

**Crab Fisheries Survey to Sustain Community-Based
Economic Development:
In Pakklong Sub-District, Pathew District,
Chumphon Province**



**Training Department
Southeast Asian Fisheries Development Center
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**Department of Fisheries
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Economic Development:
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(LBCFM-PD)



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FOREWORD

Under ASEAN-SEAFDEC Fisheries Consultative Group (FCG) Scheme, Thailand takes duty as the lead country among ASEAN member countries and the Training Department (TD) takes as lead department of SEAFDEC to implement coastal resources 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 formulating 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-prior consider their own policies and formulate new direction for cost-effectiveness of coastal fisheries resource management plan and implementation.



Niwes Ruangpanit
Secretary-General

PREFACE

Crab resources are important economic aquatic species to secure community economic development and productivity. High competition of local resource users lead to rapid decline of crab resources which size is getting small and smaller at recent. The project staff of the Locally Based Coastal Fisheries Management Project in Pathew District (LBCFM-PD), Chumphon Province gives prior consideration on crab fisheries resources and its situation by conducting data collection and survey to recognize problems and its severity, needs of local resource users.

The gained results are also expected to be supportive information to help policy-maker and planner to formulate appropriate activities and/or project to rehabilitate and enhance stock of crab resources for long-term utilization. This information may help to arrange priority of solution to alleviate competition of resource users and decline of crab resources.

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5 June 2004

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P. Suanrattanachai and Co-authors

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**Crab Fisheries Survey to Sustain Community-Based Economic Development:
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Abstract

Crab fisheries survey has objectives to collect data and analyze problems to define solution to alleviate conflict of interests between fishers are using crab gill net and fishers are using collapsible crab trap. These two types of resource users heavily compete exploiting crab resources. The survey results disclose that fishers engage in crab gill net only hauled weights of average catch per trip are 24 kg per trip per respondents, while fishers employ in collapsible crab trap only gained weights of average catch per trip are 19 kg per trip per respondent. 86% of fishers engage in collapsible crab trap only using crab trap with 2.5-3.5 cm net mesh size. The enlargement of bottom net mesh size of collapsible crab trap activity launches to increase responsibility of catch sized selection and releasing mature stage catch back to the sea to fishers particularly who using collapsible crab trap to sustain stocks of crab recruitment for long term utilization. This activity would aim a security of community productivity and continue fishers' job opportunity.

Keywords: crab fisheries survey, conflict of interest, collapsible crab trap, stock of crab recruitment

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Crab Fisheries Survey to Sustain Community-Based Economic Development: In Pakklong Sub-District, Pathew District, Chumphon Province

I Introduction

Southeast Asian Fisheries Development Center (SEAFDEC)/Training Department (TD) collaborates with the Department of Fisheries (DOF), Thailand, to conduct the Locally Based Coastal Fisheries Management Project in Pathew District (LBCFM-PD), Chumphon Province, Thailand (see Figure 1). The two counterpart's project staffs make project action plan to implement the LBCFM-PD project in the community site. Activity I: Base Line Survey is a project component that mainly conducts data collection and community survey. The project staff initially conducted preliminary community survey to recognize status and characteristics of the community. The results of the preliminary survey illustrate that crab gill net (CGN) and collapsible crab trap (CCT) are including in eight-top ranking of fishing gear employed in capture fisheries sector in the community site (Suanrattanachai and et.al. 2002, pp.35).

Crab gill net and collapsible crab trap fishing gears have the same target species, which are blue swimming crabs (*Portunus* spp.). This leads to high competition among resource users to utilize this target species. CGN fishers criticize that CCT fishers catch any size of blue swimming crabs; they do not select only the marketable size crabs. CGN fishers have faced problems of cost-ineffectiveness of fishing operation that they catch a few numbers of crabs, but they spend a big amount of fishing operation costs.

Crab fisheries survey in the community designs to collect data, analyze problems and define solution to alleviate conflict of interests between CGN and CCT fishers. Results of the data collection and analysis are useful information to help the project staff and policy-maker of the DOF comprehended characteristics of crab fisheries including users employed and catch utilization. Then, staff and officer concerned, give prior consideration and define solution to avoid severe conflict of interests between crab resource users.

II Objectives of the Survey

- 1) To characterize crab fisheries and their operation to realize how fishers utilize this kind of aquatic resources
- 2) To identify utilization of crab catch and product and its market channel to recognize an importance of this kind of fisheries to coastal resource development
- 3) To identify problems, needs and pinpointed factor of the crab fishers and fisheries to formulate development plan and activities to attain long-term utilization of this kind of aquatic resources.

III Methodology of Conducting the Survey and Data Analysis

- 1) Design questionnaire, which objectives of the questionnaire relied on the objectives of the survey, composed of 4 parts to conduct data collection by interviewing respondents in community site (see Annex 1 and Annex 2).
- 2) Numbers of respondents vary from village to village. Table 1 shows numbers of fishing households engaging in crab gill net and/or collapsible crab trap fisheries in Pakklong Sub-District, Pathew District, Chumphon Province. This table includes numbers of respondents in each village who given information to fill the questionnaire.
- 3) Raw data are input and managed as community database. These data are calculated into percentage
- 4) Results of the data analysis will illustrate by tabulation
- 5) Term of reference of crab fisher respondents are fishers using crab gill net and/or collapsible crab trap, which are major and/or minor fishing gears, to catch crab resources in the coastal areas.

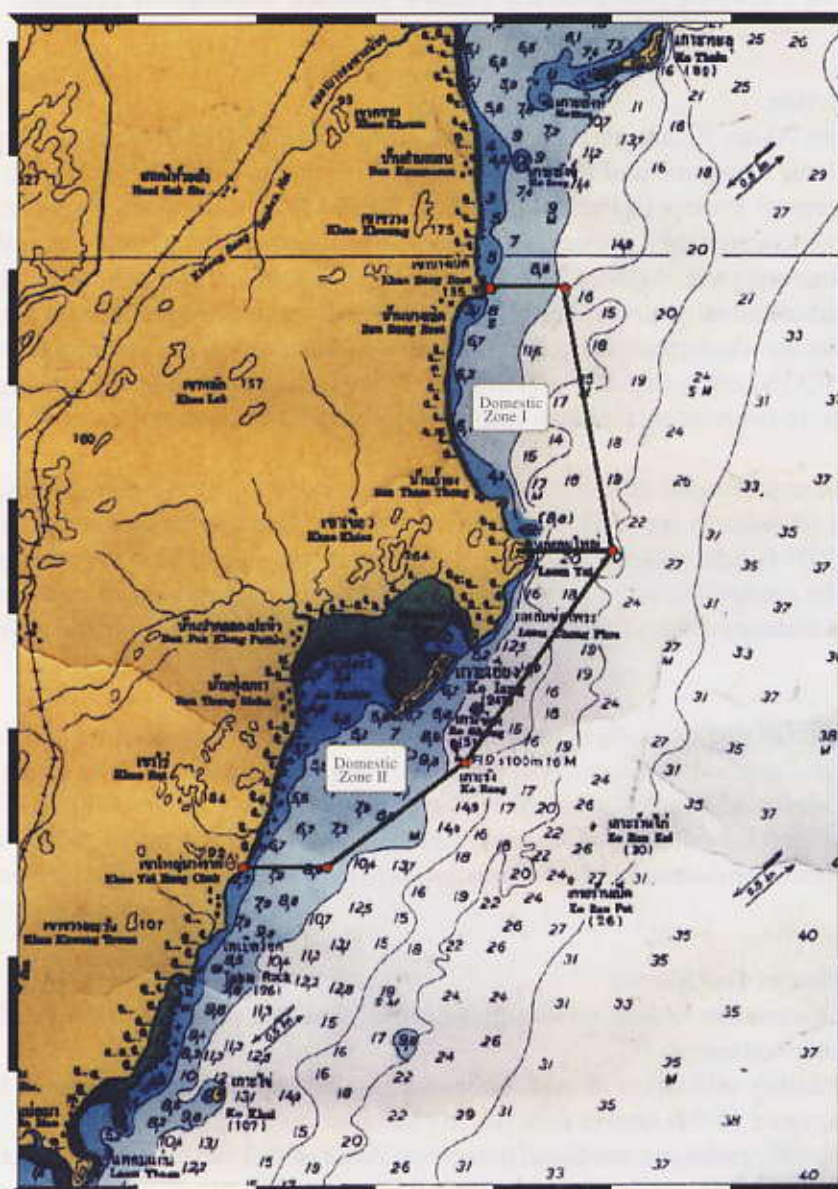


Figure 1 Site map of the LBCFM-PD project at Pakklong Sub-district, Pathew District, Chumphon Province

