	2.6	23.0	100
	M-L	16.7	23.8	21.4	21.4	2.4	14.3	100
	Total	18.5	22.3	19.7	15.5	2.6	21.5	100

*Fishery household group: S=Small-scale fishery households (n=193), M-L=Medium-large fishery households (n=40) and Total (n=233)

**condition scale: 1=very bad, 2=bad, 3=not good & not bad, 4=good, 5=very good

Table 2-12: . Ranking of perceived threats to fisheries resources.

Types of perceived threats to fisheries resources	Ranking of perceived threats to fisheries resources(%, n=233)								
	First most severe			Second most severe			Third most severe		
	S	M-L	Total	S	M-L	Total	S	M-L	Total
Increase in number of fishers & fishing gears	37.7	50.0	39.9	30.4	31.0	30.5	10.5	9.5	10.3
Illegal fishing	29.8	9.5	26.2	29.8	23.8	28.8	15.7	19.0	16.3
Natural disaster	8.9	9.5	9.0	14.7	16.7	15.0	26.7	23.8	26.2
Marine pollution	12.0	16.7	12.9	11.5	11.9	11.6	12.6	11.9	12.4
Others	8.4	14.3	9.4	2.1	2.4	2.1	5.2	0	4.3
No answer	3.1	0	2.6	11.5	14.3	12.0	29.3	35.7	30.5
Total	100	100	100	100	100	100	100	100	100

*Fishery household group: S=Small-scale fishery households (n=193), M-L=Medium-large fishery households (n=40) and Total (n=233)

c. Perceived laws and regulations and participation in decision making

Most respondents (81 percent) perceived that they were aware of, or knew about the regulations and laws related to fisheries in their fishing grounds. However, one-fifth of small-scale respondents (21 percent) was unaware of, or did not know about the fishery laws (**Table 2-13**).

Most respondents (55.3 percent) perceived that fishers generally complied with fisheries regulations and laws at level 2 or 3, which is low to moderate compliance. Most small-scale and medium-large-scale respondents perceived that fishers complied with fisheries laws at level 1 (low compliance) or level 2 (moderate compliance), respectively (**Table 2-13**).

The enforcement of the fisheries regulations and laws was given a ranking of 2 by most respondents (40.8 percent) corresponding to low enforcement (**Table 2-13**).

Approximately 60 percent of respondents reported that they have participated in decision-making processes for fisheries management in Trat such as participating in public hearings. A public hearing is one of the requirements when the decision makers plan to make changes or introduce a new fisheries law or regulation into the area. A breakdown of the 40 percent who had not been involved, showed that 43.5 percent of small-scale respondents and 27.5 percent of medium to large-scale respondents had not participated in decision making processes. This is consistent with the question about attending meetings or listening to information regarding fisheries management. About 34 percent of respondents had never attended or participated in such meetings (37.3 percent of the small-scale respondents) (**Table 2-13**).

d. Perceived future of their fishing

Most respondents (84 percent) thought that they could continue their fishing activities indefinitely. However, 14 percent of small-scale respondents and 25 percent of medium to large-scale respondents thought that they could not continue fishing, given the current fisheries trends (**Table 2-13**).

Table 2-13: Perceived laws and regulations and participation in decision making.

	Small-scale fishery households (n=193)	Medium-large fishery households (n=40)	Total (n=233)
Awareness of rules and regulations (know or don't know)			
• No (Not aware/Don't know)	21.2	7.5	18.9
• Yes (Aware/Know)	78.8	92.5	81.1
Compliance on a scale of 1 to 5 (to what extent do most fishers comply with fisheries regulations and laws?			
• 1 = No compliance	13.0	0	10.7
• 2 = Low compliance	34.7	22.5	32.6
• 3 = Moderate compliance	18.7	42.5	22.7
• 4 = High compliance	29.0	32.5	29.6
• 5 = Full compliance	4.7	2.5	4.3
Enforcement: on a scale of 1 to 5, to what extent are the fisheries regulations and laws enforced?			
• 1 = No enforcement	8.3	2.5	7.3
• 2 = Low enforcement	46.1	15.0	40.8
• 3 = Moderate enforcement	26.4	45.0	29.6
• 4 = High enforcement	16.6	32.5	19.3
• 5 = Full enforcement	2.6	5.0	3.0
Participation in decision making: on a scale of 1 to 5, to what extent do you participate in fisheries management decision-making?			
• 1 = No participation	43.5	27.5	40.7
• 2 = Low participation	22.0	22.5	22.1
• 3 = Moderate participation	23.6	27.5	24.2
• 4 = High participation	9.4	15.0	10.4
• 5 = Full participation	1.6	7.5	2.6
Participation in a meeting or listening to information related to fisheries management in Trat.			
• No (Never participated)	37.3	15.0	33.5
• Yes (Have participated)	62.7	85.0	66.5
Do you think that you can continue with current fishing activities forever?			
• No (cannot continue)	14.2	25	16.1
• Yes (can continue)	85.8	75	83.9

Respondent's perceptions of measures and options for fisheries management in Trat

During the first stakeholder meeting organized by REBYC-II CTI project in Trat province, the fishers including small-scale, medium- and large-scale who attended the meeting supported fishery management options no. 2 - 14 presented in දොස! යොමු මූලාශ්‍රය හමු නොවිණි.. Option no. 1 was dded by the researcher to observe the responses. These options were included in the questionnaire used in this study to understand the respondent's opinions and agreements on these options on a scale of 1-5 (1=strongly disagree, 2=disagree, 3=neither agrees nor disagree, 4= agree, 5=strongly agree) (**See** දොස! යොමු මූලාශ්‍රය හමු නොවිණි. for the zone map).

An ordinal logistic regression was used to investigate differences in responses for the small-scale fishers and medium to large scale fishers for each of the 14 options and there were five options where there were statistically significant differences between the responses of the two groups. The small-scale fishery households were more likely to agree or strongly agree with option 5 (no use of some fishing gears in zone 2 and zone 3 during May-October); option 6 (No fishing in spawning season in zone 3 during February-May); option 7 (No use of any fishing gears having net mesh size smaller than 4.5 cm); option 9 (Publicity campaign for no take fish larvae); and option 12 (Promote more and maintain crab bank project), than medium to large-scale fishery households. The differences in the mean for the two household groups were more than 0.5 for options 5, 6, and 7. The mean of options 9 and 12 for the two groups differed by less than 0.3 (**Table 2-14**).

