



Bi-annual Project Progress Report
of
Locally Based Coastal Fisheries Management in Pathew District
(LBCFM-PD)

Compiled by

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Bi-annual Project Progress Report

- Project title** : Locally Based Coastal Fisheries Management in Pathew District (LBCFM – PD)
- Program Categories** : Programs under the ASEAN-SEAFDEC FCG Mechanism
- Program Title** : Coastal Resources Management
Resources Enhancement (Special 5-year Program - SDI-4)
- Duration of Project** : 5 years (October 2001 – September 2006)
- 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 42,000 (Under Japanese Trust Fund input – year 2004 only)
USD 10,000 (Special 5 year program SDI-4 – year 2004 only)
Baht 15,200,000 (DOF Thailand Input – for 5 years)
- Reporting period** : **January to June 2004**

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1. GENERAL ACCOUNT

As a whole, the project has progressed on the right track compatibly with the project design.

It was decided that the project operation will be terminated as its first phase with the budget input of TR-1 at the end of 2004. Meanwhile, the second phase of the project commenced in middle of 2004 with a new budget input of TR-4, which includes the final project evaluation of the phase I and the new project formulation for the phase II.

A shortage of manpower within the project staff of SEAFDEC/TD is foreseen and new recruitment is imminently necessary to expand the scope of the work.

Re-organization of the fishermen core groups has hardly progressed and is a major task to be tackled in the next phase.

The oceanographic and environmental surveys have been successfully carried out by CMDEC with periodic monitoring by SEAFDEC/TD. This is an area that can be phased out soon.

An attempt to introduce crab-traps with larger mesh size has shown promising results.

The crab bank scheme, which was initiated by the fishermen's own motivation has been encouraged. A more scientific approach should be introduced by the intervention of the project.

Legitimatization of the demarcated zones is still left unsolved. Also, little progress has been made in the creation of enforcement measures in the protected Area I and II by Ao.Bo.To.

Obtaining GMP by the women's groups has been approached. The training in bookkeeping and accounting for the group activity has commenced. In addition to Moo. No.1, the group activity of Moo. No.4 has been vitalized. A few processing training courses have been initiated by the initiative of CMDEC. The area of product development can be similarly taken over by CMDEC.

An attempt to improve feeding technology in fish cage culturing is continued. Also, an effort to introduce Babylonia shell culturing has been made.

Installation of 1,750 pieces of artificial reef was made by the DOF. The pre-installation marine environmental survey was made by the project team of SDI-4 and the post-installation monitoring survey will be continued.

1,000 pcs. of T-shirts with the project design were produced and distributed.

2. ACTIVITIES

Activities have progressed in line with the Action Plan in general as shown in the Annual Activity Monitoring Sheets in 2004 to be found in Annex 1.

2.1. Baseline survey

2.1.1. Socio-economic survey

None of the planned socio-economic surveys has undertaken in this reporting period. The surveys on the monitoring of large cast nets and anchovy falling nets and on the monitoring of collapsible crab trap fisheries management were initiated by the preparation of the questionnaires toward the end of the reporting period.

The planned monitoring socio-economic survey on aquaculture will not take place during this year as the introduction of Babylonia shell has just started and is still in the experimental stage.

2.1.2. Oceanographic and environmental survey

Consonant with the project implication that involvement in the project activities by SEAFDEC/TD would be gradually phased out and the involvement of CMDEC would be increased inverse-proportionately, one of the areas that SEAFDEC/TD can phase out first lies in the routine fish landing and other oceanographic surveys. The fish landing data collection through the exercises of interviewing fishermen, measuring fish catches and collecting fishing logbooks which were distributed to the 10 selected fishermen are regularly conducted every month by CMDEC staff and the SEAFDEC/TD staff just joins the operation irregularly to monitor the procedure. The monthly raw data are processed by CMDEC.

The oceanographic and environmental survey is carried out by CMDEC every two months, although they still rely on the Marine Fisheries Centre in Songkhla for sample analysis. The SEAFDEC/TD staff continues monitoring the exercise once every 6 months. The raw data are still analyzed by SEAFDEC/TD and a discussion with the Department of Marine and Coastal Resources (MRC) has been initiated aimed at transferring the work to the staff of the MCR station in Chumporn.

As to the mapping for fishing grounds and gear, it was decided to summarize this at the end of the project in 2006 as the respective change is so minimal that no significant difference is seen on the map within a year or so. The required data has been collected by CMDEC with regular monitoring by SEAFDEC/TD staff every three months and these are accumulated for the subsequent analysis and mapping in 2006.

2.2. Encourage and extend the LBCRM concept

An attempt to introduce enlarged mesh size collapsible crab traps which has a 2.5 inch mesh size bottom cover net in place of the conventional 1.2 inches was put into place in August 2003 with 12 volunteer fishermen and the necessary funding to replace the conventional ones were accommodated by the DOF as a revolving fund. The scheme is now further expanded with 15 fishermen cooperating. As to the expected impact given by this attempt, the relevant monitoring survey has been continued with CMDEC since January 2004. The results show that, although the CPUE per fishing trip is decreased at 14.5% by this attempt, the sizes of male and female crabs are increased by 4.7 and 4.6 % respectively and similarly, the composition of immature size of crab are decreased by 76.0 and 14.4% for male and female crabs respectively. This is a just preliminary analysis result, but it is a promising sign of encouragement in sustainable crab resources management. A further detailed monitoring survey is to be carried out during the next reporting period.

The crab bank, which was established in the village 7 by volunteer fishermen, was further strengthened. They were willing to leap into the advanced step that could raise blue swimming crab fingerlings in the ponds after spawning. Although their enterprising spirit and motivation was appreciable, it was considered technically unrealistic and immature. The study tour to the Coastal Fisheries Aquaculture Station in Ranong Province was organized aimed at having the fishermen realize how the fingerling hatching and releasing scheme is technically remote from their present capacity. However, their motivation toward the resources management should be fostered and some measures should be put in place to support their movement.

The need to intervene in the demarcation between shell fish and cage culturing was identified in the middle of 2002 and the Project has coordinated disputes among stakeholders in collaboration with the Provincial Fishery Office since then. The dispute was eventually settled in November 2002 in the way that a respective aquaculture field is demarcated from each other and a precise zoning map was drawn based upon the repeated discussions at the working committee, which is comprised of five representatives from all the villages concerned. As the next step, the proposal to amend the present regulation which was promulgated for the shellfish culture in 1984 was submitted to the Provincial Committee from the Provincial Fishery Office but it was returned because it lacked some necessary information. Meantime, the officer responsible for coordination in this matter in the Provincial Fishery Office was transferred to another province and his successor is dealing with the work to complete the process. This matter has been left unsolved for sometime and an attentive follow-up should be pursued.

There is a need to establish a coastal fishery-monitoring unit within the Ao.Bo.To. to enforce regulations in Areas I and II were promulgated by the Provincial announcement on 14th November 2002 as protected zones for artisanal fishermen. A request to expedite the establishment has been put forward a long time ago to the Ao.Bo.To. but no concrete steps for realization have been taken yet primarily because of logistic problems. There is a similar precedent in the establishment of the coastal fisheries monitoring unit in Krabi province. It is worthwhile to study the case in detail.

