Large Cast Net and Anchovy Falling Net Fisheries to Community Based Economic Development : Survey in

Pakklong Sub-district, Pathew District, Chumporn Province

Training Department
Southeast Asian Fisheries Development Center

Department of Fisheries
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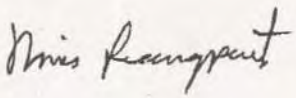
FORWORD

Under ASEAN-SEAFDEC Fisheries Consultative Group (FCG) Scheme, Thailand acts as the lead country among ASEAN member countries and the Training Department (TD)acts as lead department of SEAFDEC to implement coastal resource management program. This program is mainly supported by Japanese Trust Funds.

Under the coastal resource management program, TD and Department of Fisheries (DOF), Thailand collaborated in fomulating and planning the collaborative coastal fisheries management project. An aim of the collaborative project is to promote and achieve sustainable use of resource utilization. TD and the DOF, Thailand agree to transfer essence of technologies, accumulated knowledge and lesson learned, which gain through the implementation of coastal fisheries management project to other SEAFDEC member countries through the SEAFDEC's information mechanism. This information may help ASEAN-SEAFDEC member countries to re-consider their own policies and formulate new direction for cost-effectiveness of coastal fisheries resource management plan and implementation.



Niwes Ruangpanit
Secretary-General

PREFACE

The project staff of the Locally Based Coastal Fisheries Management Project in Pathew District (LBCFM-PD), Chumporn Province recognizes that large cast net and anchovy falling net fishing gears play an important role to develop fisheries economic sectors of Pakklong Sub-District. These fishing gear operations have controversy that they return high incentive to fishers in short-term of resource utilization, but whether they sustain an incentive to fishers in long term of resource uses.

Thus, the project staff gives top priority to make a survey on large cast net and anchovy falling net fishing gears to clarify roles and characteristics of these two types of fishing gear how they utilize target aquatic resources, how yield products are marketed and distributed and particular how many stakeholders involve in these kinds of fishing gears to encourage community-based economic development. The results of the survey are fundamental information that may help stakeholders who concern and local government officers to receive a similar common understanding of large cast net and anchovy falling net's features and importance. Then, local government officers and related stakeholders participate in compromising definition of solution and action plan to reach all resource users and stakeholders' interests.

P. Suanrattanachai and Co-authors

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The Project's employee

Mr. Sirisak Sae-Jeah	The project's employee

And to all people who directly and indirectly have helped us to complete this paper.

SEFADEC/TD and CMDEC

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Abstract

Large cast net and anchovy falling net fishing gears are developed and innovative technologies of fishing gears. These gears are more effective than traditional fishing gear types to catch a large volume of squid and anchovy yields. Objectives of large cast net and anchovy falling net fisheries survey are to characterize feature of community-based economic development of Pakklong Sub-District and to identify categories of large cast net and anchovy falling net operations, resource base utiliztion investment and needs. The surveyed results of three target villages, where are of Ban Thungmaha (Moo1), Ban Thumthong (Moo 3) and Ban Bonrai (Moo 6), are categorized into four types. Type 1 is fishers engage in traditional fishing gear and large cast net. Type 2 is fishers employ in traditional fishing gear and large cast net and anchovy falling net. Type is fishers occupy in large cast net and anchovy falling net. Type 4 is fishers engage in large cast net only. Length of fishing boats, which exists at the target villages, are 6-9m and 10-12m. These sizes are defined that fishers engage in four types of boat length are small-scale fishers when compares boat length with categories of boat length defined by the National Statistic Office. Dried squid and dried anchovy products are sold to patronage local fish traders both living inside and outside village. These results of the survey are fundamental information to contribute provincial fisheries officers and all stakeholders to make a plan for alleviating severe conflict of interests among resource users in Pakklong Sub-District.

Keyword: Large cast net, anchovy falling net, community-based economic development, length of boat, conflict of interests

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Large Cast Net and Anchovy Falling Net Fisheries to Community Based Economic Development: Survey in Pakklong Sub-district, Pathew District, Chumporn Province

I. Introduction

The collaborative project between SEAFDEC/Training Department and Department of Fisheries (DOF), Thailand entitles 'Locally Based Coastal Fisheries Management in Pathew District, Chumporn Province'started in October 2001. Seven villages of Pakklong Sub-district are target villages of the project site in Pathew District (see Figure 1). Particular fisheries sector and its development are placed an emphasis on how its role performs in community-based economic development.

Large cast net and anchovy falling net fishing gears are developed and innovative techonologies of fishing gear, which can effectively catch a large volume of squid and anchovy product. Fishers gain higher incentive, which come from these fishing gear operation, compare to other traditional fishing gears. Dried squid and dried anchovy processing and handling processes increase alternative job opportunity to local fishers and others in fishing community. This results to economic status of a fishing community develop and actively progress.

However, high competition of resource utilization occurs among resource users and limit of the two target species lead to conflict of interest particular large cast net, anchovy falling, anchovy purse sienes and small-scale fishers. This cause also find out at fishing communities in Tambol Pakklong (Pakklong Sub-district), Pathew District, Chumporn Province.

Result of pre-survey conducted at Tambol Pakklong, in January 2002, showed that fishers were 38% of Moo1, 36% of Moo 3 and 25% of Moo 6 engaged in large cast net and anchovy falling nets (see Table 1, Suanrattanachai and et.al.2002). These numbers are higher than other types of engagement in fisheries sector, so large cast net and anchovy falling nets are assumed as an important fishing operations to develop community economics. LBCFM-PD project staff priors this operation is on the top of priority to collect socio-economic data of large cast net and anchovy falling net fishers and their capacities. Large cast net and anchovy falling nets survey is to characterize feature of community-based economic development in Tambol Pakklong. Therefore, this survey is to identify categories of large cast net and anchovy falling net operations, resource base utilization, products, investment, needs and common problems of these types of engagements.