The majority of small-scale fishery households were in agreement with options 4-14 (47.2-93.7 percent of the respondents). The most popular options were option 8 (dolphin watching tourism), option 9 (no take fish larvae publicity campaign), and option 12 (crab bank project). The small-scale fishery respondents disagreed or strongly disagreed with options 1-3 (50.7-84.3 percent of the respondents). Option 1 (no fishing in zone 1-3 permanently) and option 3 (no fishing in zone 1 and 2 permanently) were disagreed or strongly disagreed by most respondents (**Table 2-14**).

The majority of medium to large-scale fishery households agreed or strongly agreed with options 5, 6, and 8-14 (50.0-80.9 percent of the respondents). Option 12 (crab bank project) was the most popular option for the respondents followed by option 8 (dolphin watching tourism), option 9 (no take fish larvae publicity campaign), and option 13 (squid egg hatching bank). The medium to large-scale fishery households also disagreed or strongly disagreed with options 1-4 (57.2-76.2 percent). Options 1 and 3 were disagreed or strongly disagreed by most respondents. This outcome is similar to the responses of the small-scale fishery households (**Table 2-14**).

Table 2-14: Respondents' perception on measures and options for fisheries management in Trat Province.

Measures/options for fisheries management in Trat (see map of fishing zone above)	Fishery household group[1]	Disagreement/ Agreement Level[2] (percentage of group)					Mean level[3]	Ordered Logit Estimates ($p < 0.05$)* ($p < 0.01$)**
		1	2	3	4	5		
1. No fishing in zone 1, 2, and 3 permanently	S	61.8	22.5	5.2	5.8	4.7	1.6	- 0.027^{ns}
	M-L	59.5	16.7	9.5	11.9	2.4	1.7	
	Total	61.4	21.5	6.0	6.9	4.3	1.6	
2. No fishing in zone 1, 2, and 3 in some seasons	S	27.7	23.0	4.2	31.9	13.1	2.8	0.241^{ns}
	M-L	31.0	26.2	2.4	33.3	7.1	2.6	
	Total	28.3	23.6	3.9	32.2	12.0	2.8	
3. No fishing in zone 1 & 2 permanently to conserve *Rastreliger brachysoma*, endangered species (dolphin & mangroves)	S	38.7	26.2	7.9	20.4	6.8	2.2	- 0.190^{ns}
	M-L	31.0	31.0	9.5	23.8	4.8	2.3	
	Total	37.3	27.0	8.2	21.0	6.4	2.3	
4. No fishing in zone 1 and 2 in some seasons (Alternate with	S	20.4	21.5	11.0	39.3	7.9	2.9	0.631^{ns}
	M-L	28.6	31.0	9.5	26.2	4.8	2.4	
	Total	21.9	23.2	10.7	36.9	7.3	2.8	

opened-closed seasons between zone 1 and zone 2)								
5. No use of some fishing gears in zone 2 and zone 3 in May - Oct to conserve *Rastreliger brachysoma*, swimming crab, and short necked clam	S	4.7	14.1	8.4	48.2	24.6	3.8	1.181**
	M-L	21.4	19.0	9.5	38.1	11.9	3.0	
	Total	7.7	15.0	8.6	46.4	22.3	3.6	
6. *Rastreliger brachysoma*: No fishing in spawning season in zone 3 in Feb-May to conserve *Rastreliger brachysoma*	S	4.2	8.9	13.6	44.5	28.8	4.0	0.978**
	M-L	16.7	11.9	14.3	40.5	16.7	3.0	
	Total	6.4	9.4	13.7	43.8	26.6	3.9	
7. *Rastreliger brachysoma*: No use of any fishing gears having net mesh size smaller than 4.5 cm. in Mar-May to conserve *Rastreliger brachysoma*	S	6.8	11.5	11.0	37.7	33.0	3.9	1.262**
	M-L	16.7	14.3	33.3	26.2	9.5	3.0	
	Total	8.6	12.0	15.0	35.6	28.8	3.8	
8. Dolphin: Promotion of dolphin watching tourism in Trat	S	0.5	1.6	4.2	34.0	59.7	4.6	0.256^{ns}
	M-L	0.0	9.5	11.9	26.2	52.4	4.4	
	Total	0.4	3.0	5.6	32.6	58.4	4.5	
9. Fish larvae: Publicity campaign for no take fish larvae	S	0.5	3.1	5.2	39.8	51.3	4.5	0.825*
	M-L	2.4	11.9	14.3	38.1	33.3	4.3	
	Total	0.9	4.7	6.9	39.5	48.1	4.4	
10. Sea turtle: reserved feeding and spawning area for sea turtle	S	2.1	1.0	18.8	41.9	36.1	4.3	0.192^{ns}
	M-L	0.0	0.0	35.7	40.5	23.8	4.4	
	Total	1.7	0.9	21.9	41.6	33.9	4.4	
11. Sea grass: Reserve existing area and new planting for suitable species	S	1.6	1.0	20.9	40.8	35.6	4.4	0.343^{ns}
	M-L	0.0	4.8	38.1	33.3	23.8	4.2	
	Total	1.3	1.7	24.0	39.5	33.5	4.3	
12. Promote more and maintain crab bank project	S	0.0	1.6	4.7	31.4	62.3	4.6	1.016**
	M-L	0.0	2.4	16.7	47.6	33.3	4.3	
	Total	0.0	1.7	6.9	34.3	57.1	4.6	
13. Squid eggs: Promote squid egg hatching bank by training fishery community and establish squid egg bank	S	0.0	3.1	17.3	39.8	39.8	4.4	-0.022^{ns}
	M-L	0.0	2.4	26.2	35.7	35.7	4.4	
	Total	0.0	3.0	18.9	39.1	39.1	4.4	
14. Mussel: Increase area for mussel culture in allowed areas, and placed artificial reef in the areas not allow	S	8.4	9.4	18.3	42.9	20.9	3.7	-0.112^{ns}
	M-L	2.4	9.5	31.0	40.5	16.7	3.9	
	Total	7.3	9.4	20.6	42.5	20.2	3.7	

[1] Fishery household group: S=Small-scale fishery households, M-L= Medium to Large-scale fishery households

[2] Disagreement/ agreement level: 1=strongly disagree, 2=disagree, 3=neither agrees nor disagree, 4= agree, 5=strongly agree

[3] Scale of 3 for neither disagree nor agree was not used for calculating the mean level of disagreement or agreement as it was considered as a neutral response.

