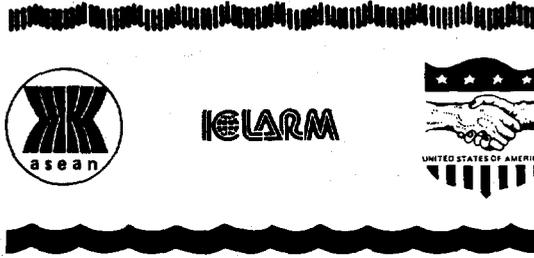


PD-ARW-050
90872



ASEAN-US Cooperative Program
on Marine Sciences:

Coastal Resources Management Project

Association of Southeast Asian Nations
United States Agency for International Development
International Center for Living Aquatic Resources Management

A

The goal of the Coastal Resources Management Project (CRMP) is to increase existing capabilities within the Association of Southeast Asian Nations (ASEAN) region to develop and implement comprehensive, multidisciplinary and environmentally sustainable CRM strategies through: ● analyzing, documenting and disseminating information on trends in coastal resources development; ● increasing awareness of the importance of CRM policies and identifying, and where possible, strengthening existing management capabilities; ● providing technical solutions to coastal resources use conflicts; ● promoting institutional arrangements that bring multisectoral planning to coastal resources development.

The CRMP, funded by the United States Agency for International Development (USAID), is being executed by the International Center for Living Aquatic Resources Management (ICLARM). The CRMP's Project Steering Committee, composed of representatives from each of the ASEAN nations, is responsible for establishing overall project policy direction and overseeing and evaluating project activities and performance.

The CRMP has two components. The first is the development of site-specific CRM plans in the respective ASEAN countries. This component includes resource assessment, cooperative research and planning activities.

The second component is information dissemination and manpower development through:

- publications: a regular regional newsletter; technical reports generated from in-country pilot site activities, reviews, monographs, training manuals, workshop and conference proceedings; educational materials in the form of booklets and leaflets produced in various languages and audiovisuals.
- training activities: short-term training courses in CRM: principles; remote sensing applications; methodologies; socioeconomic analysis; information research and management; postgraduate and on-the-job training in CRM.
- technical workshops and policy seminars

These activities are coordinated through the following national institutions in the ASEAN nations: ● Brunei Darussalam—Department of Fisheries; ● Indonesia—Indonesian Institute of Sciences; ● Malaysia—Ministry of Science, Technology and Environment; ● Philippines—Philippine Council for Agriculture and Resources Research and Development; ● Singapore—Science Council of Singapore; ● Thailand—Office of the National Environment Board.

For more information on the project, contact: The Project Coordinator, ASEAN/ USAID Coastal Resources Management Project, ICLARM, MC P.O. Box 1501, Makati, Metro Manila, Philippines.

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TERMINAL REPORT

THAILAND

THE UPPER SOUTH INTEGRATED COASTAL RESOURCES MANAGEMENT

THAILAND

COORDINATING AND LEAD

IMPLEMENTING AGENCY : Office of the National Environment Board (ONEB).

COOPERATING AGENCIES

: DEPARTMENT OF FISHERIES : Brackish water Fisheries Division, Marine Fisheries Division, Phuket Marine Biological Center.
ROYAL FORESTRY DEPARTMENT
LAND DEVELOPMENT DEPARTMENT
CHULALONGKORN UNIVERSITY : Marine Science Department.
KASETSART UNIVERSITY : Faculty of Forestry.
MAHIDOL UNIVERSITY : Faculty of Social Sciences and Humanities.

NAMES OF COUNTRY PROJECT

STAFF

: Pakit Kiravanich (Jun.1986-Sep.1986)
Arthorn Suphapodok (Oct.1986-Dec.1991)
Chalerm Sak Wanichsombat (Jul.1986-Sep.1990)
Saksit Tridech (Sep.1990-Dec.1991)
Teerayuth Poopetch (Jul.1986-Jun.1987)
Chandhana Indhanya (Feb.1988-Nov.1991)
Sirikul Bunpamong (Jul.1986-Mar.1989)
Orapin Wongchumpit (Jul.1987-Dec.1991)

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SUMMARY

The Upper South Integrated Coastal Resources Management Project was carried out since 1987 with support from the ASEAN/US Cooperative Programme on Marine Science and cooperation of various government agencies, universities and institutions whereas ONEB was a lead and coordinating agency. After studies of sub-tasks, four Technical Working Groups were established in order to review sectoral reports and to formulate into Integrated Action Plans. The Issue - based Action Plans were categorized into four aspects :

- Coastal water quality;
- Fisheries resources;
- Mangrove - Aquaculture and land use
- Coral reef, Beaches and Island Environment at Ban Don Bay.

The objectives of such plans are to solve some crucial environmental/resource management problem/issues currently facing the Upper South's coastal zone.

Experience in the field of resource management suggests that the participation of those people in the area where a project is targeted is a requisite of project success. Also the success on implementation of such plan relies heavily on support and coordination from a wide range of government ministries and agencies both at national, provincial and local level.

ONEB had incorporated Upper South Integrated Coastal Resource Management Plan with Thailand Coastal Resource Management Plan (CRMP) into National Policy, Measures and Action Plan for Coastal Resource Management in Thailand. These will be used as a guideline for coastal resource management of the country.

1. Project Identification

Project Name : The Upper South Integrated Coastal Resources Management.

Duration of Project : 5 years (June 1986 - December 1991)

Total Cost of Project : US\$ 500,000

Country Counterpart : Scientists, secretarial support, office facilities, supplies, technical support services and equipment.

Project Sites : Ban Don Bay (Gulf of Thailand) and Phangnga Bay (Andaman Sea) of the Upper South Region, Thailand

2. Goal and Objective of In-country Project

Goals : The project aims to develop coastal resources management strategies and formulate a management plan which can be implemented at the Upper South region and used as a model development plan for other regions in the country.

Objectives : The primary objectives of the project are :

- to develop an effective management plan for the rational utilization of the coastal resources of the Upper South region,
- to increase awareness of trends in living coastal resources utilization or exploitation and the impacts from development projects, and

- to develop institutional arrangements linking applied research to coastal resources planning and management and a model plan that can be applied to other critical zones.

Interproject Coordination

The Implementation and output of the study will coincide with the Royal Thai Government's Sixth National Economic and Social Development Plan (NESDP) which coastal zone management is one of the first priority programs of the plan.

The relevant objectives for governmental actions under the Sixth NESDP are to :

- 1) prepare national management policy and strategy for the coastal zone and those activities affecting coastal resources;
- 2) develop management plans for coastal development and protection for optimal beneficial use in the long term;
- 3) support coastal resources inventory and environmental evaluation in order to assess development potential and coastal resources sustainability;
- 4) promote and support research on coastal resources in order to assess the functioning of coastal and marine ecosystems, including their utilization, problems, and the impacts from development projects;
- 5) develop management plans for priority parks and sanctuaries, including marine national parks; and
- 6) develop management strategies for each specific coastal resource, e.g. strategies for mangrove management including classification zoning for mangrove resource uses, strategies for coral reef management, etc.

Moreover, ONEB in behalf of the Royal Thai Government is now engaged with Coastal Resources Management Policy and Planning, the project under support of the Science and Technology Bureau of AID/Washington. The project objectives include developing overall national strategy and supporting policies for CRM, and action plans for priority region or problem areas. Beginning in 1987, the project takes 3.5 years to complete.

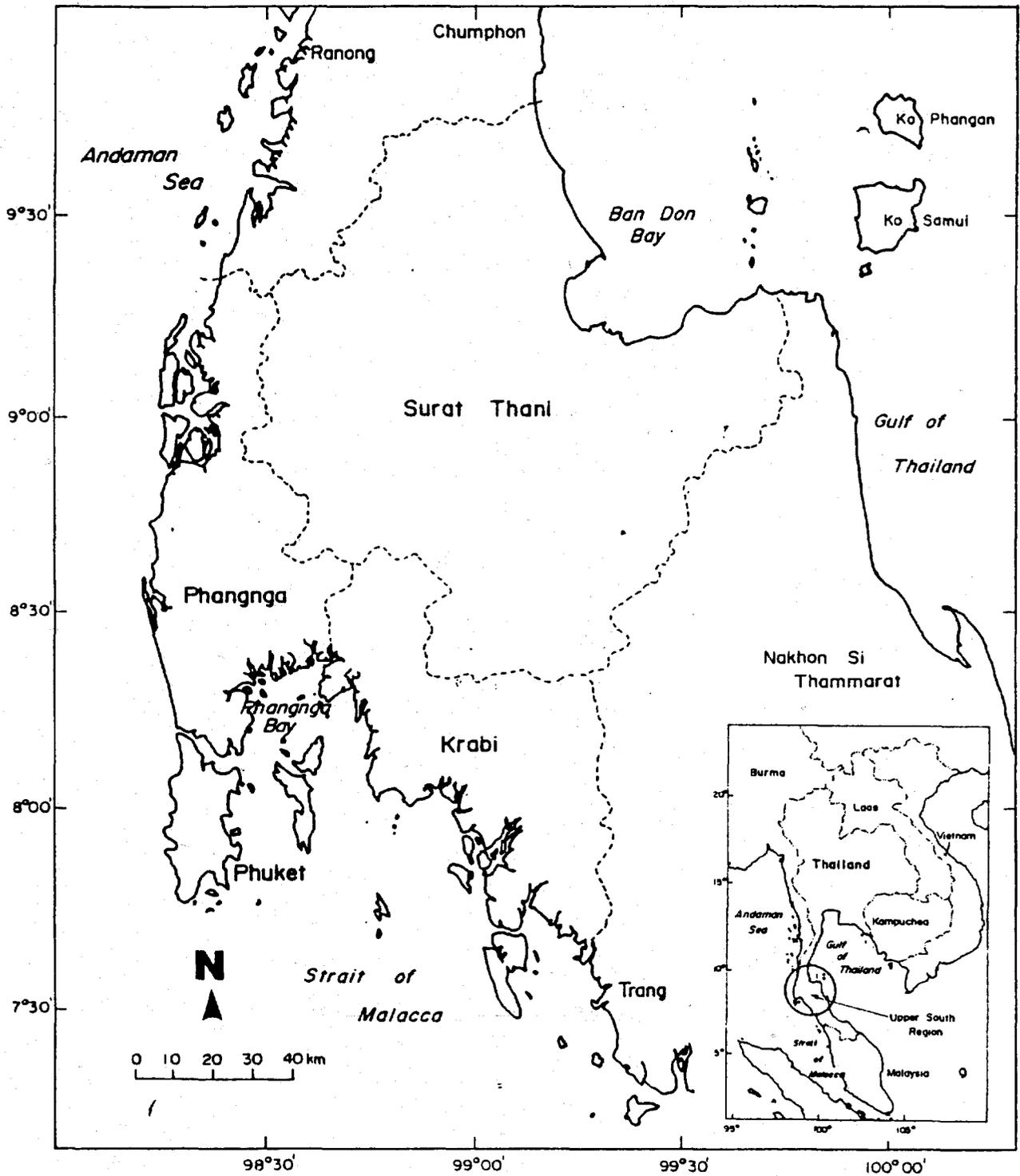
It is apparent that the Upper South CRM project will serve as a part of the CRM Policy and Planning project and will be integrated into formulation of national strategies and policies for CRM. As the products of the project, the study and CRM management plan will be the fruitful target for the Sixth NESDP. It is hopeful that the plan will be carried on to the Seventh NESDP.

3. Project Rationale

Over the past several years, the Royal Thai Government (RTG) has shown keen interest over the country's regional development projects. This includes the Eastern Sea Board Development Projects and the Songkhla Lake Basin Planning Study. In addition, a development study for the Upper South was recently been conducted by Japan International Cooperating Agency (JICA) in collaboration with the National Economic and Social Development Board (NESDB) for the RTG. The initial development master plan identified several potential areas for development, including coastal resources, but no consideration for environmental or coastal resources management (CRM) was made.

The various resources and economic sectors of industry and tourism in the Upper South as well as the rest of Thailand are under the jurisdiction of several government departments and agencies. A major CRM issue is the overlapping of responsibilities and conflicting jurisdiction of coastal resources among key government agencies. With this situation is the lack of a single authority to implement management measures, which is one of the reasons behind rapid coastal resources deterioration. Present laws such as the nature conservation

Fig. 1 Project boundary



acts and the natural resources exploitation acts need to be amended to minimize sectoral overlapping and enlarge in scope to include critical habitats like coral reefs. Other issues include resource use which conflicts with development activities such as mining, tourism and industry, inappropriate land use, socioeconomic problems and lack of information base on the various resources in the region. It is thus hoped that ONEB will be able to mitigate these problems and provide relevant and current information for the sustainable management of the various coastal resources and to develop a workable management plan for the Upper South.

4. List of task's activities from 1986 - 1991

The list of task's activities from June 1986 - December 1991 are identified as follow :

Division 100-T Baseline Information

Division 200-T Biogeographical Studies

- | | |
|-----------------|--|
| Task code 210-T | Present status of aquaculture Practices and potential areas. |
| Task code 220-T | Economics of aquaculture production |
| Task code 230-T | Evaluation of fisheries development potential and feasibility for sustainable management |
| Task code 240-T | Assessment of coastal environment at Ban Don Bay |
| Task code 250-T | Assessment of coastal environment at Phangnga Bay |
| Task code 260-T | Land Based Pollution Study |
| Task code 270-T | Evaluation of mangrove development potential for coastal zone management |
| Task code 280-T | Evaluation of wildlife resources for integrated coastal zone management |
| Task code 290-T | Evaluation of land capability use and development potentials |

Division 300-T Socioeconomic Studies

Task code 310-T Socioeconomic survey of key development areas

Task code 320-T Anthropological evaluation of the social and economic consideration in coastal resources use in Ban Don & Phangnga, Thailand.

Division 400-T Legal and Institutional Division

Task 410-T Legal Framework and Institutional Arrangement

Task 420-T Evaluation of existing and potentials for recreation and tourism development and management in the Upper South Region, Thailand

Division 600-T Resource Management Plan Formulation

Task 611-T Sectoral Plan co-ordination and integrated CRM plan formulation

Task 612-T Initial environmental impact examination of coastal development projects

Task 613-T Management Guidelines and Policies for Coastal Resources / Activities

Task 614-T Water quality management plan

Task 615-T Management planning for Land-use

Task 621-T Management planning for coral reefs, beaches and Island environments, in Ban Don Bay, Surat Thani

Task 622-T Formulation of statements for management of marine protected areas

Task 623-T Management planning for fishery resources in Ban Don and Phangnga Bays

Task 650-T Mapping

Division 700-T	CRM - Pre Plan Implementation
Task 710-T	Public forums / Technical seminars
Task 720-T	Educational materials and campaign on coastal resources and environmental conservation

Division 800-T	Project Management Division
Task 810-T	Project management

5. Summary of the approach or methodology used in implementing in-country project

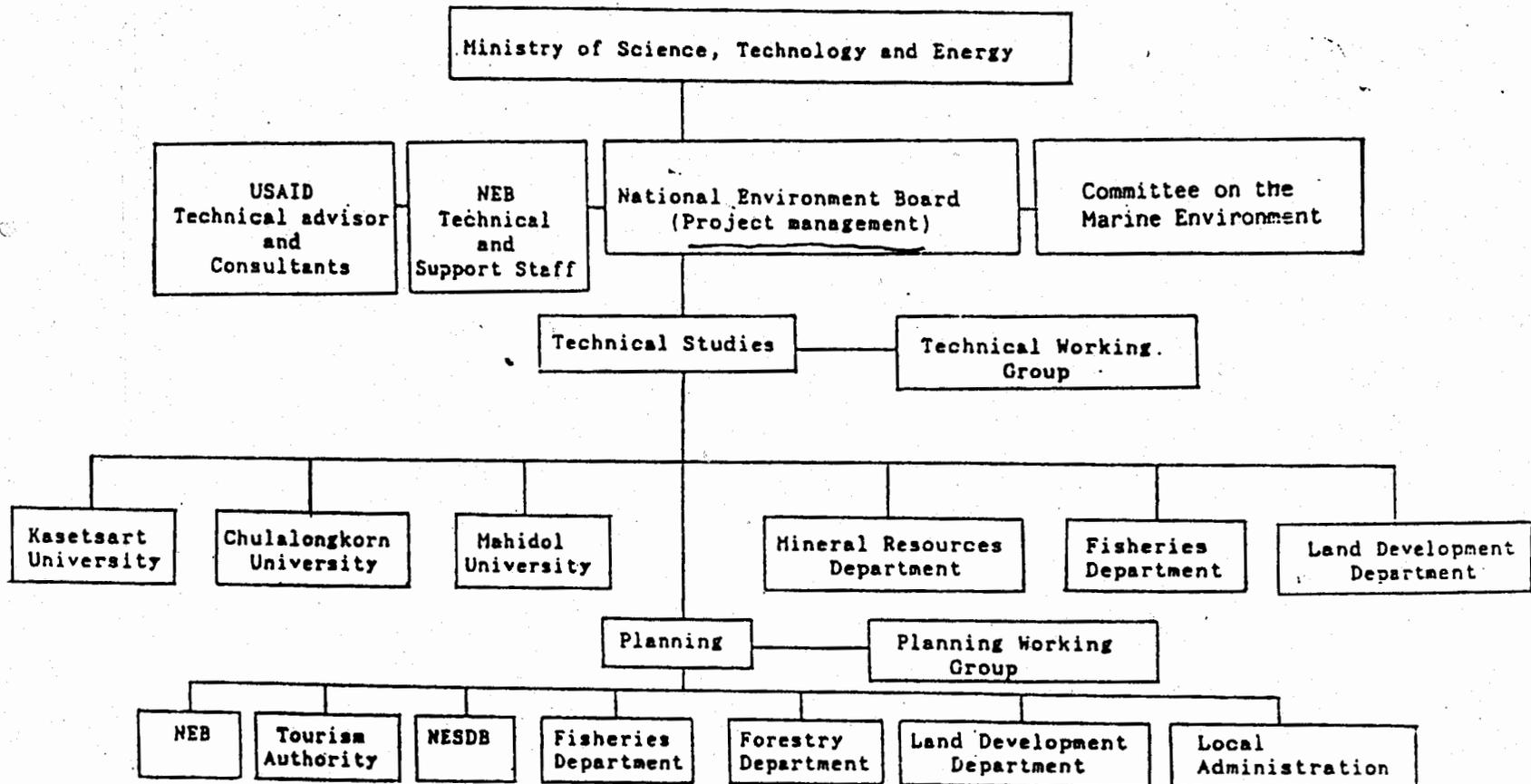
The Upper South integrated coastal Resources Management Project was carried out under the aegis of the Ministry of Science, Technology and Energy with the Office of the National Environment Board (ONEB) as the lead agency. Various government departments, universities and institutions will play key roles in carrying out special studies as well as providing inputs for plan preparation.

National steering Committee (NSC) had been set up earlier in the project. Later on Technical Working Group on ASEAN-US CRM Project was appointed by NSC. The major roles of the Working Group include preparation of annual workplans and project program plans prior to the PSC meeting, establishing country project policy guidelines; monitoring, reviewing and evaluating in-country project progress and being responsible for all other regulation and coordination of all tasks.

Entering planning activities in 1988, A Planning Working Groups were set up to oversee and coordinate all planning activities and preparation of planning documents to be submitted to NSC for approval.

Figure 2 shows basic management system for CRM Project. As a focal point of the project, ONEB serves as the core of management structure. The major roles of ONEB management group are to coordinate

Figure 2 Project management organization chart



professionals' activities as specified in the work plan, to promote the exchange of ideas and information among the NSC members, to develop a thorough understanding of the project execution of study and planning stages, and to coordinate the team's work with the objectives, goals, and activities of other agencies and groups working in the Upper South Region.

In view of complexity of the project structure, technical assistance effort was needed to involve in the project framework from time to time. Consultants from ICLARM and other outside consultants with environmental planning expertise were engaged periodically throughout the project.

In order to identify the coordination approach implemented in the project, the relevant agencies and institutions are categorized as the followings.

1. Coordinating and Lead Implementing Agency

Office of the National Environment Board (ONEB) working like a country focal point in cooperation with other Royal Thai government (RTG) agencies and institutions. ONEB itself set up an administrative team for day-to-day managing technical and financial activities.

2. Cooperating agencies.

The project, in coordination with experts from various government agencies and institutes, had conducted several field studies since 1986 - 1988. Most of the research studies had been carried out by these agencies under the responsibilities of team leaders. Involvement of institutions is described as the following.

a) Department of Fisheries (DOF). The DOF has been responsible for three aspects of studies. The Division of Marine Fisheries, Division of Brackish Water Fisheries and Phuket Marine

Biological Center are taking care of studying and planning for fishery resources, aquaculture, and environment of Phangnga Bay.

b) The Royal Forestry Department (RFD). The RFD joining hands with KU play the leading role in studying and planning for mangrove swamp areas in the two Bays.

c) Department of Land Development (DLD) Specializing in soil classification the experts of DLD surveyed soil characteristics and properties for the two Bays. The teams coordinating with the other group are responsible for zonal planning for land use.

d) Kasetsart University (KU) KU contributes for the studies of mangrove forest and wildlife resources. The Department of Conservation has leaded the work so far.

e) Chulalongkorn University (CU) The Department of Marine Science involves with studying about environment of marine water in Ban Don Bay.

f) Mahidol University (MU) The Department of Social Science has conducted two aspect of studies namely socio-economic survey and anthropology.

g) ONEB The ONEB itself supported a free-lance expert to study potential for tourism and recreation. The project staff have been recruited to facilitate technical coordination and financial management.

