



**Bi-annual Project Progress Report  
of  
Integrated Coastal Resources Management in Pathew District  
(ICRM-PD)  
July - December 2006**

**Compiled by**

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## **Bi-annual Project Progress Report**

- Project title** : Integrated Coastal Resources Management in Pathew District (ICRM – PD)
- Program Categories** : Programs under the ASEAN-SEAFDEC FCG Mechanism
- Program Title** : Capacity Building of Human Resources and Participation in Integrated Coastal Resources Management
- Duration of Project** : 5 years and 3 months  
- 1<sup>st</sup> Phase: October 2001 – December 2004 (under TF-1)  
- 2<sup>nd</sup> Phase: January 2005 – December 2006 (under TF- 2)
- Executing Agency** : Department of Fisheries, Ministry of Agriculture and Cooperatives, Thailand
- Cooperating Agency** : SEAFDEC/TD
- Funding Agency** : Japanese Trust Fund (the FCG scheme)  
DOF Thailand (Co-financing)
- Proposed Budget** : USD 23,260 (Under Japanese Trust Fund input – year 2006 only)  
Baht 15,200,000 (DOF Thailand Input – for 5 years)
- Reporting period** : **July to December 2006**

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10th March 2007

## **TABLE OF CONTENTS**

	<u>Page</u>
1. GENERAL ACCOUNT .....	3
2. ACTIVITIES .....	3
3. OUTCOMES .....	13
4. MAJOR CONSTRAINTS .....	14
5. REPORTS PREPARED .....	15

### **ANNEX**

Annex 1 : Annual activity monitoring sheet in 2006 .....	16
Annex 2 : Report on Socio-economic survey .....	19
Annex 3 : Report on Introduction of the Japanese Model Crab-bank to a fishing community in Thailand .....	21
Annex 4 : Report on Experimental Babylonia Shell Culturing – 2 <sup>nd</sup> Trial .....	28
Annex 5 : Report of Local Seminar on Concept for Coastal Fisheries Management .....	40
Annex 6 : Travel Report to Chumphon (August) .....	49
Annex 7 : Report on Study Tour to Trad Province .....	54
Annex 8 : Report of Fish Enhancing Device (FED) Performance in Pathew, Chumphon ...	58
Annex 9 : Minutes of 10 <sup>th</sup> ICC Meeting .....	64

## **1. GENERAL ACCOUNT**

The project is terminated at the end of December 2006 as scheduled.

As a whole, the project has progressed on the right track compatibly with the project design and the project phasing out process was followed.

The organizational structure of PAG/PFG has been further strengthened with completion of the new office premises and initiation of a credit scheme.

The final project evaluation was conducted.

The final socio-economic survey was conducted.

The Japanese style crab bank was tried out.

The women's group activities have further progressed with the village No.1 , 4 and 6.

The Babylonia shell culturing experiment was completed.

10 sets of FED were installed and the monitoring of these retention was continued.

The mangrove replanting was arranged by PAG/PFG

The local seminar was held in Chumphon.

The 10<sup>th</sup> ICC meeting was held.

## **2. ACTIVITIES**

Activities have progressed in line with the Action Plan in general as shown in the Annual Activity Monitoring Sheets in 2006 in Annex 1.

### **2.1. Monitoring survey**

The monitoring socio-economic survey was conducted on 11 – 14 December prior to termination of the project operation in 2006 aimed at measuring changes in socio-economic aspects during the project tenure in the project operational area. The same survey methodology was employed so as to enable to measure socio-economical changes. The data will be analyzed and compiled in early 2007. The detailed survey work is described in Annex 2: Report on Socio-economic Survey.

The regular marine biological survey has been carried out by CMDEC once a month and in-between the SEAFDEC/TD extension worker conducts supplemental surveys once a month.

The regular marine environmental survey has been jointly carried out every two months by CMDEC and MCR.

The survey on mapping for fishing ground and gear was initiated in January 2006 and continued until the end of December. The SEAFDEC/TD researcher and/or the extension worker visited the site to collect the data once a month. The final analysis of the data will be made in 2007.

## 2.2. Encourage and extend the CBRM concept

### Trend of resources dynamics

In the local seminar, it was reported that shrimp and crab catches and CPUEs had been increasing year by year and the sizes have been getting larger as well as seen in the following table 1 and 2. It is positively assumed that the increasing of crab catch is attributed to the series of resources management efforts like enlargement of mesh size of crab traps and crab bank.

Table 1: Swimming crab catch record in Pathew District

Data: CMDEC 2007

year	Average carapace length (cm)		Total catch(Ton / year)
	Male	Female	
2002	8.60	8.97	-
2003	9.17	9.56	72.1
2004	9.55	10.01	87.6
2005	10.15	10.34	112.6
2006	10.39	10.62	142.6

Table 2: Shrimp catch per boat / trip (kg)

Source of data: CMDEC 2006

Species	Year			
	2002	2003	2004	2005
1. Penaeus	2.92	4.58	3.68	4.02
2. Metapenaeus	0.18	0.68	1.13	2.57
3. Others	0.48	0.13	0.63	0.33
4. Total	3.58	5.39	5.44	6.92

As to shrimp production, releasing fingerling 2 to 3 million every year may be attributed to this increase, although it is not scientifically proved yet. The CMDEC plans to start a research work on tracing released shrimp in 2007 so as to investigate the correlation between the increases of shrimp production and the discharging of seeds. Aimed at training in this shrimp releasing experiment with tagging, the project arranged a training course with the Professor Fushimi from Japan on 22-23 December 2006 in CMDEC. In this training course, 5 researchers from CMDEC and 2 from SEAFDEC/TD participated. A Japanese NGO, HunetASA, promised to donate necessary tag-guns and tags for the releasing experiment of shrimp in middle 2007.

### Aquaculture zoning

There was a certain conflict on allocation of the spaces for culturing among 20 mussel culturists in 2005. The request for demarcation of the aquaculture area was initially submitted to the Provincial Fisheries Office in 2003 for promulgation, but it was suspended until the Sea Food Bank scheme be finalized. This issue was further raised up at the 7th IC meeting held in April 2006 for expediting the matter. The Provincial Fisheries Officer explained that the implementation of the scheme was

just started in 2005 with 3 year tenure; i.e. 2005 for training, 2006 for allocation of the space and 2007 for funding, and the aquaculture zoning proposal should be incorporated in the government scheme of Sea Food Bank. In doing so, the provincial office promised to take some intermediate action meantime, however the mapping process has not been completed yet and no further action has been made to date. Moreover, its implementation posed a political question especially after the revolution taken place in September 2006, when the Federation of Small-scale Southern Fishermen submitted a petition demanding scrapping the scheme. Under such situations, it is not foreseeable in the near future to advance the attempt of demarcation of aquaculture zoning.

#### Crab bank

The leader of the Crab Bank visited Japan from 19 to 25 June as a member of the study tour team and his experience and findings gained through the study tour was disseminated to other members at the Fishers Workshop organized on 10 August 2006. His presentation is comprehensive and the outcome was fully understood by other members of PFG/PAG. As a result, it was decided to introduce the Japanese system that gravid crabs were marked with cross (X) on their carapaces and released them directly in the sea.

To start up the system, a workshop to demonstrate the newly introduced system to both the sub-fishers groups, i.e. Crab Trap Fishing Sub-group and Crab Gill-net Fishing Sub-group, was organized on 24-25 October at the Village No.7 and the Village No.1 respectively. In this workshop, 15 out of 16 Crab Trap Fishing Sub-group members and 5 out of 7 Crab Gill-net Fishing Sub-group members participated to learn the new system. SEAFDEC/TD provided them with necessary tools for marking and recording; e.g. towels, pens and markers and demonstrated them how to mark "X" and record the logbooks. This exercise would be continued until the end of March 2007 as a trial. Thereafter, its practical applicability is evaluated with the concerning fishers and its continuation would be decided. Meantime, SEAFDEC/TD prepares praises for the fishers who have released gravid crabs most for stimulating them. *(Actually, the gravid crab releasing exercise continued until January 2006 in the village No.7 and until March and further onwards in 2007 in the village No. 1. During this period, the total number of 1,191 gravid crabs were release to the sea. The detailed development of this scheme is dealt at length in Annex3: Report on Introduction of the Japanese model crab-bank to a fishing community in Thailand.)*

SEAFDEC provided 200pcs of T-shirts to the Crab Bank in a bid to support the scheme financially. One shirt is sold at 100Baht and the sales are used for the crab bank activity.

#### Local enforcement unit (LEU)

Chumphon Fisheries Enforcement Unit (CFEU) assisted the PAG in organization of a volunteer group to carry out the local enforcement activity in May 2006. This group was further divided into two patrol teams. They will be stationed in the village No.5 in where AoBoTo is going to build a CFEU office. The CFEU plans to bring a tube boat to the site and conduct patrolling at least 10 days a month. *(Actually, aimed at upholding this attempt, C MDEC disbursed Baht 10,000 per month to CFEU in 2007 but no patrolling have been taken place to date until the end of March 2007.)*

### **2.3. Encouragement of local businesses**

#### Village No. 1

As seen in the following summary of transaction in 2006, the women's group yielded Baht 161,797 as the gross income through their business activity.

**Table 3: Transaction sheet in production of Anchovy products for the Group No.1. (2006)**

No.	Month	Sales	Expenditure (Bath)							Gross income (Bath)	
			Raw materials	Transport	Salary				Misc.		Total Expenditure
					Employee	Member	Accountant	Total			
1	January	96,067	48,911	6,060	7,500	11,500	1,500	20,500	11,618	87,089	8,978
2	February	129,102	81,107	4,767	7,963	11,500	1,500	20,963	5,114	111,951	17,151
3	March	171,852	98,984	8,000	9,469	10,000	1,500	20,969	28,350	156,303	15,549
4	April	125,345	82,000	6,200	6,001	12,000	1,500	19,501	6,741	114,442	10,903
5	May	137,711	92,674	6,200	8,740	12,000	1,500	22,240	4,352	125,466	12,245
6	June	201,692	144,820	10,500	7,790	12,000	1,500	21,290	4,386	180,996	20,696
7	July	129,168	143,684	6,924	23,785	3,000	5,500	32,265	3,810	186,683	-57,515
8	August	203,080	142,931	10,282	15,352	3,000	5,500	23,852	2,924	179,989	23,091
9	September	207,765	218,192	13,655	17,648	3,000	5,500	26,148	8,650	266,645	-58,880
10	October	225,480	155,776	10,880	46,386	3,000	7,000	56,386	4,800	227,842	-2,362
11	November	206,216	157,907	10,393	27,924	3,000	7,000	37,924	9,118	215,342	-9,126
12	December	343,180	105,961	6,240	35,968	3,000	7,000	45,968	3,944	162,113	181,067
	<b>Total</b>	<b>2,176,658</b>	<b>1,472,947</b>	<b>100,101</b>	<b>214,506</b>	<b>87,000</b>	<b>46,500</b>	<b>348,006</b>	<b>93,807</b>	<b>2,014,861</b>	<b>161,797</b>

Of this gross income amounting to Baht 161,797, the total amount of Baht 113,233 was distributed to 71 members depending on the numbers of share per each member as seen in the following table. The balance amounting to Baht 32,384 was retained in the group fund as the group share. This means that Baht 1,595 was distributed to each member on average a share dividend in 2006.

**Table 4: Distribution of the gross income in 2006 (Group No.1)**

Gross income (Bath)	10% for committees' reward in kind (Bath)	Remained (Bath)	Number of share			Amount distributed per share (Bath)	Total amount distributed to members (Bath)	Total amount retained with the group (Bath)
			Member	Group	Total			
161,797	16,180	145,617	7,112	2,034	9,146	16	113,233	32,384

Following to continued efforts having been exerted by the project on introduction of the proper bookkeeping and accounting system from the outset, the group recruited a part-time accountant from January 2006 and entrusted management of the accounting books. She was further turned to be a full-time employed from July 2006. With such an input, the accounting system has been evidently improved as witnessed in the above tables and against such an effort the Cooperative Promotion Office of Chumphon Province awarded the prize for well-maintained accounting system to the group on 26 October 2006.

The quality of the product and packaging has been improved after incorporating advices by Fisheries Technology Development Department (FTDD), DOF, especially in introduction of tray packing method. The products are well recognized and accepted by the OTOP in Chumphon Province.

The production lines have been diversified eight different types of dry anchovy products under the technical guidance by the FTDD. The processing yard was awarded the GMP (Good Manufacturing Practices) by the Ministry of Health in addition to the good accounting practices by the Chumphon Provincial Office. Corresponding to these efforts in standardization of the quality of products as such, the marketing channels have been expanded in other provinces than Chumphon like in Songkhla. The bottleneck in expanding production emerged in the limited capacity of the

dryer oven. The total amount of standing orders from the regular customers reached 9,000 packets (equivalent to 1,800kg raw material) per month, while the maximum capacity of the old dryer oven was 18kg (in terms of raw material weight) per 8hrs at maximum. They were coping with this limited capacity with round clock operation of 3 shifts, but it was not still sufficient. The FTDD requested to procure a larger and modern oven to meet the required production capacity, otherwise it would result in deterioration of the quality of products. To meet the requirement, SEAFDEC/TD contributed the new dryer over amounting to Baht 32, 240 to alleviate the bottleneck in December 2007. (Actually this machine commissioned its operation in January 2007. Since then, the production volume has been increased by large and the workload has been reduced).

#### Village No. 4

The women's group No.4 started the new venture in selling daily general commodities. To do that, the group applied the SML under the Ministry of Interior for the kick-off fund and Baht 250,000 was granted to them in May 2006. The group organized a commodities retailing sub-group appealing the group members to join this new venture. As the result 36 members joined this sub-group. The first meeting of this sub-group was made on 2<sup>nd</sup> June and the 11 committee members including the chairperson and vice-chairperson were elected. The group recruited a shopkeeper and opened the shop on 9<sup>th</sup> June 2006. The first stocktaking was made on 25<sup>th</sup> July. The gross income showed the profit of Baht 7,162 in 2006 and was distributed among members as per the following calculation.

Out of total income, it is distributed as;

- Bonus for regular buyers (members)	:	10%
- Remunerations for committee members	:	20%
- Bonus for the shopkeeper	:	5%
- Reserved for interests	:	5%
- Saving	:	20%
- Administration fee	:	15%
- Share for members	:	25%

The MSL will evaluate the activity after one year's operation and depending on the outcome they may further provide additional funds to expand the business.

**Table 5: Transaction sheet for the Group No.4. (2006): Producing dry flowers**

No.	Month	Sales	Expenditure(Baht)				Gross income (Baht)	Saving (Baht)	Balance (Baht)	Members attending to work (Person)	Share divided to a participant (Baht)
			Raw materials	Transport	Misc.	Total expenditure					
1	January	10,000	700	1,000	300	2,000	8,000	1,500	6,500	8	812.50
2	February	0	0	0	0	0	0	0	0	0	0.00
3	March	9,000	500	0	0	500	8,500	700	7,800	7	1,114.29
4	April	0	0	0	0	0	0	0	0	0	0.00
5	May	12,500	600	0	0	600	11,900	1,200	10,700	7	1,528.57
6	June	7,500	300	0	0	300	7,200	1,000	6,200	7	885.71
7	July	6,500	300	0	0	300	6,200	1,000	5,200	7	742.86
8	August	3,500	200	0	0	200	3,300	500	2,800	6	466.67
9	September	0	0	0	0	0	0	0	0	0	0.00
10	October	0	0	0	0	0	0	0	0	0	0.00
11	November	24,000	19,000	0	0	19,000	5,000	2,500	2,500	6	416.67
12	December	20,000	15,345	0	0	15,345	4,655	2,000	2,655	6	442.50
	<b>Total</b>	<b>93,000</b>	<b>38,845</b>	<b>1,000</b>	<b>300</b>	<b>38,245</b>	<b>54,755</b>	<b>10,400</b>	<b>44,355</b>		<b>6,408.78</b>



The dry flower making for occasions of funeral was continued in 2006. This activity could produce the total net-income of Baht 44,355 which resulted in distribution of Baht 6,409.76 to each participating member on average as remuneration in 2006 as seen in the above table 5.

On the other hand, the production of snack types of food was reduced due to lack of manpower as seen in the following table 6. Only Baht 373.06 was distributed to each participating member as remuneration in 2006.

**Table 6: Transaction sheet in production of snack for the Group No.4. (2006)**

No.	Month	Sales	Expenditure (Baht)				Gross Income (Baht)	Saving (Baht)	Balance (Baht)	Members attending to work (Person)	Share divided to a participant (Baht)
			Raw materials	Transport	Misc.	Total expenditure					
1	January	0	0	0	0	0	0	0	0	0	0.00
2	February	800	348	0	54	400	400	100	300	5	60.00
3	March	0	0	0	0	0	0	0	0	0	0.00
4	April	0	0	0	0	0	0	0	0	0	0.00
5	May	1,800	880	0	50	730	870	100	770	9	85.56
6	June	0	0	0	0	0	0	0	0	0	0.00
7	July	0	0	0	0	0	0	0	0	1	0.00
8	August	800	400	0	40	440	360	0	360	4	90.00
9	September	1,000	450	0	0	450	550	0	550	4	137.50
10	October	0	0	0	0	0	0	0	0	0	0.00
11	November	0	0	0	0	0	0	0	0	0	0.00
12	December	0	0	0	0	0	0	0	0	0	0.00
	Total	4,200	1,878	0	144	2,020	2,180	200	1,980		373.06

The mini-credit scheme is very active. This scheme was initiated in 2001 and the number of current members has increased to 164. The total saving has reached Baht 680,250 and the total interests yielded in 2006 through the transaction amounts to Baht 45,042. Of which, Baht 31,529 was distributed to the members as share dividend after deduction of required expenses like reserves for the next year's operational cost, payment for remunerations for the committee members etc. The bookkeeping and accounting are well maintained by an accountant /a committee member who is also an officer of Sub-District office. The account book is regularly controlled by the Sub-District Office under the supervision of District Office.

#### Village No.6

The main business of the women's group No.6 is batik production. As seen in the transaction sheet for 2006 in the table 7 below, they yielded Baht 62,575 as the gross-income which was divided by two participants. In effect, more members were involved in batik painting work but their names did not appear on the sheet.