Table 1 Main Types of Employing Fishing Gear at a Target Village, Pathew District

%

Village(No.-Moo)	Large cast net	Indo-Pacific mackerel gill net	Crab gill net	Mullet gill net	Anchovy falling net	Shrimp trammel net
Ban Thungmaha(Moo1)	38	19				
Ban Bosamrong(Moo2)			32	32		
Ban Thumthong(Moo3)	36				18	
Ban Nampoo(Moo5)		25				25
Ban Bonrai(Moo6)	25	25				
Ban Tha-at(Moo7)		28				23

Remark: % of counting fishing gear units in own village

Source: Result of Pre-survey on 8-11 January 2002, Pakklong Sub-district, Pathew District, Chumporn Province

Figure 1 **Location of Coastal Area of Pakklong Sub-Disrtrict, Pathew District, Chumporn Province Attached with the Demarcation of the LBCFM-PD Peoject Site.**

This survey does not emphasize on figure of fishers' income or net income gain from large cast net and/ or anchovy falling net fisheries. This survey would characterize how these two main fishing gears involve in fishing community economic development, how fishers progress their engagement and particular in numbers of fishing efforts employ in these sectors.

Result of this survey is vital information to contribute provincial fisheries officers, local organization and all stakeholders to alleviate severe conflict between small-scale fishers and large cast net and anchovy falling net fishers and including anchovy purse seiners. Clarification of fishing ground areas and utilization is an important parameter to pin point how to solve this conflict to compromise and achieve each resource users and stakeholders' interests. The survey results are expected to give a clear feature to guide community leader, local people's organization, local government agencies and other stakeholders to formulate fisheries management plan for their own community.

This article would describe characteristics of large cast net and anchovy falling net based on the result of the survey. The result is calculated in to percentage. The explanation of each parameters and result would describe combining with further information, which gets from respondents' knowledge, experience, comment and recommendation.

II. Objectives of the Survey

1) To identify categories of large cast net and anchovy falling net fishers.

2) To assess capacity of large cast net and anchovy falling net fishers to utilize resource and develop community economics.

3) To identify feature of product distribution, expenditure of fishing operation and accessible source of credit

III. Methodology of Conducting the Survey and Data Analysis

1) Design questionnaire of conducting large cast net and anchovy falling net fishers survey which considers scope of the survey objectives

2) Numbers of sampled respondents vary from village to village to collect reasonable sampled size for each targeted village. Table 2 (Department of Community Development, 1995) shows number of fishing households which are ideal number of sampled respondents and real number of sampled respondents of Moo 1, Moo 3 and Moo 6

3) Process data by calculating the raw data into percentage of total data and average number of the total data

4) Result of data analysis will illustrate by tabulation

IV. Result of the Survey

Part I: General Information

The survey was on the subject of general information of lagre cast net and anchovy falling net fishers focused on eduactional level and fishers' participation in people's group. The result of educational level is crucial information to assess literacy capacity building of local fishers. This information is useful to extension officer to arrange a proper extension program to local fishers. Fishers' participation in people' s group emphasizes on group's member status. Group's member status is strategic to pin point fishers' interest that put fishers to frequently participate in the group's activity and do on duty of group's member.

Table 2 Numbers of Fishing Households and Respondents for Large Cast Net and Anchovy Falling Net Survey

Households

Type of Number	Ban Thungmaha (Moo 1)	Ban Thumthong (Moo 3)	Ban Bonrai (Moo 6)
Number of Fishing household	94	25	20
Percentage of Sampling (%)	32	60	40
Ideal Number of Sampled respondents	30	15	8
Real Number of Sampled respondents	31	11	11

Source: Statistical data of Department of Community Development, Ministry of Interior, 1995

Large cast net and anchovy falling net fishers mostly finished at primary school level. 81 % of Ban Thungmaha (Moo 1), 82% of Ban Thumthong (Moo3) and 73% of Ban Bonrai (Moo 6) graduated primary school level (Table 3). 9% of Ban Thumthong and Ban Bonrai were illiteracy, because they did not attend at school. This might cause by far distance between school and home when they were young. Other reason was problem of poverty of the household that could not afford to contribute children to go to school. Percentage of fishers' illiteracy is information to remind the project staff should arrange series of simple type of media to fishers for easily getting information of the project.

Table 3 Educational Level of Large Cast Net and Anchovy Falling Net Fishers

Village	Primary School	Junior School	High School	College	Not Attend
Ban Thungmaha	81	13	3	3	
Ban Thumthong	82	9			9
Ban Bonrai	73	18			9

Remark: % of Total sampled of a village

Large cast net and anchovy falling net fishers are member of people' group at their own village. Fishers are of Ban Thumthong (Moo 3), Ban Bonrai (Moo 6) and Ban Thungmaha (Moo 1), which are 100%, 73% and 61% as member of people' group, respectively (Table 4). However, members of sampled fishing household are not member of people' group. 100% of Ban Thumthong (Moo 3), 82% of Ban Bonrai (Moo 6) and 61% of Ban Thungmaha (Moo 1) are members of sampled fishing household who are not member of people' group.

Table 4 Participation in People's group as a Member

Village	Respondent		Respondent's family member	
	Member	Not member	Member	Not member
Ban Thungmaha	61	39	39	61
Ban Thumthong	100	0	0	100
Ban Bonrai	73	27	18	82

Remark: % of Total sampled of a village

Part II Fisheries Sector

Term of Reference of Fishing Gear:

Traditional fishing gear: type of fishing gears are gill net, drift gill net, hand line, beach seine, trap, etc. which operate with small fishing boat (Marine Fisheries Division, 1997, pp.12, see Picture 1)

Large cast net: large sized cast net is rectangle shape. The operation of this gear has to use machine to cast the target species, which are Indian squids (*Loligo duvauceli*). This gear normally operates with luring light tubes. Manpower of this gear operation is 2-6 person (Marine Fisheries Division, 1997 pp. 7, see Picture 2)

Anchovy falling net: this gear is frequently found out on the large cast net fishing boat. But the mesh size of this gear is smaller than mesh size of large cast net. Boat skipper is main person to decide when he should operate large cast net or anchovy falling net which depends upon stock of aquatic resource he finds out at that time. Anchovy falling net also operates with luring light tubes. At recent, this fishing gear is very popular to effectively exploit anchovy stock (Marine Fisheries Division, 1997 pp.70, see Picture 3)

1. Categories of Large cast net and anchovy falling net Fishers

Large cast net and anchovy falling net fishers are categorized into four types (See Table 5). Four categories are fishers who engage in traditional fishing gear and large cast net (Type 1), traditional fishing gear and large cast net and anchovy falling net (Type 2), large cast net and anchovy falling net (Type 3) and large cast net only (Type 4).