IV Results of the Survey

Part I General Information in Crab Fisheries Sector

Main objectives of this part are to characterize capacity of fishing gear and fishing boats and to verify fishing ground, fishing season and fishing operating time to use these information to formulate development plan and activities. Results of data collected from respondents, which are totally 73 respondents from six villages of Pakklong Sub-District, Pathew District, Chumphon Province and one village of Saithong Sub-District, Bangsaphan Noi District, Prachuabkirikhan Province. Fishers at village no. 5 (Moo 5 Saithong) are also respondents, because they operate fishing in the same fishing ground in Pathew Bay.

1.1 Categories of Crab Fisheries Engagement

Crab fisheries engagement exists in the community site categorized into six types. They are 1) crab gill net only, 2) collapsible crab trap only, 3) both collapsible crab trap and crab gill net, 4) crab gill net combining with other fishing gear, 5) collapsible crab trap combining with other fishing gear, 6) traditional crab trap.

Table 2 categorizes types of crab fisheries engagement in numbers of fishing households by village. Moo 1 fishers mostly employ in crab gill net fishing gear (45%), collapsible crab trap combining with other fishing gear (18%), traditional crab trap (18%), crab gill net and both crab gill net and collapsible crab trap (9%). No fisher of this village engages only in collapsible crab trap fishing gear. Moo 2 fishers employ in crab gill net fishing gear (50%), which is highest number comparing to other type of engagement existed in the village. 44% of respondents occupies in crab gill net combining with other fishing gear.

Fishers lives at Moo 3 and Moo 6 mainly employ in crab gill net only and crab gill net combining with other fishing gears, which are 75% and 25% of Moo 3 and 50% and 50% of Moo 6, respectively. 100% of Moo 5 (Pakklong) and 100% of Moo 5 (Saithong) respondents operate crab gill net combining with other fishing gears. Moo 7 fishers have no one engaged in traditional crab trap. 26% of respondents of this village employ in crab trap only. Large numbers of respondents at Moo 7, which are 39% of total respondents in the village, are busy with crab gill net combining with other fishing gears.

1.2 Capacity of Fishing Boats, Fishing Efforts and Fishing Grounds

1.2.1 Capacity of Fishing Boats

1.2.1.1 Type of Fishing Boat

Capacity of fishing boats and fishing efforts describe on four parameters are type of fishing boat, lengths of fishing boats, lengths of crab gill net and numbers of collapsible crab trap unit. Table 3 shows numbers of respondents by type of engagement combining with type of fishing boat. Main type of fishing boat consists of long tailed boat (outboard powered boat) and inboard powered boat. Fishers engage in crab gill net only living in Pakklong Sub-District mostly used long tailed boat, however, this excepts fishers lived at village nos. 5 (Pakklong and Saithong Sub-District).

Respondents engage in crab gill net combining with other fishing gear owned long tailed boat only. Respondents of village no.3 (Moo 3) use inboard powered boat only. Long tailed boat and inboard powered boat employ in crab fisheries at village no. 7 (Moo 7) which percentage of number of respondents is 19 % of total number in the village. 26% of total number of respondents at village no. 7 (Moo 7), who employ in CCT only, uses long-tailed boat.

1.2.1.2 Length of Fishing Boat

Table 4 illustrates four categories of length of fishing boat employed in Pakklong Sub-district. Categories of length of fishing boat are 1) less than 6 m, 2) between 6-9 m, 3) between 10-12 m and 4) more than 12 m. These categories classified by length of fishing boat, which gained information from interviewing questionnaire. These four categories are basic grouped information to fundamentally comprehend capacity of fishing operation by type of engagement.

Table 3 Type of fishing boat by type of fishing gear

Village no.	Type of Engagement										Total		
	Both crab gill net and collapsible crab trap		Crab gill net only		Collapsible Crab trap only		Crab gill net combining with other fishing gear		Collapsible crab trap combining with other fishing			Traditional crab trap	
	L	I	L	I	L	I	L	I	L	I	L	I	
Moo 1	9		45				9		18		18		99
Moo 2	6		50				44						100
Moo 3			75					25					100
Moo 5 (Pakklong)							100						100
Moo 5 (Saithong)							100						100
Moo 6			50				50						100
Moo 7	13		10		26		19	19	13				100

Remark: L - Long tailed boat
I - Inboard powered boat

Table 4 Length of Fishing boat by type of engagement

%

Village No.	Crab gill net only				Collapsible crab Trap only				Traditional crab trap			
	<6m	6-9m	10-12m	>12 m	<6m	6-9m	10-12m	>12 m	<6m	6-9m	10-12m	>12 m
Moo 1	9	36								2		
moo 2		44	1									
Moo 3		75										
Moo 5		100										
Moo 5 (Siathong)												
Moo 6		50										
Moo 7		10				23	13					

%

Village No.	Both crab gill net and collapsible crab trap				Crab gill net combining with other fishing gear				Collapsible crab trap combining with other fishing gear			
	<6m	6-9m	10-12m	>12 m	<6m	6-9m	10-12m	>12 m	<6m	6-9m	10-12m	>12 m
Moo 1		9				9				18		
moo 2		6				38	6					
Moo 3						25*						
Moo 5						100						
Moo 5 (Siathong)												
Moo 6					50							
Moo 7	3	10				19/13*	6*			13		

Remark: * mean number of household using inboard powered boat

Fishers employ in crab gill net combining with other fishing gear also owned 6-9 m long tailed boat where are found at village no.1 (9%), 2 (38%), 5 (100%) (Saithong) and 7 (19%). Some of these type of fishers are using 6-9 m inboard powered boats where found at village no 3(25%) and village no. 7(13%). 23 % of fishers live in village no. 7 use CCT only operated on 6-9 m long tailed boat. 6% of these fishers operate crab gill net combining with others fishing gear 10-12 m inboard powered boat.

1.3 Capacity of Fishing Efforts

1.3.1 Capacity of Net and Trap

Capacity of fishing efforts explains by two main parameters, which are lengths of crab gill net and number of collapsible crab trap units. Crab gill net is classified by fishing ground areas combining with the gear operation at depth of seawater. Two main categories of crab gill net are crab gill net operated in the deep seawater and in the shallow seawater areas. Generally, crab gill net fishing gear operates in coastal areas which depth is 2-40 m (Marine Fisheries Division, 1997, pp.90). Fishers of Pakklong Sub-district classify crab gill net by the depth of seawater that they carry out the fishing gear operation.

Table 5 figures numbers and percentage of crab gill net fishers with categories of depth of seawater combining with type of fishing boats. This table gives total numbers of crab gill net fishers using the net at deep seawater and at shallow seawater. Some of these respond how deep they operate the fishing, but some of these does not specify. Table 6 contains numbers of crab gill net fishers who specify the depth of seawater where they often do fishing operation. Range of seawater depth level is categorized into four levels which based on information responded by interviewee fishers. The range of seawater depth level is 1-10 m, 11-20 m, 21-30m and > 30 m.