The sale of batik shirt in this reporting period has been reduced due to the trend to wear yellow T-shirts more popularly to honour the Majesties of the King. Mass-orders from institutions were hardly received toward the end of 2006. *(It has become more conspicuous in 2007. Also, the group split into three and each sub-group started to produce batik prints individually in 2007.)*

Table 7: Transaction sheet for the Group No 6 (2006) : Producing batik

No.	Month	Sales	Expenditure (Baht)				Gross Income (Baht)	Members attending to work (Baht)	Share divided to a participant (Baht)
			Raw materials	Transport	Misc.	Total expenditure			
1	January	5,400	4,800	0	0	4,800	600	2	300.00
2	February	4,758	4,098	0	0	4,098	660	2	330.00
3	March	5,400	3,800	0	0	3,800	1,600	2	900.00
4	April	9,900	6,600	0	0	6,600	3,300	2	1,650.00
5	May	13,500	9,000	0	0	9,000	4,500	2	2,250.00
6	June	27,000	18,000	0	0	18,000	9,000	2	4,500.00
7	July	26,100	17,045	0	0	17,045	9,055	2	4,527.50
8	August	36,000	32,000	0	0	32,000	4,000	2	2,000.00
9	September	54,000	48,000	0	0	48,000	6,000	2	3,000.00
10	October	60,750	43,200	0	0	43,200	17,550	2	8,775.00
11	November	13,050	9,280	0	0	9,280	3,770	2	1,885.00
12	December	6,500	4,160	0	0	4,160	2,340	2	1,170.00
	Total	262,358	199,783	0	0	199,783	62,575	2	31,287.50

#### Babylonia shell culture

In a bid to test an applicability of Babylonia shell culturing in cages, the experimental babylonia shell culture was conducted for 7 months from August 2005 to February 2006. However, the result was rather pessimistic with mal-growth of the shells, especially after 3 months' culturing. The suspected cause for this could be attributed to the unfavourable sea conditions after November 2005 when the monsoon season set in. Also, some other reasons were suspected as discussed in the report: Experimental Babylonia Shell Culturing (Etoh 2006). The experiment was not satisfactorily conducted as such, and in order to ensure a commercial feasibility in this venture the 2<sup>nd</sup> experiment was conducted for 6 months from March to September 2006 during calm seasons in an improved way incorporating lessons learned through the first experiment.

In this experiment, the shells evidently grew much faster compared with the first experiment and it showed a similar trend of growth rate with the laboratory test conducted in the Chulalongkon University in 2002. The 2<sup>nd</sup> experiment was terminated on 22 September 2006 after passing 185 days' culturing. The outcome was analyzed from the technical as well as economical point views. The result is summarized as follows.

- The expected economic return is negative or just at the marginal break-even point even if it turns to profitable.
- The maintenance of cages requires laborious work in cleaning and repairing and can not be managed within part-time work.
- The cost of seed is still relatively high.
- The growth rate is largely affected by the environmental condition like wind, current, tide etc. therefore it is very fragile and difficult to cope with the weather changes.
- As having been commercially established, the culturing with the concrete tanks or in the ponds may be feasible but such attempts entail huge amount of initial investment.

The full description in the course of this experiment is seen in Annex 4: Report on experimental Babylonia Shell Culturing – 2<sup>nd</sup> trial.

### Crab culturing

An experiment on swimming crab fattening which had been carried out by CMDEC since April 2006 ended up failure with 42 days' feeding. The main cause of the failure rests on missing majority of crab in the cages which was claimed due to being stolen. However, the preliminary result showed some promising trend of growth rate. The weight increased from 26.44gr to 68.57gr on average within 42 days' feeding and its FCR (food conversion rate) was about 22%.

### Comparative Fish culture experiment

In an attempt to compare the profitability and practicability in cage fish culture in use of different types of feed, e.g. fresh fish vs. artificial feed, a comparative experiment began on 22 April, 2006 by the CMDEC team. In this experiment, CMDEC entrusted the experiment to 5 fish farmers who were to culture 1,000 to 4,000 sea-bass depending on the numbers of cages (1,000 fingerlings per cage). In August, all fish cultured by one of them died due to inflow of inundated fresh water to the bay. The experiment is to be continued with other four fish farmers until January 2007. *(The experiment was completed but the result in use of artificial feed was not promising compared with feeding with fresh trash fish. The report is under compilation by CMDEC.)*

## **2.4. Enhance human resources capacity building and participation**

### PFG / PAG

The PFG office was newly renovated at the Chairman's premises in October. The expenses incurred by this renovation were mostly contributed by the chairman of the PFG himself.

The PFG was officially registered with the Provincial Cooperative Promotion Office (PCPO) in Chumphon on the day of 23 December 2005 as the name of Pakklong Aquaculturist Group (PAG) because the duplicated name was already registered with PCPO in 1993. The previous reporting period is the transitional term that the PFG members registered in the membership of PAG. It took long time to persuade some members who were reluctant to move to the reorganized PAG. The leading group and the Chumphon PCPO exerted tenacious efforts in doing so. The number of the new members of PAG reached 120 as of 31 December 2006 and the members of PFG are still 167 (all PAG members still retain the memberships of PFG as well).

The PAG formulated the supplemental Internal By-Law with technical assistance of Chumphon PCPO including provisions of Rules and Procedures for Depositing and Lending Transaction, Rules and Procedures for Loans and Interests and Establishment of Sub-Committee and submitted for approval in May 2006. This draft was further amended a few times and eventually approved in October 2006. By that time, the amount of saving reached Baht 177,767.80 and with this accumulated fund the PAG initiated its transaction of credit scheme on 2<sup>nd</sup> November 2006. Further, AoBoTo provided a free loan amounting to Baht 300,000 to the scheme to be used as the kick-off fund in September 2006 with the conditions of no interest and 5 years' refunding period. The saving scheme is now consisted of 100 members out of 120 PAG members. The share contribution per member varies from 1 to 10 at maximum. The amount of one share is Baht 50. In addition, there is a monthly saving credit from each member to the scheme which amount varies from Baht 100 to 500 per month. In such a way, the credit scheme has been taken off and the transaction sheet and account book are attentively checked once a month by PCPO Chumphon.

#### Local seminar

The local seminar entitled "Concept for Coastal Fisheries Management" was held on 31 August to 1 September in the conference room of CEMDEC, Chumphon. In this seminar, the work progress made during last one year from September 2005 to August 2006 was presented by each institution and group pertinent to the project operation. In this seminar, the participants reached to 78, and among them 52 are leading fishermen and members of women's groups for presentation of their activities.

Some interesting findings are presented in this seminar as follows.

- Productions of shrimp and crab have been increased while those for Indian mackerel and squid tend to decrease, which may be resulted in resource enhancement efforts like releasing fish fingerlings and resources management measures for the formers.
- In general, the quality of coastal waster is satisfactory without any serious pollution.
- In the wake of the observation made in Japan, it was found that that the Japanese style crab bank would be more effective and it should be introduced.
- Local business development in eco-tourism should be sought.

The detailed description of this seminar is seen in Annex 5: Report of Local Seminar on Concept for Coastal Fisheries Management.

#### Fishers' workshop

A fishers' workshop was organized on 10 August 2006 at the project office in Pathew with participants of 30 fishermen, officers from AoBoTo, CMDEC and SEAFDEC/TD. The main agenda in this workshop was (1) disseminating lessons learnt and experiences gained during the latest study tour in Japan among all members of PFG and (2) discussing on how the findings made in Japan reflected and incorporated in the CBFRM approach of the project. In such a way, benefits of study tour would be equally shared among all members of PFG. The Chairman of PFG, the Leader of the Crab Trap Fishing Sub-group and the SEAFDEC/TD Extension worker who joined the study tour to Japan presented their views and findings gained in Japan to the workshop, on which base lively discussions on applicability of these Japanese practices into the project operational area was made. The more detailed description is seen in Annex 6 : Travel Report to Chumphon (August).

#### Study tour

The study tour to the Trad Province was conducted on 8-10 November 2006 in a bid to inspect various activities having been undertaken by the Ban Ped Nai Community. In this study tour, 7 leading members of PFG and 2 members of CMDEC were accompanied by the SEAFDEC/TD staff. The primary objectives in this study tour lay in observing their advanced activity in promotion of eco-tourism that the PAG envisaged developing in Chumphon. Also, they are well known by the activity of the self-regulatory measures for mud crab and mangrove crab harvest with setting the close fishing seasons, which could be applied by the PAG. The study tour was so conducive and fruitful for the leading members of PAG in many aspects as they exchanged views on fisheries group activity development with the committee members of Ban Ped Nai Community in addition to physical inspections for various activities. The detailed description is seen in the Annex 7: Report on Study tour to Trad Province.

### **2.5. Rehabilitate and enhance coastal resources**

#### Installation of FEDs

Recognizing that the FEDs were effective in their function, the AoBoTo agreed to support the

PFG to install 60 sets of FED in the project operational area. However, there was a doubt in the durability. The project installed 10 units of FEDs on 25 August 2005 in collaboration with the Special Five Year Program SDI-4 Resources Enhancement to test its durability, but 9 of them were disappeared within 10 months. There seemed to be two suspected reasons; i.e. either drifting away caused by structural defects or dragged away by encroaching trawlers. It was bound to ensure their durability prior to actual installation of 60 units and it was decided to carry out a trial installation with 10 units with the improved and reinforced design.

Thus, 10 units were installed on 29 June 2006 in the area where numbers of ARs were formerly installed by DOF. Then inspection of these FEDs was conducted after 2 months on 29 August 2006 and disclosed that 4 sets were disappeared and one was dislocated to a deeper place off the project area and the remained were maintained in tact. Judging from this fact, the cause of disappearance of FEDs can certainly defined as encroachment by trawlers is responsible. Also, two trawlers which were fishing nearby were witnessed on that day. Again, the second follow-up investigation was conducted on 1st December 2006 by CMDEC. They found, however, that all 10 units were disappeared. According to the outcome from interviews with fishermen, it was proved that encroaching trawlers dragged away all the units. The result of both investigations is described in detail in Annex 8: Report of Fish Enhancing Device (FED) Performance in Pathew, Chumphon.

Under these circumstances there are two conceivable ways to encounter the problem. One is to strengthen the enforcement function to protect all trawlers from invasion by Enforcement Unit of DOF. The other is to install FEDs in safer places like in 10 – 20 meter radius of ARs. The proposed positions of FEDs are shown in the above annex. *(Given the result as above, AoBoTo is now reluctant to release the proposed fund to construct and install 60 units of FEDs once for all, but they agreed to test again installation of 20 units with the newly proposed locations.)*

The hook and line fishing was not originally popular in the project area. After installation of FEDs, however, some fishers started fishing mainly for barracuda and Spanish mackerel around the FEDs. Once 60 units of FED have been installed, more fishing activity is foreseen around FEDs with hook and line. It needs impact marine biological survey to be followed.

#### Reforestation of mangrove trees

The PAG organized the event of reforestation of mangrove trees in the project operational area in appealing various parties to join. On 9<sup>th</sup> August, about 200 people participated in the event to plant 2,000 nursery trees which were supplied by MCR. The students from three primary schools in the area were also participated. Other necessary expenses were provided by AoBoTo.

## **2.6. SC and IC meetings**

### IC Meeting

The 10<sup>th</sup> IC meeting was held on 31<sup>st</sup> August in the meeting room of CMDEC, Chumphon. The main outcomes of the meeting are:

- CMDEC prepared the tentative work-plan for extended three years from 2007 to 2009 for submission to the Royal Project for approval. The total budget requested was 3 million Baht for the duration of 3 years.
- The crab bank will apply the new system similar with the Japanese one from October.
- The Chumphon Fishery Enforcement Unit (CFEU) will put more efforts in the project operational area in establishment of Local Enforcement Unit (LEU) and putting it into operation.

- The potential new local business in green mussel culture and fresh water fish culture in village No.5 should be sought.
- The identification of a proper consultant to carry out the final project evaluation should be expedited as it has already been behind the schedule.

The detailed description of this meeting is further seen in Annex 9: Minutes of the 10<sup>th</sup> ICC Meeting.

## **2.7. Final project evaluation**

Upon termination of the project operation, it is bound to conduct the final project evaluation by an outsourced consultant. After exerting every effort to identify a qualified and suitable consultant, the SEAFDEC/TD entered into the contract with Prof. Somsak Boromthanasat, Coastal Resources Institute (CORIN), Prince of Songkhla University on 24 October 2006. Thereafter, the investigation was commenced immediately and the preliminary report was submitted to SEAFDEC/TD on 18 December 2006. The final version was submitted to SEAFDEC/TD on 17 January 2007. The report is being published.

## **2.8. Other activities**

Responding to the request proposed by the Cambodian delegation at the Special Council Meeting of SEAFDEC in April 2006 in Bangkok for collaboration work on fish product development, the preliminary research at the border between Cambodia and Thailand was carried out on 28 – 30 August 2006 by the Fish Technology Development Division (FTDD) of DOF. To this mission, a project member joined as the project had involved in the fish processing technology development aspect in Cambodia. The findings and recommendations will be compiled and reported to the DOF Cambodia through the regular channel.

## **3. OUTCOMES**

The major outcomes produced from the above activities during this reporting period are:

### Socio-economic and Monitoring surveys

- The project terminal socio-economic survey was conducted.
- Regular marine biological survey has been continued fortnightly.
- Regular marine environmental survey has been continued quarterly.
- Fishing mapping survey has been continued monthly.

### Encourage and extend the CBFRM concept

- It is proved that shrimp and crab landings have been increasing year by year.
- The crab bank management has been highlighted in many other parts of fishing community in Thailand.
- The crab bank applied the Japanese system in the wake of study tour to Japan.
- The volunteer group to carry out the enforcement activity was organized and the CFEU conducted the training on physical operation.

### Encourage local business

- Bookkeeping and accounting practices in the Group No.1 have been improved with recruitment of a part-time accountant.

- The Group No. 1 was awarded the prize for the well-maintained accounting system by Provincial Cooperative Promotion Office.
- The standardization of products has been progressed in the Group No. 1 with the technical intervention of FTDD.
- The group No. 4 started to operate the commodities store.
- The group No.4 continued production of dry flowers.
- The Group No.6 continued production of batik printing although the scale of production has been dwindling.
- An experiment on babylonia shell culturing completed.
- A comparative experiment on feeding with fish culture completed.
- A experiment on swimming crab culture completed

#### Enhancing human resources capacity building and participation

- The numbers of PAG members increased to 120.
- The supplemental Internal Bu-law was formulated.
- The PAG initiated the credit scheme for providing loans to members.
- The local seminar to share data and information on project progress among stakeholders was held.
- The study tour team consisting of 12 members visited the Trad Province to inspect the various activity of Ban Ped Nai Community.
- The new premises of the PAG/PFG completed.

#### Rehabilitating and enhance coastal resources

- 10 units of FEDs were installed by SEAFDEC/TD prior to investment of 60 units by AoBoTo.
- The first and second monitoring surveys were conducted with the result that all of unit were dragged away by illegal trawl fishing boats.
- 2,000 mangrove seedlings were planted under organization by PAG

#### Committee meeting

- The 10<sup>th</sup> IC meeting was held.

#### Others

- The final project evaluation was conducted by the outsourced consultant.
- The project team participated in the preliminary survey on fish processing technology in Cambodia which was conducted jointly by DOF Thailand, FiA Cambodia and SEAFDEC/TD.

## **4. MAJOR CONSTRAINTS**

The project is terminated after over 5 years' operation and it is proposed to be continued by hands of DOF Thailand under the financial auspices by the Royal Project. However, there has no tangible action has been taken yet. The momentum for sustainable fishery resources management has been gained with PAG/PFG who is playing an active and key role. The CMDEC and other relevant local agencies should continue positive involvement as they had done without any interruption toward the eternal goal that the PAG/PFG could build up their institutional capacity sufficiently enough to manage their coastal resources for themselves.

## 5. REPORTS PREPARED

Reports and documents prepared by the project during to this reporting period are listed below.

<u>No.</u>	<u>Title of the report</u>	<u>Name of author(s)</u>	<u>Date of issue</u>
01.	Travel Report – Chumphon (9-11 August)	Sumitra R.	Aug. 2006
02.	Travel Report – Chumphon (22-23 Sept.)	Sumitra R.	Sept. 2006
03.	Report of Local Seminar on Concept for Coastal Fisheries Management	Jirapa K.	Oct. 2006
04.	Minutes of 10 <sup>th</sup> ICC Meeting	Jariya S. & Sumitra R.	Sept. 2006
05.	Follow-up Report of FEDs Installation in Pathew, Chumphon	Yuttana T.	Sept. 2006
06.	Report on Experimental Babylonia Shell Culturing – 2 <sup>nd</sup> Trial	Etoh S.	Dec. 2006
07.	Travel report to Chumphon on 25-26 October 2006	Jariya S.	Nov. 2006
08.	Report on Study Tour to Trad Province	Sumitra R.	Nov. 2006
09.	Report on FEDs' Performance in Pathew, Chumphon	Yuttana T.	Jan. 2007
10.	Report on Socio-economic Survey	Sumitra R.	Dec. 2006
11.	Travel Report to Chumphon on 22-25 December 2006	Jariya S.	Dec. 2006
12.	Report on Introduction of the Japanese Model Crab-Bank to a Fishing Community in Thailand	Etoh S.	March 2007
13.	New Experience of Sub-district Administrative Organization in Coastal Resources Management: Case of Chumphon Province, Thailand	Phattareeya S. et al	Jan. 2007





Activity	2008												Responsible organization							Remarks							
	1	2	3	4	5	6	7	8	9	10	11	12	SEA	FDE	CM	DEC	MCR	POOF	CFUE		FTD	DAGC	SAO	RP	PCA	SCH	PFG
3. Encourage local business																											
3.1. Expansion of local business																											
3.1.1. Identification of potential local business																											
3.1.2. Introduction and demonstration of local business																											
3.1.3. Monitoring and follow up business improvement																											
3.2. Standardization of products																											
3.2.1. Monitoring processing practice																											
3.2.2. Training and/or advices for improvement and follow up																											
3.3. Promotion of awareness in restaurants																											
3.3.1. Continue experimental Babylonia shell culturing																											
3.3.2. Evaluation of experimental Babylonia culturing result																											
3.3.3. Continue experimental crab culturing																											
3.3.4. Evaluation of experimental crab culturing result																											
3.3.5. Experiment in use of artificial feed in place of natural one																											
4. Enhance human resources capacity building & participation																											
4.1. Restoration of survey results																											
4.1.1. Local seminar on research results																											
4.2. Awareness building on coastal resources conservation																											
4.2.1. Fishermen's workshop on CBRM approach																											
4.2.2. Training for school students in CBRM																											
4.3. Participation in environmental conservation & development work																											
4.3.1. Identification of action plan for environmental development work																											
4.3.2. Implementation of environmental development work																											

Activity	2006												Responsible organization							Remarks					
	1	2	3	4	5	6	7	8	9	10	11	12	SEAFDEC	CMDEC	MCR	PDOF	CFUE	FTDD	DAGC		SAO	RP	PCA	SCH	PFG
5. Rehabilitate and enhance coastal resources																									
5.1. Improvement of marine habitat																									
5.1.1. Monitoring marine biological survey on ARs / FEDs																									
5.1.2. Installation of FEDs																									
5.2. Fish restocking program																									
5.2.1. Releasing fish seeds																									
5.2.2. Monitoring marine biological survey on released fish																									
5.3. Improvement of coastal environment																									
5.3.1. Beach cleaning																									
5.3.2. Scenery development (e.g. tree planting)																									
5.3.3. Mangrove reforestation																									
6. Committee Meeting																									
6.1. Steering Committee meeting																									
6.2. Implementing committee meeting																									
7. Project evaluation																									
7.1. Final project evaluation																									
7.1.1. Evaluation survey																									
7.1.2. Publication of the report																									

- SEAFDEC: South East Asian Fisheries Development Centre / Training Department
- CMDEC: Chumphon Marine Fisheries Research and Development Centre / DOF
- MCR: Chumphon Marine and Coastal Resources Research Centre
- CFUE: Chumphon Fisheries Enforcement Unit / DOF
- RP: Royal Project
- SCH: School
- FTDD: Fisheries Technological Development Division / DOF
- PDOF: Provincial Fisheries Department Office / DOF
- SAO: Sub-district Administration Office(Ao.Bo.To)
- DAGO: District Agriculture Office
- PCA: Prachaupirkirakaj Coastal Aquaculture Research and Development Centre
- PFC: Pakklong Fishermen's Group
- I: Implementing agency
- S: Supporting agency
- P: Participating agency

**Report  
on  
Socio-economic survey  
December 11-14, 2006**

Sumitra Ruangsivakul  
27 December 2006

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**1. Objectives**

Consistent with the project work plan of ICRM-PD, we plan to carry out the monitoring socio-economic survey in the project site of Pakklong Sub-district. The baseline survey on socio-economics was conducted upon initiation of the project in January 2002, and the present survey is actually a follow-up to the initial survey.