Table 5 Categories of Large Cast Net and Anchovy Falling Net Fishers at Moo 1,3, 6, Pakklong Sub-District

%

Village	Traditional gear & large cast net (Type 1)	Traditional gear & large cast net and anchovy falling net (Type 2)	Large cast net and anchovy falling net (Type 3)	Large cast net (Type 4)	Total
Ban Thungmaha	32	16	23	29	100
Ban Thumthong	0	18	55	27	100
Ban Bonrai	18	0	36	45	99

Remark: % of Total sampled of a village

Picture 1 Traditional Fishing Gear
(Left: Blue swimming crab gill net, Right: Indo-pacific encycling gill net)

Picture 2 Large Cast Net Fishing Gear

Picture 3 Large Cast Net and Anchovy Falling Net Fishing Gear

Type 1 means a fisher has mostly started to engage in traditional fishing gear and expanded his engagement in large cast net when he observe that his neighborhood gains high incentive from large cast net. Therefore, he gets deficient cost-effectiveness of traditional fishing gear to earn income enough to take care of his family. Then he expands investing more in large cast net which is a bit higher technology and more efficient than traditional fishing gear.

Type 2 means a fisher engages in large cast net and anchovy falling net which normally carries out these two gears at the same night, which depends up on abundant stock of squid and/or anchovy. This fisher firstly shoot large cast net or anchovy falling net for sampling volume of squid and /or anchovy to decide which gear should be operated on that night. He uses traditional fishing gear when he cannot operate large cast net and anchovy falling net particularly when lunar circle is lightening.

Type 3 means a fisher employs in large cast net and anchovy falling net. He carries out these two gears to the sea and decide to operate by sampling volume of squid and/or anchovy. He sometimes uses squid jig when lunar circle is lightening.

Type 4 means a fisher invests in large cast net only. Some fisher stops using traditional fishing because of low incentive. He gives a reason why he does not engage in anchovy falling net because he does not have enough money to invest in this type of fishing gear.

Ban Thungmaha (Moo 1) has Type 1, which is about 32% of total respondents at Moo 1. Type 4 is second-ranked operation that has 29% of total respondents at Moo 1. Type 3 and Type 4 are first-ranked and second-ranked operation which are 55% and 27% of total respondents at Ban Thumthong (Moo 3) engaging, respectively. Fishers are at Moo 6, they prefer employing Type 4 and Type 3. 45% and 36 % of total respondents at Moo 6 employ in Type 4 and Type 3, respectively.

Type 1 to Type 4 are fundamental information that roughly gives assessment of household economic status, which observe from type of fishing gear investment and catch products. Increase or decrease of each type can indicate how aquatic resources particular squids and anchovy are utilized

2. Change of Fishers' Motivation in Type of Fisheries Engagement

Change of fishers' motivation in type of fisheries engagement is informative data to help forecasting what species are utilized. A stop and start of type of fishing gear engagement is supportive information that confirms the target species are important to a change of fisheries economic development.

Table 6 shows change of fishers' motivation in fisheries engagement. 19.35% and 9.68% of total respondents at Ban Thungmaha (Moo1) continually engage in traditional fishing gear and large cast net (Type 1) and traditional fishing gear and large cast net and anchovy falling net (Type 2) up to present time, respectively. 16.13% of total Moo1 respondents stop engaging in traditional fishing gear, employ only in large cast net. 29.03% and 25.81% of total Moo1 respondents directly engage in large cast net (Type 4) and large cast net and anchovy falling net (Type 3).

54.55% of total Ban Thumthong (Moo 3) respondents fully stop traditional fishing gear, they only employ in large cast net and anchovy falling net. 45.45% and 36.36% of total Moo 6 respondents directly start to engage in large cast net and large cast net and anchovy falling net, respectively.

Table 6 Change of Fishers' Motivation in Fisheries Engagement

Village	Traditional fishing gear and large cast net (Type 1)	Traditional fishing gear and large cast and anchovy falling net (Type 2)	Large cast net and anchovy falling net (Type 3)		Large cast net (Type 4)	
			Stop traditional fishing gear	Directly start	Stop traditional fishing gear	Directly start
Ban Thungmaha (Moo 1)	19.35	9.68	0	25.81	16.13	29.03
Ban Thumthong (Moo 3)	0	0	54.55	18.18	0	27.27
Ban Bonrai (Moo 6)	18.18	0	0	36.36	0	45.45

Remark: % of Total sampled of a village

Some of respondents gave reason why they stopped using traditional fishing gear. He cited that he did not gain reasonable incentive when he operated traditional fishing gear. This was because high competition in fishing boats and crowed fishers and low fish product price. He invested and operated large cast net and or anchovy cast net gear and so far gained higher incentive than incentive came from traditional fishing gear. Then, he decided to stop operating traditional fishing gear.

Table 7 shows change of fisheries engagement. Each type of engagement comprises two main columns are started and present statuses. The present status attaches two sub-columns are increase and decrease of number of respondents in percentage. Type 1 illustrates that percentage of respondents engages in Type 1 trends to increase about 6% of Total respondents of Moo 1. Type 2 shows change of this percentage is at the same at Moo 1 and Moo 6, but the percentage of this increase in Ban Thumthong (Moo 3) which is 18% of Total respondents of Moo 3.