2.3. Encouragement of local businesses

The commercial activity in Moo. No.1. is the most outstanding among the 7 groups in the project operational area. They expanded their business to duck rearing in addition to their conventional fish processing in May 2003. They are now producing about 1,000 eggs a day which are either marketed fresh or after processing into the salted form. They exerted all their efforts to expand their marketing channels through any possible means including conducting a campaign in the government offices.

Moo. No. 1 was preparing the submission of an application for official registration as a group engagement body to the Department of Community Development (DCD). However, it was postponed because their office has been moved to another location. It should be followed up.

In an attempt to obtain a certificate of Good Manufacturing Practice (GMP) issued by the Ministry of Health, the project consulted with the Fish Technology Institute of the DOF for technical application. They were in agreement to first inspect the yards of the project area where fish processing takes place and to provide any suggestions to improve the production techniques, facilities and hygienic level. However, it has not yet materialized because of their tight working schedule.

It was found that the bookkeeping and accounting system employed in the group activity was not appropriate and was unsystematic and it was necessary to improve these for transparency of transactions and accountability. To improve the situation, the training courses in Marketing Strategy, Bookkeeping and Accounting were organized between 28th and 30th June 2004 with instructors from the Chumporn Technology College (CTC). The training was repeated for 3 groups in the villages; i.e. Moo.No.1, No.4 and No.6. with the total number of participants being 31 women. In this training course, a general ledger which was devised by the CTC was introduced while the ledgers of product, material and labour developed by SEAFDEC/TD were introduced. The training content is dealt at length in Annex 8. As a result of the training, Moo.No1. decided to employ an accountant to look after all bookkeeping and accounting.

Following Moo.No.1, Moo.No.4 became more active. This group was organized in January 2001 even before the project initiation. It has 9 members who are farmers' wives and has as its major business artificial flower making and a micro-credit scheme. They started processing a local snack called pun-seb in the yard constructed by a contribution from the Provincial Office and Ao.Bo. To at 300,000 and 29,000 Baht respectively in July 2003. This group has already registered with the DCD in the group name of Women's Development of Ban Bangwan. There are 88 members of this group now. The further details are described in Annex 5, Report on Monitoring Women's Group Activities.

The dissemination of processing technology within the province has been promoted by CMDEC. Some localized products like *mapao kaew* and *thang pub* (sorts of snack) are produced by the women's group in Sawe District, Chumporn Province, and have caught the market. The CMDEC organized a training course on processing these products in village No. 4 on 27th-28th May. The

main instructor was the chairwomen of the women's group in Sawe District and rendered her services voluntarily. The participants from the women's group were 15 in number.

The women's group comprising of 5 members plus one officer from the DOF in KL and an extension officer in the District DOF from Langkawi, Malaysia, where the sister co-management project is in operation visited the project site in Chumporn from 28th April to 2nd May to inspect the product development work being carried out by the women's group in Chumporn and to exchange views on women's participation in group activities. The activities promoted by the women's group in Chumporn were highly commended by the women's group in Langkawi.

The current practice of cage culturing employed in Chumporn is limited to the expensive way relying on feeding with trash fish or by-catch from push-net fishing. On the other hand, more improved intensive cage fish culturing methods are being commercially practiced in other parts of Thailand on a large scale, including manufactured pellet feeding. Aimed at seeking improvement opportunities in cage culturing in the project site, a three day site inspection tour cum training course took place on 1st-3rd April in the three provinces; Krabi, Trangand, Songkla, where intensive cage culturing for grouper and sea bass has been put in place in different surroundings and ways. One of important factors to study lay in the economic viability of the use of manufactured pellets which were more effective in stimulating growth of fish and more practical, but naturally more costly. It was observed through the inspection tour that alternately combined feeding with pellets and raw fish would be more effective and economical. In this inspection tour, 7 fish culturists participated. More detail is described in Annex 6.

The project arranged the training course cum study tour for babylonia shell culturing in July 2003. Resulting from the outcome of the training course, some leading fishermen started to carry out experimental shell culture in the Pakklong Bay from 28th April 2004 with a duration of 6 months. This trial was financially as well as technically supported by CMDEC. About 21,000 juvenile babylonia shells are purchased from the Rayong Province and stocked in three cages with dimensions of 1 x 1.5 x 1.2 m(LWH). These shells are fed with trash fish by the group of fishermen once a day. The growth and survival rates are measured by the CMDEC staff every 2 weeks. This experiment will be continued until 28th October 2004 and an evaluation from the economic and technical aspects will be made.

2.4. Enhancing capacity and participation

As dealt with at length in the previous quarterly project progress report, it was found that in the original project set-up that Ao.Bo.To. would take charge of CBRM as a core institution hardly worked. This is a critical issue especially in sustainability of the people's participation to CBRM after the termination of the project. The dialogues with fishermen have started trying to encourage them to participate in the reorganization of the fishermen's group with those who are pursuing a common interest. To realize an institutional entity from the outset, it is intended to organize a group in line with the context of the bye-law of cooperatives. It has just started but little tangible progress has been made so far.

Aimed at enhancing the level of awareness on CBRM and encouraging fishermen's participation a 2-day training course on coastal fishery resources management and enhancement was jointly organized with CMDEC on 22nd April, This course was followed by a site inspection on coastal resources management in Suratani, Nakorn Sri Thammarat Provinces for 3 days . The 40 selected community leaders from the project operational areas, Pakklong Sub-district, participated in this course.

As stated in 2.3., the main concern in the capacity building of the women's group during this reporting period was centered on the management aspects including bookkeeping and accounting. To meet the requirement, the training course on group management and accounting was jointly organized with CMDEC on 28th – 30th June.

2.5. Strengthening extension and developing methodologies

The 1,000 pcs. of t-shirt with the design of fish conservation and the project title were produced and distributed to those who are concerned with the project operation and the participants in various training courses.

Numbers of technical and scientific research tasks have been conducted by the project during the past project operation. It is time now to present and restore the results and findings to the beneficiaries and the public, thereby the research orientation will be exposed to public hearing and is expected to be assessed from various angles. All valuable reports based upon the research work carried out since the inception of the project will be discussed openly with participants from relevant institutions and organizations, this will benefit the evaluation of the project scheduled to be take place in the latter part of 2004. This technical seminar is expected to be on 17th –18th August 2004.

2.6. Rehabilitating coastal resources

Installation of 1,750 pieces of artificial reef was carried out jointly with DOF in the project operational area in March, particularly in the zone of Moo 2 and Moo6 with a distance of 3.0 to 5.8 km from the shoreline. The concrete-made ARs with the dimensions of 1.5 x1.5 x 1.5 meters each were sunk in a depth of 12m covering a 2 km² area. The total cost was 6 million Baht borne by DOF. It is anticipated to have a very positive impact on costal resources enhancement. SEAFDEC/TD as the Special 5-year Program (SDI-4) conducted the pre-installation marine biological survey in December 2003. The monitoring survey to trace changes of coastal dynamics will be continued by the project. A detailed description of installation of ARs is seen in Annex 9.