**2. Travelers**

1. Ms. Sumitra Ruangsivakul
2. Dr. Phattareeya Suanrattanachai
3. Ms. Jirapa Kamhongsa
4. Ms. Jariya Sornkliang
5. Ms. Tanyalak Suasi

**3. Program**11 December '06 (Monday)

0800 - Leave SEAFDEC/TD to Chumphon

1500 -1700 - Briefing on survey methodology to interviewers at CMDEC

12 December '06 (Tuesday)

0900-1700 - Data collecting at village no. 1, 2 and 6

13 December '06 (Wednesday)

0900 - 1700 - Data collecting at village no. 3, 5 and 7

14 December '06 (Thursday)

0900 - 1200 - Follow up crab bank at village no. 1 and 7

- Interview fish-farmer and crab trap fishers concerned self-management on utilizing fishing ground under the zone demarcation for fishing and aquaculture

1300 - 1800 - Leave for SEAFDEC/TD

**4. Results**Survey planning

- At 1530 pm on 11 December, SEAFDEC's team visited at CMDEC, discussion on the detail of socio-economic questionnaire, survey schedule, team survey and village survey.
- The important of meeting was clearing on questionnaire by each interviewer, after discussion, some detail of each part was changed and made understand together.
- The number of interviewer was 9, 5 interviewers from SEAFDEC and 4 interviewers from CMDEC. The number of villages for data collecting was 6, composed village no. 1, 2, 3, 5, 6, and 7.
- The total of respondent was 80, the number of respondent in each village will be followed the first survey, 22 respondent of village no. 1, 9 respondents of village no. 2, 16 respondents of village no. 3, 11 respondents of village no. 5, 8 respondents of village no. 6 and 14 respondents of village no. 7.

- The first day (12 December) plan to collecting at village no. 1 and 6 in the morning, because two villages were nearby. At afternoon, two teams of interviewers will go to village no. 2 and 5.
- The second day (13 December), in the morning, interviewers divided two teams, the first team will go to village no. 1 and 6 by collected the remain respondents, the second team will go to village no. 5. In the afternoon all interviewers went to village no. 7.
- The third day (14 December), there had only morning session, SEAFDEC's team will be collected the remain questionnaires of each village.

#### The number of respondents

- The total respondents was 83 of this survey, in 6 villages, the respondents of village no. 1,2, 3, 5, 6 and 7 were 27, 5, 14, 13, 9, 15.
- Data analysis will be used the same methodology of first survey, because the results will be compared with the first results.

#### Follow up crab bank in Japanese system

- On 25-26 October 2006, SEAFDEC arranged fishers' workshop on crab bank in Japanese system at village no. 1 and village no. 7, and provided book recording, marker pen and towel to PFG's member, who volunteer in this activity. This activity will be experimental in monsoon season, from November 2006 to February 2007.
- Mr. Winai Sakulnum, PFG' member and used crab trap fishing gear shown the data of gravid crab to us, he began to releasing from 27 October to 6 December 2006, there was two kinds of gravid crab to releasing by him, the total of gravid crab (outside) was 99, and gravid crab (inside) was 59. He explained more that, his harvesting, selected only big size, 10-15 crabs per kg to sell, and about 50-100 crabs of small size to release per day.
- Mr. Jang Fungfueng, Leader of crab bank activity, he shown the book recording to us, he started to releasing from 26 October to 12 December 2006, the total of gravid crab was 20 without marker, and 9 crabs with marker.

## Annex 3

### Report on Introduction of the Japanese model crab-bank to a fishing community in Thailand

Seiichi Etoh  
6<sup>th</sup> March 2007

#### 1. Background

Prior to the project initiation in Pathew District, Chumphon Province, in November 2002, the crab fishermen were concerned about dwindling crab production along with reducing their sizes year by year. To cope with the problem, measures were taken to initiate reserving gravid crab in the spawning cage in the village No. 7 of Pakklong sub-district under the guidance by the NGO Thai Environmental Institute. This scheme was taken over by the SEAFDEC / DOF Thailand Collaborative Project (Integrated Coastal Resources Management in Pathew District – ICRM-PD). Further, another measure to reduce juvenile crab catch in crab trap fishing was introduced by initiation of the project in a way of minimizing the mesh size of crab trap from 1.2 inch to 2.5 inch from August 2003. Since then, both the crab catch volume and the sizes of harvested crab have shown an encouraging trend as seen in the following table and figure. At this stage, however, it is difficult to predict whether these increases of harvesting volume and individual size are attributed by the effect of crab bank or the one by mesh-size control or the combined. Therefore, it is intended to continue both the measures by all means.

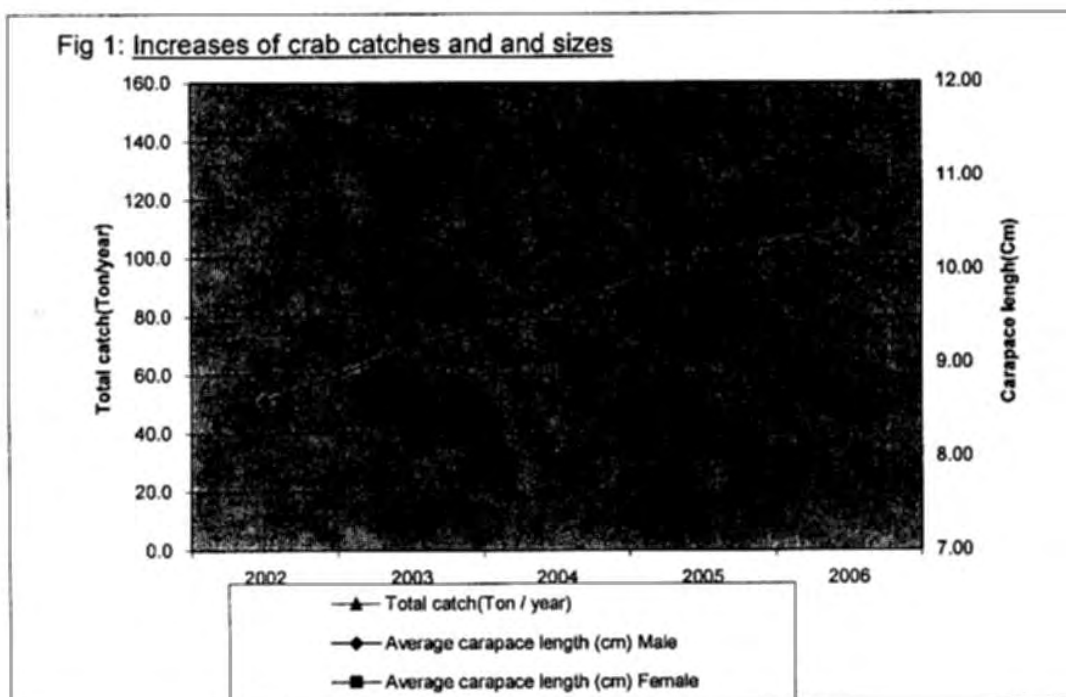


Table 1: Swimming crab catch record in Pathew District

Data: CMDEC 2007

year	Average carapace length (cm)		Total catch(Ton / year)
	Male	Female	
2002	8.60	8.97	-
2003	9.17	9.56	72.1
2004	9.55	10.01	87.6
2005	10.15	10.34	112.6
2006	10.39	10.62	142.6

In the village No. 7, the Crab Trap Fishing Sub-Group was organized under the framework of Pakklong Fishermen's Group (PFG) in 2004 and the crab bank was incorporated in the PFG's undertaking as one of their activities. The crab bank continued their activity in a way that gravid crab were collected from crab-trap fishermen and stocked in a cage for a month or so until eggs were hatched. However, they encountered some problems through their operation like loss by thefts, high mortality, high feeding cost and laborious work in stocking. Meantime, the study tour to Japan was conducted in May 2006 to inspect crab bank practices prevailing in Hyogo-Prefecture since last 20 years under the financial auspices of a NGO group, Hunet ASA in Japan. In this study tour, the Leader of Crab-Bank, the Chairman of the Pakklong Fishermen's Group and the Extension Worker participated. They were impressed by the different type of approach from the different angle in the crab resources management and considered positively its application to their crab bank system, especially during the monsoon seasons when the maintenance of stocking cages would become difficult. Thus, a trial introduction of the Japanese system was initiated in the project site with the Crab Trap Fishing Sub-Group of PFG after setting in the monsoon season in October 2006.

The brief comparison of advantages in both the methods is described in Annex 1: Optional approaches for the Crab-Bank Scheme.

## 2. Application of the Japanese system of crab-bank

When envisaging introducing the Japanese style Crab Bank System to the project area, the major difficulty lay in the operational fund. In case of Japan, the gravid crabs were purchased by the fund donated by a few thousand volunteers; a half from fisheries people and a half from other ordinary volunteers. In the project site, the same could be unlikely applicable under the current situation, and until such time would come, some measures to provide incentives had to be taken in one way or another. Taking the above factor into account, the scheme was initiated with the following guidelines.

1. Participants of the scheme: Two sub-groups; i.e. Crab Trap Sub Group in village No. 1 and 7
2. Collection of gravid crab: Live Crab bearing eggs are collected at a certain point and marked **X** on the carapace after being cleaned and released to the sea where they live. The number of crab collected by each member should be recorded. This work should be done voluntarily among the members. Thereafter, no fishermen are allowed to harvest **X** marked crab.

3. Duration: This exercise should be continued during the monsoon seasons, October to March, as an experimental practice.
4. Incentives: Some incentives are awarded by SEAFDEC/TD for the fishermen whose contributions in collection of gravid crab are prominent compared with others.
5. Required equipment and materials: Equipment and materials necessary for this trial such as cleaning towels, special markers and logbooks are provided by SEAGDEC/TD.

### 3. Implementation of the scheme

The trial to introduce the Japanese system of crab bank initiated on 20 October 2006 in both the villages No.1 and 7. The crab fisherman in the village No. 1 has continued the operation until now and will continue in future, while those in the village No.7 resumed the conventional system when the monsoon season was over in January 2007. They said that they would resume the Japanese system when the monsoon season sets in. During the course of operation, however, the fishermen found that many marked crabs were caught by crab-gillnet fishers in off-shore where was demarcated from the crab-trap fishing by the mutual agreement. Further, it was reported that some marked crab were caught in the next province at the distance of over 30km from the project area within one month's time. With these facts, the notion that the Japanese crab system has benefited to other fishermen than due beneficiaries has become prevailing among members of crab fishers and affected to continuation of the trial beyond January 2007. The discussion was made with the crab fishermen on the issue on 6<sup>th</sup> March 2007 and they expressed that they would like to continue the crab bank operation with the combination of their own system in calm seasons and the Japanese one during monsoon seasons. As to the crab fisherman in the village No. 1, only one active crab-trap fisherman though, he expressed that he would like to continue the Japanese system even in future.

### 4. Result of the trial

As aforementioned, the trial continued for 3 months from October 2006 to January 2007 in the village No. 7 and 5 months from October 2006 to March 2007 in the village No.1. As seen in the detailed record in Annex 2: Crab releasing record from October 2006 to March 2007, 405 crabs were released for 5 months by 3 fishers of the village No.1 and 786 crabs for 3 months by 12 fishers of the village No.7, amounting to 1,191 crabs in total. The number of crabs released per a fishing trip / boat is 3.33 pcs.

#### Participant

- Village No.1: Only one fisherman is engaged in crab-trap fishing in this village (Mr. Winai Sakulnum). In fact, other two fishers participating in this trial purchased gravid crabs from Mr. Winai Sakulnum for the sake of voluntary contribution, which means all 405 crabs were caught by Mr. Winai.
- Village No.7.: There are 20 crab-trap fishers registered as members of Crab-trap Fishing Sub-group of PFG. Of those, 12 fishers participated in the trial.

#### Equipment

- The project provided fishers with logbooks, a towel and markers (oil felt-pen). They complained that the Thai-made markers were susceptible to discoloration compared with these from Japan.



#### Prize awarding

- As an incentive, the Project prepared some nominal prizes for the winners, runners-up and third winners. In the village No.7, Mr. Somjit was awarded the winners prizes by releasing 235 crabs. While, in the village No.1, Mr. Winai was done the winner's prize by releasing 293 crabs.
- All participants were provided with T-shirts as prizes of participation.

#### **5. Discussion**

It is no doubt that the result is encouraging. It is particularly so when taking the fact into account that neither payment nor compensation is made to crab-fishermen for crabs discharged unlike those in the crab bank of Japan whose are enjoying compensation against releasing crab from the fund donated by the public. The awareness rising among crab fishers on crab resources conservation is appreciable.

In relation to the above, two PFG members in the village No.1. purchased 112 gravid crabs from a crab fisherman and released them to the sea voluntarily. Such a voluntary participation to the resources conservation activity is noticeable.

Crab is one of major fish catches and constitutes important incomes in the project operational area. Therefore, sustainable and optimum natural resources utilization is the vital factor for the fish-folks' well-being. They have already experienced a negative trend on dwindling crab resources and based on such experiences and lessons they have challenged some measures to cope with. Their activity is highlighted not only in the country but also in the neighboring countries as a vanguard to practice effective crab resources management tactics. The advancement of this activity is no doubt attributed by the voluntary and energetic contribution by the leader of Crab Trap Sub-group of PFG. His dedication to the crab-bank is commendable.

During the course of trial, it was disclosed that crabs marked by the member fishermen were caught by gillnet crab fishers who were operating in the off shore and some were found in the neighboring fishing village at the distance of 30km. Since then, the member fishermen started to argue on effectiveness of Japanese model crab-bank saying that the exercise of releasing gravid crab voluntarily would mostly benefit to outsiders. For this reason, the crab fishermen in the village No.7 resumed the old methods of crab bank that kept gravid crabs in cages until spawning. An explanation about the phenomenon of crab movement and reciprocal common benefit with the shared resources were made at the sub-group meeting on 6<sup>th</sup> March 2007 in a bid to persuade them to continue the trial. They agreed to resume the Japanese method when the next monsoon season set in. This is simply caused by the visibility effect against impacts by crab releasing as described in Annex 1: Comparison sheet in three crab bank systems. It takes time until all fishermen realize the real concept of common resources management. It needs tenacious efforts. It took 20 years even in Japan to reach the present goal.

#### **6. Conclusion**

The trial is considered successful in a sense that awareness development and beneficiaries' positive participation in crab resources conservation have been stimulated to a great extent through this exercise. The fishers in the village No.1 continues the Japanese system which is considered more effective by all means. Also, those in the village No. 7 will resume the Japanese system from October 2007. The SEAFDEC/TD terminated the project operation in

December 2006 but the project operation will be continued for next 2 years until December 2009 by the consolidated government institutes under the financial auspices by the Royal Project. Given the fact that the crab bank operation has just got its impetus and need more support, SEAFDEC/TD should continue technical supports on end in future.

### Acknowledgement

Taking advantage of this occasion, I would like to express a sincere appreciation to Hunet ASA for rendering such a great chance for the project as well as the fishing community in Chumphon to become acquainted with the advanced crab-bank system in Japan, which will be by all means conducive to the coastal fishery resources management approach in Thailand. Also, a particular acknowledgement is for Prof. Hiroshi Fushimi for endeavoring to bring about this attempt through his dedicated coordination.



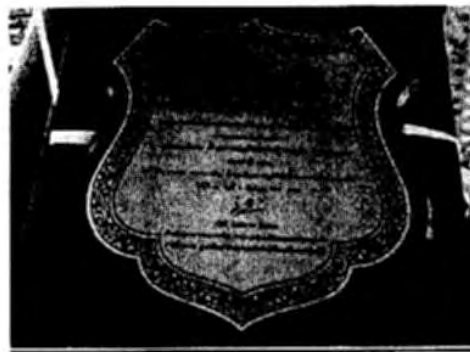
The cage for crab hatching



The leader of Crab Bank with gravid crab



Prize awarding to the winner



The shield for the winners

Table 2: Comparison sheet in the three crab bank systems

Assessment / System	Stocking in cages (Chumphon)	Stocking in tanks (Bang Saphan)	Releasing to the sea (Japan)
1. Survival rate of gravid crab	Low (about 50%)	High (only a few days stocking)	High (in the natural environment)
2. Survival rate of zoea	High (in the natural environment)	Relatively low (in air-agitating tanks)	High (in the natural environment)
3. Target gravid crab	All gravid crab	Only matured crabs before hatching (with black coloured eggs)	All gravid and potentially gravid crab (marked)
4. Operational season	During the calm seasons	All seasons	Spawning seasons
5. Cost of investment & operation			
- Initial investment	High (cages etc.)	High (shed, plastic tanks, air pumps ect.)	Nil
- Labour	High (daily attendance at sea)	Medium (daily attendance on land)	Marginal (only marking)
- feed	High (one month at maximum)	Negligible (a few days at maximum)	Nil
- fuel	High (daily attendance at sea)	Negligible (combined with fishing)	Negligible (may rely on fishing trips)
- Maintenance	High (repair of cages)	Negligible (repair of air pumps ect.)	Nil
6. Income for the member fishermen	Nil (indirectly yes in the form of loan)	Sale of mother crabs after hatching	Sale of gravid crabs to the Crab Bank
7. Institutional support	Marginal	Need to some extent	Need to some extent (PR etc.)
8. Organization	Need a strong leadership and coordinator	Need a strong leadership and coordinator	Need a strong public awareness
9. Fund raising	Not necessary	Not necessary	Relying on fishermen as well as public contributions
10. Sustainability	Subject to the leadership	Subject to the leadership	Subject to the public awareness
11. Visibility of impacts	High	High	Low

Annex 2


Crab releasing record from October 2006 to March 2007

No.	Name	Village/No.	Total released	Date		Fishing trip	Average crab released/trip
				strating	closing		
1	Winai Sakulnum	1	293	27/10/2006	06/03/2007	75	3.91
2	Bun-Auen Somson	1	75	03/01/2007	03/03/2007	6	12.50
3	Wara Ket-Ampai	1	37	23/02/2007	27/02/2007	5	7.40
4	Somjit Fungfuang	7	235	26/10/2006	17/01/2007	39	6.03
5	Wanee Niyom	7	128	20/10/2006	06/12/2006	42	3.05
6	Amnaj Piwkhaw	7	81	28/10/2006	16/01/2007	37	2.19
7	Paisan Jinthanom	7	80	27/10/2006	10/01/2007	29	2.76
8	Armong Annacha	7	72	27/10/2006	11/01/2007	29	2.48
9	Pranom	7	57	28/10/2006	03/01/2007	23	2.48
10	Jang Fungfuang	7	47	26/10/2006	17/01/2007	30	1.57
11	Wisut Namma	7	29	26/10/2006	21/11/2006	10	2.90
12	Prapat Khodkrit	7	23	30/10/2006	10/01/2007	18	1.28
13	Patsanan Puangmalai	7	21	26/10/2006	06/11/2006	9	2.33
14	Jatuphon Kuntongsuk	7	10	26/10/2006	10/11/2006	3	3.33
15	Porntip Tadee	7	3	20/11/2006	30/11/2006	3	1.00
	<b>Total</b>		<b>1,191</b>			<b>358</b>	<b>3.33</b>

Remark: -In Village No.1, Bun-Auen Somson and Mr.Wara Ket-Ampai released crab that she bought from Mr. Winai Sakulnum.  
In Village No. 7, the closing day to release crab is 17 Jan 2007

## Annex 4

### Report on Experimental Babylonia Shell Culturing – 2<sup>nd</sup> Trial ICRM-PD with Pakklong Fishermen's Group(PFG)

	Sei Etoh Project Leader SEAFDEC/TD 12 December 2006
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#### 1. Background

The project has exerted efforts in promotion of prospective local business among fishers and women's groups in the project area since inception of the project. The implication in this attempt lies in not only increasing supplemental income sources among fishers' families but also looking for alternative job opportunities to avert over-capitalization in fishing efforts.