In addition, ONEB had conducted Land Based Pollution Study (260-T), Initial Environmental Impact Examination of Coastal Development Project Study (612-T) and Technical Seminars (710-T) as well as Educational Materials and Campaign on Coastal Resources and Environmental Conservation (720-T).

3. National Steering Committee (NSC)

The Task activities which had already been done during the passing period, the results had to be submitted to the meeting of The National Steering Committee which is the Sub-Committee for Coastal Resources Management. Under the Committee for National Environment Board, the subcommittee consisted of the representatives from different related agencies : National Economic and Social Development Board, The Harbour Department, The Royal Forestry Department, Department of Fisheries, Land Development Department, Department of Lands, Department of Mineral Resources, The Tourism Authority of Thailand, Provincial District Offices of Phangnga, Krabi and Surat Thani, and ONEB. The major role of Steering Committee is to direct the project management plans to suit the National Economic and Social Development Plan. The NSC was established in March 1987.

Under the NSC, The Technical Working Group on ASEAN-US CRM Project was appointed. The major roles of the Working Group include preparation of annual workplans and project program plans prior to the PSC meeting; monitoring, reviewing and evaluating in-country project progress, and report to the NSC. The Working Group, consists of team leaders from every sub-sectors was appointed in June 1987.

4. Working Groups on Upper South Integrated Coastal Resources Management

The planning process of this project started in May 1988. According to the research findings, the plans designated to be issued-based action oriented which focus on 1) coastal water quality 2) fishery resources 3) coastal land use, mangrove and aquaculture conflict resolution 4) tourism resources concentrated on coral reef, beaches and island resources in Ban Don Bay and 5) integrated coastal resources management. The Office of the National Environment Board (ONEB) appointed the Working Group on Upper South Integrated Coastal Resources Management to facilitate the planning activities. The major responsibilities of the Working Group include reviewing technical

studies of the project, reviewing and recommending draft plans which are prepared by contracted planners. Determining legal and institutional framework for plan implementation is also a major part of the planning process. Members of the Working Group consist of all task leaders and planners involved in the project, outside specialists, representatives from local and central government agencies concerned, namely, the three provinces in the project areas : Surat Thani, Phangnga and Krabi, Fisheries Department, Land Development Department, Royal Forestry Department, Thailand Institute of Scientific and Technological Research, Tourism Authority of Thailand, Kasetsart University, Mahidol University, Thammasat University and Chulalongkorn University.

The working group has 41 members in total. To make the planning process workable. 5 Sub-Working Groups have been appointed composing of selected as appropriate members from the said Working Group. The 5 Sub-Working Groups are namely, Water Quality Management Planning (WG1) chaired by Dr.Eddie Ke-Siong Hum Land Use Management Planning (WG2) chaired by Dr.Pisoot Vijarnsorn. Fisheries Management Planning (WG3) Chaired by Dr.Ruangrai Tokrisna, Tourism Resources Management Planning (WG4) chaired by Dr.Suraphol Sudara and Integrated Coastal Resources Management Planning. Sectoral plans have been produced and reviewed by the working Group as follow :

1. Management Plan for Coastal Water Quality in Ban Don Bay and Phangnga Bay
2. Coastal Land use particularly Mangrove and Aquaculture Conflict and Land Use in Ban Don Bay and Phangnga Bay
3. Management Planning for Fisheries Resources in Ban Don Bay and Phangnga Bay
4. Management Planning for Coral Reefs, Beaches and Island Environment in Ban Don Bay and Phangnga Bay

When the sectoral plans were finalized the action plans were proposed for discussion and approval. ONEB had conducted 3 Official Forums or Technical Seminars to refine the action plans. The participants of the forum/seminar comprise of members of NSC, Project Planner and investigators, representatives from related central government agencies, local and provincial government agencies in the project areas.

In view of prioritization of the action plans the following measures were employed :

1. The severity of the problems/issue being adressed
2. The costs of the project
3. The ability of the projects to contribute to the objectives of the plan
4. The willingness of local communities and/or local government officials to implement the project.

Thereafter the readiness of government agencies, local communities and local government officials as expressed at the Technical Seminar in May 1991 was used to determine overall project priorities.

The integrated CRM plan was the outcome from integration of information and plans of sectoral plans by study teams on multisectoral and multidisciplinary basis. The implementation of action plans, however, relies heavily on cooperation between related agencies both in local - implementing level and central - planning level.

6. Project Implementation

The CRM project is described in three stages as follow :

Design Stage. This begins with a preliminary survey to pre-diagnose the area, outline the work plan and prepare the baseline

information. It ends with the revision of the work plan and preparation of the resource profile.

Execution Stage. This is divided into two phases :

Phase I Resources Assessment. This involves the diagnosis of the principal needs and problems of the region, its main resources, development potentials and constraints. It ends with interim reports which proposes alternative management and development strategies and identifies and resolutions of coastal resources management issues. The phase I report will provide recommendation for CRMP.

Phase II Plan Formulation and Preparation of Action Plan. Development strategies are refined and an interrelated plan is formulated. The products of this phase are final reports which will include formulation of socioeconomic and environmental-cum-economic objectives, policies for sectors, environmental quality standards and the establishments of a regional environmental monitoring program.

Implementation Stage. This involves planning for implementation process. This will help formulate national guidelines for management programs which will be the target of Phase II.

As any practitioner knows the studies are seldom conducted in a simple linear sequence. since the steps tend to be iterative with many feed back loops, for example, study design may continue into the execution stage since the diagnosis may reveal information that substantially changes idea about region and forces redesign of the study, formulation of action plan may be conducted simultaneously with preparation of implementation.

Implementation Process

Each work tasks will be undertaken by study teams under the direction of the Working Group on ASEAN-US CRM project and ONEB management group. The study teams are responsible for carrying out

the day by day work. The Working Group will meet monthly to review progress, to approve the work plan, and to review the progress interim, and final report. The technical progress report will be called quarterly, Besides, the field trip report must be submitted to ONEB after each survey has been complete. Interim report will be called annually and final report will have to be submitted within 30 days after the task is finished.

Output of the study will include

(a) Quarterly Progress Reports will be prepared for purpose of assisting project management.

(b) Reports will be prepared for each special study, for example;

(i) Mangrove Classification, Condition, and Development Potential.

(ii) Existing and Potential Future Aquaculture Development Potential and Management Requirements.

(iii) Existing and Potential Future Coastal Fisheries Development Potential and Management Requirments, and

(iv) Land Based and other Pollution Sources and Effects on Water Quality; etc.

(c) Draft Final Report, Integrated Coastal Resource Management Plan with separate volumes for specific action plans.

(d) Final Report

7. Results of the Project in General

7.1 Results of Specific tasks

All work tasks were finished under the responsibilities of study teams within the recommendations from Working Group on CRM project and ONEB management group. The detail information including results of studies are summarized task by task as follow :

Division 100 - Baseline Information

Objective :

To summarize existing information on the bio-physical, social and institutional environments of the proposed sites, to determine the nature of the existing data base and identify information gaps, and to identify key coastal issues which characterize the sites.

Result of the Study

1. Ban Don Bay and Phang-Nga Bay were selected as the project sites.
2. The report on "Coastal Environmental Profile of Phangnga Bay and Ban Don Bay" was produced with the cooperation from ICLARM and USAID"

Division 200 - Biogeographical Division

Task Code 210/220-T Present status of aquaculture practices and potential areas/Economics of aquaculture production.

Objective :

To promote the sustainable and environmentally viable development of aquaculture in the Ban Don and Phangnga coastal areas. To increase existing aquaculture productivity through limiting nonsustainable production practices, and the reduction of external sources of stress in areas currently under production. To find out

potential economic area of coastal zone for aquaculture (both land and mud-flat). To determine problems and constraints to coastal aquaculture development and to prepare a guideline for its development.

Result of the Study

1. Reports

- 1.1 The report on Present status of aquaculture practices and potential areas
- 1.2 Economics of aquaculture production

2. Findings

1. Summary of the Study :

Although the development of coastal aquaculture plays an important role in rural economic development in the Upper South of Thailand, conflicts in coastal resource uses cannot be ignored. This paper summarizes concept and problems of aquaculture in Ban Don and Phangnga Bays. In these areas, there are both existing and potential sites for aquaculture as identified by water and soil qualities, and the abundance of plankton and benthos. Highways shown in a route map and aerial photographs can be used to be an area boundary for saltwater and freshwater environments

2. Problems

The main problems in this subsector can be divided into 3 categories as follows :

2.1 Problem from fishery activities.

This problem is due to the increasing use of aquatic resources without keen and careful management. The incorrect practice of fishery activities is a major cause of the problem. The fishery activities include :

- an over-exploitation of fisheries resources
- an increasing use of explosive and poison in fish-catching process

- an illicit fishing during breeding seasons
- uses of poison to exterminate predators in shrimp farmings
- aquaculture overfeed
- an expansion of saline water and soil to the nearby area due to aquacultural practices

2.2 Problem from conflict use of land between Mangrove forest and aquaculture.

The encroachment, for aquaculture activities, into mangrove forest areas, which are suitable to environmentally and ecologically conserve, is the main problem in this area. The conflict in land use between coastal aquaculture and other activities, such as transportation, agriculture, and human settlement, is not serious.

2.3 Problem from pollution.

Presently, domestic waste does not cause a serious problem on water quality. Water pollution is mostly due to low quality water released from a hydropower project during the early stage of the post-impoundment period.

3. The principle concepts for solving the aforementioned problem.

3.1 The concepts for solving problems generated from fisheries is to issue the efficient and effective regulations in controlling the fish-catching procedures, and to increase the fisherman awareness on conservation. However, the best solution for this problem is to convert the procedure of fisheries from fish-catching to culture fisheries.

3.2 The concepts for solving problems of pollution from aquacultural practices are as follows :

- Promote the awareness on using harmful toxic substances.
- Encourage the researcher to study the suitability of toxic substances for extermination of predators in shrimp farming.
- Construct the public canal for draining waste water
- Introduce recycling water system
- Promote lime application to increase pH of acid soil

3.3 The concept for solving problems from water pollution is zoning the areas. Shrimp farming areas should be located far away from industrial areas.

4. Recommendations

To fulfill the objectives of this project, following measures should be conducted :

4.1 Transplantation of suitable varieties of shellfish in Ban Don Bay area in order to produce seed bed. Shellfishes produced from this measure will compensate the amount of natural shellfishes which is decreasing.

4.2 Increase the number of government officers to control the violation from illegitimate fisheries

4.3 Acknowledge the importance of conservation of marine fishery resources

4.4 Conduct the coastal resource planning project to define a suitable management plan for coastal aquaculture

4.5 Reforestation of mangrove in the degraded protected area. For Ban Don Bay area, which has a conflict on land use between Royal Forestry Department and local fishermen, reforestation must be done in newly-built mudflat.

4.6 Determine specific zones for coastal industries.

Task Code 230-T Evaluation of Fisheries Development Potentials

Objective :

To evaluate the status of all the important inshore fisheries and to formulate a sustainable use management scheme with sufficient detail for practical implementation

Result of the Study

1. Report : Evaluation of fisheries development potentials.
2. Findings
 - 1) Conclusion

This report is the result of the primary survey in Ban Don Bay during two monsoons of the year 1987 - 1988. The data were obtained by random samplings from the artisanal gears at the important landing places and by the four cruises at 13 stations on vessel were made in Ban Don Bay. A total of 2,689 fish larvae at 13 stations was collected. Seventeen families of the larval fish were identified. Fish larvae in the family Gobiidae were the most of numerous larvae in collections, accounting for 61.31% of all total catch. Penaeid shrimp larvae catches were dominated by protozoa, Mysis and Postlarva stage, represented 24.31%, 74.71% and 0.8% of all total larvae respectively. The average catch of resources caught by each push nets were 233.04, 241.91 and 376 kg./boat for small, medium and large size respectively. In the case of baby trawl nets, the catch rate ranged from 13.28 kg./hour to 17.55 kg./hour and the catch between economic fish and trash fish during the two monsoons were similar. The first biomass maximum

in baby trawl nets catches occurred in early South-West monsoon. A total of 36 types of fishing gear was found, baby trawl nets, push nets, brine shrimp scoop nets, crab drift nets, trammel nets were widely employed, and was the most favourite gears, early South-West monsoon and 514.48 tons in early North-East monsoon. However, it was found that each group of resources had different amount of biomass at different times of the year. Since, we could not have sufficient data and informations in hand, therefore, we could not answered clearly why and how this phenomenon occurred. However, the other data and informations, especially biological aspects of the species should be gather for the proper biomass estimate to be made.

It is apparent that, the seasonal variation are effective as resulted in the fluctuation in the stock density of some economic resource, for instances *P. merguensis*, *L. duvaucelli*, indicating that these species use the study area as nursery ground at different species at different time of the year. However, the predation is one of the factor seem to have influenced to the stock density of resource. Detail study to this matter is still need.

Based on the data were obtained in present study, there are six types of fishing gears were widely employed around the Ban Don Bay, namely baby trawl, push nets, trammel nets, crab bottom gill nets, brine shrimp scoop nets and mullet gill nets. Among these, the push nets seem to be play a very important role in the term of values of the total marine production in this area.

2) Recommendation

1. Cod-end mesh size should be increased and also not allowed to be operated some particular area for all year round.
2. To reduce the number of fishing gears by introducing other occupations so that the people will gain compensation income.

3. To develop new sources of fish, through creating new fishing area.

4. To arrange for the establishment of a fund for the fishermen. With this fund they can borrow money to make or repair their fishing equipment. This fund will provide a solution for their financial problem.

5. To provide the fishermen knowledge in the correct use of fishing implements and equipment.

6. To train the youth in each village, so they can understand the advantages of conserving natural resources.

7. To provide increased knowledge of fish processing.

Task Code 240-T Assessment of coastal environment at Ban Don Bay

Management Objective of the Project 240T :

To protect the existing marine resources as well as to enhance the productivity of Ban Don Bay

Immediate Objectives of the Project.

1. to assess the marine environmental condition of Ban Don Bay in biological, physical, chemical and geological aspects.

2. to understand the problems facing the Bay or expected to arise from the industrial development of the Upper South Region.

3. to define the problems, if any.

4. to find out the means to correct the problems and to protect the marine environment.

5. to suggest a monitoring plan of Ban Don Bay

Result of the Study

1. Report : Assessment of coastal environment of Ban Don Bay.

2. Findings

Notable findings :

1. Water Quality

The major problems of the Tapi River and near coast sea water were :

- deoxygenated water released from Ratchaprapa Dam Reservoir caused the lowering of the dissolved oxygen content of the lower reaches of the Tapi River. And on two occasions in early 1988, the downstream water became smelly and dead fish floated in the river. Follow-up studies by several agencies indicated that this low oxygen water was the main cause for the catastrophe.

- untreated household wastewater from the coastal communities increased the nutrient elements of the water in the aquacultural farms nearby and supporting the high coliform content in the water and bivalve products during the low flow dry season.

2. Phytoplankton and Zooplankton

Three plankton samplings were made in 1987 in March, August and November. The peak of phytoplankton density at about 8 times the amount in August was found in November, coinciding with the peak fresh water runoff into the Bay.

Zooplankton, being the secondary producer, takes some time to respond to the phytoplankton increase, thus the maximum zooplankton was detected in March. This increase might have occurred in earlier month but since we only made 3 samplings, the finer detail might have been overlooked in - between.

The result of these studies showed that Ban Don Bay is a very productive area all the year round and has a high potential for coastal aquaculture. Copepods, the most important niche in the food chain, were abundant in sea water in Ban Don Bay.

The maximum phytoplankton density occurred in the flood season, and as the rainy season in the South lasts 6 months, it is long enough to provide plentiful phytoplankton for bivalve culture, without any need for supplementary food.

3. Benthos

From this work, it became clear that the benthic productivity of Ban Don Bay was higher than any other part of the Gulf of Thailand where the average of the Upper Gulf was 47.7 g/m^3 while those of Ban Don Bay was 79.4 g/m^3 in August and 460.3 g/m^3 in March. Small benthic organisms are food for benthic living crustaceans like shrimps and crabs.

4. Bacteria

From the two surveys in March and August, it was found that the cockle and oyster qualities during March were up to the U.S. Standard (there is at the present no microbiological standards for Thailand). However, in August, 40% of the oyster samples collected did not pass the accepted standards with respect to total coliforms. This was due to the high total coliforms in the water contaminated by household wastes. However, most recently, the oyster farmers clean up their products before marketing them so there should be no more problem to the consumers if the practice is made compulsory for all farmers.

5. Tidal Current Computation Using Mathematical Model

Estimation of current patterns in the Gulf of Thailand and in Ban Don Bay at the given time periods has been made. The hydrodynamic model developed can be used as a total to estimate roughly the current patterns, provided that tidal level fluctuations at the Gulf/Bay boundaries are known. No seasonal difference in the current pattern of Ban Don Bay was observed.

6. Heavy Metals and Pesticide Residues in Seafood

Cockles and oysters from the farming areas of Ban Don Bay were intensively studied for their contents of potentially toxic heavy metals (mercury, cadmium, chromium, copper, lead and zinc), and pesticide residues (organochlorine and organophosphate compounds). Selected fish, cuttle fish, squids, and short-necked clams were also studied. Only DDT and dieldrin were detected in trace concentrations in both the March and August samples. Heavy metal concentrations in all samples were within the normal safe range of marine food standards. These results indicate that Ban Don Bay is a suitable place for aquacultural product promotion.

RECOMMENDATION FOR FURTHER STUDIES

1. Regular monitoring of the marine environment of Ban Don Bay once a year, to observe any significant change that may occur as a result of the coastal zone development. The number of monitoring stations further away from the coast can be reduced, but the number of near coast stations should be increased, especially in the aquacultural areas.

2. Zooplankton study should be continued for another year, at the frequency of once every 2 months. This is to make sure that we do not miss any developmental larval stages of the important species, as well as to know their seasonal distribution.

3. Baseline levels of various trace metals in bivalves in the peak flood season should be found, since in the 1987 surveys, only dry season and the beginning of the wet season samplings were made. The trace metal baseline for flood season could be as much as 4 or 5 times the dry season baseline (Hungspreugs and Yuangthong, 1983).

4. Flux of nutrients from sediment in Ban Don Bay should be studied to see whether sediment is an important source of nutrients in the bay or not.

5. From the results of the modelling study, the following recommendations are provided :

5.1 The hydrodynamic model developed in this study can be used as a tool to estimate roughly the current patterns in the Gulf of Thailand and in Ban Don Bay, provided that tidal level fluctuations at the ocean boundary are known.

5.2 More accurate results can be obtained if sizes of elements are reduced. This, however, requires more computer storage and computation time.

5.3 To evaluate variations in current patterns in the Gulf of Thailand and in Ban Don Bay, the model must be run for longer time period, e.g. one month in each monsoon season.

5.4 More detailed analysis should be undertaken, such as sensitivity analysis on the effects of wind speed and direction, bottom roughness coefficients, model stability as time increment is changed, etc.

Task Code 250-T Assessment of coastal environment at Phangnga Bay

Objective :

To characterize the nearshore and marine environment of Phangnga Bay with emphasis on existing and/or potential relevance to coastal resources and development of an ecological considerate management scheme for the bay

Result of the Study

1. Report : Assessment of coastal environment of Phangnga Bay

2. Findings :

ENVIRONMENTAL CHARACTERISTICS

The Counter clockwise residual circulation during northeast monsoon was calculated to drift a part of economically important

mollusc larvae (bivalve, etc) out of the bay within 7 days before metamorphosis. In combination with the relatively dry period in the monsoon, the well mixed water was experienced leading to small variation in water characteristics. Contrastly, high level in sulfide was observed in the sediment layers resulting a toxic substrate for the bivalve to grow.

Under the southwest monsoonal influence which brings about heavy rainfall and strong wind blowing over the bay. A two layer water flow was recorded, the wind driven clockwise residual circulation prevailed in the surface layer while a counter clockwise residual flow prevailed in the subsurface layer (5 m). The magnitude of the residual flow was relatively as strong as 0.072 m/s. Consequently, a faster drifting period of those planktonic larvae was calculated. Heavy runoff coupling with circulation resulted a great variation in water characteristics which dominated the coastal areas.

The potential variation of 12 ppt was ever recorded to access the coastal areas effecting 5 km offshore under prolonged heavy rainfall which was very common in the area during southwest monsoon. Less salinity stress was observed during northeast monsoon effecting 2 km offshore.

Most of the total suspended solids (TSS) were derived from the resuspension process taking place at the coastline with an extreme value of 615.0 ppm. diurnal variations in the inner bay waters leading to low water transparency. It was also found that the TSS contained relatively low organic fraction indicating they may derive from the unconsolidated silt clay of alluvial deposits origin (Garson, et al., 1975) and were turned over through dredging operations.