Crab gill net fishers with shallow seawater areas mostly operate the fishing gear near shore area with depth of seawater is around 1-10 m. employing by long-tailed fishing boat. Crab gill net fishers, who are executing at deep seawater areas, use inboard powered boat living at village nos.3 and 7 go fishing in deep seawater areas are at 21-30 m depth which percentage is 100% and 33%, respectively. 33% of inboard powered boat fishers of village no. 7 handle crab gill net gears at more than 30 m depth of seawater level.

Table 7 illustrates average length of crab gill net combining with type of engagement, which is both crab gill net, and collapsible crab trap, crab gill net only and crab gill net combining with other fishing gears. Average length of crab gill net divides into two sub-categories is deep sea net and shallow sea net. Fishers of village no. 7 employ in each type of engagement invest in large numbers of crab gill net. Fishers engage in crab gill net only using the deep sea net have owned average length of crab gill net around 8,400 m and average length of shallow sea net is 5,350 m. Fishers engage in both crab gill net and collapsible crab trap and crab gill net combining with other fishing gears using the deep sea nets are around 5,400 and 5,045 m, respectively.

Capacity of fishing efforts of collapsible crab trap considers on two parameters which are number of collapsible crab trap units and mesh size of collapsible crab trap. Mesh size of the crab trap is indicative parameter to roughly feature size of crab catch and tendency of use of crab fisheries resources. Table 8 shows that there are only three villages of Pakklong Sub-district engage in collapsible crab trap, which are village nos. 1, 2 and 7. Fishers of village no. 7 are only one village that they use only collapsible crab traps to engage in crab fisheries. Fishers of village no. 1 and 2 engage in both crab gill net and collapsible crab trap and collapsible crab trap combining with other fishing gear.

Table 5 Crab gill net fishing operation by depth of sea water

Village No.	boat type	Crab gill net						
		Deep seawater areas			Shallow seawater areas			
		Total	not specify	specify	Total	not specify	specify	
Moo 1								
Long tailed boat		7 (100)	5 (71)	2 (29)	7 (100)	2 (29)	5 (71)	
Inboard powered boat		0	0	0	0	0	0	
Moo 2								
Long tailed boat		16 (100)	12 (75)	4 (25)	16 (100)	6 (38)	10 (62)	
Inboard powered boat		0	0	0	0	0	0	
Moo 3								
Long tailed boat		2 (66)	1 (33)	1 (33)	2 (66)	1 (33)	1 (33)	
Inboard powered boat		1 (33)	1 (33)	0	1 (33)	0	1 (33)	
Moo 5								
Long tailed boat		2 (100)	2 (100)	0	2 (100)	0	2 (100)	
Inboard powered boat		0	0	0	0	0	0	
Moo 5 (Siathong)								
Long tailed boat		6 (100)	3 (50)	3 (50)	6 (100)	2 (33)	4 (67)	
Inboard powered boat		0	0	0	0	0	0	
Moo 6								
Long tailed boat		4 (100)	1 (25)	3 (75)	4 (100)	4 (100)	0	
Inboard powered boat		0	0	0	0	0	0	
Moo 7								
Long tailed boat		13 (68)	6 (32)	7 (36)	13 (68)	7 (36)	6 (32)	
Inboard powered boat		6 (32)	0	6 (32)	6 (32)	5 (26)	1 (5)	

Table 6 Crab gill net fishing operation by depth of sea water

Village No.	boat type	Crab gill net									
		Deep seawater areas					Shallow seawater areas				
		specify	1-10 m	11-20 m	21-30 m	>30 m	specify	1-10 m	11-20 m	21-30 m	>30 m
Moo 1	Long tailed boat Inboard powered boat	2(100)		2(100)			5(100)	4(80)	1(20)		
Moo 2	Long tailed boat Inboard powered boat	4(100)	3(75)		1(25)		10(100)	10(100)			
Moo 3	Long tailed boat Inboard powered boat	1(100)			1(100)		1(100) 1(100)	1(100)	1(100)		
Moo 5	Long tailed boat Inboard powered boat						2(100)	2(100)			
Moo 5 (Siathong)	Long tailed boat Inboard powered boat	3(100)	1(33)	1(33)		1(33)	4(100)	2(50)	2(50)		
Moo 6	Long tailed boat Inboard powered boat	3(100)	3(100)								
Moo 7	Long tailed boat Inboard powered boat	7(100) 6(100)		4(57) 2(33)	3(43) 2(33)		6(100) 1(100)	6(100)		1(100)	

Table 7 Average length of crab gill net by type of engagement

Village no.	Type of Engagement											
	Both crab gill net and collapsible crab trap				Crab gill net only				Crab gill net combining with other fishing gears			
	Total	no. of respondent	Deep sea net (m)	Shallow sea net (m)	Total	no. of respondent	Deep sea net (m)	Shallow sea net (m)				
Moo 1	1	1,1	3,360	2,240	5	2,3	700	703	1	0,1		800
Moo 2	1	0,1		2,000	8	1,7	1,200	759	7	3,4	3,466	1,575
Moo 3					2	1,1	6,720	800	1	0,1		800
Moo 5 (Pakklong)									2	0,2		1,360
Moo 5 (Saithong)									6	3,4	5,520	4,100
Moo 6					2	2,0	1,800		2	2,0	1,800	
Moo 7	4	1,3	5,400	2,550	3	1,2	8,400	5,350	12	11,1	5,045	800

Table 8 Mesh size of collapsible crab trap employed in crab fisheries

Village No.	Collapsible crab trap only			Both crab gill net and collapsible crab trap			Crab trap combining with other fishing gears		
	Total	Not specify	Specify	Total	Not specify	Specify	Total	Not specify	Specify
Moo 1				1(100)		1(100)	2(100)	1(50)	1(50)
Moo 2				1(100)		1(100)			
Moo 7	8(100)	1(13)	7 (87)	4(100)	1(25)	3(75)	4(100)		4(100)

1.3.2 Mesh Size of Collapsible Crab Trap

Table 9 classifies range of mesh size of collapsible crab trap, which composed of less than 2.5, 2.5-3.5, and more than 3.5 cm. These range classification based on data responded by interviewee fishers in Pakklong Sub-district. 86% of fishers engage in collapsible crab trap only use crab trap with 2.5-3.5 cm mesh size and 14 % of these type of fishers use collapsible crab trap with more than 3.5 cm mesh size. 100% and 75% of fishers employ in both crab gill net and collapsible crab trap living in village nos. 1 and 7 respectively use crab trap with mesh size is larger than 3.5 cm.

Average number of collapsible crab trap classifies by size of wire, which is small sized wire, and large sized wire (see Table 10). These two types give difference of use duration and economic status of fishers. Large sized wire can be used longer than small sized wire whether these do not damage by trawlers, but the price is more expensive than the small one. Fishers engage in collapsible crab trap fisheries, they prefer to use small sized wire rather than use large sized wire. Fishers employ in both crab gill net and collapsible crab trap fisheries owned small sized wire of collapsible crab trap around 270 units, which found at village no. 7. Fishers have residents at village no.2 use fewer number of collapsible crab trap units, which 50 of small sized wire and 60 of large sized wire.

Table 11 and Table 12 reveal number of fishing gear and number of average catch per trip. The two tables are indicative information to approximately assess how catches per unit of effort (CPUE) of crab gill net and collapsible crab trap gears are. CPUE of crab gill net and collapsible crab trap can make comparison with reference data of CPUE of total catch by each type of this fishing gear by seeing Annex 3, Annex 4 and Annex 5.