Babylonia shells have been widely consumed in Thailand at relatively high price. Moreover, the demand for this shell has been boosted recently after the export market to Taiwan was exploited. Some substantial amounts of this shell must have been exported to the foreign markets although no precise statistic data is available. With such a marketing trend, the culturing Babylonia shell has commenced in the central part of Thailand especially in the Chonburi Province in order to offset the expanding domestic demand. Under this trend of increasing market demand, the project considered it worthwhile and promising to introduce this new venture among those who were interested.

Consonant with this implication, the experimental babylonia shell culture was conducted for 7 months from August 2005 to February 2006. However, the result was rather pessimistic with mal-growth of the shells, especially after 3 months' culturing. The suspected cause for this may be attributed to the unfavourable sea conditions after November when the monsoon season set in. Also, some other reasons were suspected as discussed in the report: Experimental Babylonia Shell Culturing (Etoh 2006). The experiment was not satisfactorily conducted as such, and in order to ensure commercial feasibility in this venture the 2<sup>nd</sup> experiment was conducted for 6 months from March to September 2006 during calm seasons in the improved way incorporating lessons learned through the first experiment.

#### 1. Mode of experiment / demonstration

##### 1.1. Operational mode

The project provided all materials and equipment necessary for this experiment to the Aquaculture Sub-group of the Pakklong Aquaculturists Group (PAG) and the experiment was continued for 6 months under close supervision by the SEAFDEC/TD Field Extension / Liaison Officer. The intermittent technical supervision was provided by the research officers from the Chumphon Marine Aquaculture Station (CMAS).

## 1.2. Repair and installation of cages

The old 10 cages used in the previous experiment were brought in the mechanical workshop of SEAFDEC/TD for necessary repair and modification, particularly shortening the height of each cage and replacing plastic trays in the bottom basin. The raft with the bamboo frame was also reinforced and installed near the crab bank cage so that close monitoring to protect from likely theft became possible. Another advantage in this location lay in its calm sea protected by the island.

## 2.3. Experiment

The 2<sup>nd</sup> experiment was commenced on 21 March 2006. In each cage, 700 pcs of shell seed hatched in the Chumphon Coastal Aquaculture Center (CCAS) were released totaling 7,000 pcs in all. The average weight of a seed was 0.33g which was comparatively smaller than the one in the previous experiment, 0.48g. The price was 0.75 Baht per piece compared with 0.60 Baht in the previous experiment.



Daily taking care for maintenance of cages and feeding was exerted by the locally assigned SEAFDEC/TD extension officer with assistance of local fishing community. Small fish mainly caught by squid cast-netters as by-catch were purchased daily at around 12 to 15 Baht per Kg and fed to the cages after splitting. The daily feeding quantity were initiated 0.5Kg for 10 cages and increased to 2-3Kg judging from the remaining of unfed fish. The amount of feed given every day was recorded by the extension officer. Remaining residues were removed every day and the cages were cleaned once a week.

The growth in weight was measured and recorded by the extension officer every fortnight in a way that 100 pcs of shell were picked up at random from the cages No.1 and 10 to measure the growth of shells and the total numbers survived were counted in both the cages.

As such, the experiment was continued up to 22<sup>nd</sup> September 2006 with 185 operational days.

## 3. Observation

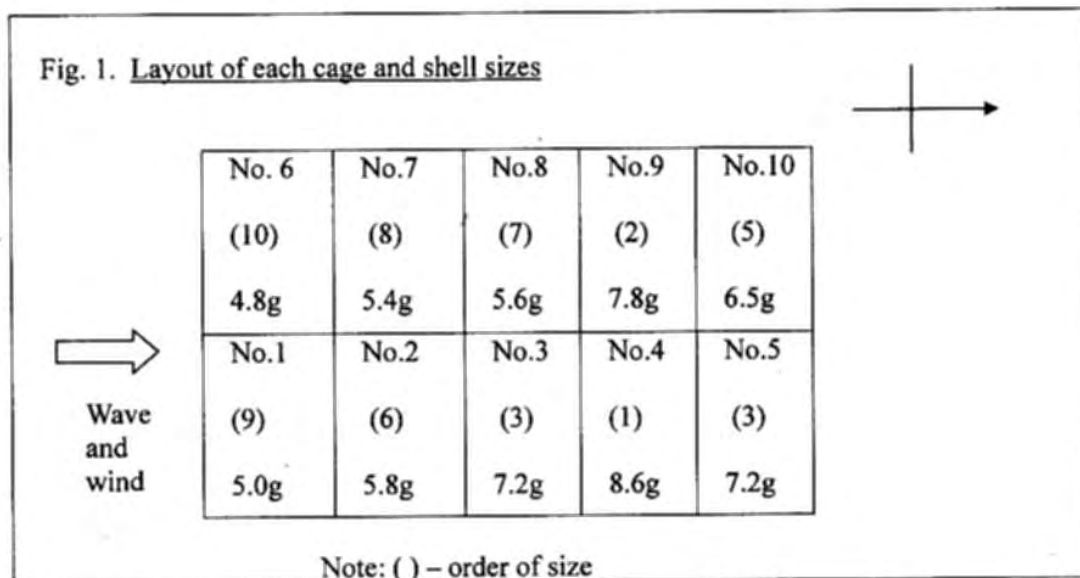
Toward the end of experiment, it was observed that some shells were tainted with black colour. The taste, texture and flavour were not different from normal ones. The consultation was made with the researcher in the CMAC was made to find a cause and seek a solution. As a result, it was found that the black colouring was attributed to the contact with the mud at most times. This black colouring was seen especially in shells in cage No. 4 and 9 most and 5 to some extent. This is something to do with the wave direction. When the tide is low, the bottom mud is swelled up with the current and dredged at the bottom of cages. However, the black colour would turn to normal after placing them in the clean sand for a while before delivery, the researcher from the CMAC suggested.



During the course of experiment, it was observed that there was noticeable unevenness in growth rate depending on the cages. As seen in the table 1 below, the largest group in the cage No. 4 (8.6g in mean) exceeds the smallest group (4.8g in mean) in sizes by as much as 44.2%. These were fed in the exactly same condition and volume. In reference to the figure 1 below, the cause could be reasonably attributed to exposure to the strong current; the groups in No.1 and 6 which are most exposed to the strong current are smallest one, while the groups No1 and 9 which are protected from exposure to the direct current are largest. This assumption was supported by the researcher of CMAC. This can be a valuable instruction in practical application in babylonia shell culturing.

Table 1: Average weight of shell in each cage

Cage No.	Number of sample (Pc)	Weight of sample (gr)	Mean weight (gr / pc)	Order in size
1	100	500	5.0	9
2	50	290	5.8	6
3	50	360	7.2	3
4	50	430	8.6	1
5	50	360	7.2	3
6	50	240	4.8	10
7	50	270	5.4	8
8	50	280	5.6	7
9	50	390	7.8	2
10	100	650	6.5	5
Average	-	-	6.4	



At the last stage of experiment, it was found that two cages got damaged and some shell escaped. Given that this is the experiment in the calm season, the further reinforcement on the

frame is necessary in case of commercial production which is bound to undertake even during the monsoon seasons.

#### 4. Result

The results of periodical measurement every fortnight in weigh and also the amount of feed given are tabulated in the table 4 of Annex 1. As seen in the table, the growth rate of shells in the cage No.10 has been increased soundly until the end of experiment, while for the one in cage No.1 the pace of growth has been dwindled slightly after 105 days. The average sizes of shells in the cage No.1 and No.10 after 185 days culturing are 5.20g and 6.87g respectively, which can lead the mean size of all shells to 6.04g. The total feed given is calculated at 469.9Kg (the last period of data for feed given was lost and it was calculated based on the previous figure.)

On 22<sup>nd</sup> September 2006 after culturing for 185 days, the experiment was terminated as it had passed the targeted culturing period of 6 months and the shells were taken out of the cages and measured. The total weight is recorded at 35.45Kg. The weight, appearance and quality are described in the following Table 2.

Table 2: Production record of Babylonia shell culturing

Cage No.	Initial stock (pc)	Final stock (6 months)			Survival rate (%)	Remarks
		(pc)	Total wt.(gr)	Wt. per shell (gr)		
1	700	543	2,825	5.20	77.6	Many lost in the last month
2	700	535	2,975	5.56	76.4	
3	700	687	5,350	7.79	98.1	Good colour and sizes
4	700	601	5,400	8.99	85.9	Tainted with black colour
5	700	637	4,700	7.38	91.0	Tainted with black colour
6	700	262	1,300	4.96	37.4	Cage damaged, small sizes remained
7	700	186	1,000	5.38	26.6	Cage damaged, small sizes remained
8	700	484	2,600	5.37	69.1	Cage damaged, small sizes remained
9	700	560	4,700	8.39	80.0	Tainted with black colour
10	700	670	4,600	6.87	95.7	Tainted with black colour
Total	7,000	5,165	35,450	6.59	73.8	

Table 3: Quantity and expected prices by size and quality

Grade	Size / quality standard	Quantity (kg)	Expected beach price (Baht) / Kg	Expected gross sales (Baht)	Remarks
A	Over 7.8g (130 pcs. per Kg)	4.2	350	1,470	
B	Between 7.8 – 5.0g in average (130 – 200 pcs. per Kg)	11.2	250	2,800	
C	Under 5.0g	12.8	Immature	-	To be further cultured
D	Black tainted shell	7.2	No marketable	-	Mostly 8.3 – 10.0g size
Total		35.4		4,270	



## 5. Discussion

As seen in the Table 4 and Fig 2 of Annex 1, it is obvious that the shell growth in the cage No. 10 shows satisfactorily while for the ones in the cage No.1 the pace of growth becomes slightly retarded after passing around 105 days stocking. This difference in growth is certainly caused by the position of cages as dealt in 3. Observation. This exactly demonstrates the resultant observation in the first experiment that the wave and current tend to impede the growth of shell due to less feeding. It is striking when compared with the data of experiment conducted by Dr. Ninnard Chaithavisut, Chulalongkorn University in 2002 (Ref. Fig. 2). The trend of growth in the cage No.10 is closely consistent with the one in the laboratory experiment result. (In this laboratory experiment, it seems to be a bit unrealistic that the growth rate after 150 days increases abruptly. It could be stabilized or slightly decreased toward reaching the matured size.) In addition, judging from the fact that the growth rate of cage No. 10 is not highest but just in the middle (ref. in Fig 1), shells in some cages are much bigger than those in the laboratory experiment, e.g. shells in Cage No.4 which are almost 32% larger.

As for feeding practices, some irregularity is witnessed especially around 30 and 110 days. In these periods, growth rates were unreasonable decreased, although this slow growth may not be attributed to only the feed practices but something else as well.

The average feed conversion rate (FCR) is 13.7% which is reasonable and was improved compared with 9.0% in the previous experiment. Also, as shown in Annex 3, it is obvious that the growth rates in the 2<sup>nd</sup> experiment are improved by far compared with the one in the 1<sup>st</sup> experiment. This demonstrates the diagnosis given by the researcher of CMAC that the feeding habit of shell gets deteriorated in the shaking environment by monsoon is persuadable.

## 6. Economic feasibility

As for possible marketing outlet, it was consulted with the CMAC. A few middlemen visit Chumphon to purchase the babylonia shell whenever products are ready to deliver in quantity. The prevailing beach prices are Baht 350 and 250 per Kg for grade A and B respectively, although no transaction was realized in this experiment as the quantity was too small for a middleman to attract.

The cost and profit analysis in this experiment is shown in Annex 4, which ends up with deficit. The cost and profit analysis made by Dr. Ninnard in the Chulalongkon University explained that an expected expenditure of Babylonia shell per kg would be as little as Baht 199.50 based on his laboratory experimental result, which is by far low compared with the experiment result carried out by the project with PFG; i.e. 799.15 per kg shell.

Also, the cost and profit analysis is made in case of commercial operation with the expanded capacity of 50 and 100 cages as seen in the Annex 5. Even in this calculation, no possible profit can be foreseen in this venture. The expenditure is estimated at Baht 391.11 per kg shell in case of culturing 100,000 shells, which would be still too high to expect some profit as the best beach price is Baht 350 per kg. The major expenses are the cost of seeds and labour.

## 7. Conclusion

In the wake of the first experiment conducted in August 2005 to February 2006, the 2<sup>nd</sup> experiment was initiated in March 2006 in the favourable environment as more positive outcomes were expected as suggested in the laboratory test result by the Chulalongkorn University and also some encouraging lessons were learnt through the 1<sup>st</sup> experiment. However, the result was again negative as seen in the economic calculation and it is not convincing for the PFG to envisage entering this venture in future under the present marketing trend. The reasons are;

- f. the expected economic return is negative or too marginal even if it turns to lucrative,
- g. the maintenance of cages requires laborious work in cleaning and repairing and can not be managed within part-time work,
- h. the cost of seed is still relatively high,
- i. the growth rate is largely affected by the environmental condition like wind, current, tide etc. therefore it is very fragile and difficult to cope with the weather changes,
- j. as having been commercially established, the culturing with the concrete tanks or in the ponds may be feasible but such attempts entail huge amount of initial investment.

## Reference

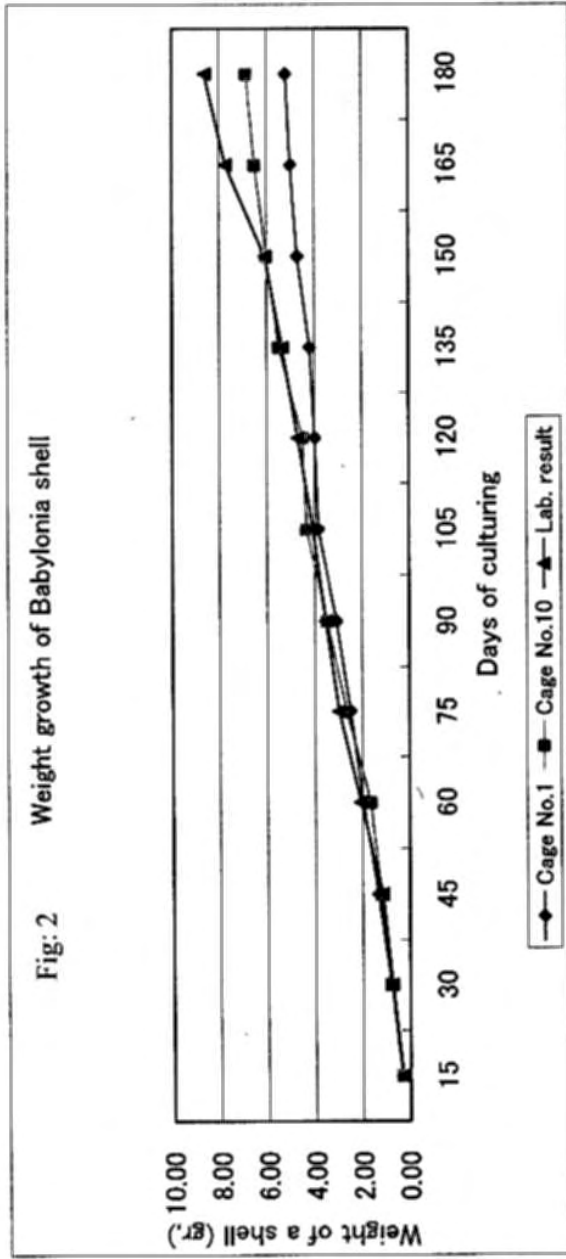
Ninnard C., Manual of Babylonia Shell Culture (Theory and Practice) 2002, 92P.

Annex 1 Table 4: Growth of Babylonia Shell in the Experiment

Measuring date	Accum'd culturing days	Cage No.1				Cage No.10				Total feed given		Lab. experiment Wt. per pc. (g)	
		Weight measurement		Number of shells (Pcs)		Weight measurement		Number of shells (Pcs)		(Kg)	(Baht)		
		Wt per 100 pcs (gr)	Mean per pc. (gr)	Survived	Escaped	Wt per 100 pcs (gr)	Mean per pc. (gr)	Survived	Escaped				
21.03.2006	0	33.8	0.34	700	0	32.1	0.32	700	0	-	-	0.30	
05.04.2006	15	80.0	0.80	700	0	78.6	0.79	700	0	7.3	108	0.73	
24.04.2006	34	132.5	1.33	697	3	120.0	1.20	689	11	23.6	353	1.16	
09.05.2006	49	196.1	1.96	697	0	163.9	1.64	689	0	23.0	230	2.07	
24.05.2006	64	250.0	2.50	680	14	266.7	2.67	675	10	23.7	230	2.98	
07.06.2006	78	308.8	3.09	680	0	348.2	3.48	675	0	25.4	253	3.52	
24.06.2006	95	383.6	3.84	670	4	434.1	4.34	673	2	41.8	418	4.06	
10.07.2006	111	400.0	4.00	670	0	450.0	4.50	673	0	80.7	968	4.70	
24.07.2006	124	418.0	4.18	670	0	549.0	5.49	673	0	50.0	600	5.34	
12.08.2006	144	470.0	4.70	670	0	600.0	6.00	673	0	60.0	720	6.08	
02.09.2006	165	500.0	5.00	670	0	650.0	6.50	673	0	*	*	7.73	
22.09.2006	185	520.0	5.20	543	5	687.0	6.87	670	3	*	*	8.63	
<b>Total</b>				543	26	131		670	26	4	335.4	3,880	

\* Note: The total feed given (335.4Kg) is the total amount up to 144 days.