The low Do (< 3 ppm) and total alkalinity (< 60 ppm CaCO_3) were observed in the intensive mariculture site leading to high coliform bacteria (1700 MPN/100 ml).

Monsoonal influences altered the depth of top sediments from around 8 cm in northeast monsoon to 4 cm in southwest monsoon with some diurnal variations.

Anaerobic condition occurred leading to high H₂S content. The H₂S content was recorded as high as 306.6 mg/kg wet wt. in the northeast monsoon comparing to 223.9 mg/kg wet wt. in the southwest monsoon.

BIOLOGICAL RESPONSES

The assessment is to highlight the bio-environmental stress-responses in the coastal areas during northeast and southwest monsoons.

Penaeid (shrimp) response

In the early morning, 4 hours gill net operation yielded 2-6 kg. mainly penaeid and metapenaeid with a minority of other organisms. The average yield of 4.0 + 1.2 kg/day was recorded with various sizes ranging 6 - 15 cm. in length. Comparison to the catch in the same way during southwest monsoon yielded 1 - 5 kg/day with an average of only 2.5 + 1.1 kg/day.

Bivalve response

It was evident that those Paphia sp. 4 cm in length scarcely collected in January, 1987 was heavily affected by high H₂S content. Some dead juvenile cockles (Anadara spp) were also recorded in depth of top sediment as well as juveniles of Paphia sp. and oyster.

The highest H₂S, was recorded in April which may result the lowest catch yield of Paphia sp. in the region.

CONCLUSION RECOMMENDATIONS

One of the major difficulties on legislative enforcements is due to the lack of measures for water quality standard. Thus, it is in need to put frontal priority to the legislation of a water quality standard for the bay as detailed in "Guidelines for the environmental management of Phangnga Bay."

The jeopardizing exploitation of resources including fishery resources were experienced in the regions. Thus on interpretation of the present findings, a zoning management plan is recommended and is likely to approach the difficulties.

A Sensitive Zone where is a 5 km stripe along the inner bay and has been being degraded by anthropogenic activities.

A Partically Protected Zone where can be easily affected by the sensitive zone and some certain approved exploitations are allowed with nondestructive National Park and Fishery Conservation Area.

A Buffer Zone is also proposed to regulated all explotatione under nondestructive operations. This zone is partly influenced by the coastal sea and bay waters.

It can be concluded that the enforcement operations is relatively lack of manpower and facilities which are common obstacles in most countries. The national government should recognize the problems and frontal priority is required. Further more the current degree of penalty concerns is relatively weak and thus legislative penalization needs to be reviewed and augmented. The purpose of the action is to counteract those traditionally destructive operations but support those nondestructive operations. The ultimate goal is to maintain good environmental qualities from which the local livelihood can be increased through increasing fishery productions, recreations, tourism, etc.

Task Code 260-T Land based pollution study

Objective :

To determine the extent, location and severity of land based pollution so that water quality management can be formulated.

Result of the Study

1. Report : Land based pollution study

2. Findings :

RECOMMENDATION AND MITIGATION MEASURES

Due to the existing problem of direct discharge of wastewater from various land-based sources into natural receiving waters and the deterioration of natural receiving water quality in addition to an increase in quantity of wasteload due to developmental projects and an increase in population number in the future, the water quality management plan must be developed. The management plan must be developed on the basis that the facts and findings found in this study are considered.

The goal of the water quality management plan for Ban Don and Phangnga Bays proposed is to improve/maintain the water quality of natural receiving water so that minimum impact on coastal resources is achieved. To attain the management goal, the control strategies are to minimize the wasteload at the source and to prevent the direct discharge of wasteload into natural receiving waters. The preliminary recommendations and investigation measures to be considered during the development of the management plan are presented. The recommendation and mitigation measures proposed are divided into the immediate and long-term plans with justification, brief description, major environmental effect and responsible agencies of each management schemes.

Task Code 270-T Evaluation of mangrove development potential

Objective :

Development of a management plan with a zonation scheme to ensure sustainable use and management of mangrove resources in Ban Don and Phangnga Bays.

Result of the Study

1. Report : Evaluation of mangrove development potential

2. Findings

Recommendations

Data from research studies on land use types, mangrove community structure and mangrove soils reveal that there are several problems to be solved for the future utilization and management of mangrove resources on the basis of sustainable use in these two study areas. The recommendations are as follows :

1. Mangrove land use zones.

Mangrove forests at Phangnga and Ban Don Bays are facing increased a conflicts from other forms of land use mainly from shrimp farming and agriculture. Ban Don Bay seems to be more serious problem. Therefore, the most effective task towards resolving the conflicts of mangrove land use is the classification of mangrove land use zones.

With the compatibility of the National Forest Policy, the management mangrove land use can be divided into three zone.

Conservation zone : This zone mainly covers areas of undisturbed mangrove forest, especially along the banks of rivers, estuaries, coastlines and around islands. Conservation zone is important in terms of ecology, supporting and maintaining the life of both plants and

marine animals. The area can be use as green belt to protect shorelines as well as prevent soil erosion. This zone also includes an area which can be used for wildlife, national parks, research and eduction.

Economic zone A : This zone covers an area of managed mangrove forests and plantations. The area will be utilized for sustained yields by means of the careful management of forest production.

Economic zone B : This zone mainly covers denuded and unproductive area. Most of the area provides for the development of other uses, such as aquaculture, agriculture, industrial site, etc.

Classification of mangrove land use in Phangnga and Ban Don Bay should be based on the present environmental and socio-economic studies.

2. Mangrove forest management development

In most mangrove forests in Phangnga and Ban Don Bays Rhizophora is the main commercial species especially in Phangnga area because the main product is charcoal. Rhizophora species can produce the best qualily of charcoal while the other species can be only used for firewood and poles. From this study, data indicates that most of Rhizophora having diameter greater than 10 cm, have been already cut so the existing forests are mainly composed of small-sized trees (1 - 10 cm in diameter). A large mangrove tree species with diameter exceeding ,20 cm is mainly belonging to the species of Avicennia, Sonneratia and Xylocarpus. Illegal cutting in different levels of intensities can be observed throuthout the mangrove forests. Fortunately, the natural regeneration in most area is quite good. Therefore, to develop the management of mangrove forests in Phangnga and Ban Don Bay, the recommendations are as follows :

2.1 Harvesting system "Clear felling in alternate strip" used in mangrove forests should be very strictly controlled as followed by the Royal Forest Department's regulations.

2.2 The protection of illegal cutting has to be continuously operated. For the effective operation of protection of mangrove forests, laws and regulations should be backed with an enforcement mechanisms, with sufficient officers trained for enforcement together with the necessary support, equipments including vehicles and boats, to enable these mangrove officers to carry out their responsibilities.

2.3 Replantation needs to be established only on the mudflats along the coast of Ban Don Bays especially in Don Sak, Kanjanadit, Muang and Phumphin where the existing mangrove forest occupy a narrow strip or less than approximately 75 m in length from the estuarine's bank to inland site according to Cabinet Decision on December 15, 1987 for coastal protection.

2.4 If it is possible, mangroves at Phangnga and Ban Don Bays the timber exploitation have to be ceased for at least two-three years in order to increase more productivities of small-sized trees. Timber harvesting, if needed, should be made only trees having diameter greater than 20 cm in order to increase more space for natural regeneration especially Rhizophora species. Cutting and hauling of wood should cause minimum danger to the sites.

2.5 All tree species of mangroves, not only Rhizophora, should be harvested. It is evident that the mangrove area where only Rhizophora has been cut will be replaced by other species and finally, Rhizophora, the commercial species will disappear due to inadequate natural regeneration.

2.6 Clearing of forest vegetation may enhance the chemical process and the direct sunlight eventually dry up the surface soil,

therefore the soils become hard and strong acid which is difficult to improve by reforestation.

2.7 Conversion of mangrove soil area into shrimp pond may obstruct the tide flooding, acid sulfate soils developed, which are quite common, the water in the soils may become very strong acid the marine animals cannot survive. However, if used for shrimp ponds, chances of success are poor. This situation has been shown in the case of shrimp farming in mangroves at Ko Lao, Ranong Province. If it is at all possible, shrimp pond development should be made first in degraded or severely damaged mangroves or in areas behind mangroves. Shrimp pond development should not be allowed in undisturbed mangrove forests both in Phangnga and Ban Don Bays. Floating cage culture should be promoted in these regions and this culture has been proven a viable method.

3. Realizing that the participation of public at all levels is very important for the management and conservation of mangrove resources. As the inhabitants are the actual owners of natural mangrove forests and they are the real users of the resources, their good understanding of mangroves is very important. Therefore, widespread education to these people is necessary to insure public support. This activity can be made by a short seminar, or through various extension mass medias. At least, these people should know the situation of present mangrove resources and how they can work together to solve both immediate and long-term problems.

4. Promotion of good cooperation among the institution concerned the mangrove resources users especially at local level. The Provincial Mangrove Resource Committee (PMRC) may be established in encouraging this activity. The committee may be composed of the representatives from Royal Forest Department, Department of Fisheries, Department of Mineral Resources and other necessary institutes concerned. The Governor or Deputy-Governor of the province will serve as the Chairman

of this committee and the Chief of Provincial Forester will serve as secretariate to the committee.

5. To achieve the recommendation, it is strongly recommended that the "Pilot Area" should be selected for implementation. Ban Don Bay especially at Amphoe Chiya may be a good example for this experiment. The purpose of this is to find out very detailed basic information on socio-economic, attitudes of local people and other information related to mangrove land-use zones. It is believed that this information can be used by managers to draw up a model for management of mangrove land use zones which is already classified to be possible not only at Ban Don Bay but also in other parts of the country where mangrove Land-use zones are a key issue.

Task Code 280-T Evaluation of land wildlife resources

Objective :

To formulate a management plan to ensure conservation of endangered/rare land and marine wildlife and critical habitats to allow sustained use of the wildlife and habitat resources which is still plentiful and economically useful.

Result of the Study

1. Report : Evaluation of land wildlife resources

2. Findings :

Summary of the Study for Ban Don Bay

1. Conclusion

The present study on the existing conditions of forest and wildlife in Bandon Bay area was conducted as a part of coastal resources in the Upper South, with the prime purpose of rational utilization of the available resources for national development with minimal impact to the environment. The adapted methodology are the indoor literature review on the subject and the outdoor field activities of the habitat inventory, the wildlife census methods

consisting direct count, indirect count and habitat evaluation, for obtaining through information on forest and wildlife.

Based on the landuse types, 4 wildlife habitat types of the total area of 8,045.10 km² are categorized, i.e. Mangrove type, Melaleuca type, Evergreen type and Agriculture type. The largest is the Agricultural one of 5,694.10 km², followed successively by the evergreen of 2,089.25 km², the Melaleuca of 215.75 km², and the Mangrove type of 46 km².

In terms of wildlife, Bandon Bay harboured total of 81 families in 242 species of wildlife, consisting of 159 birds, 35 mammals, 18 amphibians and 30 reptiles, which were either directly observed or evidences found. Birds form the majority of 65.7% and dominated by insectivores and piscivores; whereas the frugivorous bats dominated the mammalian, the ranid frogs the amphibian, and the colubrid snakes the reptilian faunas. Concerning the avifauna, 76.7% occurred as residents, 15.7% as migrants and the rest of 7.6% with both the migratory and resident individuals in the area. In diversity, the highest is found in the Evergreen type and lowest in the Melaleuca type; while in animal abundance the high number of common species (11.0%) is found in the Mangrove type and high number of rare species (67.9%) in the Evergreen type.

The Mangrove type was occupied by 84 wildlife species of which birds were the dominant fauna of 89.3% followed by 6% of mammals, 3.6% reptiles and 1.1% amphibians. Birds were categorized into the water birds, land birds and aerial-feeding birds with the occurrences of 74.2% residents and 14.5% migrants. Dealing the abundance, this type has high number of common species which are mostly the migratory waders or other water birds.

Melaleuca type has a lowest diversity of wildlife, because of its recent origin by human disturbance of the original forests and 22 wildlife inhabiting are common and widespread which can utilize

this almost pure stand habitat. the dominant Melaleuca provides nectar and shelters to wildlife and acting as hosts for innumerable insects devoured by birds.

The most important habitat type for wildlife is the Evergreen type which many rare and endangered species are still existing. Here the vegetation are in good condition, especially on the slopes; they are stratified into 3 distinct layers of trees in various heights. The species diversity is highest comprising 143 species of which 53.8% are birds, 18% reptiles and 10.2% amphibians. Among birds, the insectivorous and mixed-dietary birds predominating both in the river-frequenting group and slope-inhabiting group; while bats and rodents predominating among the mammals. Amphibians found are those stream species and successional species; dominated by 57.1% ranid frogs. High- adaptable species are found in reptiles which apart from the forest, they are also know to live in agricultural areas too.

The last habitat type, Agricultural type, contained 77 wildlife species, of which comprising 71.4% birds, 14.3% reptiles, 7.8% mammals and 6.5% amphibians. All wildlife are those well-adapted species capable to thrive in and around human habitation, including a small number of migratory waders.

During the present survey, 3 rare and endangered wild animals wre found, i.e. the Masked Finfoot and Saltwater Crocodile in the mangrove type and the White-handed Gibbon in the Evergreen type. They are remnants of once-widspread species that still able to live side by side with human. The former two were discovered in Khanom District, Nakhon Si Thammarat Province and the last in two localities in The Chang District and Ban Na Sarn District in Surat Thani Province.

Concerning the forage species of plants that providing food for wildlife in all 4 habitat types, 52 species were found with high 65.4% in both the Evergreen and Agricultural types. The majority provide edible fruits comprising 51.9% of the total species. The

Mangrove type and Melalcauca type have a few forage species, the first with 7.7% and the second 1.9% of total observed species.

As high as 6,677.5 km² of protected areas are distributed throughout the Upper South area in 7 Southern Provinces, including 16 National Parks. 4 Wildlife Sanctuaries and 6 Non-hunting Areas.

2. Recommendations

Several problems dealing with the forests and wildlife were encountered in the present study in Ban Don Bay; which including the heavy destruction of habitats, the conflictions between officials in different departments with difference approaches to deal with the local inhabitants and between the officials themselves with the inhabitants which occasionally invade into the protected areas for establishing the settlements and hunting for wildlife. These problems will be discussed in details, together with the recommendations pertaining each problem as follow :

2.1 Mangrove habitat destruction

Existing condition ; The widespread popularity of shrimp cultures in recent times have led to the wholesale destruction of mangrove habitats all over the area. At present, 52.50 km² in the area are shrimp farms. The extensive cutting down of mangroves occurred in Don Sak and Kanchanadit Districts, where narrow fringes of mangroves can be seen along the shores and along the canals. In some cases of unsuccessful attempts the destroyed mangrove areas were abandoned and eventually covered by high successional plants.

Recommendations :

1. Setting up the concrete plans for expanding shrimp farming that correspons closely with the conservaticon plan of the mangrove forest in each particular region. They should be limited in percentages of the total mangrove areas.

2. Sufficient patches of mangroves should be left along the coastline to protect the shores from wave acting during the monsoon months, and, in suitable areas for acting as nurseries for young fish and other animals.

3. The size of shrimp farms should not over 30 rai for gaining maximum yields.

4. Encouraging the culture of shrimps in netted pens situating along the coasts or along the rivers to reduce the pressure of cutting down the mangroves.

5. Closed cooperation should be made between the Royal forest Department and Fisheries Department on the establishment of shrimp farms in the mangrove areas.

6. Certain areas of fair natural conditions should be fully protected. From the survey, two mangrove types which fall in this requirement are one at the estuary of Tapi River and a reserved mangrove forest at Khanom District. They should be declared as non-hunting areas, and the status of rare and endangered animals living in those areas should be urgently surveyed.

2.2 Melaleuca habitat destruction

Existing condition : Many patches of Melaleuca forest have been cut down indiscriminately for great consumptions of firewood and charcoal, and for establishing ricefields. This forest type, though secondary in plant community, is of an immense industrial potential as the source of pulp for paper factories and also of beneficial benefits to wildlife as sources of food and shelter.

Recommendations :

1. A good patches of Melaleuca forest of 2,500 rai in area at Ban Bang Man, Lang Suan District, Chumphon Province with good stands of 10-15 m height of trees, should be protected for both

wildlife and local inhabitants, Management plans for utilization should be prepared to use it in sustainable yield basis.

2. Survey to determine the exact areas of good stands of Melaleuca forest to preserve as subsistant forests supplying firewood for the nearby rural communities.

2.3 Evergreen habitat destruction

Existing condition : Rapid conversion of forest lands into plantation were obviously observed in Ban Don area in many sites. Great demand of raw materials for exporting has accerelated the expansion of rubber, coffee and oil palm plantations into the natural forested lands. Around the prectected areas patchos after patches of forests have been cut down and burnt for growing field crops for local subsistance. In addiiton, regular controls by responsible officlals can not be practised in many terrorized areas or areas occupied by influential persons.

Recommendations :

1. The extent and activity dealing with the logging concession should be thouroughtly reviewed and those endangering the existance of important wildlife be cancelled.

2. All enterprises within the protected area boundaries should be carefully asessed by teams of specialists which should be comprised of forestors, environmental scientists, wildlife biologists, etc.

3. Controlling the cultivation of ceconomic crops which show hugh tendency to spread further into the protected areas, for example rubber, oil palm and coffee, by cooperating with the provincial agricultural efficials and improving the cultivating policy.

4. The control efficiency of the officials in each protected area is comparatively low, because of insufficient budget,

manpower and protecting stations. Furthermore, the precise boundary of the protected area has not yet been fixed in the field, so only defined in the declaration of the area.

5. Urgent need for comprehensive management plan for each protected area should be fulfilled in order to know how to precisely the existences of rare and endangered, problems and the possible ways to remedy them.

2.4 Confliction in utilization of protected areas

Existing condition : Different approaches to use the lands for human benefit between the regional forests and the administrators and the foresters and the inhabitants have created many serious confliction in various areas, exemplified by one at the proposed Sadet Nai Kromaluang Chumphon, Chumphon Province which resulted in a big quarrel between the foresters and the inhabitants; and intimately between the foresters and administrative officials. The effective control method for the area was virtually impossible to practise.

Recommendations :

1. Educating the local people that live along the peripheries of the protected area to become aware of its importance to human and his livings in a long run.
2. The management plan prepared for such protected area should emphasise on the participation of local people in the area for their own benefit on tourist guides or selling souvenirs or local products.
3. Cooperation should be made with the heads of the villages or other key persons to reduce the conflicting pressure and encourage the social adaption to the existence of protected area.

4. A natural conservation plan should be simplified and made known to all provincial official, both civil and military, in order to achieve the same approach in implementing the plan.

5. Nominating the local committee for compromising the confliction arising in each particular protected area which should be included both governmental and private agencies; with the purpose to adjust and settle confliction.

2.5 Illegal hunting of wildlife

Existing condition : Many wildlife species whose fleashes esteemed by local people as great delicacy were seen available for sell or on order in many restuarants in Bandon area. Such animals are Common Mouse Deer (Tragulus javanicus), Common Palm Civet (Paradoxerus hermaproditus), Common Porcupine (Hystrix brachyura) and Malayan Pangolin (Manis javanica). The invasion into the protected area for hunting those animals were frequently occurred to supply the demands of restuarants or to trap the living animals for pet trade. Such activities intensify the threats already encountered wild animals by losing the suitable habitat, to the point of total extirpation.

Recommendations :

1. Frequent partrols of the most vulnerable sports for illegal hunting and establishing the guard stations in some protected areas for efficient control.

2. Enforcing the existing Wildlife Law by inspecting the wild animal carcasses in shops and restuarants.

3. Educate the local people, according to Bhuddhist believe, to prevent killing of wild animals and keeping wild animals as pets. This campagne should initiate in the elementary level in local schools.

Summary of the Study for Phangnga Bay

1. CONCLUSTION

As a part of coastal resources development and management planning, this study on the existing conditions of forest and wildlife in Phangnga Bay was intensively done to serve the purpose of rational utilization of all available natural resources with the ultimate goal of maximal national development and the minimal environmental impact. Two main study methods of literature review and field activities are employed to find out information on forest and wildlife; the wildlife census methods used consisting of the direct count, indirect count by interviewing and habitat evaluation, which aimed to gather data representing all-year-round pictures of wild animals in Phangnga Bay.

Because of the close similarities between the landuse types, only 2 wildlife habitat types are recognized, i.e. the mangrove types of 246 km² and the lowland types of 3,605.75 km², the latter is heterogeneous consisting of true forested areas, plantations, mining sites and settlements.

The forests and the mangroves vary in tree species composition depending on the substrata, whether it is limestone, shale and quartzite, or sandstone. This edaphic factor governs the forest composition and density to a great extent that reliable forest types can be distinctly divided.

Regarding the wildlife in Phangnga Bay, totalling 55 families of 157 wildlife species are encountered; of which there are 120 birds, 7 mammals, 4 amphibians and 26 reptiles; all of them were directly, or some also indirectly, observed by the study team. Birds form the majority of 76.4% of all wildlife species, dominated by insect-eating birds and birds with mixed diet of fruits and insects; and the reptilian animals are dominated by the rear-foraged snakes and agamid lizards. The occurrence of 74.2% of residents, 19.2% of migrants and 6.6% of species with both the residents and migrants in the study area.