1.4 Fishing Grounds

Fishing ground areas of Pathew Bay are divided into four zones as seen at Figure 2. Zone I starts from Khao Bang bird Mt. to Khao Thumthong Mt. Zone II is from Khao Thumthong Mt. to the area of Ko Aeung Island. Zone III covers coastal areas from Ko Aeung Island to Ko Rang Island. Zone IV is from Ko Rang Island to Ko Khai Island. Table 13 illustrates categories of crab fishing gear employed in fishing ground areas of the Pathew Bay. Fishers, who engage in crab gill net only, operate this fishing gear at zone II that is 9.6% of total fishers. Some of these fishers are 6.8% of total fishers carries out crab gill net gear at zone II and III. Fishers employ in crab gill net combining with other fishing gear and collapsible crab trap combining with other fishing gear, which are 8.2% and 6.8% of total fishers, do fishing operation at zone II and III.

Part II Crab Catch Landings and Distribution

Objectives of this part are 1) to assess average catch per trip by type of fishing gear engagement and identify categories of catch production; 2) to clarify channel of catch distribution at community and 3) to clarify fundamental relationship of fishers and fish-traders through trade of crab production, distribution and access of credit source. Table 12 shows average catch per trip by type of engagement and Table 13 discloses intermediate source of catch distribution by type of engagement and by type of products.

2.1 Average Catch Per Trip

Table 14 reveals average catch per trip, which calculated, by total catch divided by number of respondents who gave information. Fishers, who engage in crab gill net only at village no. 1, feature that average catch per trip is 24 kg per trip per a respondent. Fishers are engaging in collapsible crab trap only gained weights of average catch per trip are 19 kg per trip per a respondent. Fishers employ in crab gill net combining with other fishing gear living at village nos. 1 and 7, they gained average catch per trip is 81 kg per trip and 83 kg per a respondent, respectively. Generally, fishers operate crab gill net fishing gear gain average catch per trip larger than collapsible crab trap fishing operation.

Table 9 Mesh size of collapsible crab trap employed in crab fisheries: Categories of mesh size

Village no.	Collapsible crab trap only				Both crab gill net and collapsible crab trap				Crab trap combining with other fishing gears			
	Total	<2.5	2.5-3.5	>3.5	Total	<2.5	2.5-3.5	>3.5	Total	<2.5	2.5-3.5	>3.5
Moo 1					1(100)			1(100)	1(100)			1(100)
Moo 2					1(100)		1(100)					
Moo 7	7(100)		6(86)	1(14)	3(100)		1(25)	2(75)	4(100)	1(25)	2(50)	1(25)

Table 10 Average number of collapsible crab trap by type of engagement

Village no.	Type of Engagement											
	Both crab gill net and collapsible crab trap				Collapsible crab trap only				Collapsible crab trap combining with fishing gears			
	Total	No. of respond ents	SW (units)	LW (units)	Total	No. of respond ents	SW (units)	LW (units)	Total	No. of respond ents	SW (units)	LW (units)
Moo 1	1	0,1	0	150					2	2,0	210	0
Moo 2	1	1,1	50	60								
Moo 3												
Moo 5 (Pakklong)												
Moo 5 (Saithong)												
Moo 6												
Moo 7	4	3,2	270	50	8	8,2	201	150	4	4,0	161	

Remark: SW = Small sized wire
LW = Large sized wire

Figure 2 Main Fishing Ground Zones Employed by Crab Gill Net and Collapsible Crab Trap at Pakklong Sub-District, Pathew District, Chumphon Province

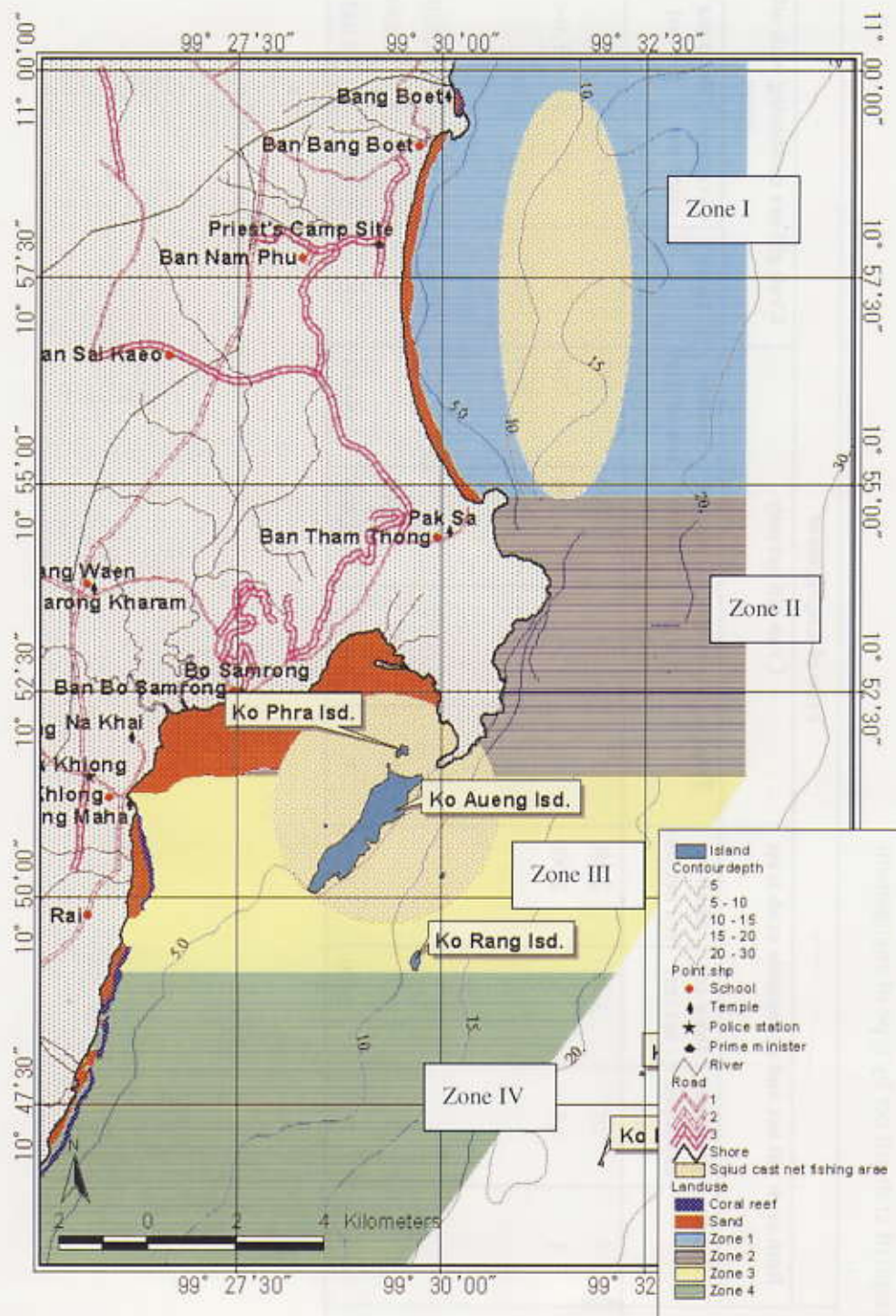


Table 12 Average number of collapsible crab trap by type of engagement

Village no.	Type of Engagement											
	Both crab gill net and collapsible crab trap				Collapsible crab trap only				Collapsible crab trap combining with other fishing gear			
	No. of respond ents	Average catch per trip	SW (units)	LW (units)	No. of respond ents	Average catch per trip	SW (units)	LW (units)	No. of respond ents	Average catch per trip	SW (units)	LW (units)
Moo 1	1	15	0	150					2	16	210	0
Moo 2	1	3	50	60								
Moo 7	4	11	270	50	8	19	201	150	4	15	161	

Remark: SW = Small sized wire

LW = Large sized wire

Table 13 Categories of crab fishereis employed in fishing ground

Type of fishing gear	I	II	III	IV	Others	I & II	I & III	I & IV	I & other	IV & other	I, II & III	II & III	II & IV	III & IV	II, III, & I	Total
Crab gill net only	1.4	9.6	5.5	4.1												27.4
Collapsible crab trap only		5.5										6.8				11.0
Both crab gill net and collapsible crab trap		1.4	5.4								1.4					8.2
Crab gill net combining with other fishing gear	5.5	1.4	4.1	5.5		1.4			4.1	2.7	1.4	8.2		5.5	1.4	42.5
Collapsible crab trap combining with other fishing gear													6.8	1.4		8.2
Traditional crab trap			1.3		1.4											2.7
Total																100