Annex 1 - 2



Annex 2 Table 5: Changes of Feed Conversion Rate of Babylonia Shell

Measuring date	Accumulated culturing days	Duration of culturing (days)	Mean wt. per pc (g)			Increased wt. during the period	Survived shell			Calculated number of shells in all the period (pc)	Increased wt. of shells in all during the period (Kg)	Feeds given during the period (Kg)	Calculated Feed Conversion Rate (%)
			Cage No.1	Cage No.10	Average		Cage No.1	Cage No.10	Average				
21.03.2006	0	0	0.34	0.32	0.33	-	700	700	700	7,000	-	-	-
05.04.2006	15	15	0.80	0.79	0.80	0.47	700	700	700	7,000	3.3	7.3	44.8
24.04.2006	34	19	1.33	1.20	1.27	0.47	697	689	693	6,930	3.3	23.6	13.8
09.05.2006	49	15	1.96	1.64	1.80	0.54	697	689	693	6,930	3.7	23.0	16.1
24.05.2006	64	15	2.50	2.67	2.59	0.79	680	675	678	6,775	5.3	23.7	22.5
07.06.2006	78	14	3.09	3.48	3.29	0.70	680	675	678	6,775	4.7	25.4	18.7
24.06.2006	95	17	3.84	4.34	4.09	0.81	670	673	672	6,715	5.4	41.8	12.9
10.07.2006	111	16	4.00	4.50	4.25	0.16	670	673	672	6,715	1.1	80.7	1.3
24.07.2006	124	13	4.18	5.49	4.84	0.59	670	673	672	6,715	3.9	50.0	7.9
12.08.2006	144	20	4.70	6.00	5.35	0.52	670	673	672	6,715	3.5	60.0	5.8
02.09.2006	165	21	5.00	6.50	5.75	0.40	670	673	672	6,715	2.7	65.4	4.1
22.09.2006	185	20	5.20	6.87	6.04	0.29	543	670	607	6,065	1.7	69.1	2.5
Total												469.9	13.7

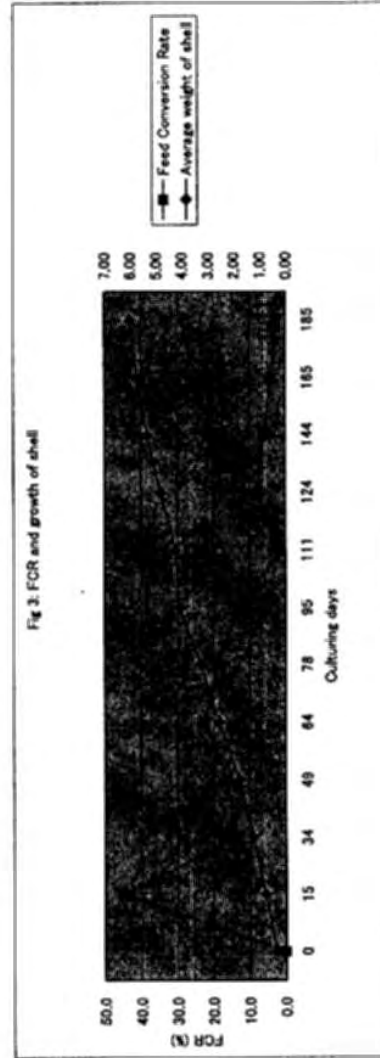
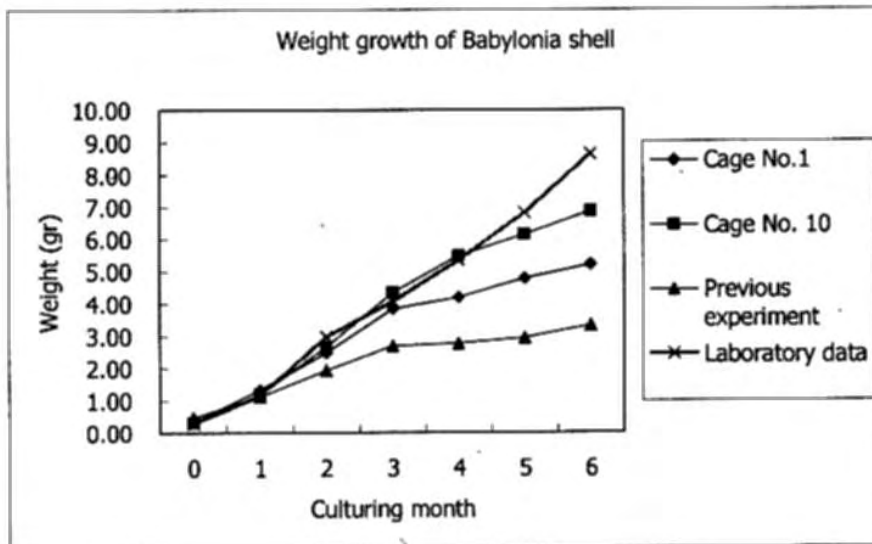


Fig 3. FCR and growth of shell

**Annex 3 Comparative weight growth in experiment 1 and 2**

Culturing month	Cultured shell (gr)			* Laboratory data (gr)
	Cage No.1	Cage No. 10	Previous experiment	
0	0.34	0.32	0.48	0.30
1	1.33	1.20	1.13	1.16
2	2.50	2.67	1.93	2.98
3	3.84	4.34	2.70	4.06
4	4.18	5.49	2.76	5.34
5	4.78	6.14	2.94	6.82
6	5.20	6.87	3.33	8.63

\* By Dr. Ninnard Chaithavisut, 2002



Annex 4

Cost & profit calculation (Experiment)

	<u>Remarks</u>
1. Base of calculation	
- Cost of 10 cages; Baht 3,200 x 10 = 32,000	
- Depreciation term of cages: 5 years	
- Cage maintenance cost per season: 5 %	
- Cost of seed: Baht 0.75 per pc.	
- Cost of feed: Baht 3,880 per 7,000 pc	
- Cost of labour: Baht 1,500 per month	
- Fuel and lubrication: Baht 900 per month	
- Price of shell: A grade - Baht 350/Kg (over 8.0g)	
B grade - Baht 250 /Kg (over 5.0g)	
C grade - Baht 200/Kg (under 5.0g)	To be further cultured
<hr/>	
2. <u>Expenses</u>	<u>Baht</u>
<u>Fixed cost</u>	
- Depreciation cost for 6 months(Baht 32,000/10)	3,200
- Cage maintenance cost (Baht 32,000 x 5%)	1,600
- Labour cost (Baht 1,500 x 6m)	9,000
- Fuel & lubrication (Baht900 x 6m)	5,400
Sub-total:	19,200
 <u>Variable cost</u>	
- Cost of seeds (Baht 0.75 x 7,000pc)	5,250
- Cost of feed	3,880
Sub-total:	9,130
 <u>Total Expenses:</u>	28,330 Baht 799.15/Kg shell
 <u>Income</u>	<u>Baht</u>
3. a. <u>Sales</u>	
- A grade: Baht 350 x 4.2kg	3,990
- B grade: Baht 250 x 11.2kg	2,800
- C grade: Baht 200 x 12.8kg	2,560 With assumption
Sales total:	9,350
 b. <u>Income</u>	
- Sales total	9,350
- Expenditure total	28,330
Net income:	-18,980

## Annex5

Cost & profit calculation (in commercial scale)

	In case of 50 cages	In case of 100 cages	Remarks
<b>1. Base of calculation</b>			
- Number of cages:	50	100	
- Number of shell in a cage	1,000	1,000	
- Total number of shell to be cultured	50,000	100,000	
- Cost of cages: Baht 3,200 each	160,000	320,000	
- Depreciation term of cages:	5 years	5 years	
- Cage maintenance cost per season:	5%	5%	
- Cost of a seed:	Baht 0.75	Baht 0.75	
- Cost of feed per shell for 6 months:	Baht 0.55	Baht 0.55	
- Cost of labour per month:	Baht 5,625	Baht 11,250	
- Fuel and lubrication per month:	Baht 900	Baht 900	
- Price of shell: A grade(over 8.0g, average 10.0g)	Baht 350/Kg	Baht 350/Kg	
B grade (over 5.0 to 8.0g, average 6.5g)	Baht 250/Kg	Baht 250/Kg	
C grade (under 5.0g, average 4g)	Baht 200/Kg	Baht 200/kg	Further cultured
- Mortality rate of shell:	5%	5%	
- Number of product in pc.: A grade (32%)	15,200	30,400	
B grade (32%)	15,200	30,400	
C grade (36%)	17,100	34,200	
Sub-total:	47,500	95,000	
- Quantity of product in kg: A grade (32%)	152	304	
B grade (32%)	99	198	
C grade (36%)	68	137	
Sub-total:	319	638	
<b>2. Expenses</b>			
	<u>Baht</u>	<u>Baht</u>	
<u>Fixed cost</u>			
- Depreciation cost of cages for 6 months	16,000	32,000	12.8%
- Cage maintenance cost (5% of initial investment )	8,000	16,000	6.4%
- Labour cost	33,750	67,500	27.1%
- Fuel & lubrication	5,400	5,400	2.2%
Sub-total:	63,150	120,900	48.5%
<u>Variable cost</u>			
- Cost of seeds (Baht 0.75 per a seed)	37,500	75,000	30.1%
- Cost of feed (Baht 0.55 per a shell)	26,813	53,625	21.5%
Sub-total:	64,313	128,625	51.5%
<u>Total Expenses:</u>	127,463	249,525	Baht 381.11/Kg
<b>3. Income</b>			
	<u>Baht</u>	<u>Baht</u>	
<u>a. Sales</u>			
- A grade: Baht 350 per Kg	53,200	106,400	
- B grade: Baht 250 per Kg	24,700	49,400	
- C grade: Baht 200 per Kg	13,880	27,360	
Sales total:	91,580	183,160	
<u>b. Income</u>			
- Sales total	91,580	183,160	
- Expenditure total	127,463	249,525	
Net income:	-35,883	-66,365	



## Annex 5

### Report of Local seminar on Concept for Coastal Fisheries Management

#### Integrated Coastal Resources Management in Pathew District (ICRM-PD)

Venue: The conference hall of CMDEC, Chumphon

Date: 31<sup>st</sup> August to 1<sup>st</sup> September 2006

Jirapa Kamhongsa

4 October 2006

#### 1. Background

Integrated Coastal Resources Management in Pathew District is collaborated between DOF/CMDEC and SEAFDEC/TD. This project is emphasized fishermen cooperative and sustainable resources utilization. The project duration is 5 years, started from 2001 to 2006, this year is the last year of project. Project evaluation is important to know that community can get benefit from project, and project has weak or strong point to development.

#### 2. Objectives

1. To review progress report of the last year of the 2<sup>nd</sup> Phase, to continue the 3<sup>rd</sup> Phase
2. To exchange experience between fishermen, stakeholder, governor and project's staff.
3. To bring recommence of project to developing the next project or next phase.

#### 3. Participants

1. Department of fisheries (Central Office)	2
2. Chumphon Marine Fisheries Research and Development Centre (CMDEC)	8
3. Chumphon Marine and Coastal Resources Research Center (MCR)	2
4. Chumphon Coastal Aquaculture station	1
5. Chumphon Fisheries Enforcement Unit (CFEU)	2
6. Southeast Asian Fisheries Development Center (SEAFDEC/TD)	5
7. King Mongkuts Institute of Technology Ladkrabang (Chumphon)	2
8. Leader of Village and Ao.Bo.To.	4
9. Fisher's Group and Women's Group	52
<b>Total</b>	<b>78</b>

#### 4. Agenda and time table

##### 31 August 2006 (Thursday)

11.00-12.00	Registration
12.00-13.30	Lunch Break
13.30-14.15	Opening address by Mr. Rungsan Chayakul, Director of Marine Fisheries Research and Development Bureau
	- Direction of Community Based Fisheries Management, by Mr. Rungsan Chayakul

- 14.15-15.15      **Progress Activities of project**  
 1. Base Line Survey/Monitoring Survey by Ms. Nopparat Nasuchol  
 - Fisheries Resources (Ms. Sunsanee Srichanngam, CMDEC)  
 - Marine Environmental/Sea grass survey (Ms. Sumana Kachonwattanakul, MCR)  
 - Fishing ground and fishing gear mapping (Ms. Jariya Sornkliang, SEAFDEC)
- 15.15-15.30      Coffee break
- 15.30-16.30      2. Encourage and extend LBCFM concept by Ms. Sumitra Ruangsvakul  
 - Activity and responsibility of PFG/PAG (Vice chairman of PAG)  
 - Crab bank activity (Ms. Thitiporn Supaniran, CMDEC)  
 - Structure and work plan of local enforcement unit (Mr. Somporn Dejpgakdee, Enforcement Unit/DOF)
- 18.00-20.00      Welcome party

1 September 2006 (Friday)

- 09.00-10.00      3. Encourage Local Business by Ms. Jinda Petchkamnerd, CMDEC)  
 - Women's group activity (Leader of women's group no. 4 and 6, Ms. Jariya Sornkliang, SEAFDEC/TD)  
 - Babylonia shell culture experimental (Ms. Jirapa Kamhongsa, SEAFDEC/TD)  
 - Swimming crab culture experimental (Ms. Nopparat Nasuchol, CMDEC)  
 - Fish cage culture experimental (Ms. Nopparat Nasuchol, CMDEC)
- 10.00-10.30      Coffee break
- 10.30-11.30      4. Resource Enhancement  
 - FEDs installation (Dr. Yuttana Theparoonrat, SEAFDEC/TD)
- 11.30-12.00      5. Enhance human resource capacity building and participation  
 Two Groups Dividing for discussion  
 - Fishermen's group  
 - Women's group
- 12.00-13.00      Lunch Break
- 13.00-14.30      Recommence on project activity by each group
- 14.30-15.00      Coffee break
- 14.30-15.00      **Summary of project activity by each group**  
**Report the result of seminar**
- 15.00-15.30      Closing

**5. Content of the meeting**

**5.1 Direction of Community Based Fisheries Management**

Mr. Rangsun Chayakul, Director of the Marine Fisheries Research and Development Bureau, the Department of Fisheries, addresses that the implementation of the project was such the gravid crab bank. This activity returned the enhancement of crab fisheries resources. In addition, the enlargement of bottom-net mesh size of the collapsible crab trap, which changed from 1.25 inches to 2.5 inches, was strongly contributed to enrich crab resources.

Mr. Director also mentioned about the problem of the high price of fuel oil. He informed that the cabinet tried best to solve the problem for the small-scale fisheries. The cabinet considered

to provide low price fuel oil and sell to fishers. He recommended that fish harvest and product should be kept clean and fresh in order to get a good price. This condition was supportive to better sell in urban market including exported to international market.

Mr. Director also encouraged fishers and stakeholders to participate in coastal resources management by sharing opinion and working together. He strongly requested local fishers to participate in the gravid crab bank, sustain the environment at sea that get rid of garbage in sea, etc. He informed more on observation the number of foreign labor, this way was supporting to national security.

## 5.2 Progress project activity

### 1. Base line survey activity

#### 1.1 Fisheries Resources (Ms. Sansanee Srichanngam)

In 2002, base line survey was found eight main types of traditional fishing gear that, crab trap, crab gill net, large cast net (squid), shrimp trammel net, encircling gill net, mullet fish gill net, anchovy falling net and squid trap. Four types was the main fishing gears and operating in whole year, crab trap, large cast net, shrimp trammel net and encircling gill net.

Results of five years of survey were as follow;

- Fisheries resources of banana squid and indo-pacific mackerel was stable in volume, because two species did not releasing.
- Fisheries resource of swimming crab was increasing every year, because there was releasing of gravid crab to sea at whole year.
- Banana shrimp was often released at short period and some year, the catch number was not related with timing. Technical staff recommended that this species releasing would be effective when it was released in the proper fishing season.

#### 1.2 Marine Environmental/sea grass survey (Ms. Summana Khajonwattanakul)

##### Sea water quality survey

Quality of the sea water was at standard rank. This result affirmed that the sea water was good to conserve coral reefs and carrying coastal aquaculture. The quality in this area was better than the inner gulf of Thailand.

##### Phyto-Plankton in 2004-2005

Diatom was the main and food chain for indo-pacific mackerel.

##### Sea grass in 2005-2006

Sea grass was needle leave species (*Halodule pinifolia*), at Ko Teab (village no. 7) areas. The area of sea grass covered to 75 Rai.

#### 1.3 Fishing ground and fishing gear mapping (Ms. Jariya Sornkleang)

Result of the study will be present the comparison of fishing ground and fishing gear in percentage, between the project beginning and the last years of project. Monitoring survey was collected data of catch data at the surrounding artificial reef. This data will be indicator of the effective of fisheries management and artificial reef installation at project site.

### 2. Encourage and extend coastal resource management activity

#### 2.1 Pakklong fishers' group (Mr. Vinai Katekeaw)

The fishers' group registered in February 2006, and change name from Pakklong Fishermen

Group (PFG) to Pakklong Aquaculturist Group (PAG), there were 78 members, 123,000 Baht of saving, each member must have one share (50 Baht/share). The group has value of share amounted to 9,450 baht, and will be launched a loan to member with the group's regulation.

The activities were participated with project;

- On 14 March 2006, joined fish releasing activity
- On 21 March 2006, joined the second babyloia shell culture experimental
- On 22 April 2006, joined swimming crab culture experimental
- On 18-25 June 2006, representative of PFG went to Japan to observe Japanese Fisheries Cooperative Association and crab bank management in Japan.
- In June, joined to installed 10 sets of FEDs
- In August, participated at fisher's workshop to design and formulate coastal resource management plan.
- In August, invited community to mangrove reforestation

Work plan in 2007

- Increase number member of PAG
- Strongly operation of demarcation zone with enforcement unit
- Implementing crab bank in Japanese style
- Regularly on enhance coastal resources by fish releasing and mangrove reforestation.

#### *2.2 Crab bank activity ( Ms. Thitiporn Supaniran and Mr. Jang Fungfuang)*

This activity was created by the Thai Environment Institution, the main objective was increased swimming crab resources by all gravid crab are deposited in cages until they have hatched. The main purpose of this activity was awareness building to local people on sustainable and resources conservation. The second propose was making good relationship between community and governor.

In the beginning, 16 members of crab trap fishing group was volunteer to released gravid crab in the cage, the number of gravid crab was 15,111, from June, 2002 to June 2006. Now, this activity was further introduced to other part of Thailand and international.

#### Work plan from leader of crab bank group

Experience gained from study trip in Japan, new system will be marking on carapace of crab, and releases crab to the sea, will be operated at the next monsoon season. Draft of regulation of crab bank for all resource users;

- Length of fishing boat should not longer than 10 meters
- Crab trap with three inches mesh size of bottom net and operating at demarcated zone
- The number of crab trap was not more than 500 units
- Crab trap fishers' group should donate gravid crab one crab per trip.
- Crab culture farmers are not allowed to operate crab trap, if they demand for the crab, should contact the group.

#### *2.3 Structure and work plan of enforcement unit (Mr. Somporn Dejpakdee)*

The local enforcement unit established in May 2006, to coordinated with community and network on monitoring coastal resource.

Work plan of implementation, divided local enforcement group to two groups, responsibility to monitoring 10 day per month.