Table 7 Change of Fisheries Engagement

Village	Traditional gear & large cast net (Type 1)			Traditional gear & large cast net and anchovy falling net (Type 2)			Large cast net and anchovy falling net (Type 3)			Large cast net (Type4)			Total
	Started	Present		Started	Present		Started	Present		Started	Present		
		Increase	Decrease		Increase	Decrease		Increase	Decrease		Increase	Decrease	
Ban Thungmaha	23	6	3	3	3	3	23	0	0	32	6	0	102
Ban Thumthong	0	0	0	0	18	0	55	0	0	27	0	0	100
Ban Bonrai	9	9	0	0	0	0	27	9	0	45	0	0	99

Remark: % of Total sampled of a village

Type 3 has no any change of respondents in percentage. Type 4 shows that there is increase in 6% of Total respondents of Moo 1. There is not change in percentage of Type 4 at Ban Thumthong (Moo 3) and Moo 6. This resulted data just give rough trend which village has fishers increasingly and decreasingly in depended upon large cast net and anchovy falling net.

3. Fishers' Experience Engaged in Large Cast Net and Anchovy Falling Net

Fishers' experience in large cast net and anchovy falling net, which describes by duration of engagement, means how long fishers import these fishing technologies into their community. This also means how much they can afford to invest in each type of fishing gear.

Fishers expertise in large cast net and anchovy falling net measured by number of experience year (see Table 8). 22.5% of total Mool and 22.2% of Ban Thumthong (Moo 3) respondents and 12.5% of total Moo 6 respondents have an experience in large cast net at range of 10-20 years. Large cast net fishers, who have experience less than 5 year, are 25%, 17.5% and 16.7% of total respondents at Moo 6, Mool and Moo 3, respectively.

Table 8 Fishers' Experience in Large Cast Net and Anchovy Falling Net

Village	Large Cast Net				Anchovy Falling Net			
	<5 year	5-9 year	10-20 year	>20 year	<5 year	5-9 year	10-20 year	>20 year
Ban Thungmaha	17.5	25	22.5	10	7.5	15	2.5	0
Ban Thumthong	16.7	11.1	22.2	5.6	38.9	5.6	0	0
Ban Bonrai	25	25	12.5	6.25	6.25	25	0	0

Reamrk: % of 40 counting number of Moo 1
% of 18 counting number of Moo 3
% of 16 counting number of Moo 6

25%, 15% and 5.6% of total respondents at Moo 6, Mool and Moo 3 have experience in anchovy falling net at range of 5-9 years. 38.9%, 7.5% and 6.25% of total respondents at Moo 3, Mool and Moo 6 have experience in anchovy falling net less than 5 years. 2.5% of Moo 1 fishers have experience in anchovy falling net at range of 10-20 years. There are fishers of Moo 1, Moo3 and Moo 6 have an experience in anchovy falling net more than 20 years.

Anchovy falling net is attractive and effective fishing technology, however, its operation has controversal of selective method through length of mesh size and fishing ground areas at local and national levels.

4. Capacity of Fishing Boats

Length of fishing boat is a parameter to help assessing capacity of fishing boats, which is relevant to calculation of fishing operation expenditure and investment cost. A classification of fishing boat's length categorizes by length of fishing boat existing in the target fishing villages. Therefore, this data is vital information to design management pattern of voluntary fishing boat registration by fishers themselves in the near future.

Overall view of fishing boat, which is employing in four types of engagement at three target villages, has length of fishing boat is 6-9 m and 10-12 m (see Table 9). All of fishing boats are in-board-powered boat, which based on the survey result. Type 1 fishers of Moo 1 own fishing boat, which length is 6-9 and 10-12 m, are 9.68% and 9.68%, respectively. Type 2 fishers of Moo 1 are 9.68% used fishing boat, which has range of length is 6-9 m. 36.36% and 27.27% of Type 3 fishers at Moo 3 own fishing boat which has range of length is 6-9 and 10-12 meters, respectively. Type 4 fishers of Moo 6 are 45.45% invested in fishing boat which length is 6-9 m.

Table 9 Length of Fishing Boats by Type of Fishing Gear

Village	Traditional gear & large cast net (Type 1)				Traditional gear & large cast net and anchovy falling net (Type 2)				Large cast net and anchovy falling Net (Type 3)				Large cast net (Type 4)			
	< 6m	6-9m	10-12m	>12m	< 6m	6-9m	10-12m	>12m	< 6m	6-9m	10-12m	>12m	< 6m	6-9m	10-12m	>12m
Ban Thungmaha	0	9.68	9.68	0	0	9.68	0	0	0	6.45	9.68	9.68	3.23	25.8	16.13	0
Ban Thumthong	0	0	0	0	0	0	0	0	0	36.4	27.27	0	0	9.09	18.18	0
Ban Bonrai	0	0	0	0	0	0	0	0	0	0	27.17	9.09	0	45.5	0	0

Remark: % of Total sampled of a village

Length of fishing boat, which exists at the targeted village, compares with length of boat categorized by National Statistic Office. This is able to conclude that 4- type fishers are small-scale fishers. They satisfy an incentive of anchovy and squid products, which is related to cost-effectiveness of large cast net or anchovy falling net.

5. Utilizing Fishing Ground

Coastal area of Pathew Bay is usually employed by large cast net and anchovy falling net gears (see Figure 2). Fishers favorably operate large cast net along the coastal line that most crowded areas is around Ko Aeung Island to Ko Rang Island (Zone III). 32.5% and 26.8% of fishers at Ban Thungmaha (Moo 1) and Ban Bonrai (Moo 6) handle large cast net at Zone III (see Table 10).

Table 10 Fishing Ground Utilizing by Large Cast Net and Anchovy Falling Net

Village	Large Cast Net				Anchovy Falling Net			
	Zone I	Zone II	Zone III	Zone IV	Zone I	Zone II	Zone III	Zone IV
Ban Thungmaha	6.0	15.7	32.5	19.3	3.6	4.8	9.6	8.4
Ban Thumthong	17.0	19.1	17.0	8.5	12.8	8.5	8.5	8.5
Ban Bonrai	7.3	17.1	26.8	22.0	4.9	4.9	7.3	9.8

Reamrk: % of 83 counting number of Moo 1
% of 47 counting number of Moo 3
% of 41 counting number of Moo 6
Zone I: Bangbird Mt.- Ban Thumthong village
Zone II: Ban Thumthong village - Ko Aeung Island
Zone III: Ko Aeung Island - Ko Rang Island
Zone IV Ko Rang Island - Ko Khai Island

Anchovy falling net has main fishing ground areas along Bangbird Mt. to Ban Thumthong village (Zone I), areas of Ko Aeung Island to Ko Rang Island (Zone III) and areas of Ko Rang Island to Ko Khai island (Zone IV). Fishers of Ban Thumthong (Moo 3) are 12.8% operate anchovy falling net at Zone I.