As a part of the DOD program on the rehabilitation of coastal resources, 1million and 20,000 fingerlings of shrimp and sea bass respectively were discharged into the project operational area.

2.7. Seminars and meetings

It is planned to organize a local seminar entitled "The Orientation of Technical Research and Data Analysis" on 17th/18th August 2004 in Bangkok, which is the venue where all the research work done with the project since its inception will be presented to those concerned and to restore the findings and results to the beneficiaries.

In addition, another seminar on the project management and mid-term project evaluation will be held on 2nd /3rd September 2004 in Chumporn. In this seminar, the project strategy and the project evaluation will be discussed, based upon which the project program for the 2nd phase of the project to be commenced from January 2005 will be formulated.

3. OUTCOMES

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

Baseline survey

- Accumulated fish landing, oceanographic and marine biological data
- The phase-out program in the field of data collection exercises has been progressing.

Encourage and extend the LBCRM concept

- An increased confidence in trial mesh-size control on crab traps
- The study tour to inspect the crab stocking in the Ranong province was conducted.
- Establishment of a coastal fisheries monitoring unit within the Ao.Bo.To. is under negotiation.

Encourage local business

- The business of duck egg production has been further promoted with the village No.1.
- Application for registration of the women's group with the Department of Community Development by the village No.1 is in process.
- Application of Good Manufacturing Practice (GMP) with the Ministry of Health is in process by village No.1.
- A simple book keeping and accounting training program has commenced in the villages No.1, 4 and 6.
- The women's group of the village No.4 becomes active in diversification of business lines.
- The study tour team from the sister project in Langkawi, Malaysia, visited the site to inspect the women's group activities. Lively discussions were held between the two women's groups.
- The study tour on intensive cage culturing with artificial feeding was conducted by the fish culturists in the three provinces.
- Experimental Babylonia shell culturing has been progressing with leading fishermen.

Enhancing capacity and participation

- The dialogues with fishermen on reorganization of fishermen groups in line with the bye-law commenced.
- The 2-day training course on coastal fishery resources management was conducted for the fishermen.

Strengthening extension and developing methodologies

- 1,000 pieces of T-shirt were manufactured with appliqués of the project symbol for distribution to those concerned.

- The seminar to present and restore all the research reports made since project inception is under preparation.

Rehabilitating coastal resources

- 1,750 pieces of FADs were installed in the project area in March
- 1 million and 20,000 fingerings of fish (sea bass) and shrimp respectively were released in the project area.

4. MAJOR CONSTRAINTS

The Director of CMDEC resigned at the end of March after serving for only 10 months. His successor took the post in May. Although an unavoidable administrative constraint is understandable, the change of Director of the counterpart organization with such a short tenure would affect effective project implementation. In fact, the very intensive briefing on project orientation was provided to the former Director after his assignment and it took quite some time to get him acquainted with the project concept and approach. It is anticipated not to be repeated, especially in this transitional period of the project from Phase I to II.

It is expected within the project framework of community based fisheries management that the Ao.Bo.To will play a major role in taking the initiation of LBCM. However, it was found through the past project operation that they were not the right institution to take charge of it. This is a vital issue thinking in terms of the project sustainability and will be thoroughly discussed at the next project management meeting. Alternatively, the core entity of fishermen's group should be organized in anticipating them to advance the concept of LBCM. This will be a major activity in the next project phase II to be commenced from 2005.

An extension worker plays a key role in the community development activity and his/her existence is absolutely vital. This importance has been repeatedly stressed to the project counterpart organization, Chumporn Marine Fisheries Research and Development Centre (CMDEC), for the last year and recruitment of a competent extension officer had been requested. As a result, CMDEC managed to identify an appropriate extension worker borne locally in March. He was stationed in the project area staying for 3 days a week at least to coordinate the community development work under instructions from the project and reports the result to CMDEC in Chumporn once a week. SEAFDEC/TD agreed to share the cost as an incentive. He began his duty in March but he was found unfit for the work and resigned in April after only one month's service. The replacement is yet to be identified. The recruitment should be facilitated as this type of service is badly needed especially now as the project puts particular emphasis on organizing a functional fishermen's group.

In the organization of SEAFDEC/TD, the project has been handled mainly by the Socio-economic Section of the Research Division, consisting of 3 staff including the Section Head. It is foreseen that the scope of the activities will be expanded in the near future in a third country in addition to LBCRM-PL. The shortage of manpower is very obvious and new recruitment of additional staff is essential. Otherwise, the project operational structure within SEAFDEC/TD should be reviewed.

5. FINANCIAL STATUS

The project financial status during this reporting period is shown in Annex 3. As seen in the table, the amount of 348,428 Baht (ab. US\$ 8,717) was requested for disbursement during this reporting period to carry out various activities. Against this estimated cost for disbursement, the actual expenditure was 279,650 Baht (ab. US\$ 7,000).

6. WORKPLAN FOR THE NEXT REPORTING PERIOD

Primary attention during the next reporting period will be placed on the mid-term project evaluation and subsequent project formulation as phase II starting from January 2005. To pursue that, the project evaluation exercise will be conducted by a consultant and presented at the project management seminar on 2nd /3rd September 2004.

The predicted work plan for each activity line is as follows.

Base line survey

- The regular environmental and oceanographic data collection will be continued.
- The mid-plan household mapping survey, the monitoring survey on large squid cast net, anchovy cast net and collapsible crab trap fisheries management will be conducted.
- The survey on anchovy product distribution and marketing patterns in the Chumporn area will be conducted.

Encouragement and external LBCRM

- Facilitate proclamation of aquaculture zoning
- Facilitate the establishment of a coastal monitoring unit

Encourage local business

- Coordinate acquirement of GMP in collaboration with DOF Fish Technology Division
- Diversification of the local business in Moo No.4 and No.6
- Continue training in bookkeeping and accounting
- Continue experimental Babylonia shell culturing

Human resources capability and participation

- Staff training course in project management
- Staff training in the LBCFM concept
- Student training in LBCFM

Develop extension methodologies and extension system

- Preparation of a manual of coastal resources management
- Publish various documents

Rehabilitate and enhance coastal resources

- Fish fingerling release
- Monitoring survey on the marine environment around AFs (SDI-4)
- Three planting

Seminar and meeting

- Local seminar on research results
- Local seminar on project implementation and management
- Project Implementation Committee meeting
- Steering Committee meeting

Others

- Project evaluation of Phase I (under TR - 4)
- Project formulation for Phase II (under TR – 4)
- Preliminary visit to the third country to prepare project initiation (TR – 4)