### 3. Encourage Local Business

#### 3.1 Women's group activity (Ms. Jariya SornKleang, Mrs. Ubol Maikate and Mrs. Jeamjit Klaiyraera)

The project encouraged activities of three women's group that;

- Women's group no.1, the main products was fish processing, dry anchovy processing products. Production of this group was on-going and development quality on taste and package. Fish Technology Division was the key to take care and follow up women's group development.
- Women's group no.4, the main product was snack, namely Pansib and Golden criske. This group could decorate artificial flower for the funeral ceremony, wedding ceremony and so on. Savings was an activity of group, amount of savings was 600,000 baht at recent. The group also operates a grocery shop, like cooperative in community. This group mentioned to more skill on bookkeeping and accounting for their member.
- Women's group no.6, the main product was batik printing, shirt, T-shirt, necktie, bag, handkerchief, etc. Group try to develop drawing and styling of products, and more training on shirt making.

#### 3.2 Babylonia shell culturing experiment (Ms. Jirapa Kamhongsa)

There were three objectives of this experimental, the first was study on property area to carrying-out the shell culture. The second was study cost investment of the shell culture management. The third was created alternative job to community.

Babylonia shell culturing experimental was conducted twice times, the first time implemented in August 2005 to February 2006, with 9 cage, and 1,200 shell per cage. The average size of the shell seed was 1.0-1.5 cm., total weight was 2,083 pieces per kg. The results of the first experiment found that the growth rate of the shell was little slowly, because culture time was monsoon season, the depth of cage was deep, difficult to cleaning.

The second experiment was conducted in March 2006 to September 2006. Number of experimental cages was ten cages. The depth of cage was shorter than the first experiment. Each cage was released 700 pieces, total weight was 3,030 pieces per kg., this time found that the growth rate was better than the first experiment. In addition, the survival rate was also higher. This type of culture was needed a good management such cleaning cage and sand changing into the cage. This led to a higher cost of culture management. To reduce this cost, an official suggested that the shell culture should be carried out in the shrimp pond with covered plastic at bottom-side pond.

#### 3.3 Crab cage culture Experimental (Mrs. Nopparat Nasuchol)

The objective of this culture was utilized the crab resource for maximum profit. An additional objective was created alternative income to fishers and resource users. The last objective was study on biology of crab resources.

The first experiment conducted in 2005, found that number of crab was very few, because the bottom of cage was open, and big size, difficult to checking the number of crab.

The second experiment conducted in 2006, the size of cage was adjusted to smaller than the first experiment, easy to checking. The survival rate was higher than the first experiment.

In conclusion, crab culture was recommended to carry out with a good management, by giving fresh and enough bait, and farmer should be inspected the condition of crab in cage every day.

#### *3.4 Fish cage culture with artificial feed (Mrs. Nopparat Nasuchol)*

The objective was making comparison cost-benefit between culture with pellet feeding and fresh feeding. The result was that, the survival rate of experiment by pellet feed was better than fresh feed.

The main problem of this experiment was that, heavy rain was caused low salinity of sea water, making fish was high pressure and died.

#### 4. Resource enhancement

##### *4.1 FEDs installation (Dr. Yuttana Theparoonrat)*

The objective of FEDs (Fish Enhance Devices) aggregated fish school, particular pelagic fish. Material of FEDs will be good quality and longer used, and can find at the local market. The important thing of FEDs, will be good floating at water tide.

Project had FEDs installation two times, the first deployment of 10 stes was installed outside of demarcated zone, four months after the installation, aquatic resources were surrounded FEDs, and six months later, buoy of FEDs was disappeared. There were two reasons of disappearance that, chain and shackle part was broken and the second reason, may be fishermen used buoy of FEDs to boat anchored.

The second installation, the FEDs model was changed by un-use floating, and install at the middle of artificial, each set was far 300-400 m. After two months installation, the spongy and green mussel were found at FEDs. Technical staff suggested that, after Ao.Bo.To. approved budget to installed, the location of FEDs will be installed around ARs, for increasing pelagic fish by FEDs and demersal fish by ARs. For protect trawl encroachment, the artificial reef should install inside ARs zone, but may be conflict with encircling gill net fishers. The cost of FEDs was 7,000 baht per set.

### Questions from meeting

Item	Question	Replied	Recommendation
<b>1. Base line survey</b> - Catch composition	- What species of fish from squid cast net in 2006, because the number of fish was higher than other year?	- Pelagic fish, Spanish-mackerel, Mackerel are the main fish.	- Shrimp fishing was increasing, because shrimp resource was rich - Shrimp fishing ground will be still rich, if community have good management - Shrimp trammel net can catch only banana shrimp, after shrimp releasing may be follow up the result - The number of shrimp was increased in 2005, some fishermen comment that, some shrimp may be came from shrimp pond, which pond broken by flooding.
- Marine environmental /Sea grass survey	- Sea grass ( <i>Halodule pinifolia</i> ) at Ko Teap, the leaf was sharp, different from presentation - Sea grass had flower or not.  - MCR had monthly water quality or not, because DOF had fish cage experiment by pellet feed, and this experiment had problem on water quality.	- Picture of Sea grass from presentation enlarged to 20 times, so detail was very high solution. - Sea grass at Sawee District had flower, but not yet met at Pathew - MCR and CMDEC had data collection every two months, but the important thing of location of cage may be chose deep water, because temperature change will be effect of fish feeding.	- At ARs area usually meet Sulferdioxide Gas very high, so MCR would like to collected data of water, before ARs installation.
<b>2. Encourage and extend CBRM concept</b> - Work plan of Enforcement unit			- There was conflict between crab trap and trawl, enforcement unit will be survey more.
<b>3. Encourage local business</b> - Women's group of Pakklong Sub-district  - Babylonia shell	- Project have plan on sewing training to women's group or not.	- Project had collaborated with Out-school Education on sewing training, but equipment can not support.	- Framer must take care

<p>culturing experimental</p> <p>- Swimming crab cage culture experimental</p> <p>- Fish cage culture experimental by artificial feed</p>	<p>- The second time of culture will be continue on January 2007 or not.</p>	<p>- The timing of culture was postpone, because can not find fingerling.</p> <p>- The second time don't have, because this culture is high cost, and the next budget is limited of budget to operation.</p>	<p>this culture too closely</p> <p>- Cost of feeding was very high, because bait was Spanish mackerel, sardine.</p> <p>- Heavy rain was the main problem of this culture</p> <p>- This culture was problem in cage, because the wave was effect on feeding</p> <p>- Crab cage culture should be put in pond, may be better than in sea.</p> <p>- There was problem on small of cage and don't have spare cage</p> <p>- The second problem on heavy rain</p>
<p><b>4. Resource enhancement</b></p> <p>- FEDs installation</p>			<p>- ARs made by tire, the time of tire was very short life, and have problem on degeneration of tire.</p>

### 5.3 Summary of project activity by each group

#### *Fishermen's group*

1. Crab bank activity was useful on resources enhancement, and this activity should be continually implementation. Crab escape and crab death should be improved on technical, and Japanese model may be taken to operated in this area. For crab bank in cage model should be released small number of gravid crab and short time in cage, this way was easily to checking the number of crab.
2. FEDs installation should be progressively implementation, this device expected to promote on eco-tourism such sport fishing around FEDs and make more income to fishermen on rental boat.

#### *Women's group/ community leader*

##### Positive opinion

1. Local people get more income from job's opportunity
2. Local people can improved development their skill.

##### Negative opinion

1. Project did not provide a capacity building program on group's administration and marketing management.
2. Project's staff/Extension's worker, who responsibility of this activity, should visit and coordinate with group (women's group no. 4)



3. Project's staff should often monitor the group's activity.
4. Communication between project's staff and group should be clear and easy to understand.

#### Problem

1. Women's group have production, but don't have market, project should provide marketing training to women's group, or coordinated agency concern on marketing to develop skill on marketing to women's group.
2. Natural group will be slow to developing, but group with administrative will be fast to developing.
3. Artificial flower products did not have market.
4. Lack of information on women's group to local

#### Need

1. Lack of equipment on sewing (women's group no. 6)
2. Development of batik production
3. Extension on marketing
4. More coordinated from project's staff.

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Edited by Sumitra Ruangsivakul  
4<sup>th</sup> October 2006

## Annex 6

### Travel Report to Chumphon

August 9-11, 2006

Sumitra Ruangsivakul

21 August 2006

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#### 1. Objectives

##### Fishermen's workshop

In the wake of the study tour conducted in Japan from 19 to 25 June 2006 by the members of PFG, a workshop is organized for the purpose of (1) disseminating lessons learnt and experiences gained during the study tour among all members of PFG and (2) discussing on how the findings made in Japan can be reflected and incorporated in the CBRM orientation and the community development planning of the PFG. In such a way, benefits of study tour would be equally shared among all members of PFG.

##### The 7<sup>th</sup> PFG meeting

The organization and development of fishermen's group is now under the transitional period with shifting the institutional entity from PFG to PAG. The current member of PAG reaches 68 among 175 PFG members, which means almost two third of PFG members is still reluctant to join the newly formed institution. Under these circumstances, a discussion is to be centered to clarify the reason why some of the members are hesitating from joining the PAG and to find out the way-out.

In this occasion, as other agendas, the following issues are also discussed.

- The current trend that the fish landings are generally dwindled and any measure to be taken
- Reporting on monitoring the FEDs installed in June 2006
- Reporting on the current situation of fund saving and initiation of credit scheme
- other issues as appropriate

#### 2. Travelers

1. Mr. Seiichi Etoh
2. Ms. Sumitra Ruangsivakul
3. Ms. Jariya Sornhliang
4. Ms. Jirapa Kamhongsa
5. Mr. Ikuya Tanaka

#### 3. Itinerary

##### 9 August 2006 (Wed)

- 05.00 – 10.00 - Move from TD to Chumphon
- 10.00 – 13.00 - Attend mangrove reforestation
- 14.00 – 18.00 - Visit the women's groups (No.1, 4 and 6)

##### 10 August 2006 (Thu)

##### The Fishermen's workshop

- 09.00 - 09.30 - Opening of the workshop and visual information on the trip by TD
- 09.30 – 10.00 - Presentation by the Chairman of Crab Trap Sub-Group on the issue of Crab Bank

- 10.00 – 10.45 - Presentation by the Chairman of PFG on the issues on management and function of fishermen's cooperatives and CBFRM approach
- 10.45 – 11.15 - Presentation by the extension workers on Japanese fisheries in general
- 11.15 – 12.00 - Discussion on possible application of Japanese model to PFG
- 12.00 – 12.15 - Summary on the workshop and closing by TD
- 12.15 – 13.30 - Lunch break

#### The 7<sup>th</sup> PFG / 4<sup>th</sup> PAG meeting

- 13.30 – 14.00 - Opening and statement on the current activity and movement of PFG by the Chairman of PFG
- 14.00 – 14.30 - The current status of transferring the membership from PFG to PAG and discussion on how to expedite the matter
- 14.30 – 15.00 - General trend of current fish landings and any measure to be taken to improve the situation
- 15.00 – 16.00 - Any other issues including the monitoring FEDs
- 16.00 – 16.00 - Closing the meeting

#### 11 August 2006 (Fri)

- 09.00 – 12.00 - Inspection of the activity of FEDs, Experimental babylonia shell culturing, crab bank and experimental crab culturing
- 12.00 – 18.00 - Moving from Chumphon to TD, BKK

## **4. Results**

### 4.1 Mangrove Reforestation

- Mangrove reforestation activity was opening at 1000 by Head of District, Mr. Peecha. SEAFDEC's team arrived at 1100 am., and participated with them, all participants were Ao.Bo.To., student and teacher from project site, PFG's members, women's group, local people, CMDEC and SEAFDEC.
- The total of mangrove was 2000, this activity started by PFG, and cooperated to requested mangrove by CMDEC, Ao.Bo.To. supported lunch and water drinking.
- The next time will be held on 5 December, this activity will be held on Queen's birthday and King's birthday.

### 4.2 Visiting Women's group No. 1

- SEAFDEC's team visited Women's group No. 1, the main product of this group was anchovy processing, but group has applied various test and style. This time Chairman and some member went to sell products at OTOP exhibition in Bangkok, only accounting and worker was still working and waiting us at the office.
- The number of production was still same number, because lack of manpower and limited of factory size (too small).
- From observation, the packaging was developing, by used good material of packing. The accounting of this group was analysis, from January to June 2006.

### 4.3 Visiting Women's group No. 4

- This group had a lot of activity, produced dry flower for wedding ceremony and cremation, snack and open community shop (grocery). The objectives of this activity was that, provide the good quality of goods and cheap to people in village, the second objective was create new business in village.

- Community shop started on 9 June 2006, operated by women's group, the capital of this activity 250,000 baht by SML project of Interior Ministry. There are 35 members now, every three months will be get new members. The regulation of this group was that;
  - The fee for new member was 20 baths for book record and service charge
  - Member will buy share, one share is 20 baht, and not more than 50 share per member
  - The end of year, the benefit will be provided to member that; 10% of net profit to buyer, 20% to committee, 25% to worker, 3% for interest of saving, 10% for reserving, 10% for administration and 22% for share.
- Mr. Etoh commented on this activity that, women's group may be not work together like to produced snack, but the problem of this group that, almost members were busy in the morning on rubber activity. Group's Chairman said that, they did not stop snack processing, still produced by order.
- Ms. Sumitra commented on equipment of snack processing that, may be distributed to member, who need to produced, and give some commission to group on equipment charge. Chairman will be bring this information to discuss at the next meeting.
- Mr. Etoh given more information that, please find the activity, which available for group to participation, and informed to us.

#### 4.4 Visiting Women's group No. 6

- Products of this group were batik printing and making to shirt, bag, etc. This season, their income was reducing, the order was not come more, because this season Thai people have wearing yellow T-shirt for Majesties the King ceremony.
- Mr. Etoh comment the accounting that, the expenditure of month was not clear, please record more of expenditure.
- Chairman informed to project's leader that, please order batik T-shirt for local seminar, Mr. Etoh would like to discuss with TF's manager on this requested.

#### 4.5 Fishermen's workshop

- Fishermen's workshop started at 1000, 10 August 2006, at the ICRM-PD project's office, with 30 of PAG's member, CMDEC, Ao.Bo.To. and SEAFDEC/TD.
- Fishers' workshop was opening by Mr. Etoh, ICRM-PD project's leader, he informed on the objectives and background of this workshop and the important issue that, the outcome of study trip to Japan from PAG's Chairman, Chairman of Crab fishing group and extension worker.

#### Crab Bank activity (Mr. Jang Fungfueng)

- Mr. Jang, Chairman of Crab Fishing Group and Crab Bank, introduced himself and presented the program of study tour from 19-25 June 2006, he was deeply thanks to SEAFDEC/TD and Hunet ASA of Japan, supporting this traveling.
- He summarized his impression from this trip that, Fishermen in Japan respected their regulation very much. He would like to see fishers' group in Thailand respecting their regulations like Japan.
- For the second impression, he was surprised to see the fact that the income of each clam sub-group member had been maintained at the higher level on end in spite of the number of the sub-group (more than 500 members). This means that the clam resource is well managed by their own measurements.
- As the lesson learnt on crab bank, he informed that the objective of activity was the same: building awareness among fishermen, but the approach was different. He hoped that the fishermen might start releasing gravid crab to the sea by themselves in the

future, after everybody got understand on responsible fishing.

Fisheries Cooperative (Mr. Wara Keteumpai)

- Mr. Wara, Chairman of Pakklong Aquaculture Group and Pakklong Fishermen Group, he informed of the program from the first day until the last day of study trip, and appreciated SEAFDEC and Hunet ASA for offering such a chance.
- The lesson learnt from this study trip was follow as;
  - Fish marketing of fisheries cooperatives: fishermen (members) are selling their catches at the cooperative premises through the auction system to buyers (middlemen); the initial prices of fish are fixed by the auctioneer of fisheries cooperative. Middlemen, who participated in the auction, have to be registered with the cooperative. The auction is held 6 days a week, and starts at 12.00 p.m. everyday, it normally lasts for two hours or so. Therefore, fishing time is adjusted according to the beginning of auction, which can be applicable in Thailand.
  - The small bank: this business provided the members with loans. There were 3 levels of interest for members, i.e. the first type, ordinary member with saving paid lowest interest, the second type, ordinary member without saving paid the low interest, but higher than the first type, and the third type, temporary member, paid the highest interest.
  - The FCA is basically managed by employed staff governed by a committee which consists of FCA members (fishermen). They are engaged in various businesses like selling fuel and lubrication oil, buying and selling fish, mini-banking, operating ice plants, fishers' sales outlets, etc. As such, the FCA earns income, e.g. 5% commission for selling fuel, 2% commission for selling fish at an auction, 6% handling charge from fishermen for selling fish, etc. Those incomes enable the FCA to employ staff.
  - The step to become to member of Fisheries Cooperative, must proceed in the career step by step as follows:
    1. First step, he must be an employed fisherman for not less than 3 years
    2. He must go fishing at least 90 days per year
    3. He must sell products to FCA.
    4. After that, he can be a temporary member of FCA.
    5. He can buy a fishing boat and become an independent fisherman.
    6. The Committee inspects his activity and behavior.
    7. Subject to the Committee's approval, he can buy shares.
    8. Then he is qualified to be a full member.
- He would like to follow the zoning of project site like Japan, by forming volunteer fishermen to protect area and providing information to DOF's staffs.

Extension worker on Japanese Fisheries (Ms. Napat Pongjit)

- Ms. Napat, extension worker: she informed of the duty of fisheries development station that takes care and develops the fishing ground.
- The station studied the habitat of each specie, and discussion with fisheries cooperative to making resource management plan for each species. The sample of main specie, as clam is the most valuable species harvested in the lake, there are 3 methods for resource management, i.e. destroying predators, releasing fingerlings and setting the allowable size for catch limitation.
- For prawn, swimming crab, mangrove crab and other fish, fingerings are released to the sea. The FCA released clam and crab because they were not the species to migrate

widely. The prefecture fisheries office released migratory species like prawn and some other fish.

- The Clam sub-group has an internal regulations as,
  - The limit on size and quantity of harvested clam: there are two types of sieve for size separation, 2.8 and 3.0 cm. The harvestable size of clam must be bigger than 2.8 cm. Fishermen can catch small size not more than 44 kg or 2 buckets (22 kg/bucket) and the total allowable catch per day is 110 kg or 5 buckets per member
  - The time of fishing was limited from sunrise until 1:00 pm, and no fishing on Saturdays and national holidays.
  - The limit on fishing zone: the off fishing area in the lake is the ground used for nursery of clam; so that fishermen are not allowed to catch clam in these areas.
  - This group has its own enforcement unit which carries out patrolling voluntarily in the lake for illegal fishermen in use of their own fishing boat with fuel paid by the FCA.

#### Closing

- Mr. Etoh informed on decreasing of catch data that the project would like to discuss with PAG to find a solution. Fishermen said that this condition have occurred in the world, hot water and low tide, nobody can resolve this problem, this condition waiting the normally condition to return.
- Mr. Etoh gave thanks to participants for attending this workshop and appreciated to understand on the lesson learnt from Japan.
- Mr. Tanaka informed that, he was deeply appreciated on fishermen participation and hope to see PAG will be grown like fisheries cooperative in Japan. One thing given to PAG that, Fisheries Cooperatives in Japan have taken more than 100 years to completed on resources management compared with this group which started just two years ago. It needs step by step progress.