The landing and mapping survey results make confirmation that fishers conventionally operate large cast net and/ or anchovy falling net fishing gear along the coastal areas where is in front of their villages. Additionally, fishers use small fishing boat that cannot go to far distance from shoreline where the vertical distance is less than 3 km of coastal line. Thus, these fishers move up to north direction and move down to south direction of Pathew Bay to operate large cast net and/ or anchovy falling net.

Arnuphapboon and Laongmanee (2003) reported that large cast net fishing boat moved up and down which depended on fishing season. Kaewnuratchasorn and et.al. (2003) reported that large cast net fishing boat operated fishing in fishing ground which was at depth of 10-20 m along Zone III and Zone IV. Arnuphapboon and Laongmanee (*Ibid*) reported that anchovy falling net operated the gear only in the near shore areas.

6. Average of Operating Costs for a Trip

Average of operating costs of fishing boat roughly considers from variable costs such are fuel oil, ice and labor. Table 11 shows volume of fuel oil, ice, labor, number of hauling net in a trip and number of fishing day. Numerical survey results are overall scenario how much fishers spend expenditure of operating costs in a trip. Number of fishing day is a supportive variable to calculate how much fisher have to pay operating costs in a month. Number of hauling net a night is recorded information to point out whether changes of fishing operation are to compare for the next survey of these fishing gears.

Table 11 Volume of Fuel oil, Ice, Labor,Number of Hauling Net in a Trip (in average) and Number of Fishing Day

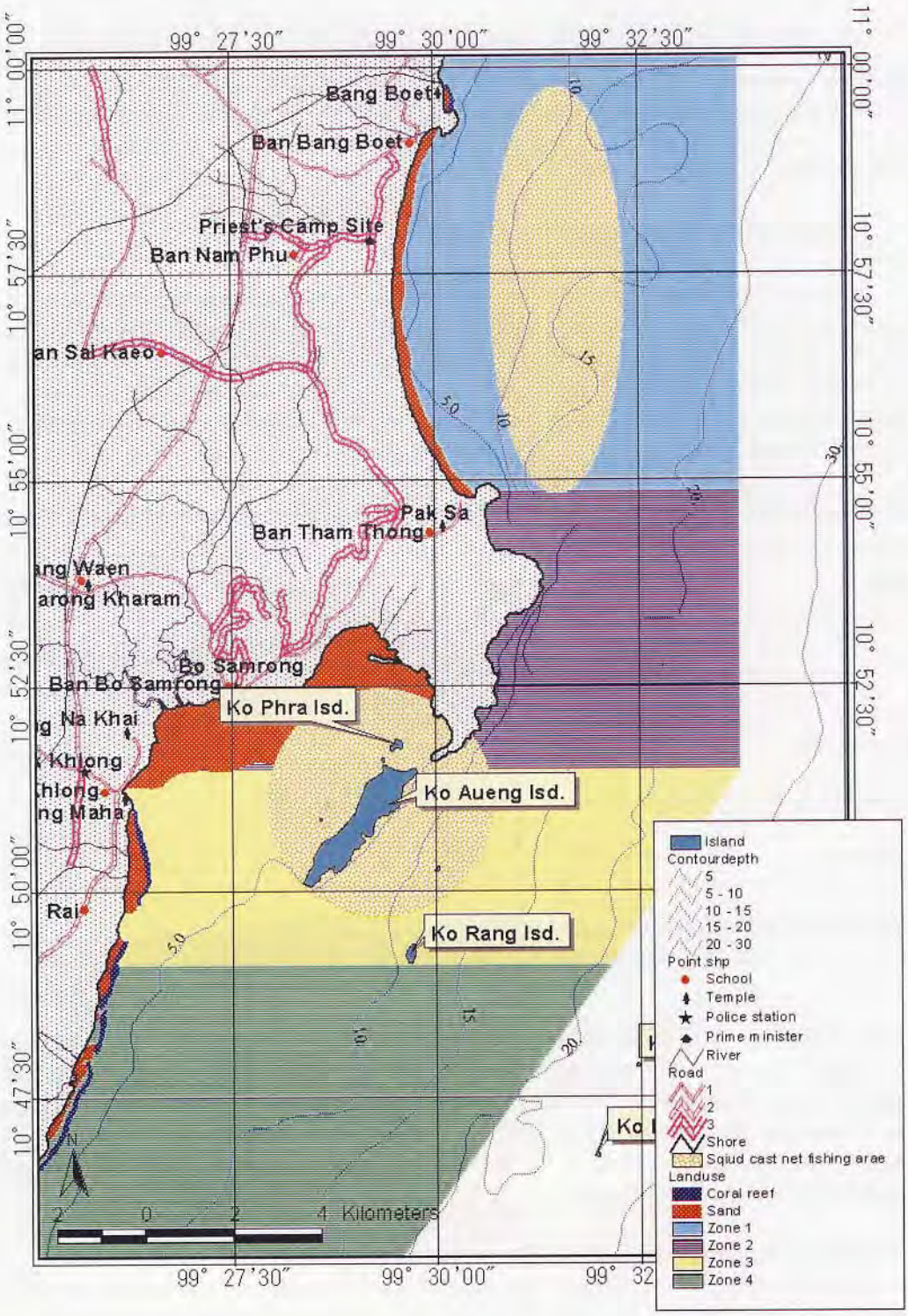
Village	Fuel oil (liters)	Ice (kg)	Labor (persons)	Anchovy falling net		Large cast net	
				Fishing day in a month (days)	Hauling net a night (times)	Fishing day in a month (days)	Hauling net a night (times)
Ban Thungmaha	61.61	67.8	3	20	6.36	19	6.42
Ban Thumthong	60.9	108	7	22	5.7	19	5.8
Ban Bonrai	49.45	66.6	1.5	22	6.2	20	4.23

Remark: Gasoline price 16-17 baht/litre at Tambol Pakklong in February 2002
Ice price 1 baht/kg at Tambol Pakklong in February 2002

Fishers live at Ban Thungmaha spend volume of fuel oil about 61.61 liters in a trip. Table 9 and Table 10 are supportive data to confirm that fishers almost use a bit big sized fishing boat in fishing operation at Zone III and Zone IV. Fishers at Ban Thumthong use 60.9 liters for fishing operation that Table 9 illustrates that fishers use long length of fishing boats, which are 27.27% of Type 3 and 18.18% of Type 4 own boat length is 10-12 m. Fishers at Ban Bonrai averagely use fuel oil in a trip about 49.45 liters which normally operate fishing in Zone III.