Table 14 Average Catch per trip by type of engagement

Village no.	Moo 1		Moo 2		Moo 3		Moo 5		Moo 5*		Moo 6		Moo 7	
	Gill net	Trap	Gill net	Trap	Gill net	Trap	Gill net	Trap	Gill net	Trap	Gill net	Trap	Gill net	Trap
Crab gill net only														
Not specify	1													
Specify	4		8		2						2		3	
Kg per a trip	24		19		28						10		47	
Collapsible crab Trap only														
Not specify														
Specify													8	
Kg per a trip													19	
Traditional Crab Trap														
Not specify														
Specify		2												
Kg per a trip		9												
Both crab gill net and collapsible crab trap														
Not specify													1	1
Specify	1	1	1	1	1								3	3
Kg per a trip	20	15	4.5	3									27	11
Crab gill net combining with other fishing gear														
Not specify		1												
Specify	1		7		1				6				12	
Kg per a trip	13		81		15				28				83	
Collapsible crab trap combining with other fishing gear														
Not specify														
Specify	2												1	4
Kg per a trip	16												30	15

2.2 Source of Catch Distribution

Table 15 clarifies intermediate source of catch distribution, which roughly categorized into two sources. One is inside village fish-trader, other is outside village fish-trader. Type of catch distribution classifies two types are fresh and boiled catch products. Fishers, who operate crab gill net only and crab gill net combining with other fishing gear, sell fresh crab catch products to inside village fish-trader found at village nos. 1 and 2. Fishers of village no. 7 occupy in collapsible crab trap only, both crab gill net and collapsible crab trap, crab gill net combining with other fishing gear and collapsible crab trap combining with other fishing gear preferably sell fresh crab catches to outside village fish-trader. Fishers give more information that crab catches gained from crab gill net are big size, which demanded by market, and so far, marketable price is also high. Fishers decide to sell boiled crab products when they get small sized crab that this does not get reasonable marketable price. Fishers sell crabmeat to fish-trader after they boiled and took out crab shells. Crabmeat price is 160 Baht per kg. Crab catches hauls from collapsible crab trap gear; they are mostly sold in crabmeat. This is because crab size is getting small and smaller.

2.3 Average Size of Catches

Table 16 and Table 17 are reference data that collected from sampled crab gill net and collapsible crab trap fishers at Pakklong Sub-district in year round 2002 (Petchkamnerd, Sunarattanchai and Auimrod, 2003). Table 16 discloses that mean of length of crab catches hauled from collapsible crab trap is 9.17 cm of male blue swimming crab which is smaller size comparing to female blue swimming crab and other species. Table 17 also points out the mean of length of male blue swimming caught from crab gill net is only 11.8 cm. This is even a bit bigger than crab catches coming from collapsible crab trap, but its size is still small.

Part III Fishing Operational Cost of Crab Fisheries

Fishing operational cost is information to assess how much fishers spend for elementary variable costs to carry out daily trip of fishing operation. Objective of this part is to clarify amount of elementary variable costs is eligible to spend for a fishing operation in a trip. Items of elementary variable costs requires for a fishing trip consist of number of ice, fuel oil and fish bait and including number of crews.

Fishing operation costs in a trip classifies by type of fishing gear engagement, which it is different items of operational costs. Basic items of fishing operational costs are ice and fuel oil in any type of fishing gear engagement. Collapsible crab trap and traditional crab trap fishing operational costs have to spend for number of fish bait. Table 18 shows average number of supply eligible for fishing operation in a trip by type of fishing gear employment. This table gives notification that fishers who mainly employ in crab gill net fishing gear do not use ice, this is because they bring crab gill net to harvest crab catches on shore. After they finished crab harvest, then they bring all crab catch to fish-trader's place or fish collector who assist outside village fish-trader to compile crab catches from fishers.

Crab gill net combining with other fishing gear fishers spends a few fuel oil for fishing operation. This confirms the reliability of this information when do crosschecking with data shows in Table 13. Table 13 makes confirmation that this type of fishers do fishing operation at zone II and zone III where is not far from shore. However, fishers of village no. 7 spend many liters of fuel oil, perhaps, they cruise their fishing boat from north to south of zone II and zone III, but they do not operate beyond 3 km of coastal areas.

Table 19 illustrates elementary variable costs of collapsible crab trap fishing operation that the items consist of volume of ice, fuel oil and number of baits. Fishers employ in collapsible crab trap combining with other fishing gear, who living at village no. 1, use average number of bait is 17 kg (average number of trap is 210 units which see Table 12). Fishers engage in collapsible crab trap only of village no. 7 use average number of baits is 9 kg (average number of trap is 201 units which see Table 12).

Table 15 Intermediate source of catch distribution by type of engagement and by type of products

Village no.	Moo 1		Moo 2		Moo 3		Moo 5		Moo 5*		Moo 6		Moo 7	
	Fresh	Boiled	Fresh	Boiled	Fresh	Boiled	Fresh	Boiled	Fresh	Boiled	Fresh	Boiled	Fresh	Boiled
Crab gill net only														
Not specify	2(40)												1(33)	
Inside village	2(40)		5(63)	2(25)	1(50)						1(50)		1(33)	
Outside village	1(20)		1(12)		1(50)						1(50)		1(33)	
Collapsible crab trap only														
Not specify														
Inside village													1(8)	
Outside village													8(67)	3(25)
Traditional crab Trap														
Not specify														
Inside village														
Outside village	2(100)													
Both crab gill net and collapsible crab trap														
Not specify													1(25)	1(25)
Inside village	1(100)	1(100)											1(25)	1(25)
Outside village													2(50)	2(50)
Crab gill net combining with other fishing gear														
Not specify														
Inside village			5(71)	1(14)	1(50)		1(50)		2(33)				1(8)	
Outside village	1(100)		2(29)		1(50)		1(50)		4(67)				11(92)	
Collapsible crab trap combining with other fishing gear														
Not specify														
Inside village														
Outside village	2(75)	1(25)											4(80)	1(20)

Table 16 Length of crab from collapsible crab trap collected from January-December 2002 at Tambol Pakklong, Pathew District

unit: cm

Species	Min-Max	Mode	Mean
Blue swimming crab (Male)	5.0-13.5	9	9.17
Blue swimming crab (Female)	6.5-14.0	9.5	9.56
Crucifix crab	6.0-11.0	8.5	9.55
Mud crab	11.5	11.5	11.5

Source: Petchkamnerd, Suanrattanachai and Auimrod, 2003

Table 17 Length of crab caught by crab gill net collected from January-December 2002 at Tambol Pakklong, Pathew District

unit: cm

Species	Min-Max	Mode	Mean
Blue swimming crab (Male)	8.5-15.5	12.0	11.8
Blue swimming crab (Female)	9.0-15.5	12.5	12.91
Crucifix crab	9.0-14.0	10.5	12.39
Mud crab	13.5	13.5	13.5

Source: Petchkamnerd, Suanrattanachai and Auimrod, 2003

Table 18 Operational costs of crab gill net

Village no.	Crab gill net only				Crab gill net combining with other fishing gear				Both crab gill net and collapsible crab trap			
	not specify	specify	Ice(kg)	Fuel oil(l)	not specify	specify	Ice(kg)	Fuel oil(l)	not specify	specify	Ice(kg)	Fuel oil(l)
Moo1	1	4	0	4.5		1	0	3		1	0	10
Moo2		8	0	2.68		7	0	4.85		1	10	3
Moo3		2	0	11.5		1	0	5				
Moo5(Pakklong)						2	0	5				
Moo5(Saithong)						6	0	6.3				
Moo6		2	0	2		2	0	2				
Moo7		3	0	23.66		12	1	44.91		2	1	15.5