#### 4.6 Visited FEDs, Babylonia shell culture experiment

- On early morning of 11 August, leave from pier of village no. 1 to FEDs installation, we met 10 sets, all of FEDs was still remain. CMDEC informed that, the end of August will be driving to check and take photo some of FEDs on fish school and some aquatic.
- The second observation, babylonia shell culture experiment, the condition of shell was still grow very well, but 2 cages have black shell of shell. The problem of black shell will be discussed with Technical staff of Chumphon Aquaculture Station.

**Report**  
**on**  
**Study tour to Trad Province**  
 November 8-10, 2006

Sumitra Ruangsivakul  
 24 November 2006

### 1. Objectives

The Pakklong Fishermen Group/Pakklong Aquaculturist Group (PFG/PAG) in Chumphon plans to develop eco-tourism within their local business development framework, partly in use of loans to be provided by the PAG Credit Scheme which will officially commence from 2<sup>nd</sup> November 2006. To do that, the project envisages conducting the study tour to Trad Province in where the Ban Ped Nai Community is reputedly deploying the eco-tourism business with the following itinerary. Also, this group has initiated self-regulatory measures for mud crab and mangrove crab harvest with setting the close fishing seasons, which will be of interest for the PAG.

The group called Ban Ped Nai Mangrove Conservation and Development Group in Trad Province is well known in Thailand as the advanced community who has successfully deployed various activities by their own motivation for the last 10 years. The newly organized PAG can learn many from their experiences and approaches in particular in the areas of group management, a credit scheme, mangrove reforestation, eco-tourism business and a CBRM approach through physical inspection and mutual discussion with them.

### 2. Travelers

1. Mr. Wara Kejumpai	Chairman, PAG/PFG
2. Mr. Vinai Kajkaew	Vice Chairman of PAG
3. Ms. Pranom Boonchu	Secretary
4. Ms. Bunenoum Somsorn	Treasurer
5. Ms. Euamporn Boonnak	Assistant treasurer
6. Mr. Saman Rattanapakdee	Committee
7. Mr. Phuwana Sukchana	Committee/Leader of Echo-tourism group
8. Ms. Nopparat Nasuchon	CMDEC
9. Ms. Thitiporn Supaniran	CMDEC
10. Ms. Sumitra Ruangsivakul	SEAFDEC/TD

### 3. Itinerary

#### 8 November 2006 (Wed)

0700-2100 - Move from Chumphon to Trad Province

#### 9 November 2006 (Thu)

0800-1200 - Visited office of Ban Pred Nai village, discussion with Community Committee

1300-1600 - Visit bamboo basket group by women's group  
 - Visit mangrove forest

#### 10 November 2006 (Fri)

0600-1800 - Move from Trad to Chumphon

### 4. Results

- PAG's Committee and project's staffs visited Village's leader/Chairman of Saving Group, Assistant Village's leader/Vice Chairman of Mangrove Conservation Group, Treasurer of

- saving group, and Leader of women's group of Ban Pred Nai at village center.
- All of Ban Pred Nai Committee introduced themselves, Ms. Samnao Predkaew, Village's leader/Chairman of saving group, Mr. Boonpin Silaloi, Assistant village's leader and vice chairman of saving group.
  - Ms. Sumitra, SEAFDEC/TD explained the objectives of this trip and introduced herself. PAG's committee and CMDEC's staff introduced by themselves.
  - Ms. Samnao explained background of Ban Pred Nai village that, this village was village no. 2 of Huangnamkao Sub-district, Muang District, Trad Province, total was 5 villages, the main occupation were rubber plantation, fruit plantation (Rambutan, Durian, Mango steel, etc.), coastal aquaculture (shrimp, grouper, sea bass and mud crab culture) and fishery (mangrove crab collection, mud crab collection and fish gill net).
  - Village's leader of village informed more that, there were 4 main groups of 20 groups in this village, and explained on group's management of 4 groups as follow as;
    1. Mangrove Conservation and Development Group
    2. Cooperative store group (Demonstration group)
    3. Saving group
    4. Women's group

#### Mangrove Conservation and Development Group

- This group established in 1998, because this area have problem from shrimp culture, capitalist from outside came to destroyed mangrove forest to shrimp pond construction, Ban Pred Nai community would like to conserved mangrove forest, by arranged community meeting, agreed to take over shrimp pond from capitalist, and informed government to closed mangrove forest. The total mangrove area of this village was 12,000 Rai, before this area have destroyed, community can used benefits from mangrove, mangrove tree for agriculture and house and fishing around mangrove forest, after mangrove forest have destroyed, no tree and mangrove crab, and the most important thing, community believed that mangrove forest can prevent house and fruit plantation from strong wind.
- The main fishing was collecting mangrove crab, income of crab collecting was 500-1,000 baht per day per person, fishing operation was night time and catching by hand at the mangrove forest.
- Mangrove group established and forming committee to request budget from various NGO groups for walkway, office center and patrol boat (enforcement activity), community and local government try to continued mangrove reforestation until complete now.
- Village's leader informed more that, village's leader will be chairman of group by position and more regulation on group management are that;
  1. There was committee to encourage mangrove forest and coastal resources
  2. Committee meeting will be held every month
  3. Monitoring carried 2 times per week
  4. Mangrove reforestation was carrying every year (1 time per year)
  5. Mangrove forest survey was carrying 3 times per year
  6. Established regulation on conservation and mangrove utilization
- Community divided 5 groups and 5 areas to conserve and each group was composed 20 households to conserved one area of mangrove forest.
- Village's leader informed the problem of this area that, after complete of mangrove, the broken of coastal area (offshore) by current, this problem was discuss with expert and try to used bamboo to protect the area from current, but offshore will be still broken.
- This center will be transferred the knowledge on mangrove forest management to student and people from country and foreign countries, which have problem on mangrove forest.



The main activity of this group was established net work on mangrove in Trad Province to solution together.

- The new regulation of group for fishermen, there has close season of mangrove crab fishing, fishermen will be stopped fishing 6 days in October, by divided 2 duration, because these durations were spawning of mangrove crab, and other period of spawning season on April and May will be discussion to close season of mangrove crab with fishermen.
- Home stay activity carried by this group also, the price of home stay was 50 baht per night per person, 150 baht for meal per day (morning, lunch and dinner).

#### Cooperative store (Demonstration group)

- Cooperative store started in 1987 by community volunteer, and established group to share capital. In the first time, member arranged team to sell, and check accounting, bookkeeping in the evening, with 5-7 members per day.
- Now this activity has committee and employed member to selling, salary of employee was 4,000 Baht per month, cooperative store opened at 0800-1700 of everyday. There was 7 members of committee, and responsible on accounting. The normally of profit was 100,000 baht per year, the end of year will be given benefit to members and committee, 10% of profit will be paid to committee.
- The normally of goods of this store was dry goods, but the special goods was fertilizer and fuel, one fertilizer bag can get 10-20 baht of profit. Members of cooperative store can get benefit double way, from Provincial Cooperative and village cooperative, because village cooperative was member of Provincial cooperative, if village cooperative bought goods from Provincial Cooperative more and more, and each member of village cooperative bought goods more and more, the end of year members will be get benefit more and can get cheap good.

#### Saving Group

- Saving group started on 18 August 1995, initially group had 200 members, now increased to 590 members, people in this village were member. The total of capitals were about 8,000,000 Baht, divided 1,000,000 Baht for welfare of member, like emergency loan and 7,000,000 Baht for ordinary loan.
- Saving money was 60,000 Baht per month, the rate of saving was 50-2000 baht per member.
- Loan activity, the maximum of ordinary loan was 40,000 Baht and return in 30 months with 1% of interest per month.
- The special welfare of saving group to member that, member dead, group will be paid 1,200 Baht with 2 bags of rice for cremation.
- Group will be paid 150 Baht per month to each member of committee, the total of member was 11 member of committee.

#### Women's group

- Women's group started in 1986, by Agriculture Provincial with 25 members and now the number of member was 52. The main products were slices of rice flour with some kinds of mangrove fruit, and mangrove crab processing.
- Group's chairman informed more that, products of group will be sent to OTOP center of Province every week. The number of member was 5-10 members came to produced products at the village center. Group will be given labor cost to member at the end of year, each member will be recorded the number of work day.
- Now group had 50,000 Baht of capital from accumulate profit, this fund given loan to member, each member can get 5,000 Baht. Every 3 months will be given loan to member,

with 1% of interest per year.

- Women's group have many agency to supported subsidy, equipment and material, like Agriculture Promotion, Burapa University, District Agriculture, Ao.Bo.To., etc.

Problem

- Village's leader informed the problem of community that, Trad Province choose this village to promote echo-tourism, by provided subsidy for office and training on echo-tourism to committee of community. The channel of subsidy transfer from government to community have problem, because committee did not understand the system, some budget have lost by Ao.Bo.To, because Ao.Bo.To managed the budget without discussion with committee of community, and office building was not good on the price.
- The second problem was echo tourism activity that, this activity was new for community, when government set up the activity to community, only provided the training and some budget to developed the place, but community don't understand the system, and don't have time to participation.



PFG's committee visited committee of Ban Pred Nai village at the village center



The village center, this center used a lot of activities, like echo-tourism center, women's group office, cooperative store.



The location of mangrove forest at Ban Pred Nai village, 12,000 Rai of area

## Annex 8

### Report of Fish Enhancing Device (FEDs) Performance in Prathew, Chumphon

Dr. Yuttana Theparoonrat

8<sup>th</sup> January 2007

Under SEAFDEC/TD cooperation program between Integrated Coastal Resource Management at Prathew district, Chumphon province (ICRM-PD) and Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement for habitat and Fishing ground development program. The activity of fisheries resource and habitat enhancement through installation of Fish Enhancing Device (FEDs) was conducted in Prathew district, Chumphon province. In order to receive support from Local Administrative Authority (Ao Bo Tor) for additional installation of 60 units of FEDs in the project area of Prathew district. The experiment on new designed FEDs were conducted. The installation of 10 units of FEDs were carried out at Prathew district Chumphon province on 29 June 2006. The installation areas are located around artificial reefs installation site. The objective for installation of FEDs were testing on the design performance and durability as well as an effectiveness of resources enhancement. In order to approval of additional FEDs installation, Ao Bo Tor of Prathew district required for 6 months criteria of testing period for design performance and durability.

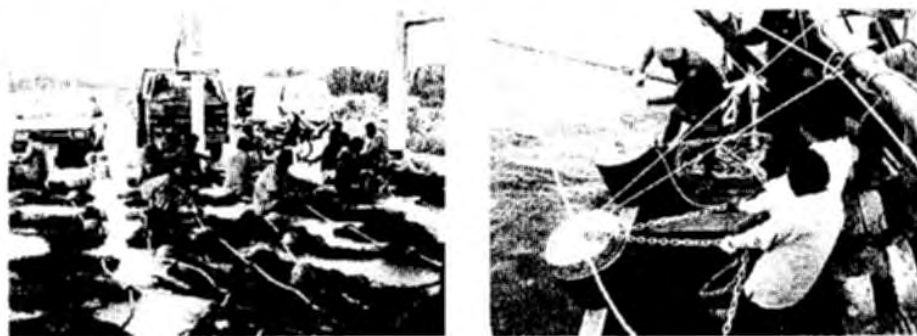


Figure 1. FEDs Construction and installation by fishermen group of Prathew district

The first investigation of FEDs condition after two months installation were conducted on 29 August 2006. Inspection performed by check position of FEDs by GPS and observation on the growth up of marine organism and fish aggregated around FEDs by under-water photography.

The result of investigation on 29 August 2006, found that 6 units of FEDs still remain and 4 unit are lost. Among the remain, one unit was relocated to a deeper place out off project area. The new position is Latitude 10° 48'.090 N Longitude 99° 28'.713 E. Since, information collection by interview local fishermen that there are 4-5 bottom trawler operated trawl net inside the artificial reefs areas during 7-18 August 2006, just two week before the FEDs inspection are conducted.

The remain FEDs are in good condition. There are marine growth attached on the PE appendix. Most of marine growth are barnacle, green mussel, oyster and corral. Part of the vertical main rope was attached by lump of squid egg hang on waiting for hatching. Many pelagic school of various species were gathering around FEDs. Young fingerling of some fish

species were found around the FEDs for nursling and hiding from predator and strong current. Some demersal fish also found feeding on the FEDs appendage. In general, FEDs could be generated a new habitat for spawning, nursling and feeding environment for bivalve, fish and squid.

Table 1. Position of FEDs installed on 29 June 2006

No.	Latitude	Longitude	Remark
1	10° 48'.937 N	99° 29'.144 E	lost
2	10° 48'.840 N	99° 29'.101 E	lose
3	10° 48'.688 N	99° 28'.852 E	lose
4	10° 48'.588 N	99° 28'.690 E	remain but change position to Lat 10° 48'.090 N Long 99° 28'.713 E.
5	10° 49'.074 N	99° 28'.978 E	remain
6	10° 48'.928 N	99° 28'.900 E	remain
7	10° 48'.929 N	99° 28'.769 E	lose
8	10° 48'.797 N	99° 28'.655 E	remain
9	10° 48'.720 N	99° 28'.692 E	remain
10	10° 48'.683 N	99° 28'.485 E	remain

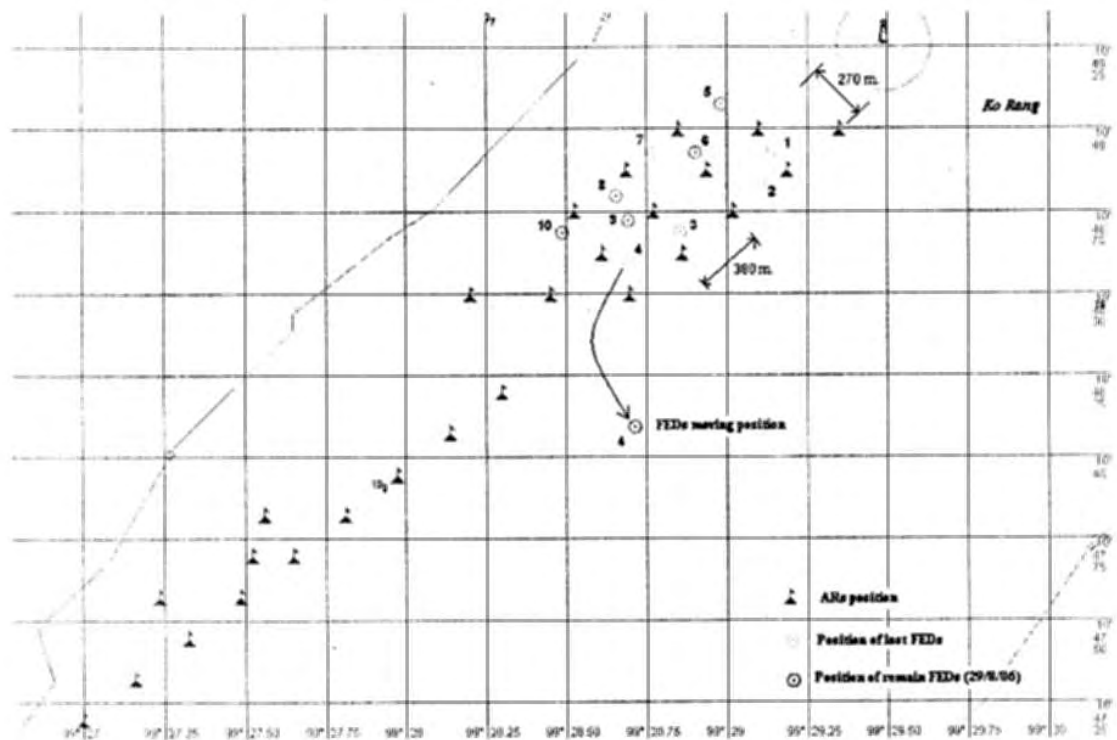


Figure 2. The FEDs setting position (circle) around artificial reefs areas.



Figure3. Marked buoy of FEDs on the surface and underwater net spreading pipes



Figure 4 Marine growth attached on FEDs appendage two month after installation.



Figure 5 Squid egg hang on vertical main rope waiting for hatching



Figure 6 Young fingerling of some fish species were found around the FEDs for nursling and hiding from predator and strong current.

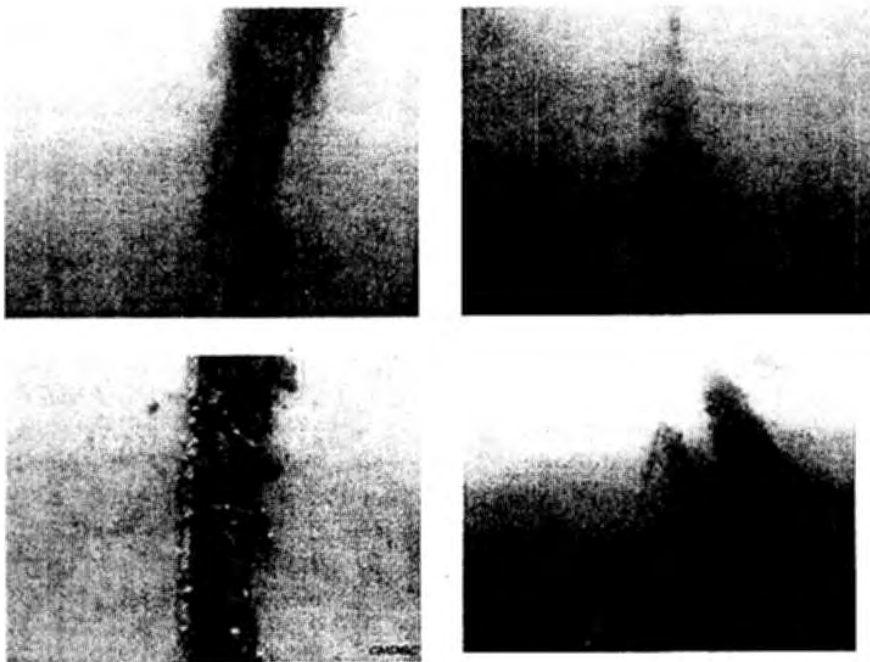


Figure 7. Many pelagic school of various species were gathering around FEDs.



Figure 8. Some demersal fish found feeding on the FEDs appendage

During inspection of FEDs, an information from interview to local fisherman found that there are bottom trawl net from others province operated in and around ARs installation site. The trawl net operation in side ARs installation areas would directed destroy some part of FEDs. Trawler could be conducted bottom trawl net fishing operation pass through the ARs installation site by using GPS navigation system to avoiding damage of net from ARs.