7. 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.	Report on Fish Landing Survey (1)	Pattarajit K.	January 2004
02.	Report on Monitoring Project Progress	Phattareeya S.	January 2004
03.	Report on Fish Landing Survey (2)	Pattarajit K & Sukchai A.	February
04.	Report on Monitoring Women's group Activities	Sumitra R.	March 2004
05.	Report on Aquaculture Training Course	Kongpathai S.	April 2004
06.	Report on Fish Landing Survey (3)	Pattarajit K.	May 2004
07.	Survey Report on Monitoring Marine Environmental System in Pak Klong	Penchan L.	June 2004
08.	Report on Fish Landing Survey (4)	Sukchai A	June 2004
09.	Report on training course in Marketing Strategy and Bookkeeping and Accounting	Sumitra R.	June 2004
10.	Report in Installation of Artificial Reefs in Chumporn Province	Yuttana T.	April 2004

No.	Disbursement request		Actual payment		Activity line	Planned activity	Expenditure line	Remarks
	Request date	Document No.	Amount (Baht)	Amount (Baht)				
01	16.01.04	SE/002/04	121,000	120,500	5.1.4.	Cost of 1,000pcs. of T.shirt	Extension material	
02	16.01.04	SE/003/04	20,488	20,045	5	Cost of a printer	Extension equipment	
03	19.01.04	SE/004/04	4,320	13,979	1.2.3.1.	Fish landing survey	Traveling cost	
04	19.01.04	SE/004/04	14,700		3.1.1.	Cooperative organization, partic	Traveling cost	
05	19.01.04	SE/005/04	21,200	15,395	4.3.2.	Training in coastal aquaculture	Inspection tour	Kabi & Songkla Province
06	30.01.04	SE/006/04	3,440	2,692	6.2.	Rehabilitation of coastal resour	Traveling cost	Rannong Province
07	04.02.04	SE/007/04	11,400	7,455	1.2.3.1.	Fish landing survey	Traveling cost	
08	18.02.04	SE/008/04	30,600	21,575	4.4.1.	Participation in the Regional TCM	Traveling cost	Kuala Lumpur
09	12.03.04	SE/012/04	8,440	5,054	3.1.	Monitoring women's group activities	Traveling cost	Also, participate in the funeral
10	24.03.04	SE/015/04	27,120	20,645	2.3.	Attend the regular meetings of village	Traveling cost	
11	02.04.04	SE/018/04	18,000	-	5.1.	Extra expenses for recruitment of an extension worker	Special allowance	
12	09.04.04	SE/021/04	17,960	15,397	4.1.1.	Training in coastal fisheries management	Traveling & training cost	40 community leaders
13	27.04.04	SE/022/04	17,040	14,900	5.2.1.	Preparation for the technical seminar	Traveling cost	
14	12.05.04	SE/023/04	10,600	7,328	1.2.3.1.	Fish landing survey	Traveling cost	
15	19.05.04	SE/024/04	3,840	3,505	3.1.2.	Training in fish processing	Traveling cost	Village No. 4
16	11.06.04	SE/032/04	18,280	11,180	1.2.3.1. 4.2.1.	Fish landing survey/Training in bookkeeping	Traveling cost	
Total:			348,428	279,650				

Annex 3 - 1

Report on the Fish Landing Survey – Chumporn January 2004

Prepared by:
Pattarajit Kaewnuratchadasorn

Project Name: Seasonal change of species composition, distribution and abundance of marine resources of Pak-Klong sub-district, Pathew district

Duration: 28th –30th January 2004

Researcher team: 1. Ms. Pattarajit Kaewnuratchadasorn (SEAFDEC/TD)
2. 4 staff members of CMFDC

Activities:

Date/Time	Fishing Village	Type of fishing gear	Number of samplings
28th Jan 2004			
0730-1200 hrs.	Moo5. Bangburd	- Pomfret gillnet - Bottom gillnet	1 2
	Moo 3.	-	-
29th Jan 2004			
0730-1200 hrs.	Moo 2. Tha-ad	-	-
	Moo 7. Ko Tep	- Squid cast net - Shrimp trammel net - Collapsible crab trap	1 2 6
30th Jan 2004			
0730-1200 hrs.	Moo 1. Thung Maha	- Squid cast net	4

Observation summary

1. On collapsible crab trap activities, it was noticed that the crab size between the shallow water (in the bay) and outside were quite different. In other words, the size in the deeper water was bigger than in the shallow water.
2. During the last three months, during the monsoon season, the fishermen in Moo 7 operated shrimp trammel nets because they caught large catches and got a high return.
3. The catches were sampled and measured for total length in centimeters and weight in kilograms. The fishermen were interviewed for the CPUE study.
4. Since October 2003, we asked a favor from the middlemen (buyers) to record the catch from the fishermen who sell their catches during the whole month.
5. The fishermen prepare squid traps for the coming closed season to as trawl fishing boats are prohibited during this time.
6. Because of the monsoon, some fishermen stop squid cast net fishing and go back to it at the end of January.

Annex 3 -2

Report on the Fish Landing Survey– Chumporn February 2004

Prepared by:
Pattarajit Kaewnuratchadasorn
Sukchai Arnupapboon

Project Name: Seasonal change of species composition, distribution and abundance of marine resources of Pak-Klong sub-district, Pathew district .

Duration: 16th –18th February 2004

Researcher team: 1. Ms. Pattarajit Kaewnuratchadasorn (SEAFDEC/TD)
2. Mr. Sukchai Arnupapboon (SEAFDEC/TD)
3. 5 staff members of CMFDC

Activities:

Date/Time	Fishing Village	Type of fishing gear	Number of samplings
16th Feb 2004			
0730-1200 hrs.	Moo5. Bangburd	- Squid cast net - Bottom gillnet	2 2
	Moo 3.	-	-
17th Feb 2004			
0730-1200 hrs.	Moo 2. Tha-ad Moo 7. Ko Tep	- - Squid cast net - Shrimp trammel net - Collapsible crab trap	- 1 2 6
18th Feb 2004			
0730-1200 hrs.	Moo 1. Thung Maha	- Squid cast net - Indo Pacific Mackerel Gillnet	4 1

Observation summary

1. On collapsible crab trap activities, because the weather conditions were bad, the small fishing boats could not sail far away. While on the contrary, the catches from crab gill net were more than 100 kilograms approximately (sold fresh).
2. The catch was sampled and measured for total length in centimeters and weight in kilograms. The fishermen were interviewed for the CPUE study.
3. Since October 2003, we asked a favor from the middlemen (buyers) to record the catch from the fishermen who sell them their catches for the whole month. The catch records are for squid and Indo-Pacific Mackerel.
4. In addition, we asked a favor from the fishermen who use crab gill net gear to record their catches because sometimes the staff could not get the data on that day.