2.5. Conclusions and recommendations

Based on the review of existing data and survey results, the following conclusions and recommendations are made:

- The number of fishery households decreased in 2000-2013 from 2 959 (DOF, 2013a) to 2 333 (CDD, 2013) while the number of fishing boats increased from 2 729 in 2000 (DOF, 2013a) to 3 204 in 2011 (MFRBD, 2016). Despite a reduction in the number of fishery households fishery resources are still under high pressure because an increasing number of fishing boats.
- The respondents represented the fishers in 21 sub-districts of the 6 coastal districts in Trat. Most of them were from Mueang Trat District (44 percent) and Klong Yai District (23.6 percent). Because 86 percent of respondents were boat owners and 11 percent were captains, the reliability of the data used for analysis in this study is relatively good. The respondents were likely to have good knowledge of fishing activities in their province given their responsibilities.
    - In general, most of respondents were men, Buddhist, and had finished primary school. The average age of respondents was 47. The government should use this demographic information of fishermen in Trat as a criterion for designing projects for additional employment for fishing communities in Trat. The study considered differences in fishing activities, income, and cost, and other major differences between small-scale fishery households and medium- to large-scale fishing households. Main fishing gear used, main fishing zones, and household incomes (before deducting cost) were different for the two groups of respondents. The main fishing gear used by small-scale households were shrimp trammel nets, crab gillnets, and crab traps while for medium to large-scale households, push nets, trawls, and purse seines were more common. The Fishing grounds of small-scale households were close to the shore (zones 4, 1, 3, and 5, respectively) while medium-large-scale households had their fishing grounds further from the shore (zones 7 and 6, respectively). Household incomes before deducting the cost of fishing were about seven times higher for medium- to large-scale households than for small-scale fishers (THB 7 000 vs THB 1 000 per day). To demarcate fishery conservation zone, there is a need to consider these fishing grounds. Banning fishing gears, in particular the main fishing gears used by the two groups, should be considered carefully and the socio-economic impacts should be evaluated and understood. Loss of income during ban period or closed season would result in negative impacts to livelihoods and households.
- The level of fishing activities of small-scale and medium- to large-scale households were similar, around 19 days per month and 11 months per year. Most of the respondents had a single occupation which was fishing (68 percent of all respondents, 66.8 percent of small-scale respondent and 72.5 percent of medium- to large-scale respondents). When the government introduces measures that might impact on fishing activities, they should prepare alternative livelihoods, compensation or any mitigation measures that can reduce the impacts of proposed measures on local communities.
- Nearly 60 percent of the respondents were moderately satisfied with the benefits from fishing in the study area. These responses are consistent with the question about the future of their fishing. Most of the respondents (84 percent) said that they could continue with their current fishing activities. These perceptions were similar for the two groups. About 58 percent of small-scale and 64 percent of medium to large-scale fishery respondents were moderately satisfied with the benefits from fishing. Most respondents in each group were also optimistic about future fishing (86 percent of small-scale fishery respondents and 75 percent of medium to large scale fishery respondents). This suggests that fishing in the study area still provides benefits to the local community.

- Fishers, however, in general perceived the condition of local fisheries resources to be not good with the main threats being an increase in the number of fishers and fishing gears, and illegal fishing. Small-scale and medium- to large-scale fishery households had similar perceptions on the threats to fishery resources. It is considered important to demarcate conservation zones (e.g. for juvenile fish) in addition to other measures that would mitigate the impacts of these threats, and all these measures should be integrated, implemented and strengthened.
- Fishers should be provided with better knowledge and awareness about fisheries laws and regulations. Some of the fishers are not at all aware of or do not know about the fishery laws and regulations (21 percent of small-scale respondents and 8 percent of medium- to large-scale fishing respondents).
- Fishing activities were prohibited in the Strait of Chang Island for the whole year in Zone 4 and in the June to November period every year in Zone 5. In our survey there were 29 percent of small-scale and 5 percent of medium- to large-scale fishery respondents who used Zone 4 as their main fishing areas and 16 percent of small-scale and 10 percent of medium- to large-scale fishery respondents used Zone 5. Clearly, compliance with the laws and regulations should be improved, and education on fisheries law and law enforcement should be strengthened. In addition, participation of small-scale fishery households in decision-making processes should be improved in order to have sustainable management of fisheries in Trat.
- Awareness-raising campaigns should be undertaken to encourage fishers to join fisheries management groups. Membership will provide benefits in receiving and exchanging fisheries information among the members and between the government agencies. About 62 percent of small-scale respondents do not participate in any groups at present.
- There were similar responses between the small-scale fishery households and medium to large-scale fishery households for fishery management options no. 1-4, 8, 10, 11, 13 and 14. However, it could be challenging to implement options 5-7, 9 and 12 because of differences in perceptions of the two groups, which could lead to a conflict between small-scale fishery households and medium to large-scale fishery households. Option no. 1 (no fishing in zone 1-3 permanently) and option no. 3 (no fishing in zone 1 and 2 permanently) were disagreed or strongly disagreed by most respondents of the two groups. The implementation of these two management options is likely to be difficult for DOF. The participation of the local community is highly recommended in this case to avoid confrontation and ensure community engagement.