The existing condition of mangrove forests are relatively good with minor human disturbances. It is occupied by 86 bird species forming 85.1% of the total, 5% mammal, 3% amphibian and 7% reptile species.

Twenty-two waterbirds that feed on aquatic animals are comparatively less in number than 64 terrestrial birds of varied feeding habits. Among the water-frequenting birds, there are 9 migratory shorebirds which forage on mudflats sandy and rocky shores; plus another 23 migratory bird species of terrestrial habit. Those with both resident and migratory individuals are consisting of 7 species.

The birds of great interest in the mangrove type are the Caspian Tern, Grey-headed Woodpecker and Grey-breasted Prinia, which are hitherto unrecorded from the area. Though characterized by 78.2% of rare species, especially the herpetofauna which are all rare, the mangrove types also harbour a number of successful species appearing in great abundances; among them are 10 waders, a swallow, a minivet and a myna while the Crab-eating Macaque is the common mangrove mammal.

In the lowland type, birds also form the largest portion (74.8%) of the total wildlife while other groups are much less in diversities. The high diversity of bird species corresponds also to the high number of rare bird species, typical of the lowland forest. Only the Philippine Starling and Common Myna, both sturnids, are common in the lowlands. The occurrence of 85.7% of resident birds is another feature of the lowland forest, whereas merely 10.4% are seasonal migrants.

Around Phangnga Bay area, 3 endangered wildlife were observed, they are the White-handed Gibbon, Smooth-coated Otter and Serow. Those pockets of remnant populations are confined to the shrinking habitats well inside the protected areas, but the numbers

are too low for maintaining good natural populations and still suffering from human activities.

Three sites of the great concentrations of shorebirds were found in the present survey; i.e. a mudflat in Takua Thung District in Ao Phangnga National Park and other two sites, a muddy delta at Phangnga Bay and a mudflat at the mouth of Khlong Sai. Last two areas are outside the boundary of the National Park.

On the forage species of plants found in 2 habitat types, 54 species are recorded; of which the mangrove types possess only 4 species of nectar-bearing trees. In the lowland types, 87% provide edible fruits for wild animals; other either provide fruits and/or leaves and buds and nectar.

2. Recommendations

As evidenced from the present study, many problems on the wildlife and its habitats were detected in and around Phangnga Bay; i.e. the destruction of the mangroves by concession of selective cutting and tin mining; the clear-cutting of lowland forests to establish or expand the plantations of rubber and oil palm; the violation into the protected areas for poaching of food animals and extracting timber trees. All 3 major constraints will be discussed in details, together with the recommended measures as follows :

2.1 Mangrove habitat destruction

Existing condition : The situation of mangrove forests in Phangnga Bay is becoming more deteriorated by the cutting concessions permitted for private agencies to clear-cut in strips. The mangrove trees for making charcoal, notably Rhizophora and Xylocarpus but that operation should be compensated by intensive planting of seedlings which are found to be a bit effective in forest managing purpose. The quarry operation in the mangrove to extract tin areas has to destroy large tracts of forests and the mine-over areas are unsuitable for the wildlife to occupy for a long period of time.

Recommendations :

1. All permitted concessions of utilizing the mangrove forests for charcoal making and tin mining should be reconsidered and contracts reevaluated with the purpose to retard the activities or to void those improperly managed that endangering the survival of the natural forests.

2. In areas of good mangroves, even though under legal concessions, should be protected for scientific studies and wildlife inhabitations, and declared as strictly as protected areas.

3. Intensive campaigns should be encouraged to restore the "deserting" conditions of the clear-cut forest and the mind-over areas by mixed species planting.

4. The shrimp cultures at present, creeping into the area, should be effectively controlled and the closed cooperation between the Royal Forest Department and Fisheries Department in the utilization of the mangroves should be implemented.

5. The faunal surveys emphasised on the rare and endangered animals should be done to vocal their status, population and habitat requirements, especially in a few remnants of healthy mangroves.

2.2 Lowland forest destruction

Existing condition : With rapid and uncontrolled expansions of the rubber and oil palm plantations, the lowland forest is now wildly scattered in tiny patches of a few square kilometers throughout the area. The increasing market price of rubber products have resulted in greater demands of cultivated lands. Now only those forest within the protected areas are still in good condition but the tendencies of human invasion into such areas are evident in many sites, though at a slower rate. These lowland forests are ideal and sole habitats for a number of lowland specialists among the wild animals that unable to survive even on the low slopes. They are

mostly the Malaysian elements that penetrating northward into Peninsular Thailand.

Recommendations :

1. Stringent controls along the peripheries of the protected areas should be practised in order to stop further invasion, with the cooperation of the local administrative officials.

2. Controlling the cultivation of economic crops by limiting the areas but encouraging higher yields. Modern agricultural practices can effectively do this by using new varieties, applying chemical stimulants and fertilized, and controlling watering.

3. Education campaigns should be encouraged to promote public awareness on the forest and wildlife conservation, and the beneficial roles that both resources play on our survival. Together with the provision of how the public can assist in nature protection.

4. The intensive survey of the remaining lowland forest and their inhabiting lowland specialist species should be urgently done in quick attempts to save these endangered habitats and management plans for each particular group prepared.

2.3 Illegal hunting

Existing condition : Wild animals are esteemed by local inhabitants as delicacy, and the poor hunters will never reluctant to hunt, though illegally, everywhere even within the protected area boundaries. Some carcasses have been sent to restuarants in towns where they will be freezed and available on orders. Live animals especially colourful birds are snared for pet trade; for one, unharmed bird that enters the trade, many will certainly die at the sites or on transit.

Recommendations :

1. Local dealers of wild animals should be strictly controlled and persuaded to stop purchasing rare and endangered species from trappers. Stronger punishment should be sentenced to those who violating the Wildlife Law.

2. Trappers or hunters who need to hunt for their subsistancies should be provided with new jobs or themselves trained to be game wardens.

3. Restuarants and shops that having in possessions carcasses of protected wild animals, their owners should be fined and restuarants temporary closed by Justice Orders.

4. People should be educated and aware that wild animals are superbly impressive alive in the nature not in cages or on dishes.

5. Every national park and wildlife sanctuary should be evaluated for its patrolling efficiency against poaching and all necessities urgently provided by responsible agencies.

Task Code 290-T Evaluation of land capability use and development potentials

Objective :

To formulate a land-use management scheme to promote sustainable use of land resources for the general Upper South area with a specific focus on coastal land.

Result of the Study

1. Report : Evaluation of land capability use and development potentials

2. Findings :

Recommendation and Strategies

Although land is just one of the natural resources of the Upper South, it has helped development as well as standard of livings of the people in the region for a long time. Unfortunately, from the study both in Phangnga and Ban Don Project area, it has shown that malpractises are certainly prevalent to damage over land resources to some extent, not only in term of inappropriate land uses but also ineffective land utilization. To secure best uses of our land resources, it is imperative that a set of integrated master plan for all natural resources should be established, covering all critical issues and constraints in the field of land use, agricultural development, fisheries management, forest mangement, water resource management, mineral resource development and wild life conservation. Furthermore, the socio-economic factors should also be integrated in order to fulfill need of people on the basis of sustainable development.

Recommedation and strategies given here aim to formulate a land-use management scheme with a specific focus on Phangnga Bay and Ban Don Bay. It is hope that these recommendation can provides one of the proper frame work which can be used in establishing a master plan for our coastal resource management.

1. Land Use Management Scheme for Phangnga Bay Project Area.

1.1 Forest Protection and rehabilitation on steep lands.

According to the land capability classification, areas where slopes exceeding 35% should restrict their uses to forest or watershed protection. However, about 96 km² of these steep lands have been deforested as a result of forest clearance after logging operation and encroachment by squatters. Some deforested areas may be converted to secondary growth but most of them have been cultivated to para-rubber. Deforestation on these steeplands not only damages the wastershed but also can lead to severe soil arosion, landslides and

flood hazard during period of rainstorms which commonly occur in the region. Therefore, it is recommended that :

1) Deforestation on the steeplands including hills and mountains must be urgently stopped. The effective measurements by various means must be practised to serve the objective.

2) Reforestation program on steeplands with fast growing trees must be emphasized.

3) Although much of the national reserved forest on steepland had been encroached for cultivation of para-rubber, it is impractical to remain gazetted. Therefore, a special form of land ownership should be issued to notify "right to farm" on these forest area. In principle, the "right to farm" certificate is equivalent to the usufruct licence which is not permitted to sell the land. However, this certificate can be transferred from person to person by means of hierarchy within the same family.

4) There has already been serious damage from soil erosion including land slides on the steep lands where cultivated to young para-rubber. It appears that the soil conservation practise (terracing at 1 m width along the countour line for all slopes and soils) is inadeguate. Therefore, it certainly needs careful planning and implementing of a proper programme of soil conservation works. The basic consideration for soil conservation system should be made upon the following factors :-

- a) the soil conditions and slope characterization.
- b) the intended land use i.e. fruit trees or rubber.
- c) the local capacity to design, construct and maintain soil conservation works.

So far, the technical side of designing appropriate conservation works for rubber on steep land in Thailand is still unknown. However, it may be physically possible to modify the now-a-days method by means of strengthening specific research on soil conservation practises.

1.2 Intensify land use

Land use in the project area by average is traditionally extensive rather than intensive. It is likely that crop production, both perennial and annual crop is relatively low. If agricultural production is to be increased, improvements in land productivity by means of proper management are required. Therefore, this implies that the land must be used more intensively.

Although paddy rice is not the major crop in the project area, few small irrigation projects have been established in some areas. However, water supply is likely to be inadequate and the whole irrigation system should be improved. Since the region has ample supply of rainfall together with ideal watershed, water supply for paddy rice can be managed without any difficulties. Moreover, rice production as well as cropping intensity will increase.

1.3 Need for appropriate land use.

It has been found that a substantial amount of agricultural land in the project area has been misused. Apart from forest destruction and rubber cultivation on steep lands, the cultivation of paddy on unsuitable soils alone amounts to 18 km². Therefore, attention should be made to recommend the farmers to produce the crops suitable to soil condition. In this case, the farmers can make use of land intensively and crop yields can be increased with low input.

1.4 Rehabilitation of tin mine tailings.

Phangnga Province by far has been known as the major area for tin production, both inland and offshore. Gravel-pump mines

are commonly operated on the alluvial placers, where as dredges operating offshores. In the project area operating gravel-pump mines cover an area of about 5 km². However, some of these mines might stop operating due to world wide recession of tin demand. Included in the areas, there have been tin mine tailings which occupy an area of about 10 km² in total.

These areas have left abandoned and the soil conditions are so poor to support growth of the economic crops. Therefore, it is recommended that for the time-being, these tin mine tailings urgently need rehabilitation by developing fast growing trees and covering the ground surface with grasses and legumes. In addition, the slimes discharged from tin mining area to the natural water way and the sea must be effectively treated in order to protect the environments. Funding for all of this projected should be provided partly from the government and from special fees collected from the miners.

2. Land Use Management Scheme for Ban Don Bay Project Area.

2.1 Need for appropriate land use.

According to the study, there has been number of areas where the present land use are not correlated with the land capability or soil suitability. The major problem concerned is that about 144 km² of the project have been left abandoned or unused after clearance of the natural forest, thus converting to secondary growth. In fact, according the land use potentials, these areas can be utilized for production of various economic crop namely paddy rice, para-rubber, fruit trees and coconut. Therefore, the need for appropriate land use plays an important role for agricultural development in the project area. These involve effective agricultural extension, intensive land use as well as adequate supply of water resources.

2.2 Need for proper soil management.

In the project areas, there occur large areas of acid sulfate soils, saline soils, alkaline soils and sandy soils. These are problem soils that require special techniques for development.

For example, the acid sulfate soils require liming, adequate water supply and management for production of economic crops. Although liming can be practised by individual farmer, but without adequate water supply and control, effect of liming can last only a few years. Therefore, water supply is essential for improvement of acid sulfate soils as well as other soils like saline soils. Consequently, there is an increasing need for water resource development in the project area. These should be totally provided at a full scale (from water resource to farms) by the government. More also needs to be done to make uses of irrigation water effectively.

2.3 Intensify land use

Clearly, most land use in the project areas for crop production has been less intensive. This may be due to number of factors namely lack of irrigation facilities, suppression of crop yield, lack of monetary input as well as appropriate technologies to improve crop yield.

Based upon physical land condition, it can be concluded that improvement of land productivity in the project is positively feasible. Furthermore, range of crops to be grown is relatively large. For instance, on the low land areas paddy rice can be productive. If the water supply is adequate, together with proper management, these areas can be referred as the "rice bowl of the Upper South".

As the same token, number of tree crops like para-rubber, oil palm and fruit trees can be successfully grown on the upland area. However, the improvement or amendment of soil fertility seems to play an important role in increasing the productivity.

Areas in the Tapee deltaic plain where have already been cultivated to coconut on the raised bed can also be intercropped with cocoa. It has been confirmed that in Malaysia cocoa can be intercropped with coconut on the raised bed of similar soils.

Moreover, yield of both coconut and cocoa are satisfactory. Therefore, to get more income and to be independent from fluctuation of coconut price, cocoa seems to be very promising for the coconut farmers in the Tapee deltaic plain.

2.4 Need Effective Measurements towards Resolving the Conflicts of Land Uses.

1) Mangrove land use versus culture fisheries.

It has been recorded that at present about 56 km² of the mangrove areas in Ban Don Bay have cleared for shrimp culture. The conversion of mangroves for aqua-culture has been extensively practised since 1980 in the vicinity of Amphoe Chiya, Tha Chang, Kanchadit and Don Sak. It is believed that the rate of conversion of mangrove areas for shrimp culture will increase because of the substantial increase in the export value. Therefore, it results in conflicts between use of land for mangrove conservation and for aqua-culture.

To solve the problem, mangrove areas (both existing and destructing) must be divided into three zones, i.e. the conservation zone, the preservation zone and the development zone. The preservation zone covers areas of existing mangroves and an appropriate strip along estuaries and coastal lines. The areas are designated for the purpose of maintaining the natural ecological balance. The conservation zone covers an area under managed forest and plantation while the development zones can be utilized for other uses such as crop lands and aquaculture. However, there have been combination of limiting factors including unfavorable condition of soil, water and topographic within the mangrove areas. Therefore, the zone to be developed requires proper management to assure the land productivity.

Although the zonation approach seems to be preferable, it needs base-line data for basic consideration. For instance, data on soil, water, climate, natural vegetation as well as present land uses can be interpreted for best uses of the land to serve the purpose, while the socio-economic factor formulates the plan to serve the need of the people. Once the zonation is established, the most important step is to ensure that administrator and the local people or farmers become aware and appreciate the benefits and necessity of the zonation.

2) Agricultural land uses versus culture fisheries.

This refers to the paddy fields that have been converted to shrimp-culture after most of the mangrove areas have been utilized to the same use. Soils in these areas mainly consist of acid sulfate soils and non-saline alluvial soils. After ponding, water becomes acidified or has such a low salt content that can affect growth of shrimp. To improve production, high monetary input as well as appropriate technology are necessary. Nevertheless, benefit and cost ratio may be lower than what is expected.

Therefore, it is recommended to practise fresh water culture if it is difficult to convert the land for cultivation of paddy rice again. The common fish species may include snake head (ophicephalus spp), walking perch (Anabas testudineus), snakeskin gouramy (Trichogaster pectoralis), and pla slid (Notopterus notopterus). The standing crop and kind of fish however, depends on the nature of water, availability nutrient and management intensity.

Division 300 - Socioeconomics

Task Code 310-T Socio-economic survey of key development areas

Objectives :

To collect relevant socioeconomic data on coastal communities for integration into coastal resource planning process for Phangnga and Ban Don Bays and to conduct sector-specific socioeconomic assessments of particular issues to provide a basis for policy formulation and selection for issue oriented action plans.

Result of the Study

1. Report : A research study on administration and management of the Upper Southern region coastal resources associated with tourism : A case study of Surat Thani Province.

2. Findings :

1. Results

Considering the legal aspects, it was found that there are many versions of laws that deal with coastal resource management. However, many of these do not include long term development, and hence are in need of revision. In addition, there are some problems associated with a lack of understanding and realization of the benefits of resources on the part of some law enforcement officials. This leads to delays in the revision of laws and acts. Other issues include, for example, the fact that revisions and enactments of laws may collide with the interests of capitalists, causing strong objections and then a delay in revising such laws.

Results from this study indicated that if the community and its people are involved in administration, or increase their administrative roles and responsibilities, then local natural resource management will be more effective. If the community, having resided in the locality for generations, have a sense of ownership in any

development program, then program objectives are more easily attainable. More than half of the government or semi-government interviewees believe that Samui Island has the potential to be a district (tambon) municipality. In addition, the law that permits the local government to enact laws should be revised to be in accordance with the present socio-economic condition and it must take into consideration whether the present laws have appropriately indicated the roles and responsibilities of each unit or not.

On attitudes, it can be concluded that the sample group (individuals who work in the regional and local levels and have a direct responsibility on the management of resources along the coastal line of upper southern region) tend to have a negative attitude towards the management of resources on the southern region coast line, particularly in association with tourism promotion. They believe that there are many areas that need to be revised (i.e. coordination problems among and between implementing agencies, lack of manpower, equipment and supply, etc.).

On the subject of information obtained from the community and individuals who have tourist businesses the majority were satisfied with the present development scheme for Samui Island. However, private groups and people at large did not pay much attention to government activities on the island (e.g. development projects). This leads to problems of coordination with government bodies in development activities.

2. Recommendations

1. Consideration should be given to an appropriate form of local government for the situation and problems of Samui Island, which is already an international tourist attraction. This should include support on the potential and capability of local government administration to serve development policy.

2. There must be provision of support for the establishment of a law research project related to natural resource and environment management.
3. There should be an improvement in collaboration and coordination between implementing agencies, both vertically and horizontally.
4. There should be support to regional and local bodies in the joint development plan, from the very beginning, and encouragement for these sectors to initiate their own plans.
5. There should be a campaign to stimulate and encourage the local community and private sector to correctly utilize natural resources and the environment. In addition, the awareness of new development activities on Samui should be raised, so that these groups can better respond and collaborate with government policy.

Task Code 320-T

Anthropological evaluation of the social and economic situation of coastal resources use and management in Ban Don Bay and Phangnga Bay Thailand

Objectives :

To determine the local traditions and perceptions affecting coastal resources uses and management as well as their importance and actions need for future coastal resource management and planning.

Result of the Study

1. Report : Anthropological evaluation of the social and economic situation of coastal resources use and

management in Ban Don Bay and Phangnga Bay, Thailand.

2. Findings :

The summary results of the Study on a natural resources Utilization Plan for Phangnga Bay are as follow :

1) Socio-cultural structure

Both villages have similar physical characteristics, of being islands, and 90% of its people are Muslim and live in accordance with the Islamic religion in their daily life, including their various cultural ceremonies. In these villages there is a shortage of drinking and domestic water during the dry season.

2) Economic Structure

The main and original occupation is fishing. However there is a difference in the activities between the two villages. That is, in Klang Nam village tourism promotion has meant people engage in sex servicing and the tour business and yet they still have to depend on natural resources through fishing. There are no hired laborers to cut trees in the mangrove area. The main reason could be because this village is located in a national park. This occupation is found, however, in Kaw Tapoon village which is outside the national park. However, it cannot be clearly indicated that the deterioration of mangrove resources affecting aquatic life is caused by hired labourers who cut trees in the mangrove alone. The contributing factors for the high consumption are an inability to grow any replacement trees because of the lack of knowledge on the part of the planters can come from other occupation groups associated with the use of mangrove resources. These differences in economic activities has an impact on the economic status of the village people. Villagers in Kaw Tapoon who are tree cutting laborers earn an average annual income of 20,000 baht, while the Klang Nam villagers, who have occupations associated with tour activities have an average annual income of 30,000 baht.

Villagers with debts usually borrow money to start own business. For example, setting up restaurant and gift shop or fish cultivation in the floating basket. It can be primarily evaluated that the economic development might not be a good part for quality of life improvement of villagers as many of them lack money for capital investment. This could lead to other social problems which are important and found in the village i.e. drug addiction.

3) People who Benefit from Natural Resources

In the past, people who benefitted from natural resources were mostly villagers who were fisherman and labourers cutting the mangrove. Outsiders in the past who wanted to use wood from the mangrove forest for making charcoal were capitalists, who still conducting these activities. A third group were tour operators, who are the latest to come to the area.

4) Natural resource utilization plan of local residents

There is a similarity between the natural resource utilization plans of these two villages, particularly as they relate to the resource's usefulness as consumer goods. For example, wood for housing construction, bridges, furniture, fishing equipment, firewood, and, catching aquatic animals for food.

At present, the plan to utilize natural resources has changed and it must be reviewed with caution. The effect of economic development has been to increase the utilization of natural resource products through systematic commercial plans (e.g. higher prices for aquatic animals, highly efficient fishing equipment, and, as in the case of Klang Nam, which has beautiful scenery, this has been used for the tourism industry). Besides, the use of natural resources for commercial purpose requires large investments which, in turn, provide opportunities both outside and within villages for capitalists and investors.