Table 19 Operational costs of crab trap fisheries

Type of engagement	Village no.					
	Moo1		Moo2		Moo7	
	Not specify	specify	Not specify	specify	Not specify	specify
Collapsible crab trap only						
Ice(kg)						8
Fuel oil(l)						5
Biat(kg)						3
						8
Collapsible crab trap combining with other fishing gear						
Ice(kg)		2				4
Fuel oil(l)		20				10
Biat(kg)		5				4
		17				9
Both crab gill net and collapsible crab trap						
Ice(kg)		1	1		3	1
Fuel oil(l)		20				10
Biat(kg)		10				3
		15				9
Traditional crab trap						
Ice(kg)		2				
Fuel oil(l)		0				
Biat(kg)		0				
		8				

Table 20 clarifies number of crews by type of fishing boat in crab gill net fisheries in Pakklong Sub-district. Most of respondents did not give information how many crews are on their fishing boat. Fishers operate crab gill net combining with other fishing gear of village no. 7 with using long tailed boat; have average number of crews only 1 crew on board. This crew mostly is member of family like son or brother or relatives. The fishers live at village no. 7, who use inboard powered boat, have hired number of crews around 3 crews on board in average. A crew of this number is son or brother or relatives of fishers, other two crews are hiring labors.

Part IV Factors to A Change of Fishing Efforts and Capacity in Crab Fisheries

Part IV clarifies what factors give impacts to number of crab gill net and collapsible crab trap fishing gear increased or decreased. The factors consider through advantage and disadvantage proficiency of crab gill net and collapsible crab trap fishing gears in fishing operation. Other factors highlight on fish-trader (local middlemen) and fishers relationship, which this is on-going a patronage system in fishing community development.

4.1 Proficiency of Crab Gill Net and Collapsible Crab Trap

Part IV places an emphasis on what factors stimulate local fishers to decide that they increase and/or decrease number of fishing efforts and change type of fishing gears. This part highlights on advantage and disadvantage of crab gill net and collapsible crab trap with eight parameters which are 1) persistence, 2) enduring period of use, 3) price, 4) effectiveness in capture, 5) easy to harvest, 6) convenient to carry out, 7) size of crab, and 8) operational cost per trip.

Table 21 is comparative table of advantage and disadvantage between crab gill net and collapsible crab trap based on eight parameters. 47% and 50% of respondents agreed that crab gill net have no longer persistence and enduring period of use. This may be damaged by crab catches when they harvest crab catches or damaged by other crustaceans or molluscs. 62% and 66% of respondents coincide that crab gill net is effective in capture and is convenient to carry out on board. 73% of respondents strongly agree that crab gill net is efficient to catch bigger size of crab catch than collapsible crab trap.

Actually, crab gill net fishers live at village no. 2 criticized that they stopped operating crab gill net gear at recent, because fishers live at adjacent village increase number of crab trap gears and operate crab trap very near shore which less than 1 km. Crab trap fishers harvest all size of crab catch without crab sized selection. This lead to rapidly decline number of crab resources. Crab gill net fishers lose in crab fishing operation that they gain very little number of crab catch and this gain cannot cover operational costs. An increase of crab trap without controlling and no fishing zone management lead to conflict between crab gill net and crab trap fishers in competition of crab resource utilization.

4.2 Patronage Relationship in Crab Fisheries

Chart 1 shows patronage relationship of local middlemen and fishers. Catch collector assists local middlemen to assembly catch products both fresh catches and crabmeat from fishers, then keep for a few days and send all catch products to local middlemen when they come to the village.

Patronage relationship is between local middlemen and fishers in crab fisheries considered through Table 22.1 to Table 22.3. Table 22.1 clarifies type of engagement and patronage components, which are lists of cash, ice, oil, fishing gear and bait. This table expresses total number of respondents who specify and not specify which patronage components they contributed by local middlemen.

Table 22.2 and Table 22.3 continue to give detail that local middlemen provide items of patronage components to fishers like a loan. Local middlemen and fishers have commitment of debt repayment with periods of debt payment, which categorized into four periods are daily, weekly, monthly and yearly. Each period of time means that fishers have to repay debts that they get contribution from local middlemen.

Table 20 Number of crews by type of fishing boat in crab gill net fisheries

Village no.	Both crab gill net and collapsible crab trap					Crabgill net only					Crab gill net combining with other fishing gear			
	Not specify	No. Of crews				Not specify	No. Of crews			Not specify	No. Of crews			
		none	1	2	3		none	1	2		3	none	1	2
M001 Long tailed boat Inboard powered boat	1					4	1			1				
M002 Long tailed boat Inboard powered boat	1					8				6		1		
M003 Long tailed boat Inboard powered boat						1		1						
M005(Pakdong) Long tailed boat Inboard powered boat										2				
M005(Saithong) Long tailed boat Inboard powered boat										5		1		
M006 Long tailed boat Inboard powered boat						2				2				
M007 Long tailed boat Inboard powered boat	3				1	2		1		2		4	1	3

Chart 1 Patronage Relationship of Local Middlemen and Fishers

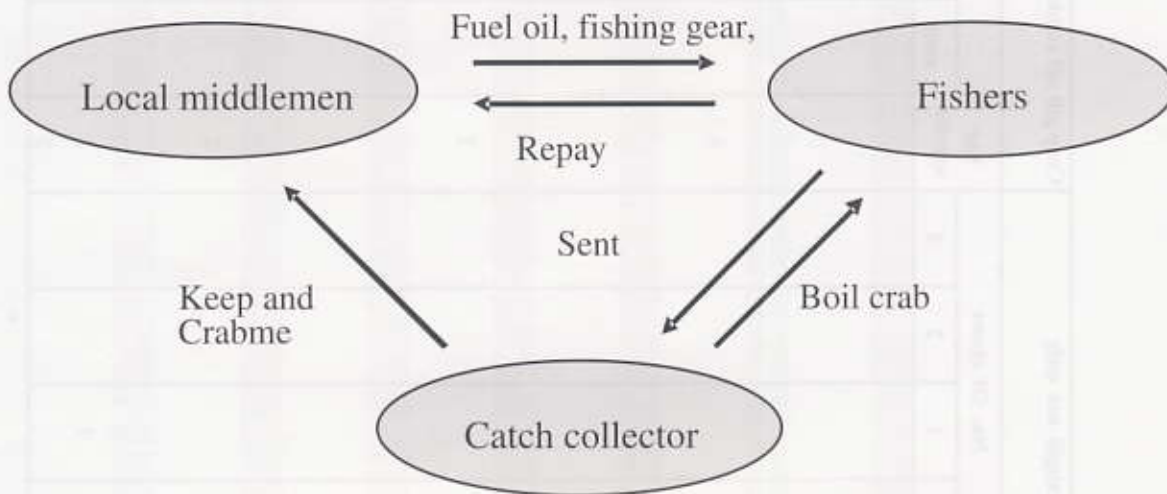


Table 21 Comparable parameters of crab gill net and crab trap fishing gears

Items	Crab gill net		Collapsible crab trap		Total
	Advantage	Disadvantage	Advantage	Disadvantage	
Persistence	23	47	21	9	100
Enduring period of use	21	50	22	8	101
Price	42	30	22	6	100
Effectiveness in capture	62	8	26	4	100
Easy to harvest	53	19	24	4	100
Convenient to carry out	66	4	26	4	100
Size of crab	73	3	17	8	101
Operational cost per trip	58	14	24	4	100

Table 22.1 Patronage relationship of local middlemen and fishers: Five main components