3. PART III: Lessons learned and recommendations for future socio-economic studies

- Understanding the socio-economic context is essential for assessing and managing fisheries. Even without any complicated statistical analysis of the data, the socio-economic information itself is still useful for planning. The data from socio-economic surveys can be used to investigate the current socio-economic conditions as well as the socio-economic trends.
- The findings from the trawl fisheries study in Prachuap Khiri Khan and Chumphon provinces were presented at three meetings: (1) 2nd REBYC-II CTI Stakeholder Consultation Meeting in Chumphon on 23 September 2014; (2) REBYC-II CTI Advisory Board Meeting in Bangkok on 25 September 2014; and (3) REBYC-II CTI Advisory Board Meeting in Bangkok on 23 July 2015. The findings from fisheries in Trat province were also presented at two meetings: (1) 2nd REBYC-II CTI Stakeholder Consultation Meeting in Trat on 30 November 2015; and (2) REBYC-II CTI Advisory Board Meeting in Bangkok on 29 January 2016. Presentations to the stakeholders provided a useful platform for disseminating the findings, to discuss and verify the findings, and to make conclusions that can be used to support the measures proposed by the Project. At present, according to the Notification of DOF, Thailand promulgated a prohibition of the possession of trawl net with codend mesh size less than 4 cm in the Royal Thai Government Gazette on 30 December 2015, as it was considered a destructive fishing gear. In the case of Trat, the Trat Provincial Fishery Committee, which was newly formulated under the Royal Ordinance on Fisheries B.E. 2558 (2015), has been working on the fishery conservation areas and fishery management measures in the Trat region.
- Enumerators who conduct socio-economic interviews should have a good knowledge of fisheries. In this study, all interviews were carried out face-to-face by the officers of CMDEC and EMDEC. These officers have good background knowledge about the fishing in the study area. This subject matter experience contributes to the reliability of the interview data that were collected. However, the selection of enumerators depends on the situation of the fisheries in each site or country. In some countries, the government officers may not be appropriate as the respondents may be unwilling to voice their perceptions or provide accurate data. In this case, university staff or students can be considered as alternatives for the data collection tasks.
- To strengthen the results and conclusions of the trawl fisheries study and to support statistical analysis of the data, additional samples of trawlers should be collected to increase the size of the data set.
- Recently, Thailand has significantly improved the system of registering fishing boats and fishing licences for both small-scale and commercial-scale fisheries. These improvements should provide reliable data for the sampling design and help to facilitate future socio-economic studies within Thailand.
- The study represents the socio-economic situation of fishers in the project sites in Thailand before the Royal Ordinance on Fisheries B.E. 2558 (2015) was fully implemented. This new fishery law is one of the crucial steps to combat illegal, unreported and unregulated (IUU) fishing, which is currently considered as the most serious problem related to fishery industry and resources in Thailand. To compare the situations and examine the impacts of the new fisheries law on fishers in the project sites, it is recommended that a similar study be conducted at a later period, using the current data as a baseline.

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Appendix I Interview schedule: Socio-economic status of trawl fishers in Prachub Khiri Khan province and Chumphon province, Thailand

Questionnaire ID: _____

Sample group ( ) 1. Otter board trawl ( ) 2. Otter board with boom trawl
( ) 3. Pair trawl ( ) 4. Beam trawl

Registered at province ( ) 1. Prachuab Khiri Khan ( ) 2. Chumphon

Name of respondent:_____	Name of interviewer: _____
Telephone number of respondent_____ Address of respondent: Number _____ Village Name _____Village No._____ Sub-district _____ District_____ Province_____	Date of interview: _____

General respondent information (Q1-Q10)

Q1. Sex: ( ) 1. Male ( ) 2. Female

Q2. Age: _____years

Q3. Religion: ( ) 1. Buddhist ( ) 2. Islam ( ) 3. Others (Specify) _____

Q4. Education:

( ) 1.No formal education ( ) 2. Primary school
( ) 3 Secondary school or equivalent ( ) 4. High school or equivalent
( ) 5.Bachelor degree ( ) 6. Other (Specify) _____

Q5. Number of household members (including respondent):

Total number: _____ (Male:_____ Female:_____)

Q6. Number of household members involved in fisheries (including respondent)

Total number: _____ (Male:_____ Female:_____)

Q7. What is your main occupation? (main occupation refers to the occupation that takes up a longer time compared to other occupations, in case you have more than one occupation)

( ) 1. Otter board trawl ( ) 2. Otter board with boom trawl
( ) 3. Pair trawl ( ) 4. Beam trawl
( ) 5. Others (Specify) _____

Q8. What is your secondary occupation?

( ) 0. None
( ) 1. Otter board trawl ( ) 2. Otter board with boom trawl
( ) 3. Pair trawl ( ) 4. Beam trawl
( ) 5. Others (Specify) _____

Q9. Relation to the boat owner

( ) 1. Owner ( ) 2. Family members or relatives of boat owner
( ) 3. Employee (on board work) ( ) 4. Captain
( ) 5. Others (Specify) _____

Q10. Have you ever participated in a meeting or listening to information related to mesh size cod end enlargement of trawl net?

( ) 0. No ( ) 1. Yes

<u>Part one: Trawl fisheries activities, catch, revenue, and cost in the past 12 months (Q11-Q36)</u> (In case you have more than one boat, please select only one boat as the representative)

Q11. Boat length (Overall length) _____meter

Q12. Gross-tonnage_____

Q13. Cod end mesh size _____ centimetre

Q14. <u>Main</u> fishing ground (Specify district, province, country) _____

<u>Secondary</u> fishing ground (Specify district, province, country) _____

Q15. What was your technique to determine or choose your fishing ground?_____
_____

Q16. Total number of months fishing undertaken by the trawl vessel____(month/year)

Q16.1 Specify the months undertaken by the trawl vessel
_____

Q16.2 Why don't you undertake trawl fishing in some months? (In case you did not do trawl fishing whole year round)
_____

Q16.3 What activities did you do in those months when you did not do trawl fishing? (In case you did not do trawl fishing whole year round)
_____

Q17. Number of trips per month _____trip/month

Q18. Number of days per trip _____day/trip

Q19. Number of hauls per trip _____haul/trip

Day time, number of hauls per day _____ haul/day

Night time, number of hauls per night _____ haul/day

Q20. Number of hours per haul _____hour/haul

Day time, number of hours per haul _____ hour/haul

Night time, number of hours per haul_____ hour/haul

Q21. Total catchamount per trip_____ kilogram/trip

Q22. Total catch amount of target species (3 main species most caught), catch proportion, and selling price

Target species	% of total catch amount in each trip	Average catch amount (kg/trip)	Average selling price (THB/kg)
1.			
2.			
3.			

Q23. Total catch amount of trash fish (3 main species most frequently caught), catch proportion, and selling price or utilization

Trash fish species	% of total catch amount in each trip	Average catch amount (kg/trip)	Average selling price or utilization (THB/kg)
1.			
2.			
3.			