Report on the Fish Landing Survey– Chumporn May 2004

Prepared by Pattarajit Kaewnuratchadasorn

- Purpose:** Landing survey in Pak-klong sub-district, Pathew District, Chumphon province in May 2004
- Project Name:** Seasonal change of species composition, distribution and abundance of marine resources of Pak-Klong sub-district, Pathew district
- Duration:** 17th –19th May 2004
- Researcher team:** 1. Ms. Pattarajit Kaewnuratchadasorn (SEAFDEC/TD)
2. Ms. Nagajima Toshiko (SEAFDEC/TD)
2. 3 staff of CMFDC

Activities:

Date/Time	Fishing Village	Type of fishing gear	Number of fishing boat samplings
17th May 2004			
0700-1200 hrs.	Moo5. Bangberd	-	-
	Moo 3. Tham Thong	-	-
	Moo 2. Tha-ad	- Crab gillnet	3
18th May 2004			
0730-1200 hrs.	Moo 7. Ko Tep	- Collapsible crab trap	5
19th May 2004			
0730-1200 hrs.	Moo 1. Thung Maha	- Squid cast net - Crab gill net - Indo-Pacific Mackerel gillnet	1 1 1

Observation summary

- On 17th May 2004, at Moo.5 Bangberd there were no fishing boats. Some fishermen complained that this was because polluted water from the shrimp farm affected the seawater and fish in the area.
- We requested 2 middlemen in Moo.3, 1 middleman at Moo. 2, 1 middleman at Moo.1 to keep records of the catch.
- The survey was carried out after the season opened (16th May 2004), all fishing boats can come within 3 km from the shore. Some fishermen complained that they could not catch much because the bigger boats have more capacity than the small ones.
- The catch was sampled and measured for total length in centimeters and weight in kilograms. The fishermen were interviewed for this CPUE study.

Annex 3 – 4

Report on the Fish Landing Survey– Chumphorn June 2004

Prepared by:
Sukchai Arnupapboon

Project Name: Overview of fishing activities in the Pakklong Subdistrict Coastal Area, Pathew District, Chumphon Province and Seasonal changes in species composition, distribution and abundance of marine resources of Pak-Klong sub-district, Pathew district

Duration: 28th –30th June 2004

Researcher team: 1. Sukchai Arnupapboon (SEAFDEC/TD)
2. 4 staff members of CMFDC

Activities:

Date/Time	Fishing Village	Type of fishing gear	Number of samplings
28th Jun 2004			
0730-1200 hrs.	Moo5. Bangburd	- Indo-pacific mackerel gill net - Fish encircling gill net	4 1
	Moo 3. Thum thong	-	-
29th Jun 2004			
0730-1300 hrs.	Moo 7. Tha-ad	- Collapsible crab trap - Mullet encircling gill net	5 1
	Moo 3. Thum thong	- Squid trap	3
30th Jun 2004			
0730-1200 hrs.	Moo 1. Thung Maha		

Observation summary

1. There are 14 samplings recorded from 3 fishing villages and 3 middlemen (buyers) records.
2. For collapsible crab traps fishing, it was noticed that harvesting was less than last month. It was approximate 7.5 kg/day. The local fishermen believed that the effluent from the shrimp farms was the cause of this problem.
3. On the sampling survey, the squid catch from the squid traps was started to collect sampling data. Because, for the last three months the survey team could not stay for conducting samplings. Normally, the survey team goes back to the office for data analysis before the squid trap fishermen finish their work.
4. The catch was sampled and measured for total length in centimeters and weight in kilograms. The fishermen were interviewed for the CPUE study.

Annex 4

Report on Monitoring the Project Progress in Chumporn on 27th-29th January 2004

Prepared by:
Phattareeya Suanrattanchai (Dr.)

1. Objectives of the tour:

- To follow up the progress of the work of the fishers' group, its activity implementation and management
- To monitor problems and needs of the project implementation and community development.
- To accumulate basic information from all people's groups concerned in the project implementation to adjust the plan of activities.

2. Activities and Findings

2.1 Visit to the Chairman of the Fishers' group network:

The chairman gave information about the group's activities. He said that mangrove reforestation is the main activity of the group in which many people from seven villages participate. He explained that the fishers engaged in collapsible crab trap and crab gill net fishing and other types of fishing gear at village no. 7 (Ban Ko Teab). A total of 15 persons established a fisher's group for crab cage culture. The members of this group planned to donate 100 baht from each member to provide material for cage construction. CMDEC supported them by providing a one-day study tour on crab culture in Ranong province to learn crab culture management and operation. The crab culture activity was to start after they attended the study tour and discussed the feasibility of engagement.

2.2. Visit to the Women's group for fish processing:

The chairman of the group stated that the group prepared an eligibility document to register with the Department of Agricultural Extension to certify agricultural products produced by the group including salted egg production. The chairman planned to register with the Department of Fisheries to certify fish processing products like fish crisp, dried seasoned anchovy, etc. she planned to invite the staff of the Chumphon provincial office of food and medical inspection to give comments and make recommendations on how to construct, decorate and manage the group's plant reaching the standard of good manufacturing practice (GMP). The plants have been re-furbished to attain sanitary and hygienic qualification.

The project staff made copies of the group's investment record account book to calculate the cost-return of the group business management. This is basic information on how far the group and its members are skilled in account book recording and management. Then, the project would look for a resource person to train the group's members in a keeping a simple and easy accounting system to strengthen the group's management.

2.3. Visit to the chairman of the crab culture group at village no. 7 (Ban KoTeab) :

The chairman said that the crab culture activity was initiated by the fishers themselves. The main purposes of this activity are mainly to enhance the number of crab fingerlings and to promote crab culture as a group business activity. However, they still needed a training course on crab culture and they greatly appreciate the CMDEC contribution on arranging a study tour

for them to observe crab culture at the Ranong Coastal Fisheries Aquaculture Station in Ranong province on 3rd February 2004. The chairman said that 15 fishers of the village participated in this activity.

2.4. Visit to the fish cage farm owner:

The fish cage farming owner gave the information that he was rearing grouper, sea bass and red snapper in 30 rearing cages. He invested to buy the seed of Babylonia shell after his wife attended the training course on Babylonia culture in Chonburi province. He added the information that Babylonia shell had a high survival rate, which is confirmed by CMDEC who record the sizes and numbers in this shell culture. However, he said he did not pay much attention to the shell culture after he started to engage in commercial crab gill net fisheries.

2.5. Short minutes of the meeting with the Director of CMDEC:

SEAFDEC and CMDEC staff discussed the importance of the landing survey report. This should be reported bi-monthly to illustrate and indicate any change in fisheries resources during each month or fishing season. Both counterparts agreed to prepare and report the results of the landing survey twice monthly.

Annex 5

Report on Monitoring the Women's Group Activities **on 9th -10th March 2004**

Prepared by:
Sumitra Ruangsivakul

1. Objectives of the journey:

- To make proper arrangements to receive the group members from Langkawi by the women's group, Ao.Bo.To and CMDEC in Chumphon Province
- To monitor the women's group activities

2. Activities and findings

2.1. Visit to Women's group No. 1

The chairwoman and some members of the group stated that the group had prepared for salted egg production. Now they try to solve the problem of the marketing the eggs. Last month they had opened the market by visiting the government office to promote the egg products, buy one pack get one pack free. Now the egg products are good quality and can go to market. Fish processing is still carried out but will be produced by order. The production of eggs is about 1,000 eggs per day so they must make arrangements to channel the egg production.