Fishers at Ban Thumthong pay highest costs of ice, which use 108 kg in a trip, and also pay highest labor costs for 7 hiring labors. Fishing operation of Ban Thungmaha (Moo 1) and Ban Bonrai (Moo 6) like within-household fishing operation, which hire only 1-3 labors, but fishing operation of Ban Thumthong (Moo 3) seems locally small fishing industry.

Figure 2 Fishing Ground Areas Employed by Large Cast Net and Anchovy Falling Net



Fishers of Ban Thungmaha (Moo1) haul anchovy falling net and large cast net is around 6.36 and 6.42 times in a night for a trip. Fishers of Ban Thumthong (Moo 3) harvest anchovy and/ or squid by hauling net is 5.7 and 5.8 times in a night for a trip. Fishers live at Ban Bonrai (Moo 6) utilize anchovy and squid by hauling net is 6.2 and 4.23 times in a night for a trip.

However, number of spending fuel oil does not only relate to length of fishing boat, but also relate to number of light that use in fishing operation which use oil as fuel. Thus, number of hauling net in a trip cause to increase and/or decrease of fishing operation costs. Table 12 illustrates an average number of using luring light tubes by type of fishing gear and boat length. Length of fishing boat is directly related to number of using light tubes. Longer length of fishing boat use higher number of using light tubes. Type 3, which length of boat is longer than 12 m., use luring light tubes are about 60 units at Ban Bonrai. This numerical data is highest numbers when compare among three target villages with using fishing boat is longer than 12 m.

Table 12 Average Number of Using Lights Tubes by Type of Fishing Gear and Boat Length

Units

Village	Traditional gear & large cast net (Type 1)				Traditional gear & large cast net and anchovy falling net (Type 2)				Large cast net and anchovy falling net (Type 3)				Large cast net (Type 4)			
	< 6m	6-9m	10-12m	>12m	< 6m	6-9m	10-12m	>12m	< 6m	6-9m	10-12m	>12m	< 6m	6-9m	10-12m	>12m
Ban Thungmaha		29	24			21				15	28	36	6	18	22	46
Ban Thumthong										21	23	25		20	27	
Ban Bonrai		15	20								30	60		18		

There are not only variable costs in fishing operation, but fishers have to invest in making hanging net tray for processing dried squid and dried achovy products. Fishers of three targeted villages individually and heavily invest in making anchovy hanging net trays which numbers of tray are 88,44, and 69 trays of Moo1, Moo3, Moo6 (see Table 13). A making unit of tray is a creative job opportunity to other fishers and local people in the community.

Table 13 Number of Hanging Net Tray for Processing Dried Squid and Dried Anchovy in Average

Trays

Village	Number of Tray	
	Squid (Total counting no.)	Anchovy (Total counting no.)
Ban Thungmaha	43 (21)	88 (7)
Ban Thumthong	0	44 (9)
Ban Bonrai	41 (5)	69 (4)

7. Source of Credit to Capitalize Fishing Operation

Source of credit is available at three villages, which are under formal credit and informal credit systems, has eleven sources (see Table 14). Formal credit system consists of six types that are Bank of Agriculture and Agricultural Cooperatives (BAAC), Commercial Bank, housing loan bank, farmers' group, village fund group and Ao.Bo.To loan. Informal credit system has five existences that are local capitalist, local fish trader, relatives, saving group and other sources.

Table 14 Sources of Credit

Village	Formal Credit System						Informal Credit System				
	BAAC	Commercial bank	Housing loan bank	Farmer's group	Village fund group	AoBoTo	Savings group	Capitalist	Local fish trader	Relatives	Others
Ban Thungmaha	31.0	2.4	2.4	4.8	0	2.4	0	7.1	35.7	9.5	4.8
Ban Thumthong	10.5	5.3	0	0	36.8	0	0	0	47.4	0	0
Ban Bonrai	25.0	0	0	0	25.0	0	5.0	0	40.0	0	5.0

Reamrk: % of 42 counting number of Moo1
% of 19 counting number of Moo3
% of 20 counting number of Moo 6

Fishers of three villages mostly access loan from BAAC and local fish trader. 31% of fishers at Ban Thungmaha (Moo 1), 10.5% of Ban Thumthong (Moo 3) respondents and 25% of Ban Bonrai (Moo 6) respondents get loan from BAAC. These fishers mostly engage in both fisheries and agriculture, and then they can use their collateral to request for amount of loan to invest in both fisheries and agriculture.

35.7%, 47.4% and 40% of total respondents live in Moo 1, Moo 3 and Moo 6 respectively access loan from local fish trader. These fishers mostly engage in fisheries sector, and they have no any collateral to get loan from any formal credit system institutions. Thus, most of these fishers are dependent on local fish traders to get loan for their investment in fishing operation.

Table 15 shows categories of source of credit by type of engagement. 14% of Type 1 and 21% of Type 4 at Moo 1 are dependent on informal credit system. 14% of Type 3 at Moo 1 can get loan from formal credit system. 50% of Type 3 at Moo 3 get loan from both formal and informal credit systems. 20% of Type 4 at Moo 3 access loan from formal credit system. 18% of Type 1 and Type 4, 27% of Type 3 at Moo 6 obtain loan from both formal and informal credit systems.