However, the change in natural resource utilization plans has other contributing factors, including the increase of population which creates a trends in changing the life pattern of villagers.

Recommendations

This qualitative study shows that the problems related to natural resources are related to the socio-economic status of the area studied. The present economic system has created many more profit-making groups than in the past. This causes a change in the social structure. In summary, the problem of the deterioration of natural resources is directly effected by factors such as economic changes and social changes. Therefore, choices for the improvement of effective natural resources utilization should consider the following :

1. Mangrove forest resources

The present deterioration includes : fewer trees, an inability to have full grown trees in time for utilization, and an ineffective replanting program. Capitalist investors are both villagers and outsiders. Choices should take into consideration the following issues :

Policy level

1. There must be a law to lift a concession on foresting and determine the exact number of years that forests will be closed for natural restoration or for reforestation programs to be carried out by experts. (This is one of the reasons why reforestation has not been effective, as it is done by less knowledgeable persons.)
2. Ministerial level policy must specify that provinces situated along the coastal area with mangrove forests (Chumporn, Ranong, Pangnga, Krabi, Satun, Surat Thani, Nakornsrihammarat) develop their own plan and activities for their forests and conservation. This should be done by

the Ministries of Interior, Agriculture and Cooperatives and Education.

3. A working committee and sub-committee should be set up to develop the plan and determine the area for forest utilization. These committee members must comprise experts and concerned individuals from the ministry, province and district levels.
4. Occupation promotion policy must utilize the socio-environmental data of the province, district and tambon as a means to prevent any adverse social change in the target area and gaps between profiteers and intended beneficiaries from the program.

Implementation level

Provincial/district levels

1. The provincial and district development plan for coastal areas with mangrove forest zone should integrate conservation plans and activities in line with socio-economic development activities.
2. The province and district should emphasize the quality of the implementing activities more than the quantitative aspects. For example, quantity control on push net fishing, numbers of in-migration and their objectives, number of investors related to natural resource utilization in the province and district.
3. A system of monitoring and control should be set up and not be in conflict with routine activities and the visits made by upper level government officials. The control and monitoring responsibility should be clearly identified and conducted on a regular basis with a time frame suitable for the locality.

4. Tambon-level coordination should be carried out on a regular basis.

Tambon level

1. Emphasize community coordination to protect natural resources.
2. Develop groups and community organizations as a means to have more bargaining power in the protection of natural resources.
3. Encourage community leaders to give more importance to the protection of natural resources.
4. Pass on the idea and concept of natural resource protection to next generations.

Responsible persons

1. Government officials

The Ministry of Agriculture and Cooperatives and Ministry of Education must collaborate in the provision of knowledge and awareness creation.

The Forestry, Fisheries, and Community Development Departments should establish collaboration so as to institutionalize natural resources conservation at the local level.

Study the socio-environmental situation of the community from community people (i.e. community leaders or religious leaders) and use the data for occupational promotion planning.

2. People

Information dissemination through a variety of mass media is important and necessary for people who are increasingly oriented to the outside world.

2. Aquatic animal resources

There is a reduction in the quantity of aquatic animals and an increase in the number and efficiency of fishing equipment. The groups that make the most profit are commercialized fishermen and middlemen. Choices for natural resource utilization should be considered the following :

Policy level

1. Use social data to develop occupational development plans.
2. Set up laws and the authority for certain level of Fisheries Department staff to arrest individuals who commit unlawful acts.

Implementing level

1. Establish a local organization on occupational promotion (e.g. fish cultivation in floating basket cooperative). This should be on a continuous basis.
2. Provide training as appropriate and needed. This should be organized and rotated between villages and tambons.
3. Assist villagers on revolving funds. This is the area where villagers are most interested.

3. Natural resources for tourism

There has not been a problem cited in this area. Recommendations are a provision of support to cottage industry at the province, district and tambon levels that is close to the tourism promotion activity areas. For example, thatching nipa leaves for building accommodation for tourists and making souvenirs from local materials, etc.

There have been changes in natural resource utilization patterns both in the studied villages and outside. The external factors are most influential to the changes occurring, but also with internal drive. For example, economic status is the condition for change on the use of natural resources. This has both positive and negative impacts. The negative impact is cutting of trees in forest zones and supplying to firewood factories. The positive impact is the social changes, the buying of woods, aquatic animals and the minimum use of forest area, etc.

Hence, to improve natural resource for effective utilization consideration should be given to the type of resources, their relationship with the ecological system and the relationship with and among human beings. Resource utilization to reduce conflict must be carefully reviewed and use social science knowledge as a basis for this revision. This will reduce inefficiency at the implementing level. The expected output, the educational system and the coordination between policy making and implement system and the coordination between policy making and implementing units are important and closely linked with the conditions of these problem.

The summary results of the study on a natural utilization plan for Ban Don Bay are as follow :

1. Socio-cultural structure

It is found that all of the villages are situated in the Ban Don Bay area. Houses are either clustered or scattered. Those who have houses clustered together tend to live along the bay zone. The average number of people in each village is around 600 - 800 persons with approximately 140 households. There are two types of migration : temporary and permanent. The permanent in-out migration is a result of marriage while the temporary in-out migration is a result of occupation.

It was found that only villages 3 and 4 have schools located in the village area. Village number 3 has three level of school and village number 4 has one. Regarding public utilities, most of these villages have only the necessary public utilities.

There are three types of marriage patterns : (1) both male and female are from the same village ; (2) either partner is from another village and being married to a person of the studied village ; and (3) both husband and wife are from another village but migrate to live and work in the studied village. The usual age for marriage is between 17 and 30 years old.

2. Economic structure

The major village economic activity is fishing. Even-though there is a similarity in the main occupation, the details, equipment and type of fishing vary from village to village. In the past people have clung to fishing as a mean to catch aquatic animals for consumption around the mangrove forest or at the nearby seashore. Labor was from the household, while the equipment used was simple and made from locally available materials. At present, fishing remains the major occupation, but villagers now carry out both shallow water and deep sea fishing as a means to earn more household income. Places for fishing are in the shallow water area near the bay or along nearby islands or in the deep sea zone that is quite a distance out to sea. Labor is still from the household, but if it is insufficient, villagers will hire labor from outside. The big fishing boats for deep-sea fishing will normally use hired labor. Equipment used is developed form that used in the past, but now with the purpose of catching as many aquatic animals as possible. In addition, a new fisheries technology has been introduced and accepted by villagers. This is the fish nursery along the sea-shore which are, for example, for oyster raising, shrimp, fishing raising in cages, and black crab raising.

3. People who benefit from natural resources

Individuals who benefit from natural resources in the studied villages can be classified by their occupation as follows :

(1) Fisherman's group, (2) Merchants and people who process aquatic animals, (3) Oyster raising group, (4) Shrimp raising group, (5) fish raising in cages group and (6) Rice and coconut farmers group.

4. Natural resource utilization plan

Natural resource utilization plan classified by type of occupation (on a year round basis).

1) Fishing : Fishing on a year round basis depends on type of aquatic animals which are abundant during various months.

2) Oyster raising : In general, the duration of oyster raising from the beginning to production/selling period takes 2 - 2.5 years.

3) Shrimp raising : Duration for shrimp raising is short, requiring only about 3 - 4 months.

4) Fishing in cages : The duration for this is about 1 - 2 years. Fish can be raised in cages at any time but the best time should be when the canal is full of water. Fish should not be raised in the summer time because the water level is low and water might be spoiled.

5. Changing of natural resource utilization plan

Before the introduction of mechanism for fishing there were plenty of aquatic animals. The use of simple equipment was enough to catch sufficient for consumption. If there was a surplus, these were then exchanged for other necessary household items. There were few people then, and the need for natural resource utilization management was minimal. Communication and transportation systems with fast locomotives were almost non-existent. The methods of preparing these

resources were only by salting and/or drying them, but there were few markets to buy or purchase these resources. This meant that people utilized natural resource only when necessary.

Now we have the period of mechanized fishing, and this has meant a decrease in the availability of natural resources. In addition, as a result of population increases, there is a higher demand for these resources for consumption. Transportation of processed resources is also convenient, and a variety of natural resource preservation processes which make the products look fresh and clean and meet market demand are available. Once there is high demand, the price is increased, so fishermen have to catch as many aquatic animals as they can. There is also new equipment that is highly efficient. The utilization of natural resources has thus become much more commercialized.

6. Selection pattern on the natural resource utilization

When village respondents were asked about their choice of occupation, all of them indicated that they want to continue with fishing or off-shore cultivation even when the income is less than present, so long as they can meet their minimum family expenses. If aquatic animals are scarce or gone, villagers in village No. 1 indicate that they would either cultivate fish or black crab or be a hired labourer or work in the rice field. Villagers in village No. 2 would want to be hired labourers, while villagers in village No. 3 would want to be hired labourers or work in the rubber, coffee or palm oil plantation, and villagers in village No. 4 would work as hired labourers. It can be seen that choices of occupation of villagers are varied according to the geographic location, land, soil condition and their present economic status.

Recommendations

- 1) Disseminate knowledge on natural resources and villagers responsibilities, including potential damage caused by the deterioration of natural resources.

- 2) Provide financial assistance to villagers. This can be in any form such as seed money or low interest loan funds. Capital is the most important necessity for maintaining a living which also results in natural resource preservation.
- 3) Educate the implementing units so that they become knowledgeable and skillful in development and research on oyster, shrimp and fish raising. This is needed because the present production cannot meet demand, and prices are also very high.
- 4) Reinforce the use of laws on prohibition of catching aquatic animals during egg-laying season, using illegal fishing equipment and conducting illegal fisheries.
- 5) Promote the growing of plants in the deteriorated mangrove areas or underneath each house as a means to prevent the erosion of off-shore zones.
- 6) Set the area expansion for shrimp cultivation in accordance to the mangrove area reservation strategies, particularly in the case of newly developed shrimp cultivation areas.
- 7) Develop a policy to promote a new line of occupation for villagers by using the socio-environmental data of the province, district, tambon and village as a basis. This can be done through collaboration with other agencies that work closely with the community.
- 8) Encourage villagers in village No. 1 to continue growing rice as they used to do. The land and soil conditions are suitable for growing rice, hence they should not let the richness of land be wasted.
- 9) Search for new materials to substitute for bamboo in the oyster cultivation process and replace the used tea leaves

in shrimp cultivation process. Developed new model for shrimp cultivation in floating baskets and provide expert technical assistance on black crab raising.

Division 400 - Legal & Institutional Division

Task 410-T Analysis of Institutional Arrangement

Objective :

To analyze existing laws and regulations pertaining to coastal resources management in the Upper South Region. Also included in the analysis is identification of government agencies and organizations concerned with the use of coastal resources and their respective roles and responsibilities at the local, regional and national levels.

Based upon the planning process, the analysis will focus on the legal and institutional issues involved in the following 4 main topic : (1) Water quality management (2) Land use planning for management of mangrove resources and aquaculture (3) Fishery resources management and (4) Coral reef and marine park management.

• Result of the Study

1. Report : Analysis of institutional arrangement

2. Findings

SUMMARY OF FINDINGS

A. Fundamental Principles and Concepts

On the basis of Task Group 410-T's study, a number of key findings pertinent to existing Thai laws relating to coastal resource management may be summarized as follows :

(1) Under the existing Thai laws, coastal resource management (CRM) is not governed by any specific statutory enactment.

(2) Although there are many laws governing the uses of land, forest, water, fishery wildlife and mineral resources, these laws are, from the management viewpoint, purely sectoral and basically oriented towards economic exploitation for the purpose of national economic and social development of the country.

(3) Due to the absence of specific and comprehensive CRM legislation, modern concepts of "sustainable development" and "integrated coastal resource management" are yet to be recognized by the existing Thai laws on natural resource management and environment protection.

(4) At present, the legal status of land and water forming part of the coastal area is determined by the following basic principles of property law :

(i) The legal status of the coastal areas known as "sea-shores" or "sea-coasts" is the "domaine publique" in the category of "common property for public uses" pursuant to section 1304(2) of the Civil and Commercial Code and sections 1 and 8 of the Land Code.

(ii) The areas of sea-shores are identical to the areas of "internal waters" in accordance with the principles of international law of the sea, i.e., the coastal water areas between the mean high-water marks (MHWM) and the mean low-water marks (MLWM).

(iii) The areas of "shorelands" and "coastal uplands" are not legally defined. Their legal status may thus vary from public lands of different categories to privately owned or possessed lands depending upon the national land allocation policies of the government.

(iv) The body of marine waters forming the maritime area of the country is divided into "internal waters", "territorial seas", "contiguous zones" and "exclusive economic zones", respectively. The width of Thai territorial seas, measured from the MLWM, is 12 nautical

miles. The legal status of the entire maritime area is also the "domaine publique" in the category of common property for public uses.

(v) Beaches and dunes forming part of the shorelands should also be classified as common property for public uses if they are traditionally open for public access.

B. Legal Framework for CRM

On the basis of existing laws relating to natural resources and environment, a legal framework for CRM may conceptually be derived from a patchwork of five areas of legislation, i.e., national socio-economic development planning, environmental policy and planning, land use control, water quality and pollution control and conservation of natural resources.

Specific enactments in the five areas of legislation relevant to CRM can be identified as follows :

(1) Laws on national socio-economic development planning

These laws are : The National Economic and Social Development Act (NESDA) of 1978, Agricultural Economics Act (AEA) of 1979, Industrial Works and Estates Acts of 1969 and 1979 and Tourism Authority of Thailand Act (TATA) of 1979.

(2) Environmental policy and planning law

The Enhancement and Conservation of National Environmental Quality Act (NEQA) of 1975 is the sole legislation on the subject matter.

(3) Land use control legislation

These laws are : The Town and Country Planning Act (TCPA) of 1975, Building Control Act (BCA) of 1979, Real Estate Development Control Regulations under Revolutionary Decree No. 286 of 1972 (REDC), Land Trade Control Regulations under the Land Code of 1954, Condominium Act of 1979, Hotel Act of 1936, Agricultural Land Use

Management Act (ALUMA) of 1974, Land Reform for Agriculture Act (LRAA) of 1975, Land Development Act (LDA) of 1983, etc.

(4) Water quality and pollution control laws

These laws are : Public nuisance law under the Public Health Act (PHA) of 1941, NEQA provisions for setting environmental quality standards (NEQA sections 5(6), 12(2), 17(2)-(3) and 25, EIA regulations under NEQA sections 17(1), 18 and 19, NEQA provision of emergency power for abatement of environmental pollution under section 20, Industrial Effluent Standards set by virtue of section 39(6) of the Industrial Works Act of 1969, BCA provisions for regulatory control of waste waters from domestic and municipal sources (BCA sections 8(6), 46, 77, 79 and 80 and certain provisions of the laws on irrigation, navigation, fishery, mining, water works, oil and gas, etc.

(5) Laws on conservation of natural resources

The principles of "domaine publique", "crown lands", and "restricted areas" are basic to conservation of natural resources. These principles are embodied in the principles of property and land right law under the CCC and Land Code of Thailand. Besides, there is a specific body of law on protected areas contained in the Wild Animal Protection and Reserves Act (1960), the National Parks Act (1961), the National Forest Reserves Act (1964) and the Fisheries Act (1947). By virtue of these laws, various types of preserved and protected areas can be established for the purpose of conservation of natural areas and resources as well as habitat protection.

C. Issues of Legal and Institutional Significance

Significant legal and institutional issues pertaining to integrated CRM approach advocated by this Project may be identified as follows:

(1) No formal linkage is provided by the NESDA, NEQA, AEA, TATA and other development laws in order to integrate different sets of national development and environmental policies with a view to

achieving integrated resource management and sustainable development. At present, the cabinet is perhaps the sole linkage for such integration purpose, but mostly on an ad hoc basis.

(2) Without legal mechanism for policy integration, many national policies are in conflict with each other. Some cannot be legally implemented simply because they are made by policy makers and planners that are more concerned with political and administrative expediency than the question of legality. As a result, many policies are squarely in conflict with the controlling laws on the subject-matters.

(3) Environmental impact assessment is the only policy and legal instrument which is conceptually designed by NEQA for direct control of certain major development activities that can significantly affect the environment. For many reasons, it must be accepted that the existing EIA law is not sufficiently effective to achieve the underlying objective of NEQA legislative policy, i.e., conservation of environmental quality.

(4) Land use control laws are in the main ineffective for the following reasons :

(i) Public opposition to prescription of land use restrictions authorized by the TCPA and BCA as well as other land use control laws.

(ii) The permit systems provided by many land use control laws are extremely ineffective. This is in the main attributable to the sectoral and functional nature of Thai public administration.

(iii) For the reasons put forward in (i) - (ii) above, regulatory process essential for implementation of land use control legislation is always cumbersome and utterly protracted.

(iv) The rising price of land as a consequence of tourism booming and land speculation is the root cause of difficulties in regulatory attempts to control private land development activities. In most cases the regulations are not timely made to keep pace with such development activities.

(5) The absence of specific and comprehensive law on water quality and pollution control is accountable for inefficient water quality management. Although some water pollution control regulations may exist, they are not effectively enforced for a host of administrative reasons. Inappropriate institutional arrangements are certainly one of the contributing factors.

(6) The laws on protected areas and natural resource conservation are ridden by loopholes created by the operative force of the law on private land ownership and acquisitive rights.

(7) Suspension of law enforcement against illegal encroachment of public lands, mostly for political reasons, has rendered the enforcibility of the National Forest Reserves Act nugatory.

Task Code 420-T Evaluation of existing and potentials for recreation and tourism development and management in the Upper South Region, Thailand.

Targets/Products :

- (1) to promote appropriate tourism development of coastal based resources with regard to socioeconomic-cum environmental management of these resources
- (2) to identify and characterize linkages between tourism and other development sectors and to recommend measures to reduce negative impacts on tourism development

Result of the Study

1. Report : Evaluation of existing and potentials for recreation and tourism development management in the Upper South Region.

2. Findings

1. SUMMARY AND CONCLUSIONS FOR BAN DON BAY

The present study identified major concerns and constraints regarding environmental aspects of coastal tourism development at Ban Don Bay as presented below. Constraints are listed in priority order.

1. Management and Planning Constraints

- a) Poor cooperation among agencies responsible for management and development of coastal tourism resources.

- b) Limited monitoring and evaluation of coastal tourism resources status and of previous management plans/plan implementation.

- c) Suboptimum tourism management skills at the local level and, to a lesser extent, limited local participation in tourism management activities.

- d) Lack of comprehensive coastal park management plans.

2. Socio-economic Constraints.

- a) Limited knowledge of tourism impacts on local populations.

- b) Limited knowledge of the ways and means to broaden distribution of tourism benefits.

3. Constraints to Tourism Development of Coral Reefs

a) Degradation of reefs due to boat anchors and fishing activities.

b) Reef destruction from dynamiting and poisons as well as loss of reef fauna to illegal collection methods.

c) Degradation of reefs due to siltation.

4. Constraints to Conservation of Beaches and Nearshore Waters.

a) Poor sanitation programs at these areas.

b) Virtually unrestricted development at coastal tourism areas.

5. Constraints to Inland Water Conservation

a) Inadequate protection and monitoring of watersheds and swamplands that are critical to water supplies.

6. Constraints to Safe Passenger Boat Travel

a) Lack of administrative and monitoring personnel in the province.

b) Inadequate penalties for violations of boating regulations.

Additionally, lack of public awareness programs to generate knowledge among tourism business operators, local residents, tourists and decision makers of the need for tourism resource protection and of the ways and means that they can participate in these conservation efforts is a major contributor to all six categories mentioned above.

Highest priority recommendations to mitigate these constraints are outlined below.

- Establish an "Environmental Task Force" to monitor and evaluate the status of critical coastal resources as well as the implementation of management plans.

- Undertake a major research project on coastal tourism's socio-economic impacts.

- Establish coral conservation zones using existing Fisheries Department legislation, and provide mooring buoys for these zones.

- Require EIAs for all construction adjacent to coral reefs that could potentially cause significant impacts on the reefs, and revise legislation allowing the sale of coral.

- Develop, approve and implement comprehensive solid and liquid waste disposal systems at major coastal tourism sites.

- Require water development projects to incorporate watershed and swampland conservation measures at the earliest project stages.

- Establish a province-wide public awareness program based at Ko Samui.

- Post two Harbor Department officers at Surat Thani to oversee compliance with boating regulations.

2. SUMMARY AND CONCLUSIONS FOR PHANGNGA BAY

The present study identified major concerns and constraints regarding environmental aspects of coastal tourism development at Phangnga Bay as presented below. Major constraints are listed in priority order.

1. Management and Planning Constraints

a) Insufficient input from local leaders in the decision making process as well as poor coordination among agencies responsible for management and development of coastal tourism resources.

b) Limited monitoring and evaluation of resource use and of management activities.

c) Lack of comprehensive coastal park management plans and poor park/local cooperation in managing parks.

d) Preparation and implementation of economic development plans without sufficient input from the environmental sector.

e) Poor tourism management skills at the local level.

2. Socio-economic Constraints

a) Limited knowledge of tourism impacts on local communities.

b) Limited knowledge of the ways and means to provide improved equity in tourism benefit distribution.