The project staff discussed the visit of the women's group of Langkawi to let them see the program, and they agreed on the arrangement of the presentation, demonstrations on dry squid and anchovy processing including preparing the lunch for the meeting.

The presentation included the history of group, the group management and structure, problems and future plans.

The project staff has discussed the book keeping of this group and has tried to prepare a table for showing the cost of products and income of the members and the group. The chairwoman said that, she would like to employ staff to arrange the group accounting.

2.2. Visit to Women's group No.4

The chairwoman gave the history of this group and that in January 2001 it was initiated, by 9 farmer's wives to establish the group, and they informed the Community Development Department, in Pathew District of its formulation. After 3 months, the Community Development Department sent staff to teach and introduce methods of group management and accounting. On 14th March 2001, a list of the committee and members was submitted to the Community Development Department. The name of this group is Women's Development of Ban Bangwan, and there are 88 members now. The objectives of group, is saving at the local level, open micro credit to local people through the arrangement of loans to members, and to increase income from the activities of the group.

Group's activities:

- Saving activity, the rate of saving is 50 - 300 baht. This activity was introduced by the Department of Community Development. Now the capital is 270,000 baht.
- Loans, there are two ways to obtain money for loans: from savings and borrowing Ao.Bo.To. (100,000 baht). The process of this activity is that loans are limited, depending on their savings plus the savings of one or two guarantors. The duration of the

loan is for one year, or less than one year and the interest is 1 % per month. The date of the loan adjudicating committee meeting is on the 7th of every month.

- Making artificial flowers for cremations, this activity started before the savings activity, and the chairwoman said that she had an interest in artificial flower making, and borrowed 3,000 baht from the temple to arrange this activity. The group still has this activity, which is done 2-3 times per month. The income of each member is about 400-500 baht per time, and employs 3-5 members.
- The Pun-seb (snack) activity, this activity started in July 2003, after the LBCFM-PD provided the training courses, they will conduct this operation only sometimes, when they do not process rubber. The income of this activity is small, but they said they don't worry, they would like to continue this group activity between them. In this case they have received a budget from the province of 29,000 baht for equipment for processing.
- Ao.Bo.To gave a budget (300,000 baht) for maintaining an old office for them. The first plan of this office will be to sell rice to the members, the chairwoman has informed all members, and everybody will their buy rice here. The second plan will be to promote artificial flowers and the processing of products by showing and to sell the production in this office.

The project staff has borrowed the book keeping of the processing activity to copy, and will be arranging more advanced bookkeeping later. For the program of the visit by the women's group of Langkawi, we have advised them of the program and discussed the presentation, demonstrations on fish processing and arrangement for a lunch for the visiting group.

2.3. Visit to Director of CMDEC

The project staff discussed the visit of the women's group of Langkawi on 17th March 2004 in the morning. The director will give a short presentation of the LBCFM-PD program to the women's group at Pakklong Sub-District. He will give 2 staff from CMDEC to assist at the site.

Director made the following comments on the prospectus of the seminar in July:

- May be swimming crab, squid and other resources in the Catch landing and fishing ground survey should be added to secure the demarcation of coastal zone management.
- The Crab fisheries survey to encourage the activity of collapsible crab trap mesh size enlargement, may be moved to session III.

Now CMDEC have employed new extension staff at the project site who started to work on 1st March 2004, the director gave the landing survey to him, after data collection at the site for 3 days a report will be made to the center at the end of the week.

2.4. Visit to the Ao.Bo.To

At the Ao.Bo.To., I have contacted the Ao.Bo.To Deputy by telephone on the visit of the women's group of Langkawi, and discussed the place for the meeting, the presentation on the Ao.Bo.To' role in the women's group. He understands and welcomes this program.

Annex 6

Report on the Aquaculture Training Course in Krabi, Trang and Songkla on 1st –3rd April 2004

Prepared by:
Kongpathai Saraphaivanich

The training course on aquaculture is arranged as a 3-day study tour (1st –3rd April 2004) that focuses on cage culture and pellet feeding. There were 7 participants from Pakklong sub-district who related to fish cage culture. This training course took the participants to observe fish cage culture at Krabi, Trang and Songkla provinces.

1. Objective

- To provide information on pellet feeding for fish cage culture
- To reduce fishing operations for by-catch for fish feeding in cage culture
- To develop fish cage culture techniques and promote opinion exchange between fishermen

2. Activities and findings

2.1. Study tour in Krabi province

The Krabi fishery provincial established a grouper cage culture group in Moo 4, Haow Nam Khaw sub-district, Klong Tom district, Krabi province. There are 5 members. This cage culture group experiment with feeding rotated between pellet and fresh fish. The objectives of this experiment to use pellets to replace trash fish when the cost is high cost and it is in short supply. The leader group explained these experiments, as when they feed the pellet there might be an effect in the groupers' stomachs because they use pellets that are normally used for feeding catfish. The group leader suggested that the pellet feeding should be rotated with trash fish.

2.2. Study tour in Trang province

At Trang province the participants went to visit a private company that tries to research and develop pellet feeding. The company experiments on the use of pellet feeding to sea bass and grouper. The company staff said the fish should be trained in pellet feeding when they are juveniles. Afterwards they will feed on only pellets, which are not rotated with trash fish. They said the fish scales and fish shape is complete and at a good price. The fish fed on pellets were healthy.

2.3. Study tour to Songkla Lake.

At Songkla province, the participants went to observe fish cage culture at Songkla Lake. This place is very popular for grouper cage culture. The cage structure is same as that of Pakklong Sub-district, which is fixed cage culture. The participants discussed with the fisherman at Songkla Lake about cage culture techniques, fish diseases, fish prices and marketing.

Annex 7

**Survey Report on Monitoring the Marine Environmental System of
The Pak Klong Sub-district Coastal Area**

Prepared by:
Penchan Laongmanee

1. Particulars of the survey

- Boat used : Inflatable rubber boat (Marine and Coastal Resources Center, Chumphon)
- Duration : 28th –30th June 2004
- Objective : To collect oceanographic data
- Survey area : Coastal area of Pak Klong sub-district

2. Observation summary:

This survey tour included people from Chumphon Marine Fisheries Research and development Center, the Marine resources and coastal research center (MCR) and SEAFDEC/TD staff.

Summaries of the station data and observation data are shown in tables 1 and 2 respectively. Temperature, salinity, dissolved oxygen and pH (water properties) was measured using a YSI sensor at the surface, mid depth and bottom. Water samples were collected using the Kittahara water sampler for the determination of chlorophyll-a, total suspended solids, phytoplankton and nutrients. Samples of chlorophyll-a and nutrients were transferred to SEAFDEC/TD for analysis as shown in table 2. The phytoplankton samples will be analyzed by MCR staff.