Type of fishing gear	Cash			Ice			Oil			Fishing gear			Bait		
	Total	Not Specify	Specify	Total	Not Specify	Specify	Total	Not Specify	Specify	Total	Not Specify	Specify	Total	Not Specify	Specify
Crab gill net only	20 (100)	15(75)	5(25)	20(100)	20(100)		20(100)	15(75)	5(25)	20(100)	15(75)	5(25)	20(100)	20(100)	
Collapsible crab trap only	8(100)	3(38)	5(62)	8(100)	3(38)	5(62)	8(100)	2(25)	6(75)	8(100)	2(25)	6(75)	8(100)	2(25)	6(75)
Both crab gill net and collapsible crab trap	6(100)	5(83)	1(17)	6(100)	5(83)	1(17)	6(100)	5(83)	1(17)	6(100)	4(67)	2(33)	6(100)	5(83)	1(17)
Crab gill net combining with other fishing gear	31(100)	27(87)	6(13)	31(100)	30(97)	1(3)	31(100)	21(68)	10(32)	31(100)	17(55)	14(45)	31(100)	31(100)	
Collapsible crab trap combining other fishing gear	6(100)	4(67)	2(33)	6(100)	5(83)	1(17)	6(100)	3(50)	3(50)	6(100)	3(50)	3(50)	6(100)	3(50)	3(50)
Traditional crab trap	2(100)	2(100)		2(100)	2(100)		2(100)	2(100)		2(100)	2(100)		2(100)	2(100)	

Table 22.2 Patronage relationship of local middlemen and Fishers: Frequency of repayment (1)

Type of fishing gear	Cash				Ice				Oil				
	Specify	Frequency			Specify	Frequency			Specify	Frequency			
		Daily	Weekly	Monthly		Yearly	Daily	Weekly		Monthly	Yearly	Daily	Weekly
Crab gill net only	5(100)	5(100)							5(100)	5(100)			
Collapsible crab trap only	5(100)	4(80)	1(20)		5(100)	5(100)			6(100)	5(83)	1(17)		
Both crab gill net and collapsible crab trap	1(100)	1(100)			1(100)				1(100)		1(100)		
Crab gill net combining with other fishing gear	6(100)	6(100)			1(100)	1(100)			10(100)	8(80)	1(10)	1(10)	
Collapsible crab trap combining with other	2(100)	1(50)			1(100)	1(100)			3(100)	2(75)	1(25)		
Traditional crab trap													

Table 22.3 Patronage relationship of local middlemen and fishers: Frequency of repayment (2)

Type of fishing gear	Fishing gear					Bait			
	Specify	Frequency				Specify	Frequency		
		Daily	Weekly	Monthly	Yearly		Daily	Weekly	Monthly
Crab gill net only	5(100)	4(80)		1(20)					
Collapsible crab trap only	6(100)	6(100)			6(100)	6(100)			
Both crab gill net and collapsible crab trap	2(100)	2(100)			1(100)	1(100)			
Crab gill net combining with other fishing gear	16(100)	12(75)	2(12.5)	2(12.5)					
Collapsible crab trap combining with other fishing gear	3(100)	2(75)	1(25)		3(100)	3(100)			
Traditional crab trap									

Most of fishers engage in each type of fishing gear agreed to do daily-repaid debts to local middlemen. Fishers deduct daily net-income to local middlemen. Most of fishers also repay daily net-income to deduct costs of fishing gear, which borrow in advance from local middlemen. Fishers employ in collapsible crab trap only, collapsible crab trap combining with other fishing gear and both crab gill net and collapsible crab trap repay daily net-income for bait expenditures.

On-going patronage relation occurs between local middlemen and fishers ensured that fishers could access loan from local middlemen both amount of cash and number of fishing gear to employ in crab fisheries. Local middlemen provide type of fishing gear and number of fishing gear as fishers request. This leads to a change of type of fishing gear and number of fishing gear, which impacted, by patronage relation.

4.3 Common Problems in Crab Fisheries

This subject has objective to ratify fishers' opinion whether they notify any problems in crab fisheries. Table 23 classifies what fishers notify problems in crab fisheries, which are mainly, listed conflict among fishers, low fish price, catch decrease, high operational costs and others. Each type of fishers' engagement responds what they notify.

81% of crab gill net combining with other fishing gear and 65% of crab gill net fishers ratify that there is conflict among fishers. 50% of both crab gill net and collapsible crab trap and 42% of crab gill net fishers recognize low fish price is a common problem. 60% of crab gill net only and 55% of crab gill net combining with other fishing gear have notification of catch decrease. 50% of both crab gill net and collapsible crab trap and 48% of crab gill net combining with other fishing gear agree that high operational cost is common problems in crab fisheries. However, 12-25% of fishers occupy in collapsible crab trap only recognize that they are facing all main items of common problems particular item of catch decrease and conflict among fishers.

V Summary of the Survey Results

Fishers engage in crab fisheries classified into six types by type of employed fishing gears. The fishers' classifications are 1) crab gill net only; 2) collapsible crab trap only; 3) both collapsible crab trap and crab gill net; 4) crab gill net combining with other fishing gear; 5) collapsible crab trap combining with other fishing gear; 6) traditional crab trap. These types of fishers normally own their fishing both which length of boats categorized into four types. Categories of length of fishing boats are 1) less than 6 m.; 2) between 6-9 m; 3) between 10-12 m and 4) more than 12 m.

Capacity of fishing efforts highlights on length of crab gill net and number of collapsible crab trap units and mesh size. Fishers live in village no. 7 employing in crab gill net only using the deep sea net have owned average length of crab gill net around 8,400 m and average length of shallow sea net is 5,350 m. Fishers occupy in both crab gill net and collapsible crab trap fisheries owned small sized wire of collapsible crab trap units around 270 units which have residence at village no. 7. Unit of collapsible crab trap used net mesh size which categorized into three categories are less than 2.5 cm, 2.5-3.5 cm and more than 3.5 cm.

Number of fishing effort and its type leads to different number of average catch per trip which calculated by total catch divided by number of respondents who gave information. Fishers, who engage in crab gill net only at village no.1, are representative of respondents that average catch per trip is 24 kg per trip per a respondent. Fishers employ in crab gill net combining with other fishing gear living at village nos. 1 and 7, they gained average catch per trip is 81 kg and 83 kg, respectively.

Table 23 Common problem in crab fisheries

%

Type of fishing gear	Conflict of		Low fish price		Catch		High operation		Others	
	not specify	specify	not specify	specify	not specify	specify	not specify	specify	not specify	specify
Crab gill net only	35	65	60	40	40	60	60	40	95	5
Collapsible crab trap only	75	25	88	12	75	25	88	12	88	12
Both crab gill net and collapsible crab trap	83	27	50	50	50	50	50	50	100	0
Crab gill net combining with other	19	81	58	42	45	55	52	48	100	0
Collapsible crab trap combining with other fishing gear	50	50	100	0	83	27	83	27	100	0
Traditional crab trap	100	0	100	0	100	0	100	0	100	0

Factors impact to a change of fishing efforts and capacity in crab fisheries considered on 1) proficiency of crab gill net and collapsible crab trap and 2) patronage relationship between local middlemen and fishers in crab fisheries. Fishers agree that collapsible crab trap is proficient to use longer than crab gill net, which easily damaged by crustaceans and molluscs. However, fishers strongly agree that crab gill net is efficient to catch bigger size of crab catch than crab trap. On-going patronage relationship happens between local middlemen and fishers make insurance that fishers can access loans from local middlemen both amount of cash and number of fishing gear. This leads to a change of type of fishing gear and number of fishing efforts.

VI Recommendation

6.1 Justification of DOF's policy on 'the enlargement of bottom net mesh size of collapsible crab trap gear

The DOF, Thailand has launched the enlargement of bottom net mesh size of collapsible crab trap activity to local fishers in Pathew District in year 2003. This activity has objective to promote campaign of selective fishing operation in crab fisheries and building awareness of responsible fishing to local fishers. The DOF subsidized the fishers who applied the activity by providing number of collapsible crab trap with bottom net mesh size 2.5 inches.