3. Constraints to Conservation of Coral Reefs

a) Insufficient planning for appropriate tourism use.

b) Insufficient law enforcement capabilities.

c) Legislation allowing purchase/sale of coral allowing deleterious construction near coral reefs.

4. Constraints to Conservation of Beaches and Marine Waters.

a) Inadequate regulation of domestic wastes.

b) Virtually unrestricted development at coastal areas.

5. Constraints to Safe Passenger Boat Travel

a) Insufficient administrative and monitoring personnel in the province.

b) Inadequate violations for safety violations.

Additionally, lack of public awareness programs to generate knowledge among tourism business operators, local residents, tourists and decision makers of the need for coastal resource protection and of the ways and means that they can participate in these conservation efforts is a major constraint to all five categories mentioned above.

Highest priority recommendations to mitigate or overcome these constraints are outline below.

a) Establish a Coastal Tourism Commission and Environmental Task Force to provide locally-generated and sound recommendations for improved management/use of tourism resources; provide training to local officials in monitoring and evaluation techniques so that monitoring can be accomplished on a regular basis by those who are closest to the resources.

b) Prepare and implement management plans for nine coastal parks in the region; prepare and implement a regional plan for these parks; and establish a regional parks coordinating center.

c) Establish provincial park management committees that will work with park officials in conserving coastal resources.

d) Develop and implement a demonstration project for appropriate treatment of wastes near tourist sites.

No.	Task	Title
11.	622-T	Statement for Management for Mu Ko Ang Thong National Park
12.	622-T	Statement for Management for Ao Phangnga National Park
13.	622-T	Statement for Management for Noparat Beach, Mu Ko Pe Pe
14.	623-T	Management Plan for Fisheries Resources in Ban Don Bay, Surat-Thani
15.	623-T	Management Plan for Fisheries Resources in Phangnga Bay.

Priority 3. Institutional Arrangement Project

Priority 4. - Community Participation in Coastal Water
quality Project
- Feasibility Study for Sewerage Schemes in
Densely Populated Communities Project

2. LAND USE

Only 3 projects have been proposed for this sector, and they are presented below in order of priority.

Ban Don Bay

1. Mangrove Rehabilitation Project
2. Multiple Use Management System for the Coastal Zone, Pilot Project

Phangnga Bay

1. Steepland Soil Conservation Pilot Project

3. NEARSHORE ZONE, CORAL, BEACHES

Only 3 Projects have been proposed, all in Ban Don Bay.

1. Ko Phangan Community-based Resource Management Project
2. Ko Taen Community Marine Reserve Project
3. Ko Samui Shoreline Management, Education and Overall Plan Co-ordination Project

As mentioned earlier the Ko Taen Project has already been set in motion with seed funding from Rhode Island University to set up a coral reef zonation scheme marked by buoys. It is logical therefore for this project be given continuous support until completion.

Preferably, all three projects should be implemented together but if this proves impossible then the Ko Taen and Ko Phangan projects should be given precedence over the more expensive and wider scope Ko Samui project.

4. CAPTURE FISHERIES

Two projects have been proposed for Ban Don Bay :

1. A Study on the Optimum Fishing Effort in Ban Don Bay.
2. Educational Program for Local Communities on Fishery Management Conservation in Ban Don Bay.

Both projects should be implemented as a package as the second one will help to make the results of the first one more understandable and acceptable.

Three projects have been proposed for Phangnga Bay and they also should be implemented as a package.

1. Education Program and Public Awareness On Fishery Management for Fishing Communities in Phangnga Bay.
2. Controlling and Reducing Fishing Effort in Phangnga Bay Through Community Cooperation.
3. Education and Training Program on Alternative Occupations.

Sub-task Code 612-T Initial Environmental Impact Examination of
Coastal Development Project in the Upper South

Objectives :

- (1) to prepare Initial Environmental Impact Examination (IEE) of proposed coastal development projects to identify present and possible major impacts on the coastal environment.
- (2) to set up Terms of Reference (TOR) for a preparation of the Environmental Impact Assessment (EIA) of the above projects that will be implemented
- (3) to develop guidelines on environment considerations for development projects in sensitive areas
- (4) to formulate development project monitoring programs
- (5) to formulated specific recommendations for CRM plans

Result of the Study

1. Report :

The Initial Environmental Impact Examination (IEE) of projects undertaken within this sub-task are summarized as follows :

- 1.1 The IEE of industrial estates in Surat Thani.
- 1.2 The IEE of deep-sea port at Kanom.
- 1.3 The IEE of land transportation and oil pipeline.
- 1.4 The IEE of coastal aquaculture mangrove conflict use in the Upper South.

Task 613-T Management Guidelines and Policies for Coastal Resources/Activities

Objectives : To review and assess the effectiveness of existing policies and guidelines for coastal resources/activities in Thailand

To formulate revised or additional guidelines and policies for coastal resource utilization and conservation in the Upper South sub-region.

To guide and support the implementation of projects contained in the various sub-sectoral action plans so that they will be consistent with, and contribute to, the overall objectives of the Upper South Coastal Resources Management Plan.

Result of the Study

1. Report : Management guidelines and policy for coastal resources management action plans.

2. Findings

Coastal resource management and planning recognizes coastal lands, waters and intertidal areas as an interacting and indivisible unit with water playing a major integrating role. This means that any environmental or resource transformation in the coastal zone is likely to have an impact on other resources. This is reflected in the following policy statements and in many cases policies for one type of resource (e.g. mangroves) address issues that concern other types of resources (e.g. aquaculture and fisheries). It must be stressed therefore that whilst coastal managers should assess the policies and measures for the resource type of particular concern to them, a study all of the policies will provide a fuller understanding of the direction and philosophy of coastal resources management adopted for the project sites.

Policy statements for the study areas are summarized as follow :

AQUACULTURE

- (1) Shrimp farm practices shall be improved by increasing and strengthening training and extension services.
- (2) No additional productive mangrove areas shall be converted to shrimp farms. New shrimp ponds shall be located only on degraded mangrove forests zoned for economic use by the Royal Forestry Department, or behind productive mangrove areas as identified in the Upper South land use zoning plan.
- (3) Increasing shrimp pond productivity rather than opening up new areas for shrimp farming shall be the major strategy for meeting targets for domestic and export markets.
- (4) Open water aquaculture zones shall be established and protected against all adverse impacts originating from both land and marine sources.

BEACHES AND DUNELANDS

- (1) The authorities shall ensure that developments in beach and duneland areas of Ban Don Bay are appropriate by means of zoning, building controls, and design guidelines, and consider methods of mitigating the effects of existing inappropriately located and ill-designed developments.
- (2) The authorities shall initiate joint action with the private sector in order to manage beach pollution.
- (3) The right of public access to beaches shall be asserted and promoted.

- (4) No mining of sand or removal of beach materials such as rocks shellgrit or gravel shall be allowed in beaches and dunelands not specifically designated for that purpose.

CAPTURE FISHERIES

- (1) Sustainable harvesting of the Upper Souths capture fisheries shall be achieved through increasing net mesh sizes, controlling the entry of new fishing boats, constructing and protecting fish habitats, and more effective enforcement of seasonal and areal limitations.
- (2) Greater equity and poverty alleviation shall be promoted by providing alternative employment opportunities to small scale fishermen.
- (3) Conflicts between large scale and small scale fishers and between mobile and stationary gears shall be resolved by introducing a Territorial Use Rights in Fishing (TURF) System and by controlling use of push nets and trawlers.
- (4) Fisheries institutions shall be strengthened and laws amended where appropriate.

CORAL

- (1) More effective administration of coral related laws and regulations shall be achieved by providing relevant government agencies with greater resources of manpower and equipment, by promoting inter agency cooperation, by revising unclear and out-dated laws and regulations and adopting new ones, and by including local participation in coral reef management.
- (2) The government shall regulate shoreline development in areas where there are coral reefs so as to protect the reefs from siltation and the effects of waste water pollution.

- (3) The government shall study and regulate anchovy fishing in the Gulf of Thailand so as to protect coral and associated reef fishes.
- (4) The government shall promote understanding among local officials/local tourism industry personnel, and local citizens of the ecological and socio-economic values of corals in the area and the need to conserve them.
- (5) A coral reef zoning scheme shall be implemented to promote multiple uses of coral resources so as to realize their diverse socio-economic and ecological values but the reefs and associated biota will be protected from human disturbance or alteration.

LAND

- (1) Deforestation in steeplands in Ban Don Bay and Phangnga Bay shall be halted as a matter of priority.
- (2) Efforts to encourage farmers already cultivating deforested areas to adopt conservation measures shall be stepped up.
- (3) Assistance shall be provided to farmers to intensify existing agricultural land use and cultivate vast areas of idle land.
- (4) Flood hazard zones shall be defined and mapped for management purposes in Ban Don Bay, notably.

MANGROVES

- (1) Mangrove lands shall be classified according to use zones and such classification strictly adhered to.
- (2) Healthy mangrove areas shall in no case be converted to shrimp ponds.

- (3) Efforts to halt illegal cutting of mangrove shall be stepped up.
- (4) Replanting of mangroves shall be carried out where necessary to ensure coastal and river border protection.
- (5) In areas where harvesting of mangroves is permitted concessionaires shall be required to adopt a sustained yield mangement system.
- (6) Appropriate measures shall be taken to ensure that more effective administration and implementation of mangrove related laws, programs and policies is achieved.

MARINE PARKS

- (1) Tourism and recreation in the parks shall be developed and promoted in a manner compatible with the conservation of natural resources.
- (2) Regulation of boat traffic both within the park boundaries and outside shall be strengthened.
- (3) The protection of mangroves and coral reefs within national marine park boundaries shall be given a high priority by park managers.
- (4) The National Park Division shall seek the co-operation of all agencies concerned to control activities outside the park boundaries which have an adverse impact on park resources.

COASTAL WATER QUALITY

- (1) Monitoring of on-site treatment systems and of effluent discharges shall be increased and industrial effluent standards strictly enforced.

- (2) Beneficial uses in the bays shall be classified and protected by setting appropriate surface water quality standards and implementing town planning measures.
- (3) Standards for dam release waters shall be established and strictly enforced.
- (4) Treatment systems for community wastewater shall be established.
- (5) Adverse impacts on water quality associated with tin-mining and shrimp farming shall be reduced or eliminated.
- (6) A national oil spill contingency plan shall be established including a detailed action plan for Ban Don Bay.

WILDLIFE

- (1) Lowland habitats such as mangrove and melaleucca types shall be included and maintained in the Upper South's protected area system.
- (2) Illegal hunting of wildlife shall be halted.
- (3) More effective protection and mangement of the protected area system shall be introduced.
- (4) A continuing program of monitoring and research on the region's wildlife species (resident and migrant) and their habitats, whether in protected areas or not shall be undertaken as a basis for identification and control of factors important for their survival.

Task 614-T : Water quality management plan

Objective :

To prevent and control water quality degradation caused by all types and sources of pollution so as to maintain beneficial uses.

Result of the Study

1. Report : Management Plan for Water Quality of Ban Don Bay and Adjacent Area

2. Findings :

1. Policies and Management for Ban Don Bay

- 1.1 Introduction

The policies adopted by the government for coastal water quality management and pollution control generally derive from a considerable number of Acts and other forms of regulation. One of the more important pieces of legislation such as the National Environmental Quality Act of 1975, with coordinating responsibilities by ONEB, covers the control of environmental quality and standards and the request of environmental impact assessment of development projects. The Public Health Act of 1941 which regulates the disposal of rubbish, filth and dirt; and authorize local authorities to issue by laws or rules stipulating the methods and procedures to be used in such disposal. The local authorities are also empowered to control commercial undertakings which are likely to be injurious to health, and insanitary dwelling places, latrines, night soil receptacles, urinals, and other sites, facilities or water courses likely to represent hazard to health.

The Act for the Cleanliness and tidiness of the country of 1960 regulates and controls public offenses, including disturbance and antiaesthetic activities. It specifically prohibits the dumping of waste into rivers or canals. The Building Control Act of 1979 empowered the local authority to issue by laws controlling the number and type of bathrooms and toilets. It can also control storm water

and waste water drainage under the Act. The factories Act of 1969 imposes certain duties on industrial concerns using processes which will lead to the discharge of defined levels of pollutants. The amended Navigation in Thai Water Act of 1913 bans the dumping of stone, gravel, sand, clay, sludge, decaying matter garbage, oil or chemical products into canals, rivers, lakes, or coastal waters. Permission for such activities must be sought from the Harbour Department. The National Park Act of 1961 includes policies for the protection and management of some coastal marine water. In spite of all these efforts, there is an urgent need for policies which enable the implementation of related laws and regulations through local participation; land use policy; guidelines for small scale development project along coastal areas; waste disposal; watershed management and coastal water quality monitoring program.

1.2 General Policies Recommendations

1) Increase monitoring of on-site treatment systems and of effluent discharges. This will require increased resources for the Department of Industrial Works (DIW) under the Ministry of Industry (MOI); as well as a closer co-operation between the DIW and the ONEB so that ONEB can more effectively monitoring coastal water quality in the bay. A good and objective oriented monitoring program will provide information for stricter enforcement of industrial effluent standards.

2) Classify beneficial uses in the bay and set appropriate surface and coastal water quality standards to protect these uses. This would be accomplished by the Environmental Standards Division of the ONEB in conjunction with the Ministry of Public Health (MOPH). Comprehensive land use zoning plans formulated by the Department of Town and Country Planning, Ministry of Interior could be used to direct potentially polluting land uses away from critical areas.

3) Strictly enforce the 3000 meter zone for trawlers. Although trawlers are prohibited from operating within 3000 meters from shore under 1972 Ministerial Notification, it is not sufficiently enforced.

4) Establish government's commitments towards investments on large scale, low-cost sewerage systems and central sewage treatment works for densely populated urban areas. For the rural areas, the government should build up local capabilities to plan, implement and maintain sanitation facilities, while also building up the MOPH's ability to guide local government.

5) Speed up the National Oil Spill Contingency Plan including a detailed action plan for the bay. In spite of the fact that there is a regulation of the office of the Prime Minister providing for the making of such plan, no action has been taken up due to lack of fund and equipment. ONEB could use her influence to convince the Harbour Department that Surat Thani area should be given the highest priority as a sub-station in the under preparing National Oil Spill Contingency Plan. As an alternative, encourage private sectors which have activities concerned with oil in Ban Don Bay to join hand with government and set up a Chronic Oil Pollution Control Group in the bay.

6) Strengthen provincial and local administration as focal point for water quality management. There are a number of organizational options and actual responsibilities for pollution monitoring, control and management remain to be specified.

7) Promote awareness and appreciation of local officials and local citizen regarding the natural and socio-economic

values of coastal water in the bay, if necessary involved non-governmental organizations (NGOs) in the activities.

1.3 Management Strategies and Actions

The management strategies are presented here. There is necessarily some overlap of the strategies and actions because it is not possible in all cases to isolate strategies and actions only relevant for one issue area.

1.3.1 Water Quality Degradation

- Strategy 1 To reduce industrial pollution. This needs closer cooperation between ONEB, MOI, and BOI as well as it must be linked together in a program of pollution monitoring and control in order to effectively enforce the NEQA and the Factories Act on all industrial effluent discharges.
- Strategy 2 To use on-site treatment such as septic tanks in areas which are still not densely populated and to study requirements for strengthening domestic waste water pollution control in the municipalities (i.e. Surat Thani, Phum Phin, The Chang, Phum Rieng, Tha Thong, Don Sak, Kanjanadit and Kradae), including implementing domestic waste water pollution abatement measures such as appropriate waste water pollution charges and fines.
- Strategy 3 To implement land use development plan. At present, only town planning has been done and implemented.

Strategy 4 To strictly enforce the 3,000 meter zone for trawlers.

Strategy 5 To combat oil spill in Ban Don Bay.

1.3.2 Socio-economic and Cultural Concerns

Strategy 6 To conduct series of meetings, seminars and study tours to improve the local public appreciation of coastal water quality control and management.

1.3.3 Legal, Institutional and Administrative Issues.

Strategy 7 To establish the principle of devolution of powers to provincial and local-level government, and enforcement of environmental regulations is clearly the responsibility of the provincial governors.

Strategy 8 To provide training for local and provincial government personnel and non-government representatives on coastal water pollution control and management.

1.3.4 Education and Public Awareness

Strategy 9 To conduct in cooperation with local, provincial and national mass media a series of TV and radio programs to improve the local public appreciation of coastal water quality management as recommended in Strategies 1 to 8.

2. Policies and Management for Phangnga Bay

2.1 Introduction

The policies adopted by the government for coastal water quality management and pollution control generally derive from a considerable number of Acts and other forms of regulation which have some bearing on water quality management. Some of the more important pieces of legislation such as the National Environmental Quality Act of 1975, with coordinating responsibilities by ONEB, covers the control of environmental quality and standards and the request of environmental impact assessment of development projects. The Public Health Act of 1941 which regulates the disposal of rubbish, filth and dirt; and authorize local authorities to issue by laws or rules stipulating the methods and procedures to be used in such disposal. The local authorities are also empowered to control commercial undertakings which are likely to be injurious to health, and insanitary dwelling places, latrines, night soil receptacles, urinals, and other sites, facilities or water courses likely to represent hazard to health.

The Act for the Cleanliness and tidiness of the country of 1960 regulates and controls public offenses, including disturbance and antiaesthetic activities. It specifically prohibits the dumping of waste into rivers or canals. The Building Control Act of 1979 empowered the local authority to issue bylaws controlling the number and type of bathrooms and toilets. It can also control storm water and waste water drainage under the Act. The factories Act of 1969 imposes certain duties on industrial concerns using processes which will lead to the discharge of defined levels of pollutants. The amended Navigation in Thai Water Act of 1913 bans the dumping of stone, gravel, sand, clay, sludge, decaying matter garbage, oil or chemical products into canals, rivers, lakes, or coastal waters. Permission for such activities must be sought from the Harbour Department. The National Park Act of 1961 includes policies for the protection and management of some coastal marine water. In spite of all these efforts, there is an urgent need for policies which enable

the implementation of related laws and regulations through local participation; land use policy; guidelines for small scale development project along coastal areas; waste disposal; watershed management and coastal water quality monitoring program.

2.2 General Policies Recommendations

1) Increase monitoring of on-site treatment systems and of effluent discharges. This will require increased resources for the Department of Industrial Works (DIW) under the Ministry of Industry (MOI); as well as a closer co-operation between the DIW and the ONEB so that ONEB can more effectively monitoring coastal water quality in the bay. A good and objective oriented monitoring program will provide information for stricter enforcement of industrial effluent standards.

2) Classify beneficial uses in the bay and set appropriate surface and coastal water quality standards to protect these uses. This would be accomplished by the Environmental Standards Division of the ONEB in conjunction with the Ministry of Public Health (MOPH). Comprehensive land use zoning plans formulated by the DEpartment of Town and Country Planning, Ministry of Interior could be used to direct potentially polluting land uses away from critical areas.

3) Strictly enforce the 3000 meter zone for trawlers. Although trawlers are prohibited from operating within 3000 meters from shore under 1972 Ministerial Notification, it is not sufficiently enforced.

4) Establish government's commitments towards investments on large scale, low-cost sewerage systems and central sewage treatment works for densely populated urban areas as well as well known coastal resorts of tourism industry. For the

rural areas, the government should build up local capabilities to plan, implement and maintain sanitation facilities, while also building up the MOPH's ability to guide local government.

5) Reduce or eliminate adverse impacts on water quality associated with tin mining. Proposed more stringent effluent standards of tin mining discharges, for example set 100 mg/L for tin mining effluent standards during storm or otherwise no discharge is permitted.

6) Strengthen provincial and local administration as focal point for water quality management. There are a number of organizational options and actual responsibilities for pollution monitoring, control and management remain to be specified.

7) Promote awareness and appreciation of local officials and local citizen regarding the natural and socio-economic values of coastal water in the bay, if necessary involved non-governmental organization (NGOs) in the activities.

2.3 Management Strategies and Actions

The management strategies are presented here. There is necessarily some overlap of the strategies and actions because it is not possible in all cases to isolate strategies and actions only relevant for one issue area.

2.3.1 Water Quality Degradation

Strategy 1 To reduce industrial pollution. This needs closer cooperation between ONEB, MOI and BOI, as well as it must be linked together in a program of pollution monitoring and control

in order to effectively enforce the NEQA and the Factories Act on all industrial effluent discharges.

- Strategy 2 To use on-site treatment such as septic tanks in areas which are still not densely populated and to study requirements for strengthening domestic waste water pollution control in the municipalities (i.e. Phangnga and Krabi), and Pan Yee and Phi Phi islands, including implementing domestic waste water pollution abatement measures such as appropriate waste water pollution charges and fines.
- Strategy 3 To implement land use development plan. At present, only town planning has been done and implemented.
- Strategy 4 To strictly enforce the 3000 meter zone for trawlers.
- Strategy 5 To abate tin mining discharges in Phangnga Bay.

2.3.2 Socio-economic and Cultural Concerns

- Strategy 6 To conduct series of meetings, seminars and study tours to improve the local public appreciation of coastal water quality control and management.