Q24. After hauling, how did you handle and preserve your product during transportation, landing or selling at fishing pier?

_____
_____
_____
_____

Q25. Where did you sell your trawl catches (please enter a "1", "2", or "3", where "1" is the place where the catch is most frequently sold catch to)

____1**.** Landing place/fishing pier
Name_____Subdistrict_____District_____Province_____

Landing place/fishing pier
Name_____Subdistrict_____District_____Province_____

___ 2. Selling by yourself at market name _____ Subdistrict_____
District_____Province_____

____ 3. Others (Specify) _____

Q26. What were the purposes of the buyers who bought your catches? (please enter a "1", "2", "3", or "4" where "1" is the most frequent purpose of the catch)

____ 1.Send to cold storage factory
____2. Send to processing plant (select multiple, if applicable)
( ) 1. Fish meal plant
( ) 2. Canned fish factory
( ) 3. Fish sauce plant
( ) 4. Others specify) _____
____ 3. Making processing product by yourself (specify) _____
____ 4. Others (specify): _____

Q27. Number of workers hired for trawl fisheries (on board working): Total number of workers _____person/trip. Comprising of

Q27.1 Sex: Male_____ persons and Female_____ persons

Q27.2 Nationality: Thai_____ persons and Foreigner _____persons

Q27.3 Type of worker: Permanent: _____persons and Temporary _____persons
Q27.4 Numbers of captain:_____ persons and Other workers _____persons

Q28. Salary of workers hired for trawl fisheries (on board working)

Q28.1 Salary for captain _____THB/month and % from selling product ____%

Q28.2 Salary (average) for other workers working on board _THB/month /person

Q29. Number of workers hired for trawl fisheries (working on land): Total number of workers _____person/trip (excluded workers on board in Q27). Comprising of

Q29.1 Sex: Male_____ persons and Female_____ persons

Q29.2 Nationality: Thai_____ persons and Foreigner _____persons

Q29.3 Type of worker: Permanent: _____persons and Temporary _____persons

Q30. Salary of workers hired for trawl fisheries (working on land)
_____THB/month/person

Q31. Fuel cost (in total) _____THB/trip

Estimated from: Total quantity fuel used_ litre/trip and the fuel price_ THB /litre

Q32. Ice cost _____THB/trip

Estimated from: Total quantity of ice used _____kg/trip, Ice price_____ THB/kg Note: one buck of ice is about 80 kg, or 1 ton of ice equal to 1,000 kg.

Q33. What was the highest cost of your trawl fisheries? _____

This cost was estimated as how many % of the total cost _____

Q34. Average income per trip from trawl fisheries _____THB/trip (income before deducting expense)

Q35. In the past 12 months, please compare between income and cost of your trawl fisheries.

( ) 1. Income more than cost

( ) 2. Income equal to cost (not much different)

( ) 3. Income less than cost

Q36. In the past 12 months, please indicate your level of satisfaction on the benefit returned from your trawl fisheries

( ) 0. Not satisfied ( ) 1.Slightly satisfied

( ) 2. Moderately satisfied ( ) 3. Highly satisfied

Part 2 Perception and attitude of the respondent (Q37-Q51)

Q37. Perception on fisheries resource condition:

How would you describe current fisheries resource condition in your main fishing ground? (Condition scale*: 1=to very bad, 2=bad, 3=not good not bad, 4=good, 5= very good)

Type of resources	Resource condition scale* (1-5)	Explanation for condition specified
Fish		
Shrimp		
Acetes shrimp		
Crab		
Cephalopod		
Shell/clam		
Others: specify		

Q38. Perceived threats to fisheries resource

What are the top 3 major threats to the health of fisheries resources (negative impact) in your main fishing ground? Please enter a “1”, “2”, and “3” in front of the perceived threats

____ 1. Marine pollution
____ 2. Increase in number of fishers /fishing gear increase
____ 3. Illegal fishing
____ 4. Natural disaster (specify) _____
____ 5. Other (specify) _____

Q39 Awareness of regulations and laws related to trawl fisheries:

Do you know about any regulations and laws related to trawl fisheries in your main fishing ground?

( ) 0. No ( ) 1. Yes

Q40. Compliance:

On a scale of 1 to 5 (1=no compliance, 5=full compliance), to what extent do most trawl fishers comply with trawl fisheries regulations and laws?

Scale: _____ reason for specified scale:_____

Q41. Enforcement

On a scale of 1 to 5 (1=no enforcement, 5=full enforcement), to what extent are the trawl fisheries regulations and laws enforced?

Scale: _____ reason for specified scale:_____

Q42. Participation in decision making:

On a scale of 1 to 5 (1=no participation, 5=full active participation), to what extent do you participate in trawl fisheries management decision-making?

Scale: _____ reason for specified scale:_____

Q43. Membership of stakeholder organizations managing trawl fisheries:

Is someone from your household a member of stakeholder organization managing trawl fisheries?

( ) 0. No ( ) 1. Yes, specify organization: _____

Q44. Perceived trawl fisheries management problems:

In the past, what do you see as the two major problems facing trawl fisheries management?

1._____; 2._____

Q45. Perceived trawl fisheries management solutions:

What do you see as solutions to the problems indicated in Q44?

1._____; 2._____

Q46. Success in trawl fisheries management:

In the past, what two things do you think have worked well and provided benefits to trawl fisheries management?

1._____; 2._____

Q47. Challenges in trawl fisheries management:

In the future, what are the two challenges in trawl fisheries management that have to be conducted for sustainable management?

1._____; 2._____

Q48. Based on the conceptual idea, which is "the enlargement of the cod end mesh size of trawl will help to conserve fisheries resources and to sustain trawl fisheries management", do you agree with the measure of enlargement of codend mesh size of trawl net measures? (write √ representing your opinion and specify the reason) (select only 1 choice)

( ) 1 = Strongly disagreed: Why? _____

( ) 2 = Disagreed: Why? _____

( ) 3 = No idea: Why? _____

( ) 4 = Agreed: Why?_____

( ) 5 = Strongly agreed: Why?_____

Q49. If you agree with the conceptual idea in Q48 (selected choice number 4 or 5 in Q48), what is the suitable mesh size of the cod end of trawl net (cm)?