27% of Type 4 is dependent on informal credit system. Some residences, who get loan from informal credit system only, mean that they may not possess collateral to make loan request from formal credit system institutions (Laowapong and Yamao, 2003, pp.12) The fishers, who engage only in fisheries, have to keep this type of business contact with local fish trader. However, the fishers, who engage in both fisheries and agriculture sectors, can select to sell fish products to local fish trader that give a satisfies fish price to them.

Table 15 Sources of Credit by Type of Engagement

%

Village	Traditional Gear & large cast net (Type 1)			Traditional Gear & large cast net and anchovy falling net (Type 2)			Large cast net and anchovy falling net (Type 3)			Large cast net (Type 4)		
	Formal Credit System	Informal Credit System	Both System	Formal Credit System	Informal Credit System	Both System	Formal Credit System	Informal Credit System	Both System	Formal Credit System	Informal Credit System	Both System
Ban Thungmaha		14	3	3	3	3	14	7	7	17	21	7
Ban Thumthong								10	50	20	10	10
Ban Bonrai			18				9		27		27	18

Remark: % of Total sampled of a village

8. Intermediate Source of Product Distribution

Anchovy and squid catch product sells into two types, which are fresh product and dried product. Intermediate source of these product distributions categorizes into inside and outside village fish traders. Anchovy catch product is sold out in dried product type that outside village fish trader is main intermediate source to distribute the product to urban market. 29.41%, 19.05% and 16.22% of total respondents at Moo 6, Moo 3 and Moo1 sell 100% of dried anchovy product to outside village intermediate fish trader (see Table 16).

Inside village fish trader is major intermediate source of product distribution. 70.27% of total respondents at Moo 1 sell 100% of dried squid product to inside village fish trader. 58.82% of total respondents at Moo 6 vend 100% of dried squid product to outside village fish trader. 38.1% of total respondents at Moo 3 preferably sell 100% of fresh squid catch to inside village fish trader.

There is factor to explain why fishers decide to sell fish products to inside and/or outside village fish traders. Normally, fishers particularly get loan both in kinds and in cash from local fish trader, then they have to sell fish products to the local fish traders (Laowapong and Yamao, (*Ibid*), pp. 12). Table 17 features patronage of fish trader and fishers. Inside village fish trader is an important source of accessible credits such are loan, equipment and in kinds (ice, fuel oil). Outside village fish trader mostly provides credit to fishers such loan and equipment, but give credit in kinds very few.

Within Ban Thungmaha Moo1, fishers mostly borrow equipment from inside village fish trader, which is about 30% of fishers. 23% and 17% of fishers of this village get credit in kinds and loan from inside village fish trade, respectively. 35% of Moo 3 fishers and 29% of Moo 6 fishers require equipment credit from inside village fish trader.

Anchovy product price and ratio of the product's composition are important factors to help fishers to decide what kinds of the products they should sell fresh or dried products to fish traders. Fishers sell in fresh anchovy products when the product price is getting low and ratio of product' s composition consists of anchovy fishes is less than 90% of total catch. They cite that they sell fresh products are better, then this they can save processing costs which including boiling, hanging and drying, and size selection.

Table 16 Intermediate Source of Product Distribution

Village	Anchovy								Squid							
	Fresh				Dried				Fresh				Dried			
	Inside village		Outside village		Inside village		Outside village		Inside village		Outside village		Inside village		Outside village	
	100%	< 100%	100%	< 100%	100%	< 100%	100%	< 100%	100%	< 100%	100%	< 100%	100%	< 100%	100%	<100%
Ban Thungmaha	0	0	0	0	0	0	16.22	2.7	2.7	0	2.7	0	70.27	2.7	2.7	0
Ban Thumthong	4.76	4.76	0	0	14.29	4.76	19.05	4.76	38.1	0	0	0	9.52	0	0	0
Ban Bonrai	0	0	5.88	0	0	0	29.41	0	0	0	0	5.88	0	0	58.82	0

Remark: % of 37 counting number of Moo 1
% of 21 counting number of Moo 3
% of 17 counting number of Moo 6

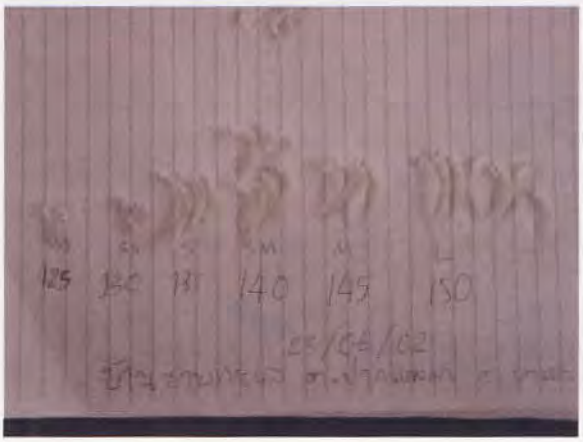
Table 17 Patronage Relationship between Fish trader and Fishers

Village	Inside Village Fish Trader			Outside Village Fish Trader		
	Loan	Equipment	Kinds (ice, fuel oil)	Loan	Equipment	Kinds (ice, fuel oil)
Ban Thungmaha	17	30	23	3	17	10
Ban Thumthong	29	35	29	6	0	0
Ban Bonrai	24	29	24	6	18	0

Remark: % of 30 counting numbers at Moo 1
% of 17 counting numbers at Moo 3 and Moo 6

Picture 4 Fresh Anchovy Products

Picture 5 Boiled Anchovy Products



Picture 6 Marketable Sized Dried Anchovy

Picture 7 Marketable Sized Dried Squids

V. Summary of the Survey Result

Categories of large cast net and anchovy falling net fishers identify into 4 types. These four types are Type 1 (traditional fishing gear and large cast net), Type 2 (traditional fishing gear and large cast net and anchovy falling net), Type 3 (large cast net and anchovy falling net) and Type 4 (large cast net only). Each type of engagement can indicate roughly economic status of fishing households. Therefore, these information features what kinds of aquatic species are utilized.