2.3.3 Legal, Institutional and Administrative Issues.

Strategy 7 To establish the principle of devolution of powers to provincial and local-level government, and enforcement of environmental regulations is clearly the responsibility of the provincial governors.

Strategy 8 To provide training for local and provincial government personnel and non-government representatives on coastal water pollution control and management.

2.3.4 Education and Public Awareness

Strategy 9 To conduct in cooperation with local, provincial and national mass media a series of TV and radio programs to improve the local public appreciation of coastal water quality management as recommended in Strategies 1 to 8.

Task 615-T Management Planning for land-use

Objectives :

1. To formulate a land-use zoning plan which resolves conflicts over the use of coastal land by mangrove, aquaculture and other land uses interests.
2. To use this zoning plan as the basis of sectoral plans for mangrove, aquaculture and other land uses.
3. To formulate issue-based sectoral plans for mangrove, aquaculture, and other land uses which provide solutions to immediate problems and address all major issues facing these sectors.

Result of the Study

1. Report : Management planning for land use

2. Findings :

1. LAND USE ZONATION AND MANGROVE/AQUACULTURE CONFLICT RESOLUTION FOR THE BAN DON AND PHANGNGA BAYS

The inland coastal areas located in Ban Don Bay and Phangnga Bay have been chosen as the study sites for the coastal resources management of the Upper South, Thailand. The Ban Don Bay situates along the eastern shoreline and has an total area of about 1,068 sq.km while the Phangnga Bay covers an area of about 1,176 sq.km. on the western shoreline. It appears that their exploitation has contributed substantially to the rapid economic development which results in conflicting with development activities. The most common case is the brackish water fisheries which affect the coastal resource areas as well as the mangroves. Moreover, conflicting in land uses among agriculture and forestry on steepland is the other issue which has been arisen in the study areas lately. Therefore, it needs attention to develop a workable zonation for appropriate land use in order to conserve the coastal resources on a sustained yield basis and to minimize nonsustainable or conversion activities.

In harmony with the objectives, the following zones along the coastal areas of the Ban Don and Phangnga Bays are proposed respectively : -

1) Ban Don Bay :-

Zone 1a : Areas for mangrove preservation.

The existing mangrove areas of about 3,680 hec. should be preserved

Zone 1b : Areas for reforestation of mangrove.
Degraded mangrove areas of about 928 hec. lining embankments of estuarine system and mud flat should be reforested with suitable mangrove species.

Zone 2 : Areas for brackish water culture
Areas of about 9,600 hec. adjacent from Zone 1a and 1b should attribute their uses to brackish water culture (pond aquaculture) on a sustained yield basis.

Zone 3 : Potential areas for brackish water culture
Areas of about 6,912 hec. are identified as the possible sites for pond aquaculture. They can be divided into three sub-zone according to degree of potentiality.

Zone 3a : Highly potential (864 hec.)

Zone 3b : Moderately potential (5,600 hec.)

Zone 3c : Low potential (448 hec.)

Zone 4 : Potential areas for mariculture

Zone 4a : Potential area for oyster culture

Zone 4b : Potential area for cockle culture

2) Phangnga Bay

Zone 1 : Areas for mangrove preservation.
All existing mangrove areas of about 19,600 hec. should be preserved. These areas are not technically suitable for any pond aquaculture.

Zone 2 : Areas for preservation on steep land.
All existing steep land forest of about 15,700 hec. should be preserved.

Zone 3 : Areas for reforestation on steep land.
Areas of about 2,300 hec. of degraded forest on steep land should be reforested with fast-growing trees.

Zone 4 : Areas for agriculture on steep land.
All existing rubber-growing areas of about 11,100 hec. on steep land should be maintained under appropriate soil conservation measurement. To avoid social problem, degazetting of national forest on these areas should be made and usufruct license should be given to the farmers.

Zone 5 : Potential areas for mariculture.

Zone 5a : Potential areas for cage culture.

Zone 5b : Potential areas for oyster culture.

Zone 5c : Potential areas for cockle culture.

It should be emphasized that educational program, promotion of public awareness as well as concrete cooperation at all level of governmental agencies play an important role in implementation of these land use zonation.

Task 621-T : Management Planning for Coral Reefs, Beaches and Island Environments, in Ban Don Bay, Surat Thani

Objectives : 1. To formulate strategies and implementation means for coastal resource use and conservations, especially coral reef, beaches and coastal water at Ko Samui and its satellite islands.

2. To identify implementation framework of management plan for coral reef, beaches and island environments.

Result of the Study

1. Report : Management planning for coral reefs, beaches and island environments, in Ban Don Bay, Surat Thani

2. Findings :

1. **Management problems and their causes**

Problems relating to beach management are the results of tourism expansion. Environmental problems are among the main concern. Although, good environment is a very important factor for tourism, public interest in this aspect has not been given much attention. Development was made to serve individual needs with different points of view. The management problems and their causes are described here.

1.1 Problems and their causes in Ko Samui

1) **Building construction problems** : The problems include lack of orderiness among buildings, in appropriate location, forms and types of buildings, removal of coconut trees, and poor landscape. All of which jeopardize the natural image and atmosphere of Ko Samui. Some areas ie. in Lamai beach look much like slums.

Causes of the problems :

- Some buildings were constructed before the laws come into effect.

- Violation of the laws were often made by the small and moderate business investors.

- Lack of personnel : The Sanitary District employs only one level 1 technician to do the works who often needs helps from the understaffed Provincial Public Work Office, located a distance away.

- Lack of understanding on the appropriate image

- Due to high demand in tourism market, the investors do not pay much attention to the building and environment.

- Rapid increase in land value resulted in high cost of investment, and the land has to be utilized to its maximum potential for profitable return.

2) Waste water drainage and treatment system problems :
At present, only the Na Thon Market and a few areas are provided with limited drainage system which drain wastewater from the buildings into the sea. The hotels and bungalows discard the waste water by seeping in the sandy area and naturally dispersed into the ground, or by passing through the seep pit before discharge into the public waterway. Sandiness in this area allows rapid water drainage. Waste water from the kitchen with oil and grease tends to cause some drainage problem. Undrained wastewater is visible in many areas at present. However, TISTR survey showed that the six beaches in Ko Samui are still suitable for swimming. Lack of adequate drainage and wastewater treatment system will definitely cause water pollution in the canal and the sea in the near future.

Causes of the problems :

- There is no planning and investment for public waste water drainage and treatment system.

- The communities and business places have been expanded too rapidly and scattered in different directions.

- Lack of financial support from the government, and limited contribution from the private sector in investment for waste water drainage and treatment system.

- Almost all bungalows and hotels here have less than 80 rooms and are not required to submit the EIA report in the process of obtaining the permission to open their business.

3) Inadequate refuse collection and disposal systems result in large amount of refuse left over. Although the Sanitary District has tried to improve the system and the private companies are allowed to collect refuse in some areas, the problem remains and need proper system for refuse management.

Ko Samui has no specific area for disposal. The refuse is normally dumped in the coconut orchard. This caused a consequence of bad smell, plainty of flys and rates and water borne disease.

The amount of refuse has increased in proportion to the number of tourists which exceed the capacity of the present system due to the lack of personnel, equipment and time. Although some dry refuse can be recycled, it is difficult to find the buyers and the cost of transport to the main land is rather high.

4) There were not much problems on the beach cleanliness. Some natural debris were washed with the sea water onto the beach. However, there is no one responsible for cleaning the beach area. The users only keep their beach area clean, but do not cooperate with the others in keeping the entire area clean.

5) In many areas, there is no entry way to the beach. The people living inland have no access to the beach which is the major obstacle to their fishing occupation. Moreover, tourists who are not the guests of the hotels or land owners cannot pass this beach area.

Causes of the problems :

- The land is privately owned, and obtained at high prices. Such investment can only be repaid by earning income from tourists who can afford to pay for the accommodation service.

- There has been no plan for public entry ways to the beach. Since the land cost is increased rapidly and very expensive, this makes the public sectors less opportunity to purchase land accessible to the beaches due to the limit of budget.

- The high land value, privacy and safety are the main reason for preventive measures on trespassing.

- There has been no investment on the tourism service center on the beach as proposed in the master plan. The centre should be located in a public area connected the public road and beach where it can serve both the tourists and the publics.

6) The beach erosion has resulted in increased steepness of the beach, and was caused by many misuses of the beach. For example, the sand in the beach area was removed for uses elsewhere. Concrete dike was constructed on the beach area. There were many cases of building construction on the beach area. Some section of the beach were filled with laterite which were washed off during the rainfalls, and changed the color of the beach. Moreover, a large number of beautiful rock and gravels were taken from the beach for uses in building decoration. The losses in natural resources and uniqueness of the beach are irreplaceable. Hat Lamai, Hat Thong Yang, Hat Laem Din, and Hat Bang Rak beach are the areas where beach erosion is a problem.

7) Illegal occupation of the public land including beaches, canals, mountain, and forests for construction of accommodation places has greatly affected the ecology of the area,

which is the results of selfishness, undefined ownership, lacks of personnels, inadequate monitoring, etc.

8) Water quality in the beach area is not good enough for uses. The wells are too shallow, and located nearby the seep pit of some tourist accommodation places. Since the water is not treated, this could be harzardous to the public health. Excessive use of water could result in the seepage of sea water into the underground water system. This problem is due to the rapid increase in the number of tourists and inadequate water supply.

9) Water scouters has been served tourists by some investors. It is dangerous and makes nuisance to the majority of tourists. The local government has tried to control or prohibit this service in Ko Samui. Thus it is not a serious problem at present.

1.2 Problems and their causes in Ko Phangan

Beaches in Ko Phangan are very similar to Ko Samui, but the problems here are relatively few, due to the low level of tourism development. Since the trend in tourism development is increasing, more problems in the future are expected. Some of the problems are

- 1) Unorganized development of the private sector
- 2) Waste water drainage and treatment systems.
- 3) Refuse collection and disposal
- 4) The beach cleanliness
- 5) Illegal occupation of public land

The causes of problems are similar to those of Ko Samui, but the problems are expected to seriously increase because there is no Sanitary District at Ko phangan, and development by the private sector lacks directions.

Limited access to the beaches in Ko Phangan is a very important problem. There are very few roads in the island. In the near future when the Ferryboat service is available, there will be more cars on the island, resulting in rapid change and disruption of the peaceful atmosphere. The lack of planning will magnify the seriousness of the problems.

1.3 Problems in other islands

There are few problems in other islands due to limited uses. As for Ko Tao which is the government property, the community and accommodation places have expanded very rapidly, more problems on the land ownership, environment and orderliness in the community are expected in the future.

Thus, the plan must be prepared to prevent and solve the problems.

2. Policy for Management

Beach management is under the jurisdiction of several organizations, while the private sector has major role in utilizing the beach area. The policy should therefore be made with emphasis on the cooperation between the two sectors and on conservation of the environment so that the peacefulness, the beauty and the uniqueness of Ko Samui will remain.

The beach management policy should be made as follows :

1) Appropriate and suitable role and pattern of various beach development under the potentials of each beach should be identified to serve the demands of different type of tourists.

2) Communication must be developed to the standard level, so that there will be entry ways to the beaches at appropriate interval of distance along the shoreline which can be used by the tourists and local residents.

3) Infrastructure must be developed throughout the island to facilitate development by the private sector.

4) Environmental conservation measures must be prepared, such as waste water drainage and treatment system, refuse collection and disposal and cleanliness on the beach area.

5) Private investment should be supported in order to provide services and conserve the environment.

6) The residents and entrepreneurs should be educated and encouraged to conserve the environment.

7) Organizations and personnels involved in the beach management should be provided with sufficient capacity to manage the beach areas.

8) Participation from the residents, government officials and others should be encouraged to form a group or organization to assist in the beach management.

3. Strategies and Actions for Management

Guidelines for management policies are as follows:

3.1 Identification of roles and patterns of development on the beach areas.

Landuse planning should be made to classify appropriate beach areas for various roles along with the landuse control measures. The beach areas can be classified as follows :

1) "The community beach" is the center of commerce, services and local residential area. The major communities are the Na Thon Market in Ko Samui; Ban Thong Sala in Ko Phangan. The minor communities are Ban Mae Nam, Ban Bo Phut, Ban Lamai, Ban Hua Thanon in

Ko Samui; Ban Chalok Lam, Ban Tai in Ko Phangan. Height of the building along the beach, open space of the building area can be less stricted than the other zones. However, set back area adjacent to the public area ie. road, mountain, canel, beach and the environmental management should be more strictness.

2) "The progressive tourism beach" is the beach where full scale tourism development is allowed, but the function relationship among various beaches should be defined. The building construction should be controlled as the present practices.

Most of the beaches in Ko Samui are identified as the progressive tourism beach, ie. Hat Chaweng, Hat Lamai, Hat Mae Nam, Hat Bo Phut, Hat Choeng Mon and Hat Bang Rak. For Ko Phangan, they are Hat Rin, Hat Nai Wok, Hat Wok Tum, Hat Thong Sala, Hat Ban Tai and Hat Thong Nai Pan.

3) "The natural beach" is hardly suitable for tourism development and should not be fully developed in order to conserve the natural environment. Agricultural communities may be allowed in this area. Tourism in this area should be limited to minimum as nonaccommodation places. This type of beach include Hat Phang-ka, Hat Na Khai in Ko Samui; Hat Nam Tok Than Sa-det, Hat Kruat in Ko Phangan; a shingle beach at the south of Ko Taen, Ka Mat Sum, and Ko Mat Lang.

4) "The conservation beach" is the areas proclaimed to be the National Park area, including parts of Ko Taen, small islands and coral reefs to the south of Ko Samui. Ko Toa should also be considered for this class.

Figure 7 illustrates the beach areas as classified above.

3.2 Development of the roads entering the beach area

1) A network of roads connecting the community beaches and progressive tourism beaches should be constructed for travelling

convenience, eg. the roads connecting Hat Chaweng - Hat Choeng Mon - Hat Bang Rak in Ko Samui; Hat Ban Tai - Hat Rin; Hat Ban Tai - Hat Thong Nai Pan - Hat Chalok Lam - Hat Mae Hat - Hat Sri Tgaby - Hat Wok Tum in Ko Phangan.

2) The roads leading to and within the beach areas should be improved to be standard ones with proper water drainage and traffic systems, eg. Hat Lamai, Hat Chaweng, Hat Mae Nam, Hat Thong Yang and Na Thon Market in Ko Samui. Construction of a bypass to avoid running through the Na Thon Market community area should be specifically considered.

As for Ko Phangan, roads within Thong Sala Market should be improved to properly organize the community area.

3) Public entry to the beach area should be provided for the uses of fishermen and day tourists. Implementation of this plan maybe difficult since the beach areas are privately owned. The private sector should be encouraged to establish tourism center at various beaches to provide activities, services and public entry to the beach area for tourists and other people. Among the first priority beaches are Hat Chaweng, Hat Lamai (improve the area near Flamingo Disco Theque), Hat Bo Phut and Hat Mae Nam.

Roads construction should be built not close to the beach except in Nathon Market, and should have a proper size, good surface quality at least up to the Public Works Department's standard.

3.3 Infrastructure development

1) Electricity and telephone services should be expanded especially in the progressive tourism beaches.

2) Water supply should be expanded in production and distribution in the community and progressive tourism beaches. The

water supply pipeline should reach the nearest position to the beach area.

3) Water reservoirs should be constructed in greater number to serve Ko Phangan and Ko Samui at various locations nearest to the beach area such as Phru Chaweng in Ko Samui; Phru Hat Rin in Ko Phangan.

3.4 Environmental conservation management system

1) Water drainage and central waste water treatment system for Na Thon Market, Hat Lamai and Hat Chaweng should be designed and constructed.

2) Water drainage system at other beaches should also be designed for future expansion and used as a guideline for preliminary implementation by the private sector.

3) Waste water treatment system should be constructed in every business places under close supervision.

4) Local vegetation in the beach area should be maintained to keep the ecology and the typical atmosphere of the island.

5) Refuse collection system should be available throughout the island. Private refuse collection service should be closely supervised. Land for garbage disposal site should be purchased.

6) Beach cleanliness campaign should be organized regularly.

7) Environmental control measures should be strictly enforced to cover the bungalows and hotels with less than 80 rooms.

3.5 Private investment promotion

- 1) Assistance and advises on investment should be given to small and medium business entrepreneurs.
- 2) Technical advises on tourism services and environmental conservation should be provided.
- 3) Incentive measure should be given to entrepreneurs who provide effective services and conserve the environment.
- 4) Personel training course should be organized.

3.6 Education for entrepreneurs and people

- 1) Training on environmental conservation should be given to entrepreneurs, teachers and community leaders on regular basis.
- 2) Educational media about environment and conservation concept should be introduced into the school system through various educational media.
- 3) Exhibition and campaign on environment should be regularly organized.

3.7 Improvement on organization and personnel

- 1) The organization capability should be increased in terms of civil manpower and equipment for more effective operation, eg. the number of fire extinguishing trucks, refuse collecting trucks, workers, etc.
- 2) Community participation for manage and conserve the environment should be encouraged by forming groups consisting of government officers, community leader, entrepreneurs, academicians.
- 3) Local administrative body should be reorganized to fit the condition of Ko Samui and Ko Phangan in order to effectively

coordinate development and conservation. Seminar to identify appropriate administrative organization should be held so that the proposal could be forwarded to the Ministry of Interior for further action.

Sub-task Code 622-T : Formulation of statements for management for marine protected areas.

Objectvie :

- (1) to improve existing management of marine parts in Phangnga and Ban Don Bays
- (2) to formulate statements for management for Mu Ko Ang Thong and Phangnga Bay National Parks

Result of the Study

1. Report : Formulation of Statement for management for marine protected area. (Mu Ko Ang Thong National Park and Phangnga Bay National Park)

2. Findings :

SUMMARY OF STATEMENT FOR MANAGEMENT OF PHANGNGA BAY NATIONAL PARK

A preliminary plan for management of Phangnga Bay National Park was developed for a continuous management of Phangnga Bay National Park during 1990 to 1994. The main objective of this plan is to conserve both offshore islands and onshore natural resources including mangrove along coastal areas. The development of public facilities and tourist activities in accordance with natural conditions is also the purpose of this plan. Knowledge and information on the values of natural resources conservation will be distributed to the National Park visitors. According to this plan, the Phangnga Bay National Park will be divided into 7 zones. Management programs are given as follows :

1. A patrol system bared with full efficient load of communication devices and accessories will be formed as a watchdog of natural resources and historic sites. Four national park protection units will be used as operation bases. Marine patrol will be on duty as well

2. Promote and extend of knowledge on natural resource, history and tourist attraction sites in Phangnga Bay National Park through information center, which will be established Exhibition, pamphlet dissemination, tourist accommodation facilities and security will be developed accordingly.

3. Coordinate and cooperate among local people, particularly at Pan Yee island and the customs station, in order to serve tourists without natural resource destruction.

4. Encourage experts and interested people to study managrove ecology and geology, or the related fields. The knowledge gained from the study could be used for National Park development.

Task 623-T : Management Planning for Fishery Resources in Ban Don and Phangnga Bays

Objectives :

1. To formulate an issue-based fishery management plan that can be implemented in the Ban Don and Phangnga Bays.
2. To improve existing plan and implementation means for fisheries management in the Bays.

Result of the Study

1. Report : Management planning for fishery resources in Ban Don and Phangnga Bays

2. Findings :

Management planning for fishery resources in Ban Don Bay

1. Management issues and causes

1.1 Resource degradation

- 1) over exploitation of resources
- 2) the catch of juvenile of economic species

1.2 Conflict between large and small scale fishermen on fisheries practices and resources uses.

1.3 Socio-economic concerns

- 1) low income for coastal fishermen
- 2) limited job opportunity for coastal villagers

1.4 Legal and institutional

- 1) ineffective control of regulatory measures
- 2) inappropriate license fees on the use of fishery resources.

1.5 Education and public awareness

- 1) low public appreciation on fishery resources
- 2) lack of adequate information on fishery resources

2. Policy Recommendations

Based on issues discussed above, the policy guideline for management of fishery resources in Ban Don Bay are recommended as follows:

(1) To revise current legislation to reduce accessibility to marine fishery resources through :

a) reducing destructive fishing effort of push nets and trawlers by increasing net mesh size and phasing out these fishing gears;

b) adjusting the License Fee System to reflect the true public values of marine fishery resources.

This must be administrated on provincial level with the objectives to reduce improper uses and problems of common property fishery resources.

(2) To reduce fishing effort in Ban Don Bay and prevent overfishing by requiring official registration of vessels and control on all new entries.

(3) Developing a Territorial Use Rights in Fisheries (TURF) for fishermen in each zone/locality around Ban Don Bay providing them an opportunity to manage marine fishery resources at their own cost and for their own benefit. Detailed studies for fisheries zonification and community educational program on fishery development must be intensively conducted prior to implementation of TURF.

(4) Installing artificial reefs in locations vital as spawning and nursery grounds for economically valuable marine species.

(5) To provide sufficient personnel, equipment and budget to provincial/district fisheries offices to encourage their taking responsibility to control regulations and to provide community educational programs on fishery management in Ban Don Bay.

(6) To provide an educational program to promote understanding and appreciation among local officials and citizens on socio-economic values of the fishery resources to improve efficiency of management.