Suitable mesh size of the cod end of trawl net _____cm.

Q50. Do you think that you can continue with current trawl fishing activities forever?

( ) 0. No Why?._____

If you could not continue trawl fishing, what alternative job will you do? (specify alternative job)_____

( ) 1. Yes, Why?_____

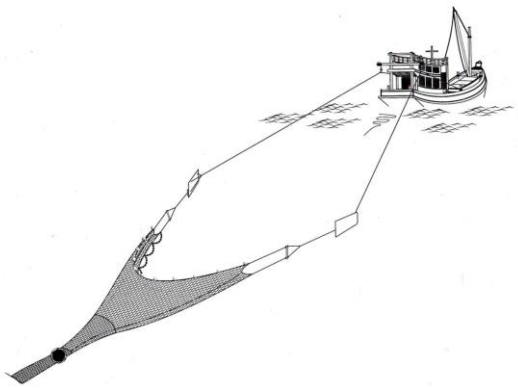
Q51. Other comments and recommendations for trawl fisheries management

_____

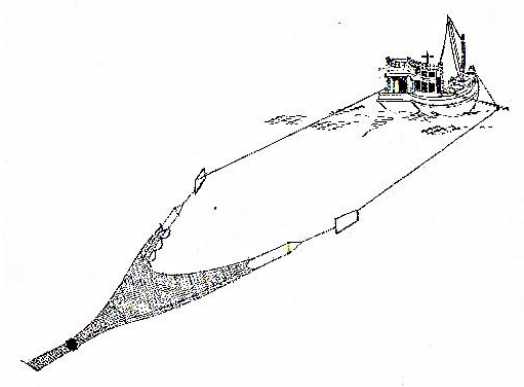
_____

_____

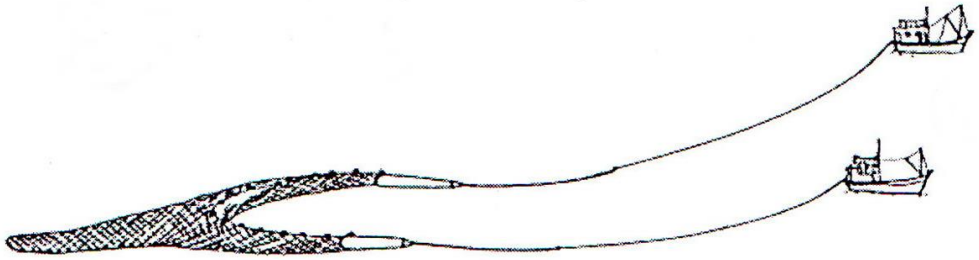
Appendix II Types of trawl fisheries



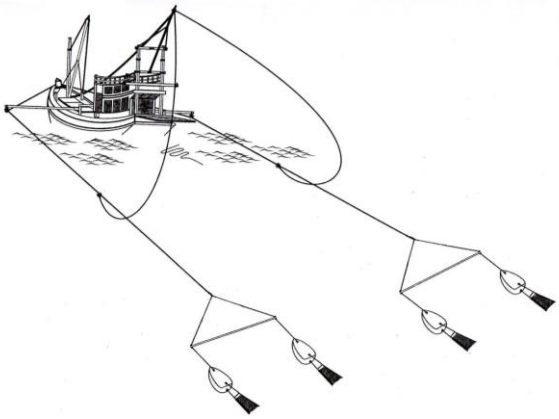
Otter board trawl (OBT)



Otter board with boom trawl (OBBT)



Pair trawl (PT)



Beam trawl (BT)

Figures adapted from SEAFDEC (2004) by Noranarttragoon (2014).

Appendix III Total landing of marine fish by landing place in quantity (Tonnes) and value (1 000 THB) in year 2006 – 2011.

		Prachuap Khiri Khan		Chumphon	
		Mueang	Hua-Hin/Pranburi	Mueang	Lang-Suan
2006	Quantity	52 922	7 156	40 800	4 624
	Value	930 153	99 972	524 847	73 266
2007	Quantity	64 417	5 219	39 009	4 551
	Value	1 021 192	82 750	542 882	80 432
2008	Quantity	41 996	4 436	32 814	4 407
	Value	741 429	73 130	444 832	56 299
2009	Quantity	41 571	4 456	37 667	5 024
	Value	666 357	68 940	520 785	74 082
2010	Quantity	37 310	5 512	47 800	4 975
	Value	546 265	71 606	634 482	81 732
2011	Quantity	53 684	6 085	53 339	6 766
	Value	930 514	68 782	805 913	119 772

Source: DOF. 2013c. Statistics of Marine Fish at Landing Place 2011 (No. 12/2013). Fishery Statistics Analysis and Research Group, Information Technology Center, DOF, Bangkok, Thailand. 32 pages

Appendix IV Interview Schedule: Socioeconomic Status of Fishers in Trat Province, Thailand

Questionnaire ID: _____

( ) 1. Small-scale fishery household: using fishing boat of not more than 10 m. in length

( ) 2. Medium to large-scale fishery household: using fishing boat of more than 10 m. in length

Name of respondent: Name of interviewer:

Tel. no. of respondent (if applicable): Date of interview:

Address of respondent:

Section 1: Household demographics (Q1-Q10)

Q1. Gender: ( ) 1. Male ( ) 2. Female

Q2. Age: _____ years

Q3. Religion:

( ) 1. Buddhism ( ) 2. Islam ( ) 3. Others, specify_____

Q4. Education:

( ) 1. None ( ) 2. Primary school ( ) 3. Secondary school (1-3)

( ) 4. Secondary school (4-6) ( ) 5. University ( ) 6. Others:_____

Q5. Family members (including respondent):

Total: _____ persons (Male:_____; Female:_____)

Q6. Family members who engaged in fishing activities (including respondent):

Total: _____ persons (Male:_____; Female:_____)

Q7. Occupations of household members (more than one answer if applicable)

( ) 1. Fisheries (specify fishing gears used, more than one answer if applicable, no.1 is fishing gears used more often