Each type of engagement clearly pin points where is the main fishing ground area to exploit squid and anchovy resources. Normally, fishers live at each target village do not go to far distance from shoreline. This is because most of respondents own 6-9 m. and 10-12 m. The National Statistical Office (NSO) defines small fishing boat has length less than 14 m., thus, these lengths of fishing boat at three target villages are measured as small fishing boats. These lengths of fishing boat are useful to calculate capacity of fishing boat.

Fishers of each type of engagement mostly spend expenditure for fishing operation costs. Variable costs of fishing operation costs are fuel oil, ice and labor. Particular fuel oil is costly price. Fishers spend large volume of fuel oil for cruising and using for electric generator for luring light in fishing operation.

Most of fishers get loan and credit in kinds (fuel oil, ice and equipment from inside village fish trader. This is because fishers have limitation of collateral till lack of collateral to make loan with formal credit system institution. Relationship of inside village fish trader leads to traditional business of catch distribution. Fishers have to sell catch to the inside village fish trader who always give them a patronage. Inside village fish trader is key person to take catch distribution from village to urban market areas. Channels of catch distribution can find more information at 'Marketing and Utilization of Fish Products in Tambol Pakklong, Pathew District, Chumporn Province (Laowapong and Yamao, (*Ibid*))'.

VI. Recommendation

1. Promote awareness of responsible fishing operation for long term resource utilization

Large cast net and anchovy falling net fisheries are acknowledged that give high incentive return to fishers much more than other type of fishing gear in particular Indo-pacific mackerel gill net, mullet gill net, etc. However, these two types of fishing gear leads to argument whether these gears bring up long term incentive and resource utilization.

To reduce a severe of this controversial, some traditional fishers request large cast net fishers should not heavily use numbers of luring light tube in fishing operation to avoid gathering non-target species. Large cast net fishers should use big mesh size to responsibly and selectively catch marketable size of squids. Anchovy falling net fishers should also change and use mesh size as fisheries law mandate allowable mesh size. Anchovy falling net should exploit the target species where is not less than 1 km. from shoreline or surround small island.

Whether large cast net and anchovy falling net fishers follow and action as other traditional fishers requested. This result may at least alleviate social conflict of interests in the fishing communities.

2. Provide simple and easy accessibility of credit source

Most of large cast net and anchovy falling net fishers who own small-sized fishing boat access loan from local fish trader. This relationship make the fishers have to sell all catch products to the local fish trader at any fish price without price bargaining. The fishers do not gain much advantage of the product sale, so this cause them to put more efforts to catch large volume of fishes to gain incentive to cover fishing operation costs.

This means that fishers have to depend on local fish trader. Variety of simple and easy accessible source of loan is useful to fishers to reduce a dependence on local fish trader. This may help to reduce strengthen of patronage system between local fish trader and fishers. Fishers can alter to sell catch to fish traders, who present them a reasonable fish price.

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Annex 1 Questionnaire Design for the Survey

Socio-economic Survey of Large Cast Net and Anchovy Falling Net Fisheries in Pakklong Sub-district, Pathew District, Chumporn Province

Part I General Information

1.1 Household Information

Number in family	Occupation		No. of Experience Year	Education Level	People's group member		
	Fishery	Agriculture			Non-member	member	Position

1.2 Household's possesses

Item	Number	Value		Present value (in case of owner)
		Owner	Rent	
1. Collateral	.....Rai			
2. House	.....house			
3. Fishing boat	.....boat			

1.3 Source of Credit

Source of Credit	Amount	Interest rate	Object of making load

1.4 Source of daily income

Source of Income	Amount (Baht/day)

Part II Fisheries Sector

2.1 Pre-employing in other fisheries before entering in to large cast net and/or anchovy falling net

Occupation	Experience year	No. of crew	Boat length (m)	Engine power (Hp)	No. of net set	No. of cage	Processing	Satisfy	Status	
									continue	stop

2.2 Catch distribution and Volume of catch

Occupation	Catch/product (kg./day)		Landing place	Selling place
	5 years ago	Present		

2.3 Present situation

Occupation	Experience year	Fishing ground	No. of crew	Satisfy	Volume of Catch		Landing Palace
					Started	Present	

2.4 Fishing gear and other equipment

Item	Number	Price/unit	Volume	Buying year	Duration
1. Boat	.....Boat				
2. Boat length	.....m.				
3. Light tube	.....tube				
4. Electric	.....engine				
5. Generator	.....engine				
6. Gas stove	.....stove				
7. Dried Plant	.....plants				
8. Fan in dried plant	.....unit				

Remark value= number x price/unit

2.5 Employ in other fisheries sectors

Aquaculture			Processing	
Aquatic species	No of cage	Size of cage(m)	Aquatic species	Type of process

2.6 Fishing ground and fishing season in annually

Type of Fishing gear	Fishing ground	No./trip	Day/month	Month											

2.7 Duration of fishing operation in 9 months

Aquatic species	Waxing moon	Waning Moon

Part III Catch Distribution

3.1 Selling source and situation

Buyer	Terminated Source	Anchovy (%sell/trip)				Squid (%sell/trip)				Agreed price			Support for buyer
		Fresh		Dried		Fresh		Dried		/day	/week	/month	
		%sell	size	%sell	Size	%sell	size	%sell	size				

Remark: The waxing moon is the period from new moon to full moon
The Waning moon is the period from full moon to new moon

3.2 Production price by size

Size of catch	Anchovy		Squid	
	Fresh	Dried	Fresh	Dried
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

Part IV Expense for fishing operation

Item	/time						In annually	
	number	Price/ unit	Value	Labor	Fee/ labor	satisfy	Price/ unit	Value
1. Fuel oil				0	0		0	0
2. Ice				0	0		0	0
3. Food				0	0		0	0
4. Lubricant				0	0		0	0
5. Boat maintenance fee								
6. engine maintenance fee								
7. License fee	0			0	0			
8. Registration fee	0			0	0			
9. labor fee							0	0
10. other								

Part V Expense for Processing

Item	Unit	Price/Unit	Value
1. Equipment			
2. Fuel in boiling process			
3. Fuel in dried process			
4. Packing box			
5. Labor in boiling process			
6. Labor in Dried process			
7. Labor in product sized selection			
8. Labor in packing			

Remark **Value = number x price/unit**

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