Table 1: Summary of station data

Date	Time	St. no.	Depth (m)	Sampling Depth	Sea state	Weather	Transparency(m)
28 th	11:50	1	8.5	Surface	Moderate	Rain	2.5
28 th Jun	11:35	2	8.5	Surface	Moderate	Rain	2.5
28 th Jun	12:00	3	6.1	Surface	Moderate	Rain	1.5
28 th Jun	12:10	4	4.2	Surface	Moderate	Rain	1
29 th Jun	11:40	5	0.7	Surface	Moderate	Cloudy	0.5
29 th Jun	11:55	6	10.5	Surface	Moderate	Cloudy	2.5
29 th Jun	12:05	7	16	Surface	Moderate	Cloudy	3
30 th Jun	10:35	8	18.5	Surface Mid Bottom	Moderate	Rain	7
30 th Jun	11:10	9	13.2	Surface Mid Bottom	Moderate	Rain	5

Table 2: Observation data

St. no.	Temp. (c)	Sal (ppt)	pH	DO(ml/l)	TSS (mg/l)	Nitrite (ug/l)	Nitrate (ug/l)	Phosphate (ug/l)	Chlorophyll-a (mg/l)
1	28.58	34	8.81	5.85	14	0.042	0.387	0.450	0.850
2	28.71	33.96	8.83	6.42	14.6	0.236	0.421	0.681	0.846
3	28.79	33.85	8.94	6.81	16.5	0.258	0.361	0.703	0.580
4	28.92	33.86	8.96	6.54	17.5	0.119	0.520	0.497	0.545
5	29.46	33.37	8.83	5.44	28.6	0.371	0.304	0.805	0.434
6	28.65	33.93	8.85	5.59	11.9	0.239	0.334	1.310	1.054
7	28.66	33.87	8.77	5.86	10.7	0.177	0.724	0.889	0.346
8	28.73	33.69	8.64	5.79	8.9	0.144	0.504	0.848	0.117
	28.64	33.7	8.68	5.63					
	28.66	33.72	8.68	5.7					
9	28.89	33.67	8.64	5.71	9.1	0.164	0.470	0.251	0.116
	28.75	33.69	8.66	5.81					
	28.62	33.87	8.66	5.62					

Annex 8

Report on the Training Course in Marketing Strategy, Bookkeeping and Accounting on 28th – 30th June

Prepared by:
Sumitra Ruangsivakul

1. Training objectives:

1.1. Group management and marketing

- To understand the factors that make groups and the theory on group management
- To understand the factors for finding markets

1.2. Bookkeeping and accounting

- To know income and expense monthly or yearly
- To know the results at the end of the month, loss or profit
- To manage the high expenses of some material and
- To develop a sales plan

2. Participants:

- 15 members of women's group no. 6 were trained on 28th June 2004
- 8 members of women's group no. 1 were trained on 29th June 2004
- 8 members of women's group no. 4 were trained on 30th June 2004

3. Trainers:

- Mrs. Sireeporn Tentiyah, expert on Group management and marketing, Chumphon Technology College
- Miss Rattana Praditvorakarn, expert on Bookkeeping and accounting, Chumphon Technology College

4. The content of the training:

4.1. In the morning, the lecture started at 1000. Mrs. Sireeporn introduced herself and the group leader gave the background of the group. The content concerning group management had many factors:

- Time for participation
- The size of the group
- The pressures from outside
- Group's success
- Group's leader
- etc.

4.2. The theories of marketing are;

- What do you produce?
- How do you set the price of the goods?
- How to sell?
- How to promote?

4.3. In the afternoon, Ms. Rattana gave a lecture on bookkeeping and accounting: There are 5 columns for commerce analysis, cash, debt, capital, income and expenses. The monthly record will be analyzed to approve the loss or profit of the business. There are 3 types of table for showing the situation of the business.

4.4. Samples of the table of income and expenses are::

**Women's group for Fisheries
Apr-04**

Date	Item	Cash	Debt	Capital	Income	Expens
1	Brought forwards from the previous month	2,000		2,000		
1	Buy gas 1 gallon	-400				4
1	Buy fish 1,000 baht and ingredients 600 baht	-1,600				1,6
2	Raise a loan from village fund 5,000 baht	5,000	5,000			
2	buy plastic bag and logo 350 baht	-350				
3	Buy vegetable oil 700 baht	-700				
4	Sell anchovy products 2,000 baht	2,000			2,000	
6	Sell anchovy products 500 baht	500			500	
15	Pay labour 500 baht	-500				
16	Buy anchovy 500 baht	-500				
20	Sell anchovy products 2,500 baht	2,500			2,500	
27	Return to village fund 500 baht	-500	500			
27	Pay interest to village fund 50 baht	-50				
29	Sell anchovy products 2,000 baht	2,000			2,000	
30	Pay labour 500 baht	-500				
	Total	8,900	4,500	2,000	7000	4

4.5. From this table a 2nd table can be arranged for the balance sheet on loss or profit as follows.

Balance sheet (loss-profit)

<u>Income</u>	
anchovy products	5,000
Fish sauce products	2,000
Total	7,000
<u>Expenses</u>	
Fish	1,500
Incredient	600
Gas	400
Plastic bag	350
Vegetable oil	700
labour	1,000
Interest	50
Total	4,600
Net profit	2,400

- 4.6. From balance sheet the main expenses are known and can be made standard for cost in the next month.
- 4.7. The next table is the balance sheet on debt and cash, this table can show the situation of the group at the end of month, the cash in hand and the debt.

Balance sheet at the end of month

<u>Asset</u>			
Cash			8,900
	Total		8,900
<u>Debt and cost</u>			
Loan (Credit)			4,500
Capital (B/F)		2,000	
Net profit		2400	4,400
	Total (C/F)		8,900

- 4.8. The questions on bookkeeping and accounting, the women's group no. 1 would like to clarify the payment of profit to members from the savings and loan activities.
- 4.9. Women's group no.4 would like to clarify the payment to labour and how to manage the profits to members.
- 4.10. From this case, the project team would like to monitor the bookkeeping record at women's groups nos. 1 and 4. And add a book of materials, a book of products and labour records to the other books.

Annex 9

Report on the Installation of Artificial Reefs at Chumporn Province

Prepared by:
Yuttana Theparoonrat
Resources Enhancement Project (SDI – 4)
31 March 2004

As a case study, TD in collaboration with ASEAN and SEAFDEC member countries conducted a Resources Enhancement project in Chumporn province, Thailand. This project is designed to integrate the installation of artificial habitats in inshore waters with careful pre-assessment of the environmental and socio-economic impact.

In March 2004, the Department of Fisheries, Thailand proposed to install artificial reefs at Chumporn province. Two groups of the cubic shaped concrete type, 1.5x1.5x1.5m, with a total of 1750 pieces, are set in the project area number 46-16-07 and 46-16-08 (Fig.1). The artificial reefs settle at a depth of 12m with an area covered of 2 km².