1) _____ 2)_____3) _____

4) _____ 5)_____6) _____

( ) 2. Aquaculture, specify main species cultured:_____

( ) 3. Business, specify: _____

( ) 4. Wage earner, specify: _____

( ) 5. Others, specify: _____

Q8.From Q7, what occupation did your household spend most time on it?_____

Q9. Relation to the boat owner

( ) 1. Owner ( ) 2. Family members or relatives of boat owner

( ) 3. Employee (on board work) ( ) 4. Captain

( ) 5. Others (Specify) _____

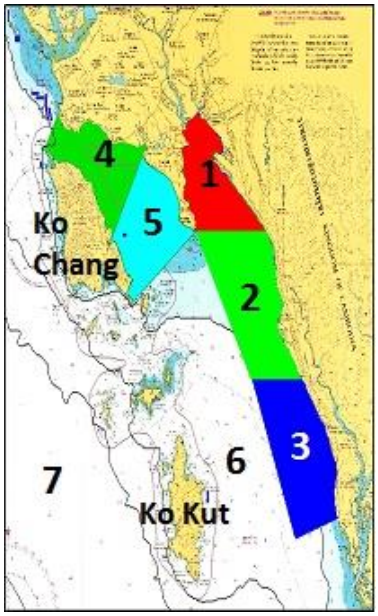
Q10. Have you or your household members ever participated in a meeting or listening to information related to fishery management measure in Trat?

( ) 0. No ( ) 1. Yes

Section 2: Fishing activities, catch amount, income and cost of fishing activities in the last year (Q11-Q29)

Q11. What types of fishing gears did your household use? When did your household use them and in which zones (see fishing zones in map below), please write the number of fishing zone in the calendar below in the appropriate month

Fishing gears	Fishing periods in which fishing zone, specify the number of zone (SEE MAP BELOW, 8=other zones)												Months/ year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
e.g., mullet gill net	8 Chantaburi	8	8	4,5	4	4	4			1,2	1,2	1,2	10
1.													
2.													
3.													
4.													
5.													



Q11.1. For other zones, please write no. 8 and specify the name of area e.g., district, province, country (e.g., 8 = Laemsing District, Chantaburi) Other zones

Other zone No. 8:

_____

_____

_____

_____

_____

Q12. From Q11, please specify your main fishing area, secondary fishing area of your household

Main fishing area (specify fishing zone no. 1-8, multiple answers if applicable): _____

Secondary fishing area (specify fishing zone no. 1-8, multiple answers if applicable): ___

Q13. How did your family select the fishing area (any techniques?)

_____

Q14. From Q11, Total number of months fishing undertaken by your household____(month/year)

Q14.1 **Why don't you do fishing in some months? (see calendar)**

_____

Q14.2**What did you do in those months when you did not do fishing?**(see calendar)

_____

Q15. Numbers of fishing days of your household in average_____ days/month

Q16-23: Three types of fishing gears, number of fishing gear used per trip, fishing effort, species caught by each fishing gear, total catch amount, household consumption , income by each fishing gear, Market orientation

Q16. Three types of fishing gears mainly used	Q17. No. of fishing gears used per trip	Q18. Fishing effort (by each type fishing gear)			Q19. Species caught by each fishing gear (specify % of total caught a day and sell price of each species (THB)	Q20. Total catch amount by each type of fishing gear (kg/day)	Q21. Household consumption (% of total amount caught a day)	Q22. Average income by each fishing gear (THB/day)	Q23. Market orientation 1= Sale at fishing port, specify:_____ 2= Sale at market, specify:___ 3= Sale at house/village to middleman, 4= Sale to other sources, specify:___
		(hours/ trip)	(trips/ day)	(days/ month)					
					1st: _____ (__ %) (_____ THB/kg) 2nd : _____ (__ %) (_____ THB/kg) 3rd : _____ (__ %) (_____ THB/kg) Other species: _____				
					1st: _____ (__ %) (_____ THB/kg) 2nd : _____ (__ %) (_____ THB/kg) 3rd : _____ (__ %) (_____ THB/kg) Other species: _____				
					1st: _____ (__ %) (_____ THB/kg) 2nd : _____ (__ %) (_____ THB/kg) 3rd : _____ (__ %) (_____ THB/kg) Other species: _____ _____				

Q24. How much is your household's income (in average from all types of fishing gears before deducting the cost) ? _____THB/day

Q25 Fixed cost

Items	Size (m. or hw)	Amount (units)	Price per unit (THB)	Useful life (years)	Cost of repair: (THB/year)
Q25.1 Boat:					
Boat type:_____	……m.				
Boat engine:_____	…….HP				
Boat type:_____	……m.				
Boat engine:_____	…….HP				
Q25.2 Three types of fishing gears mainly used:					
1)_____ License cost:_____ (THB/year)	W*L*H ……m.				
2)_____ License cost:_____ (THB/year)	W*L*H ……m.				
3)_____ License cost:_____ (THB/year)	W*L*H ……m.				

Q26. Operational cost

Items	Amount (units/day)	Price per unit (THB/unit)	Total cost (THB/year) (if applicable)
Q26.1 Type of fishing gears: 1) _____			
Petrol for boat	_____(litre/day)	_____(THB/L)	
Labour (hh members)	_____(person/day)		
Labour cost	_____(person/day)	_____(THB/person/day)	
…….Bait:_____	_____(Kg/day)	_____(THB/kg)	
Ice	_____(Kg/day)	_____(THB/kg)	
…….Other costs:___	_____(THB/day)		
Q26.2 Type of fishing gears: 2) _____			
Petrol for boat	_____(litre/day)	_____(THB/L)	
Labour (hh members)	_____(person/day)		
Labour cost	_____(person/day)	_____(THB/person/day)	
…….Bait:_____	_____(Kg/day)	_____(THB/kg)	
Ice	_____(Kg/day)	_____(THB/kg)	
…….Other costs:___	_____(THB/day)		
Q26.3 Type of fishing gears: 3) _____			
Petrol for boat	_____(litre/day)	_____(THB/L)	
Labour (hh members)	_____(person/day)		
Labour cost	_____(person/day)	_____(THB/person/day)	
…….Bait:_____	_____(Kg/day)	_____(THB/kg)	
Ice	_____(Kg/day)	_____(THB/kg)	
…….Other costs:___	_____(THB/day)		

Q27. What was the highest cost of your household's fisheries? _____

This cost was estimated as how many **% of the total cost** _____

Q28. In the past 12 months, please compare between income and cost of your household's fisheries.