The results of this activity, which gained from field observation, show that the fishers still get small-sized crab catch. On ecological point of view, number of crab resources may be rapidly declined, because there is a lack of matured or fertilized crab resources to make recruitment of new stock of crab with getting high survival rate. Increase number of collapsible crab trap unit and non-selective size of crab resources are critical cause to damage ecology of crab fisheries resources to get small and smaller size.

The enlargement of bottom net mesh size of collapsible crab trap activity may justify further by making zoning management for collapsible crab fisheries. Principle of making zoning management should be considered on distance how far distance should be allowed and sea water depth how deep should be. This principle should be varying from place to place, which mainly considers on feasibility of geographic conditions and debates fishers' agreement.

6.2 Cost-effective analysis of collapsible crab trap fisheries to decrease numbers of fishing capacity

Fishers conventionally prefer to fish a large number of catch without making size selection. They think that a large number catch means a big amount of incomes. This puts them catch all size and all species to sell catches at market. This way of thinking may be true, but it is not effective way to utilize aquatic resources reaching long-term use.

Fishers using collapsible crab trap fishing gear also think liked other fishers. Cost-benefit analysis of collapsible crab fisheries probably needs to clarify how much cost-returns the fishers would get from this type of fishing gear operation. When this considers on economic point of view, costs of fishing operation consist of fuel oil, food staff, bait expenditures, but fishers do not include opportunity costs of themselves to work in another jobs. Fishers' wives spend one day to produce crabmeats by taking out crab shells. They just think that they get better income of crabmeats than sell crab in fresh products.

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Annex 1 Objectives of Questionnaire Design for Crab Fishereis Survey

	Objective	Parameters
Part I General information in Crab Fisheries Sector	<ol style="list-style-type: none"> 1. To characterize capacity of fishing gear and fishing boat 2. To verify fishing ground, season and operating time to use in formulation of development plan and activities implementation 	<p>Fishing boat, fishing gear,</p> <p>Fishing ground, season, operating time</p>
Part II Crab Catch Landings and Distribution	<ol style="list-style-type: none"> 1. To identify categories of catch production 2. To clarify channel of catch distribution at community level. 3. To clarify relationship of fishers and fish trader in crab fisheries through trade of crab production, distribution and access of credit source 	<p>Kind of catch production</p> <p>Place of catch distribution</p> <p>Fisher, fish-trader, source of credit</p>
Part III Fishing Operation Costs of Crab Fisheries	<ol style="list-style-type: none"> 1. To assess how much cost that fishers have to spend for a fishing trip 	Fishing cost
Part IV Factors to a Change of Crab Fishing Effort and Capacity in Crab	<ol style="list-style-type: none"> 1. To clarify reason why fishers engage in crab gill net and/ or collapsible crab trap 2. To pinpoint factor of crab gill net and collapsible crab trap that lead to increase and/or decrease of these two types of fishing gears 	Number of collapsible crab trap and number of crab gill net

Annex 2 Questionnaire Design for the Survey

Crab Fisheries Survey to Sustain Community-Based Economic Development: In Pakklong Sub-District, Pathew District, Chumphon Province

Name of respondents

AddressPakklong Sub-District, Pathew District, Chumphon Province

Name of interviewerDate of interview

Part I General Information in Crab Fisheries Sector

1. Type of Fishing gear
 - crab gill net
 - collapsible crab trap
 - Both type of fishing gear
2. Type of fishing boats
 - Long tailed boat: number boats Lengthm
 - Inboard powered boat: numberboats Lengthm
3. Frequency of fishing operation in month
 - 3.1 Major type of fishing gear (use less than 15 days per month)
 - Crab gill net
 - Collapsible crab trap
 - Others, please specify
 - 3.2 Minor type of fishing gear (use less than 15 days per month)
 - Crab gill net
 - Collapsible crab trap
 - Others, please specify
4. In year round, better income get from which type of fishing gear (for who using both crab gill net collapsible crab trap)
 - Crab gill net
 - Collapsible crab trap
5. Effort of fishing gears

Crab gill net										Collapsible crab trap					
Deep sea waterm					Shallow sea waterm					Small sized wireinches			Big sized wireinches		
Unit	Unit per m	Total	Price per unit	Total	Unit	Unit per m	Total	Price per unit	Total	No.	Price per unit	Total	No.	Price per unit	Total

6. - Period of fishing operation and net mesh size

Crab gill net		Collapsible crab trap	
Fishing ground areas		Fishing ground areas	
Fishing season (month).....		Fishing season (month).....	
Period of fishing operation.....		Period of fishing operation.....	
Mesh size use at shallow sea water (cm)	Mesh size use at deep sea water (cm)	Mesh size of small sized wire (cm)	Mesh size of big sized wire (cm)

Part II Crab Catch Landings and Distribution

1. Number of catch per trip

Crab gill net (Kg per trip)	Collapsible crab trap (Kg per trip)

2. Catch distribution

Source of catch distribution	Buyer (specify name)
Sell to fish trader in the same village	1.....
	2.....
	3.....
Sell to fish trader outside village	1.....
	2.....
	3.....
Others	

3. Type of catch product selling in a trip

Fresh (baht per Kg)			Boiled (baht per Kg)	Crab meats (baht per Kg)		
Small	Medium	Large		Paddy leg	All meat	Totally sell

Part III Fishing Operation Costs of Crab Fisheries

4. Variable costs per a trip of fishing operation

Items	Price	Unit per trip	Amounts (baht)
Icebaht per box		
Fuel oilbaht per liter		
Bailbaht per Kg		
Crewbaht per person per trip		

Part IV Factors to a Change of Crab Fishing Effort and Capacity in Crab Fisheries

5. Proficiency of Crab gill net and Collapsible crab trap (put (/))

Item	Crab gill net		Collapsible crab trap	
	Advantage	Disadvantage	Advantage	Disadvantage
1. Persistence				
2. Enduring period of use				
3. Price				
4. Effectiveness in capture				
5. Easy to harvest				
6. Convenient to carry out				
7. Size of crab				
8. Operational cost per trip				

6. Patronage Relationship between Local middlemen and fishers (put (/))

Items	Frequency			
	Daily	Weekly	Monthly	Yearly
Cash				
Ice				
Fuel oil				
Fishing gear				
Bait				

Remark:

Daily means borrow in the morning, deduct tomorrow evening

Weekly means borrow, then deduct within the week

Monthly means borrow, then deduct in the end of the month

Yearly means borrow, then deduct in the end of the year

7. Facing problems in crab fisheries

- Conflict between resource users
- Low selling price
- Decrease of aquatic resources
- High operational costs
- Others.....

Annex 3 CPUE from crab gill net collected from January-December 2002 at Tambol Pakklong, Pathew District

Species	CPUE	
	kg/net 100 m length	%
Total catch	1.09	100
Blue swimming crab	1.05	96.38
Crucifix crab	0.03	2.89
Other species	0.01	0.73
Sampling size (m)	105,280	

Annex 4 CPUE from collapsible crab trap collected from January-December 2002 at Tambol Pakklong, Pathew District

Species	CPUE	
	g/trap	%
Total catch	33.98	100
Blue swimming crab	33.13	97.5
Crucifix crab	0.39	1.15
Three spot swimming crab	0.37	1.09
Mud crab	0.07	0.21
Other species	0.02	0.06
Sampling trap	9.675	

Source: Petkamnerd, Suanrattanachai and Auimrod, 2003

Annex 5 Series of picture of crab catches



Picture 1 Crab catches coming from collapsible crab trap operation



Picture 2 Crab catches coming from collapsible crab trap after boiled



Picture 3 Boiled crab catches taken crab shell to get crabmeats



Picture 4 Crab catches gained from crab gill net operation

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