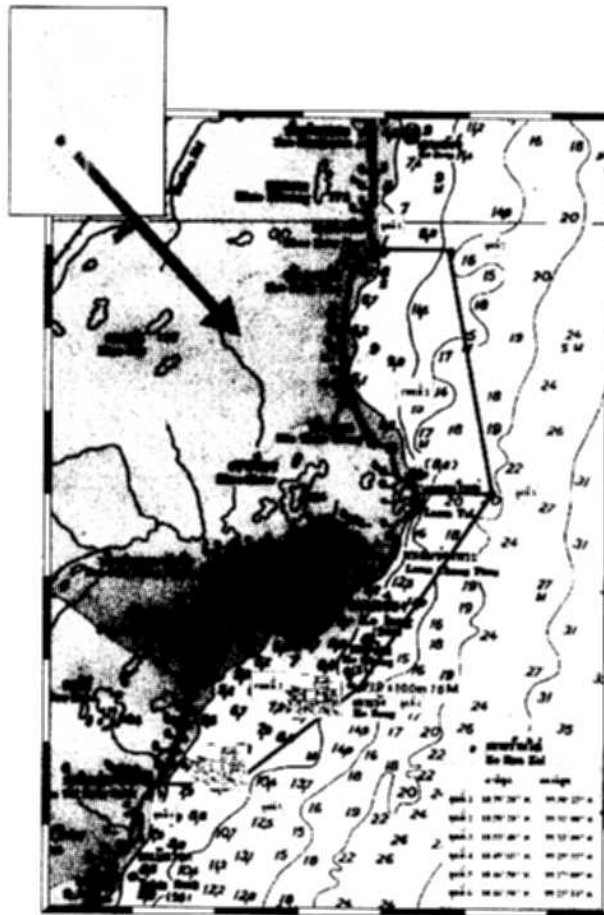


Figure 1. Location of the Artificial Reefs project site at Chumporn Province, Thailand

SEAFDEC/TD staff in cooperation with the fisheries officer of the Department of Fisheries to conducted the installation of artificial reefs using M.V. Khaow Khang at Pratew district, Chumporn province, between 10th – 31st March 2004. The installation method was to dump cube shaped concrete frames from the vessel at marked positions. The position and number of the frames installed at the project site are shown as follows;

Fisheries Department of Thailand Artificial Reefs Project for 2003

Project Number: 46-16-07

Location: Moo 2, Banborsamrong, Pakklong Village, Pratew District, Chumporn Province,

Area: 1.0 x 1.0 kilometer

Water Depth: 11.0 – 16.0 meter

Bottom: Muddy sand

Dist. From Shore: 4.9 – 5.8 kilometer

Material: Concrete 1.5 x 1.5 x 1.5 meter, 875 pieces

Position: A. Lat. 10 – 49.00 N, Long. 99 – 28.85 E
 B. Lat. 10 – 49.00 N, Long. 99 – 29.35 E
 C. Lat. 10 – 48.50 N, Long. 99 – 28.70 E
 D. Lat. 10 – 48.50 N, Long. 99 – 28.20 E

Budget: 3,000,000.- Baht

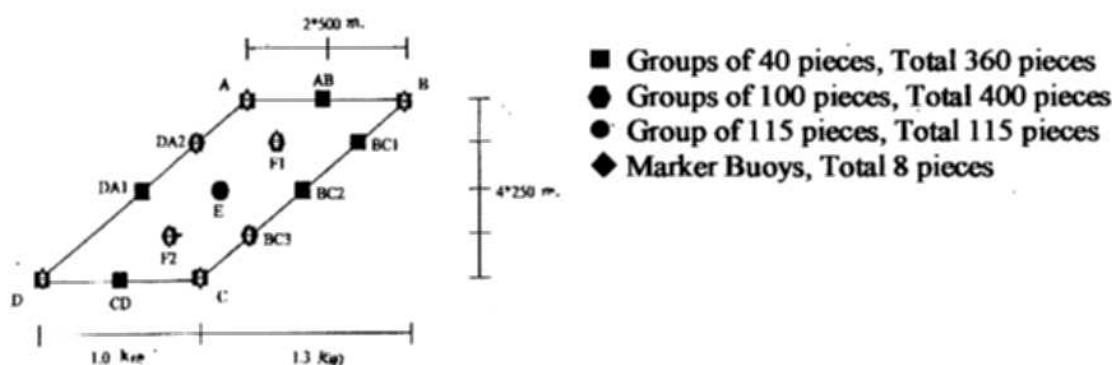


Fig. 2 Layout of the artificial reef setting at area number 46-16-07.

Project Number: 46-16-08

Location: Moo 6, Bonrai, Pakklong Village, Pratew District, Chumporn Province,

Area: 0.5 x 2.0 kilometer

Water Depth: 9.5 – 11.0 meter

Bottom: Muddy sand

Dist. From Shore: 3.0 – 4.5 kilometers

Material: Concrete 1.5 x 1.5 x 1.5 meter, 875 pieces

Position: A. Lat. 10 – 48.20 N, Long. 99 – 28.05 E
 B. Lat. 10 – 48.20 N, Long. 99 – 28.30 E
 C. Lat. 10 – 47.20 N, Long. 99 – 27.00 E
 D. Lat. 10 – 47.20 N, Long. 99 – 26.75 E

Budget: 3,000,000.- Baht

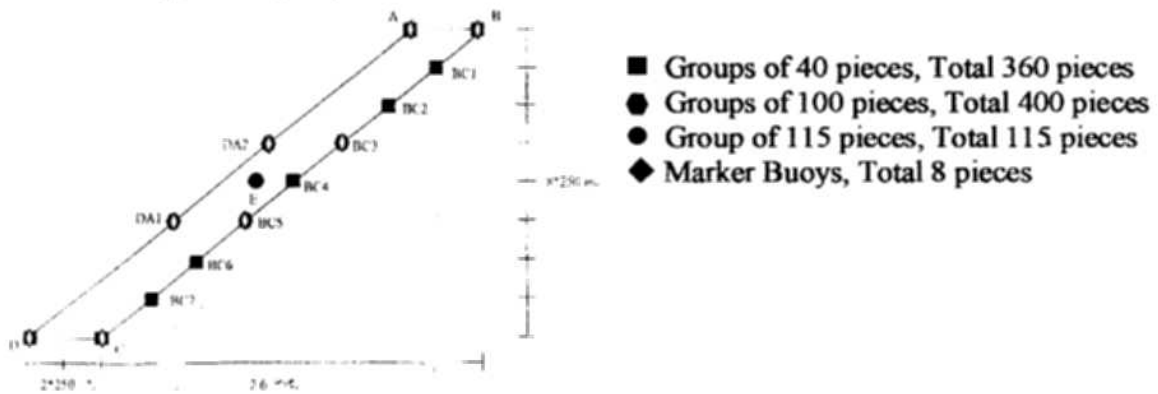


Fig. 3 Layout of the artificial reef setting at area number 46-16-07.



Fig.4 M.V. Khaow Khang, carrying the cube shaped concrete artificial reefs for installation at Pratew district, Chumporn.



a).



b).

Fig. 5 A fork lift used to convey the cube shaped concrete frames for dumping on the project site a), the dumping positions are marked by anchor flag buoy b).