( ) 1. Income more than cost ( ) 2. Income equal to cost (not much different)

( ) 3. Income less than cost

Q29. In the past 12 months, please indicate your level of satisfaction on the benefit returned from your household's fisheries

( ) 0. Not satisfied ( ) 1.Slightly satisfied

( ) 2. Moderately satisfied ( ) 3. Highly satisfied

Section 3. Attitudes and perceptions (Q30-Q44)

Q30. Perceptions of fisheries resource conditions:

How would you describe current fisheries resource conditions in Trat?
(Condition scale*: 1=to very bad, 2=bad, 3=not good not bad, 4=good,)5= very good)

Types of resources	Resource condition scale* (1-5)	More specific info:
Fish		
Shrimp		
Acetes shrimp		
Crab		
Cephalopod		
Shell		
Others: specify_____		

Q31. Perceived threats to fisheries resource

What are the top 3 major threats to the health of fisheries resources (negative impact) in your main fishing ground? Please enter a "1", "2", and "3" in front of the perceived threats

____ 1. Marine pollution
____ 2. Increase in number of fishers /fishing gear increase
____ 3. Illegal fishing
____ 4. Natural disaster (specify) _____
____ 5. Other (specify) _____

Q32 Awareness of regulations and laws related to fisheries in Trat:

Do you know about any regulations and laws related to fisheries in your main fishing ground? ( ) 0. No ( ) 1. Yes

Q33. Compliance:

On a scale of 1 to 5, to what extent do most fishers comply with fisheries regulations and laws in Trat?

( ) 1. No compliance ( ) 2. Low compliance
( ) 3. Moderate compliance ( ) 4. High compliance
( ) 5. Full compliance

Reasons: _____

Q34. Enforcement:

On a scale of 1 to 5, to what extent are the rules and regulations enforced in Trat?

( ) 1. No enforcement ( ) 2. Low enforcement

( ) 3. Moderate enforcement ( ) 4. High enforcement

( ) 5. Full enforcement

Reasons: _____

Q35. Participation in decision making:

On a scale of 1 to 5, to what extent do you participate in fisheries management decision-making in Trat?

( ) 1. No participation ( ) 2. Low participation

( ) 3. Moderate participation ( ) 4. High participation

( ) 5. Full participation

Reasons: _____

Q36. Membership in stakeholder organizations:

Are you or someone from your household a member of stakeholder organization?

( ) 0. No ( ) 1. Yes, which organization?: _____

Q37. Perceived fisheries management problems:

Aside from threats, what do you see as the two major problems facing fisheries management in Trat?

1._____; 2._____

Q38. Perceived fisheries management solutions:

From Q37, what do you see as solutions to these problems?

1._____; 2._____

Q39. Success in fisheries management:

What two things do you think have worked well for fisheries management Trat?

1._____; 2._____

Q40. Challenges in fisheries management:

What two things do you think have not worked well for fisheries management in Trat?

1._____; 2._____

Q41. Fishery management options in Trat:

Indicate degree of agreement with the following fishery management options
(1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree)

Measures/options for fisheries management in Trat* (see map of fishing zone above)	Disagreement/Agreement Level					Reasons
	1	2	3	4	5	
1. No fishing in zone 1, 2, and 3 permanently						
2. No fishing in zone 1, 2, and 3 in some seasons						
3. No fishing in zone 1 and 2 permanently to conserve *Rastreliger brachysoma*, endangered species e.g., dolphin, and mangroves						
4. No fishing in zone 1 and 2 in some seasons (Alternate with opened-closed seasons between zone 1 and zone 2)						
5. No use of some fishing gears in zone 2 and zone 3 in May - Oct to conserve *Rastreliger brachysoma*, swimming crab, and short-necked clam						
6. *Rastreliger brachysoma*: No fishing in spawning season in zone 3 in Feb-May to conserve *Rastreliger brachysoma*						
7. *Rastreliger brachysoma*: No use of any fishing gears having net mesh size smaller than 4.5 cm. in Mar-May to conserve *Rastreliger brachysoma*						
8. Dolphin: Promote of dolphin watching tourism in Trat						
9. Fish larvae: Publicity campaign for no take fish larvae						
10. Sea turtle: reserved feeding and spawning area for sea turtle						
11. Sea grass: Reserve existing area and new planting for suitable species						
12. Promote more and maintain crab bank project						
13. Squid eggs: Promote squid egg hatching bank by training fishery community and establish squid egg bank						
14. Mussel: Increase area for mussel culture in allowed areas, and placed artificial reef in the areas not allow						

*Option 2-14 was proposed by fishers during the first stakeholder meeting organized by Rebyc II-CTI Project on 29 Oct 2013. Option 1 was proposed by the researcher to observe the responses.

Q42. Apart from the fishery management options in Trat in Q41, do you have any management options to propose?

( ) 0. No.

( ) 1. Yes, specify:

_____

_____

Q43.Do you think that you can continue with current fishing activities in Trat forever?

( ) 0. No Why?._____

If you could not continue fishing, what alternative job will you do? (specify alternative job)_____

( ) 1. Yes, Why?_____

Q44. Other comments and recommendations for fisheries management in Trat

_____

_____

_____

_____

Thank you for your cooperation

Appendix V Total landing of marine fish by landing place in quantity (tonnes) and value (THB 1 000) in Trat Province in year 2006 – 2011

		Mueang Trat	Klong Yai	Laem Ngop
2006	Quantity	13 040	36 180	25 894
	Value	174 092	417 525	185 125
2007	Quantity	11 566	31 462	20 193
	Value	154 787	367 557	163 086
2008	Quantity	12 011	29 885	18 864
	Value	171 918	344 698	154 519
2009	Quantity	12 285	35 713	20 559
	Value	189 909	432 139	183 527
2010	Quantity	10 263	31 790	25 325
	Value	171 591	479 656	326 630
2011	Quantity	10 625	34 208	23 317
	Value	170 331	582 629	284 919

Source: DOF 2013c. Statistics of Marine Fish at Landing Place 2011 (No. 12/2013). Fishery Statistics Analysis and Research Group, Information Technology Center, DOF, Bangkok, Thailand. 32 pages