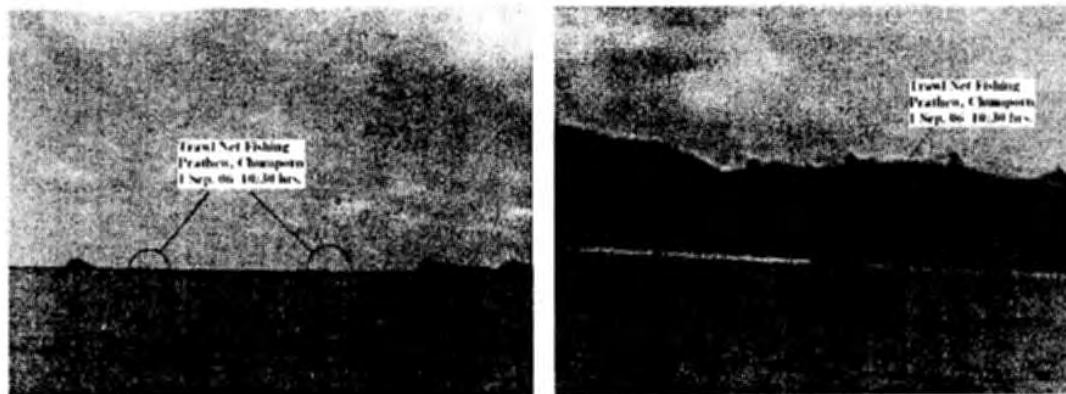


Figure 9 An evident showing bottom trawl net operated along the coast line of Prathew district. Photo recorded on 1 September 2006, time 10:30 hours.

The second investigation of FEDs condition were conducted on 1 December 2006. Inspection performed by Chumporn Marine Fisheries Research and Development Center staffs by observation of FEDs position and growth of marine organism and fish aggregated around FEDs by under-water photography. However, it found that all of FEDs are lose from the installation area. The information from interviewed to local; fishermen found that during their fishing operation on 20 November 2006, all of remain FEDs still can be observed by visual. Since, Starting the end of November, the effect from Northeast monsoon strong wind spreading cover the Southern part of Thailand. Most of the trawl net could not operated in the offshore area because of strong wind and high wave. Some of trawl net intruding into the coastal shore for illegal fishing inside 3 kilometer nursing zone, as well as around FEDs installation area at Prathew district. This is the main reason caused of the lost of FEDs by trawl net.

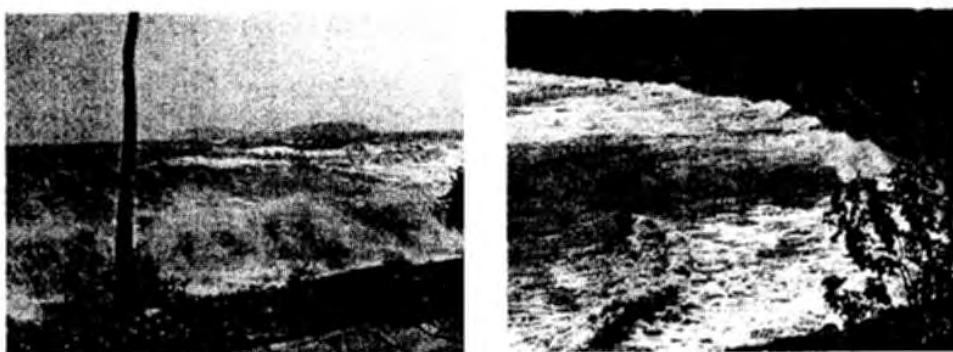


Figure 10. Strong wind and high wave hit along coastal zone of Chumporn province during November – December 2006.

## Conclusion and Recommendation

From the result of first inspection of FEDs, two months after installation, found that designed construction of FEDs make it well working performance. Some marine organism start to attached and grow up on FEDs appendage. There are both juvenile and mature fish found during under water inspection and photographing. There are 4 units lose and 1 unit re-located caused by bottom trawl net operation in the installation areas. Even through, FEDs were equipped with rope cutter on anchor chain at 3 meter above the bottom. The rope could be cut off the trawl net head rope but could not cut its ground rope with iron chain. However, the encroachments trawl net head rope could be damage by rope cutter. Normally, illegal encroachments trawl net are operating in the night time. They navigate the boat by using GPS along the channel inside ARs. This technique could be avoided from net stuck with ARs. Since, spacing between ARs in SE-NW direction around 380 meter and 270 meters in NE-SW direction. While trawl net otter board spreading distance was around 100 meter. Then spacing between ARs are wide enough for bottom trawl net to pass through.

In order to encounter with present trawl net encroachment problem, the installation of FEDs in the future should to install very near to each ARs units. The others counter measure is to install additional ARs in the middle of interval between ARs to reduce the boat navigation spacing. More often of patrol by DOF enforcement officer are also necessary.

However, with in the period of nearly 6 months just before the second inspection survey are performed, it showed that the designed and construction of FEDs are function well. FEDs could be using longer than haft year durability. This result could be satisfied to the criteria of Local Administrative Authority (Ao Bo Tor) of Pathew district.

Since, limitation of program budget, then the investigation of the effective of FEDs on biology information aspect by TD staff could not be carry out properly. However, the survey were conducted by scientist of Chumporn Marine Fisheries Research and Development Center by using visual observation methodology. Unfortunately, FEDs were destroy by trawl net before further information were collected. The local fishermen in Prathew distriv who are directly benefit from the FEDs are fish trap, hand line and bottom gill net operator. This group of fishermen are strongly requested for continuous of the further FEDs installation in appropriated management measure for utilize and study on the efficiency of this kind of resources enhancement tools.

Further more, FEDs are also installed in Langkawi for 4 unit during 24 December 2004. In Langkawi, FEDs are fully utilized by fishermen in handlining and trolling and no missing of the units as the local enforcement unit is functioning well. Further, the marine biological survey will be followed by the FRI, Penang, for the newly installed 10 unit. Therefore, the effectiveness of the FEDs will be more clearly monitored.



## Annex 9

### Minute of The 10<sup>th</sup> Implementing Coordination Committee (ICC) Meeting Integrated Coastal Resources Management in Pathew (ICRM-PD) 31<sup>st</sup> August 2006, CMDEC, Chumphon

#### 1. List of Participant

##### Department of Fisheries (DOF)

- |                             |  |
|-----------------------------|--|
| 01. Mr. Taweep Boonvanich   | Director, Marine Fisheries Development and Research Institute, <u>Chairman</u> |
| 02. Mr. Pirochana Saikliang | Director, CMDEC  |
| 03. Mr. Pinyo Thaithaworn   | Head, Chumphon Fisheries Provincial (PDOF)                                     |
| 04. Mr. Tanadol Chantakhuan | Technical staff 7, PDOF  |
| 05. Ms. Phajongjit Boonnhun | Technical staff, PDOF  |
| 06. Mr. Suthino Limsurat    | Technical staff, Chumphon Coastal Aquaculture Station                          |
| 07. Mr. Somporn Dechpakdee  | Enforcement unit staff   |
| 08. Ms. Noparat Nasuchol    | Technical staff 6, CMDEC   |
| 09. Ms. Thitiporn Supaniran | Technical staff 3, CMDEC   |

##### Marine and Coastal Resources Research Center (MCR)

- |                                 |  |
|---------------------------------|--|
| 10. Mrs. Nipawan Busravanich    | Director, Marine and Coastal Resources Research Center |
| 11. Ms. Sumana Khachornvattakul | Technical staff  |

##### Project site

- |                             |                               |
|-----------------------------|-------------------------------|
| 12. Mr. Suchat Yadum        | Head of Pakklong sub-district |
| 13. Mr. Pipop Reungthumrong | Head of village No.4          |
| 14. Mr. Suchin Nanwong      | Head of village No.5          |
| 15. Mr. Sumaung Malirum     | Head of village No.3          |

##### SEAFDEC/TD

- |                              |  |
|------------------------------|--|
| 16. Mr. Sei Etoh             | Project Leader (JICA Expert)                       |
| 17. Dr. Yutthana Theparunrat | Coastal Fisheries Management Division Head (CFMDH) |
| 18. Ms. Sumitra Ruangsvakul  | Socio-economic section Head (SESH)                 |
| 19. Ms. Jirapa Komhongsa     | Socio-economic scientist (SES)                     |
| 20. Ms. Jariya Sornkliang    | Socio-economic scientist (SES)                     |

#### 2. Agenda

- |            |   |
|------------|---|
| Agenda I   | Information   |
| Agenda II  | Adoption the 9 <sup>th</sup> ICC                                  |
| Agenda III | Progress report, problem and obstacle                             |
| Agenda IV  | Future plan program   |
|            | - PFG/PAG (Pakklong Fishermen Group/Pakklong Aquaculturist Group) |
|            | - Responsibility Agency   |
| Agenda V   | Project Evaluation  |
| Agenda VI  | Others  |

### 3. Content of meeting

#### Agenda I: Information from Chairman

- Mr. Taweep, Chairman of meeting, address opening and informed that, this meeting was the 10<sup>th</sup> Implementing Coordination Committee (ICC) meeting, and the next program of today was local seminar, please everybody was participation.

#### Agenda II: Adoption the 9<sup>th</sup> ICC meeting

- Page 1, Ms. Nipawan Busarawis change to Ms. Nipawan Busarawich
- Page 2, Dr. Yutthana Arunrav chage change to Dr. Yuttana Theparoonrat
- After registration of Pakklong Fishermen Group (PFG), the name has changed to Pakklong Aquaculturist Group (PAG).

#### Agenda III: Progress report, problem and obstacle

##### *CMDEC by Mr. Pirochana Saikliang*

- CMDEC and Aquaculture Framer Group at project site was collaborated Sea bass experimental in July 2006. The experiment compared fresh feed and artificial feed, from starting until now, there were two problems, fresh water flow to fish cage culture, and the bacteria infected from fresh feed. The report of this experiment will be reviewed on growth rate later, after this experiment finish in the end of this year.
- Mangrove reforestation collaborated PAG and local people at project site.
- Swimming crab culturing experimental, by released 100 swimming crab per cage in 3 cages. After two months, swimming crab lost 50%, no reason of this. From observation of crab cage culture can met a lot of green mussel, CMDEC will be started to study on green mussel experiment in next year program.

##### *Comment*

- Mr. Suchin, Head of village No. 5, question that, what size of swimming crab to culture? The size of swimming crab was 27 gm/crab and 27 crab/kg
- Mr. Suchin mention more that, swimming crab lost, because someone stole them. Mr. Pairochana informed that, one reason of lost, swimming crab eat together, so project try to find the system to protect on crab eat together.
- Mr. Etoh informed more this case that, if swimming crab eat together, carapace or some part of crab will be met in cage culture, but noting in cage.
- Dr. Yuttana informed more that, crab cage culture broken or not? From observation, cage did not broken.
- Mr. Taweep said that, project should make understand on DOF's experiment to fishermen.
- Mr. Suchin informed more that, project may be make understand with fisher's group on sincere to collaborative work, or make new group to continue this activity.
- Mr. Pirochana said that, DOF can not provide everything, community will be given mind to do, and this discussion will be continued in next phase.

##### *SEAFDEC/TD by Ms. Sumitra Runagsivakul*

- The registration of the Pakklong Fishermen Group (PFG), was under the name of Pakklong Aquaculturists Group (PAG) on February 2006.

- The 10 sets of FEDs were installed, and supported by SEAFDEC/TD.
- The study tour to Japan, Mr. Wara Ketumpai, Head of PAG, Mr. Jang Fungfueng, Head of crab bank group and Ms. Napat, extension worker, went to Japan to observe mainly the CBFM approach to various activities undertaken by the Japanese fishermen's cooperatives. This study trip was jointly organized by the NPO group in Japan and SEAFDEC/TD.
- Crab bank activity, project tried to improved system that, Mr. Etoh studied on improvement of the crab bank system was carried out in comparison with similar approach in Bang Sapan and Japan.
- Encourage Local Business, FTDD visited women's group No.1, made a thorough investigation on all production processes involved in the cottage-scale fish processing yard; they also made a number of suggestions to improve quality of the productions.
- The 2<sup>nd</sup> Babylonia shell culture experimental was initiated on 21 March, 2006 with improved method.

**Comment**

- Mr. Pirochana question on crab bank activity in Japan that, how to building awareness to fishermen on crab bank in Japan system? Improvement by catch data of swimming crab was increasing.
- Dr. Yuttana informed more on crab bank that, if fishermen did not except Japan system, DOF may be provide more cage to fishermen.
- Mr. Pinyo, Head of Fisheries Provincial, informed on habitat of swimming crab that, project may be study on the habitat of swimming crab, the results of this study will be known the spawning area of swimming crab.

*FEDs installation by Dr. Yuttana Theparoonrat*

- 10 sets of FEDs were installing during 28-30 June, 2006, by SEAFDEC/TD staff and Pakkong Fishermen Group (PFG), the installation areas were located around artificial reefs installation site, distance of each set was far 400 meter. The investigation of FEDs condition after two months, found that 6 units of FEDs still remain and 4 units are lost, this investigation was carried by CMDEC.

*Enforcement Unit/DOF by Mr. Somporn Dejpakdee*

- Coordination with PFG at project site, created volunteer group for local enforcement.
- Monitoring, by given information at village no. 5 (Ban Bang Bird), and patrol boat will be inspected around project site every 10 days per month.
- Mr. Somporn informed more that, he attended local seminar on CBFM at Bang Sapan, presented the progress activity of ICRM-PD project, and requested more budget on training to community.
- Mr. Somporn informed more that, he hope the illegal fishing boat will be decreased, because this project have local enforcement at site.

**Comment**

- Mr. Taweeep question that, did you have the data of illegal fishing boat came to this area, and enforcement unit arrested them? After ICRM-PD was implementing, the number of illegal fishing boat were decreasing.
- Mr. Suchin informed that, commercial fishing boat have good communication, and have network, difficult to arrested them.

Agenda IV: Work plan in 2007, 2008 and 2009

- DOF by CMDEC will be continued ICRM-PD more 3 years, there are 6 activities as follow:

Activities	Unit	Target number		
		2007	2008	2009
<b>1. Resources enhancement</b>				
1.1. Crab bank system development	Cage	3		
1.2. Fish releasing	Pieces	2,000,000	2,000,000	2,000,000
1.3. Monitoring fish releasing	Time	12	12	12
1.4. Monitoring FEDs installation	Time	6	6	6
<b>2. Occupation development</b>				
2.1. Packaging development for women group No.1	Group	1		
2.2. Promote Batik group	Group	1		
2.3. Encourage green mussel culture	Person	10	10	
<b>3. Enforcement coastal resources</b>				
3.1. Monitoring illegal fishing	Time	12(10day/m)	12(10day/m)	12(10day/m)
<b>4. Awareness building</b>				
4.1 Training on coastal resources conservation to 5 schools	person	150	150	150
4.2 Study tour on fisher's group management	person	15	15	15
<b>5. Public Information</b>				
5.1. Newsletter	book	1,200	1,200	1,200
5.2. Board	page	12	12	12
5.3. Document such brochure	book	200	200	200
<b>6. Evaluation</b>	Time			1
*budget for evaluation 2007=1.6 million Bath,2008and 2009=1.2 million Bath				

- Mr. Pairochana given more information of work plan of the 3<sup>rd</sup> phase that,
  1. Resource enhancement,
    - 1.1 Crab bank system development, will be developed in 2007, with 3 cages
    - 1.2 Fish releasing, the main species was shrimp and sea bass, by releasing before shrimp season 3-4 months.
    - 1.3 Monitoring, will be used tacking for sea bass releasing, and tail cutting for shrimp. This activity will be given more information and incentive to fishermen.
    - 1.4 FED monitoring, after improvement on technical, Ao.Bo.To will be supported 60 units, how to construction and installation.
  2. Occupation development
    - 2.1 Production and packaging of women's group no. 1 by FTDD/DOF,
    - 2.2 Batik production development, CMDEC will be coordinated agency concern to developed model of products.

- 2.3 Green mussel culture, project will be encouraged 10 fishermen on this activity.
3. Enforcement activity, CMDEC will be cooperated with EFU and volunteer fisher's group by monitoring 10 days per month.
4. Training on awareness building,
  - 4.1 Training for children, project hope that, children will be transferred some awareness on resource conservation and enhancement to parent.
  - 4.2 Study tour, the target group is leader of fisher's group and community.
5. Public information
6. Evaluation, the budget of this activity will be requested to Royal Project.

- Mr. Pairochana given more information that, what feedback from community on shrimp and sea bass releasing, community would like to change to the other species or not, and please give comment on this work plan.

**Comment**

- Mrs. Nipawan Busravanich, Director of Marine and Coastal Resources Research Center, given information on crab bank system that, if it is possible, we should put crab only 1 pieces/box.
- Mr. Etoh informed that, he was very glad, DOF will be continued the 3<sup>rd</sup> phase of ICRM-PD, SEAFDEC/TD will be participated in some activities, and SEAFDEC/TD will be held regional seminar in next year.
- Mr. Taweep informed on fishermen's situation at project site that, after project finished, we would like to change the situation of fishermen from enhancement to conservation.
- Dr. Yutthana given comment on green mussel culture that, the area of green mussel culture was limited, project may be study more on available area to extend culture for fishermen.
- Mr. Pirojchana replied this comment that, the old area of green mussel culture have capacity to culture and timing limited, project would like to change culture system, this culture will be culture on small size and short time, CMDEC will be encouraged this system to fisher's group in next year plan. The production from this area will be sent to other Province for marketing size culture.
- Mr. Suchat, Head of Pakklong Sub-district, given more information on green mussel that, DOF have encouraged green mussel culture before, but this activity have failed and stop, because they have problem on marketing. Mr. Suchat agree on this system and hope successful on this system.
- Mr. Etoh comment on green mussel culture that, if CMDEC encourage this culture at next year, this culture will be impact with Sea Food Bank of DOF or not.
- Mr. Thanadol, PDOF's staff, replied that, Pakklong Sub-district have permission of aquaculture area, and this culture will be used the same area, it was not problem. Now Sea Food Bank activity have 10 fishermen of Pakklong Sub-district to registration.
- Mr. Taweep given more on green mussel culture that, the important problem of this culture was fresh water run off.
- Mr. Pirochana mention to Enforcement unit that, please change timing, from 1 time (10 days) per month to 2 times (5 days/time) per month.
- Mr. Suchin requested on fresh fish, the main occupation of village no. 5 was agriculture, so they would like to requested fresh fish to culture in village. What organization can support and how to request fresh fish? Fisheries Provincial Office can providing and supporting.

- Mr. Etoh informed on requesting of women group no.4 that, this group mention to fresh fish culture in public pond, after agency concern came to site and study on potential public pond, the result was not culture, because this pond will be used water supply for village.
- Mr. Suchin given comment on work plan that, he agreed all activities, because all activity were useful to community, and please focus on awareness building to fishermen. Mr. Taweep informed more that, project will be focus to student also.
- Mrs. Nipawan commented on occupation development that, the 3<sup>rd</sup> phase have 3 year for operation, but this activity will be developed only one year. Mr. Taweep replied that, this activity will be evaluated at the first year, if some group need more develop, project will be continue year by year.
- Mr. Pirochana mentioned that, the 3<sup>rd</sup> phase will be decided to continue or stop, after the result of evaluation was finished. Project hope that, after project have finished and PFG have stronger, PFG can requested some budget from Ao.Bo.To., Ao.Bo.Jo., or Province, CMDEC will be support on proposal and coordination.

**Agenda V: Evaluation**

- SEAFDEC have finished TOR, and sent to DOF and MCR to comment, until now no reply from two agency.
- On 11 September 2006, DOF and MCR will be meeting again for discussion on budget and TOR.
- The last, SEAFDEC will be discuss on candidate of evaluation with SG, SEAFDEC.

**Closing**

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Draft by Jariya Sornkliang  
 Edited by Sumitra Ruangsvakul  
 26 September 2006