3. Management Strategies

Strategy 1. increasing net mesh size

Strategy 2. installing artificial reef

- Strategy 3. developing long term policy on territorial use rights in fisheries.
- Strategy 4. increasing income for coastal villagers
- Strategy 5. adjusting license fee system
- Strategy 6. improving efficiency of provincial/district fisheries offices
- Strategy 7. seeking cooperation from coastal communities for sustainable fishing
- Strategy 8. acquiring more information for effective management plan.

Management planning for fishery resources in Phangnga Bay

1. Management issues and causes

- 1.1 Resource degradation
- 1.2 Conflicts on fisheries practice and resource uses.
- 1.3 Socio-economic concerns
 - 1.3.1 low income for fishermen
 - 1.3.2 limited job opportunities for the coastal villagers.
- 1.4 Legal and institutional
- 1.5 Education and public awareness

2. Policy recommendations

- (1) Improve efficiency of regulatory measure control in Phangnga Bay by requiring official registration of fishing vessels

in the bay and by providing adequate requirements, including enforcement authorities, to provincial fisheries offices so that they can effectively act as a coordinating center in regulatory controls.

(2) Providing job opportunities for the poor small-scale fishermen who have been suffering from earning lower than the subsistence. Assistance is required to migrate them to another productive sector.

(3) Provide education and public awareness on fishery management to local fishing communities to promote their understanding on the objectives and the future benefits of conservative measures and to help strengthen their fisherman organizations which will be used as supporting units for future fishery management program.

(4) Install artificial reefs in locations where acceptable among the fishermen in Phangnga Bay

3. Management Strategies

Issues of fishery resource degradation including conditions of fisheries in Phangnga Bay could be summarized as follows :

(1) It is perceived that the major cause for fishery resource degradation in Phangnga Bay is the illegal operations of trawlers and push nets. Exploitation of marine fisher resources by other small-scale fishing gears such as drift gill net, are considered in the appropriate status.

(2) Limitation on skill, investment ability and geographical condition of fishing ground have induced the fishermen in each community around the bay to employ almost the same type of fishing gears. This unity of fisheries practice has an advantage on the formulation of community-based resource management system. However, fishermen in each community are still lack of information and knowledge on this system. Also fisherman organizations currently

existed in most communities seemed to be not strong enough to implement the concept of fishery management at present.

(3) In spite of being subjected to several fishery conservative measures, the diversity of enforced authorities, both from central and provincial levels, has resulted in controversial control of regulatory measures and, finally, to the ineffective control of those measures.

Based on these conditions, management strategies and actions for achieving better utilization of marine fishery resources in Phangnga Bay must be carried out on multidisciplinary basis. The strategies are in priority as follows.

- Strategy 1. providing education and public awareness on fishery management for local fishing communities.
- Strategy 2. community organization and education to improve compliance with fishery regulations
- Strategy 3. improving efficiency of regulatory measure control
- Strategy 4. providing substituted occupations or fishing ground for remaining small otterboard trawler (with boom) and push net.
- Strategy 5. reducing fishing effort by banning push nets and preventing trawls within three kilometers limit.
- Strategy 6. monitoring and research to provide data to update management and educate local communities

Strategy 7. installing artificial reef.

Task Code 650 : Mapping

Objective :

To provide information in graphic and cartographic forms in order to facilitate planners in both planning and presentation of the information in public forums and technical meetings.

Result of the Study

Maps :

- 1) Base Map
- 2) Topographic Map Showing Contour
- 3) Topographic Map Showing Highway Routes
- 4) Jurisdictional Boundary Map
- 5) Climate Map
- 6) Temperature Map
- 7) Relative Humidity Average Map
- 8) Forest Types Map
- 9) Water Resource Map
- 10) Wildlife Habitat Map
- 11) Irrigation Map
- 12) Mining Map
- 13) Tourism Resource Map
- 14) Industry Site Map
- 15) Infrastructure and Communication Map
- 16) Potential Landuse Map

Division 700 : Pre - plan Implementation

Task 710-T : Public Forums/Technical Seminars

Objectives :

1) to use Public forums/Technical seminars to solicit support from a broad political spectrum and to create public understanding of the approach of the project.

2) to stimulate the RTG agencies interest and sense of participation of the final product of CRM Plan and to fit the CRM ideas into existing sectoral plans.

3) to promote discussion with various agencies the technical findings of CRM Plan and the feasibility of management strategies developed by the project. Follow-up activities and project implementation will be identified with the agreement of RTG agencies.

Result of the Study

WORKSHOPS AND SEMINARS

1) Surat Thani Workshop

Workshop on Coastal Resources Management Strategies and Planning for the Upper South, a one-day National Workshop was held in Surat Thani Province on 7 August 1987. The workshop aimed to stimulate CRM interest among government agencies and local people and to solicit ideas and recommendations from the participants. The workshop was very productive in terms of identifying problems and issues for coastal resources management.

2) Annual Presentation

An Annual Presentation was held in January 1988. The meeting aimed at presenting the results of study carried out during the year 1987 to environmentalists and scientists from various government agencies. Comments from participants were noted and reflected in the Proceeding for Annual Presentation (in Thai).

The technical reports on Annual Presentation combining task papers were distributed in the meeting.

3) Phangnga Bay Workshop

A two-day National Workshop on "Coastal Resources Management Strategies and Phanning for the Upper South" was held at Phangnga's provincial office on 11-12 April 1988. The workshop aimed to stimulate CRM interest among government agencies and the local people and to solicit ideas and inputs from both public and private sectors for the formulation of a preliminary management plan. About hundred of people participated in the workshop which was very productive in terms of identifying problems and potential solutions.

4) Technical Seminar

A one-day Technical Seminar on Coastal Resources Management Planning was held in Surat Thani Province on 24 July 1990, Information and recommendations presented in the seminar will help local agencies and the provincial authorities to understand and be aware of the status of coastal resources of the province.

5) Technical Seminar

A one-day Technical Seminar on Coastal Resources Management Planning was held in Krabi Province on 25 July 1990. Information and recommendations presented in the seminar will lead to the understanding of the problems and issues in coastal resources management for the region.

6) Technical Seminar

A one-day Technical Seminar on "Coastal Resources Administration and Management of Surat Thani" was held in Surat Thani Province on 2 August 1990. The Seminar aimed at presenting information and recommendations to local agencies to understand, coordinate and to be aware of coastal resources in the province. The outcome of the seminar will lead to appropriate management of coastal resources of the Upper South Region.

7) Official Forum/Technical Seminar

An Official Forum for Integrated Coastal Resource Management Plan was held in Pattaya, Chonburi Province, on 9 - 10 May 1991. The Action Plan for Integrated Coastal Resources Management Planning for Upper South Region had been discussed, the recommendations of the forum had been incorporated into the management plan.

Task 720-T Educational Materials and Campaign on Coastal Resources and Environmental Conservation.

- Objectives :**
- 1) To arouse public awareness on coastal resources and environmental conservation.
 - 2) To educate local people on importances of coastal resources, the impacts from various activities, and ways of protecting natural resources and environments.
 - 3) To produce educational materials e.g. booklets, color slides, radio and TV spots, vedeo-tapes to support activities mentioned in 1) and 2)

Result of the Study

1. Media for Public Relation

Task 720-T have prepared the following materials to be used in public relation campaign for coastal resource conservation.

- An audio-visual slide set introducing the project and describing environment issues in the study area was used in the Phangnga Workshop.

- Short advertising spots for airing on radio and TV, brochure, and poster focusing on mangrove conservation are being designed by experts from Faculty of Journalism, Thammasat University.

- NEB Newsletter issued in September 1988 was prepared in coordination with the Division of Information and Environmental Quality Promotion. The issue was specially focus on CRM.

- Environment Magazine "CRM" issue was arranged and disseminated in the year 1989.

- Three booklets/Comics which were distribute to the schools in the coastal area. The list of booklet/comic are as follow :

1. Poisonous and Venomous Marine Animals.
2. Beaches, Shorelines.
3. The Sea, My Dear Friend.

2. Coral Exhibition

As addressed by the Working Group on Tourism Resources and Marine National Park Management Plans (WG 4), the issue of coral degradation is raised for promoting public awareness and pre-plan implementation. The WG4 recognizes the urgent need in coral conservation for Ko Samui and its satellites. Thus preparation of Coral Exhibition to be held in May 1989 at Ko Samui has been carried on through the year 1988. The WG4 made discussion with the Govenor of Surat Thani and Samui operators in October 1988. Consensus has been made to aim at increasing public awareness of the need for coral conservation and providing information to the public on what actions they can take to participate in coral conservation efforts.

The Coral Exhibition was organized by ONEB staff with coordination from Dr.Suraphol Sudara (Task 621-T and other related agencies during 30 April - 4 May 1989 at Samui Island, Surat Thani Province. Main achievement of the exhibition is the success in arousing public awareness on coastal resources and environmental conservation and also educating local people on importance of Mangrove forest on shrimp farming activities.

3. Buoys Placement at Ko Taen

One of the objectives of coral conservation theme set up by WG4 is to improve protection of coral reefs from anchor damage by establishing coral conservation zones and providing buoys at critical reefs. Hence, buoys placement at Ko Taen is planned to be a pilot project for this purpose. The project in coordination with URI/USAID-Thailand CRMP, therefore, have investigated and discussed the sites and method to install buoys. After making campaign in Coral

Exhibition, buoy placement was implemented, about 20 buoys had been placed in Ko Taen area in 1990.

4. Mangrove Planting

The project in cooperation with The Royal Forestry Department had lead a mangrove plantation activity at the coastal area of Surat Thani in order to promote public awareness on mangrove conservation in the project area.

Division 800-T Project Management

Task 810-T : Project Management

Objectives :

- (1) to oversee day-to-day management work
- (2) to facilitate coordination in administrative and financial aspects

Result of the task

Main achievement of the project management task is the accomplishment of the task's objectives and products throughout the long years of day-to-day management work. The series of report under Task 810-T can be summarized as follow :

1. Technical Report Provision

1.1 ONEB Reports

- Annual Presentation Technical Report for 1988
- Proceeding for Annual Presentation
- Preliminary Report for Coastal Resources Management Issues in Phangnga Bay
- Proceeding for Phangnga Bay Workshop
- CAM Planning, Thailand Experience
- Coastal Resources Status of the Upper South Region

2. Periodic Reports

- 2.1 Annual Workplans for 1987 till 1991
- 2.2 Annual reports for 1987 till 1991
- 2.3 Periodic quarterly progress reports
- 2.4 Periodic quarterly financial reports
- 2.5 Final accounting report
- 2.6 Terminal report

7.2 Main achievements

After some years of investigations and researches in different field of coastal resources for Upper South region, list and details of problems and issues associated with different uses and management of coastal resources had been shown and sectoral action plan had been formulated, then brings to the finalization of CRM Plan. It is concluded that main achievements of this project are as follows.

1. Succeed in stimulating the government agencies' interest and participation in the CRM plan and to fit the CRM ideas into the existing sectoral plans.

2. Succeed in arousing local and public awareness on coastal resources conservation coral reef in particular.

3. Developing sectoral plan and strategies for each specific coastal resource, for example strategies for mangrove management including zoning classification of mangrove area etc.

4. Developing CRM plans for coastal development and protection for optimal beneficial use in the long term.

5. Preparing national management policy and strategy for the coastal zone which those activities affecting coastal resources.

6. The finalized CRM Plan which have been discussed and agreed among related agencies was used as the inputs for ONEB to

create the "National Policy/Measures and Action Plan for Coastal Resource Management of Thailand which will be used as the guideline for coastal resources management of the whole country.

7.3 Conclusion and Recommendation

The readiness of government agencies, local communities and local government officials as expressed at the Pattaya Official Forum in July 1991 was used to determine overall projects conclusion and recommendation as follows :

1. Coastal Water Quality Management Plan

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Baht)
			Lead	Supporting		
1.1 Water pollution in Ban Don Bay - Deteriorating Water quality of Tapi River which flows into the Bay - Disposal of household wastewater in the Bay - Potential for severe oil spill incident in Ban Don Bay - Improper aquaculture practices have polluted down stream shrimp ponds - Lack of public awareness and participation in local communities	1. Speed up more effectively control deteriorating water quality 2. Monitoring proper treatment of wastewater systems for small industrial in Ban Don Bay effluent standards strictly 3. Increase penalties and compensation for disposal of Industrials and Mining wastewater into the Bay 4. Establish provincial coordinating organization such as Provincial Committee for Water Quality Control and Follow up 5. Establish Water Quality standards and measures in accordance with beneficial areas. 6. Speed up the announcement of Min of Interior on Building Construction Control Acts B.E.2522 to control disposal of household wastewater following to ONEB standard.	1. Improve provincial capacity on Water Quality follow up and measure	Province Surat-Thani Phangnga Krabi	ONEB Office of Budget Bureau	1992-1995	3.85 M.
		2. Coastal Water Quality monitoring Ban Don Bay and Phangnga Bay	ONEB	Province DIW	1992-1996	2.2 M.
		3. Tin mine pollution abatement Phangnga Bay	DMR	ONEB	1992	0.5 M.

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Baht)
			Lead	Supporting		
	<p>7. Announce Building Construction Control for more areas in Municiple areas in surat-Thani, Phangnga, Sea areas of Ban Don Bay, Phangnga Bay and Krabi Bay</p> <p>8. Speed up the education possibility for details design to construct the Wastewater treatment System in Surat-Thani municiple areas and Ko.Samui in accordance with Town development Plan</p> <p>9. Set up efficiency standard treatment system for household, appropriate to surface water used in Coastal area</p> <p>10. Speed up the establishment of Oil Spill Contingency plan for Ban Don Bay</p> <p>11. Set up standard of wastewater quality from Coastal Aquaculture firm Building Construction Control BE.2522</p> <p>12. Promote public awareness and participation to solve water pollution problems.</p>					

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Baht)
			Lead	Supporting		
<p>1.2 Water pollution in Phangnga Bay</p> <ul style="list-style-type: none"> - Water turbidity from Mining and mined-out land - Water turbidity from erosion and collapsing of opened land surface area - Wastewater and garbages in Community especially Ko.Panyee 	<ol style="list-style-type: none"> 1. Control the standard wastewater quality in Mining area and introduce land improvement in mining-out area and provide allocated fund for improvement 2. Issue the Rules for Opened land surface Control including the penalties and compensation for Soil degradation which effected environments 3. Declare Building Construction Control for more area in Munciple Phangnga, Krabi, Phangnga Bay and Krabi beaches areas 4. Control the impact of road construction on the beach 					

2. Mangrove, Aquaculture and Land use Management Plan

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Baht)
			Lead	Supporting		
Mangrove						
1. Mangrove Degradation - Mangrove forest area had been invaded for shrimp ponds in Ban Don Bay - Turbidity water impact from Mining in Phangnga Bay - Overcutting of Mangrove stands for charcoal, firewood and timber in Ban Don Bay and Phangnga Bay	1. Introduce mangrove zoning and land use control 2. Conduct publicity and educational campaign to local community for local understanding and gain acceptance of land use zoning scheme	1. Land use Management Plan in Ban Don Bay and Phangnga Bay	DLD	Province Surat-Thani Phangnga	1992-1993	-
		2. Pilot project : Multiple use management system for coastal zone in Ban Don Bay	ONEB	RFD, DOF, DLD Province Surat-Thani	1992-1996	7.0 M.
		3. Soil conservation on steepland area of Phangnga Bay	DLD	RFD Phangnga	1992-1993	-
Aquaculture						
1. Low productivity from shrimp Farms in Ban Don Bay - Large-scale clearance of Mangrove which act as spawning and nursery grounds reduces seed stock - Overfishing in off-shore areas using small size mesh nets caused scarcity of shrimp fry - Undeveloped shrimp feeding	- Develop mangrove zoning as of Land use zoning scheme - Training and improve technology to shrimp farm					

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Babt)
			Lead	Supporting		
<ul style="list-style-type: none"> - Construction of ponds on acid sulphate soils <p>2. Pollution in shrimp Farms</p> <ul style="list-style-type: none"> - Excess use of pesticides in shrimp ponds - Overfeeding has polluted downstream shrimp ponds - Inproper in and out water transfer system <p>Land use</p> <p>1. Erosion and degradation increased turbidity and flooding in Rainy season</p> <ul style="list-style-type: none"> - Upland deforestation and extensive replacement of Natural forest with rubber plantation 	<ul style="list-style-type: none"> - Avoid making shrimp ponds in potential acid area, considered from land use zoning scheme. - Use technology for soil improvement. <ul style="list-style-type: none"> - Conduct proper education and promote personnel in the province - Set up central in and out water transfer system <ul style="list-style-type: none"> - Increase personnel and equipment for control and investigate upland deforestation and conservation areas - Conduct education and publicity to the local community in order to make the understanding the necessity of Forest conservation and damage from deforestation - Upland reforestation - Conduct proper Water and Soil conservation 					

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Baht)
			Lead	Supporting		
<ul style="list-style-type: none"> - Low intensity land use practices in Ban Don Bay and Phangnga Bay due to inappropriate land use lack of capital for application of fertilizers etc. - Many farmers have low income from agriculture - Land alternations in the coastal plain for shrimp farms, transport networks and urban developments etc. have increased duration and severity of Coastal flooding in Ban Don Bay - Increasing of turbidity in the river particularly in Phangnga Bay 	<ul style="list-style-type: none"> - Promoting and training proper land use, considered from land use zoning scheme - Increase supported factor for appropriate productivity - Identify flood hazard zones and draw up management measure - Coordination between concerned agencies in mitigation of adverse effects from tin-mining 					

3. Fisheries Resources Management plan

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Baht)
			Lead	Supporting		
1. Degradation of Fisheries - Over exploitation of fishery resources - Excess number of fishing vessels - Increasing use of very small net mesh sizes	- Control using small set mesh sizes - Limited number of Fishing boat - Establish artificial coral reef in Phangnga Bay for laying and nursery ground for caterpillar - Control the prohibit of using some kinds of fishery equipment from February 15 to May 15 in Ban Dan Bay (spawning season) - Suggestion for Sea Turtle perservation by DOF	1. Controlling and reducing illegal fishing in Ban Don Bay and Phangnga Bay through community participation	DOF	Province	1992-1993	6.8 M.
		2. Education program on Fishery management and conservation for local community	DOF	Province NGO Min.of Education ONEB	1992-1993	10.4 M.
		3. Education and Training program on alternative occupations	DOF Province	ONEB NGO	1992-1996	4.2 M.
2. Related Laws and organization - Inappropriate Tax and Fee - Inefficiency Control of rules and measure	- Adjust proper Fishing Tax and Fee - Improve efficiency of provincial Fishery Office and District office for fishing control - Speed up transferring the responsibility of fishing boat registration work from Royal Harbour Department to Royal Forestry Department					

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Baht.)
			Lead	Supporting		
<p>3. Social and Economic</p> <p>4. Education and value of public treasure</p> <ul style="list-style-type: none"> - Lack of public understanding of both the need to conserve fishery resource and the consequences of present pattern of over exploitation <p>5. Gear and Scale conflict</p> <ul style="list-style-type: none"> - Small scale fishermen in both Bays attribute resource degradation and reduced catches to the impacts of large scale fishermen with highly efficient gears. - Gill nets are being damage by push net vessels 	<ul style="list-style-type: none"> - Use buoys to demarcate 3 km. zone and randomly place concrete tetrapods in zone to acts as an obstacle to trawlers. - Increase enforcement personnel and quipment and improve coordination among concerned agencies. - Seeking alternative income for fisherman such as promoting Aquaculture Information dissemination and Industrial training - Build up the cooperation among communities to maintain Fishing by providing education to community concerning ecosystem and Fisheries Resources Managemant - Formulate long tern policy of territorial use rights in fishing system (TURF) - Education Program to local fishermen to improve their understanding of the need for sustainable exploitation of capture fisheries. 					

4. Coral Reef, Beaches and Shorelines in Ban Don Bay

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Baht)
			Lead	Supporting		
<p>Coral Reef</p> <p>1. Coral Degradation</p> <p>- Coral damaged from destructive fishing Methods such as, using reef blasting, use of poisons (cyanide) punding on the reef to drive fish in to encircling nets and damage caused by tourism development</p>	<ul style="list-style-type: none"> - Issue the declaration of prohibiting reefpounding - Issue a Ministerial Notification and Building contractors, strict on using silt catching devices, set up - Wastewater Treatment System and arrang exhibition on low cost silt catchment and treatment system and make available brochure giving relevant information - Declare reef area at Ko Taen Ko Rap and Hin Ang Wang are fishery preservation areas and give the local people advice, training and any support required to enable them to manage the reef system - Set up buoy float near the coral tourist place give information to tour guides and tourists to have appropriate action on Coral Reef 	<p>Project Title</p> <p>1. KO Phangan community based resources management</p> <p>2. KO Taen marine reserve</p> <p>3. KO Samui Shorelines Management</p>	<p>NGO local private sector</p> <p>NGO local private sector</p> <p>NGO local private sector</p>	<p>ONEB TAT RFD CU</p> <p>ONEB TAT RFD CU</p> <p>OVEB TAT RFD DOF CU</p>	<p>1992-1993</p> <p>1992-1993</p> <p>1992-1993</p>	<p>3 M.</p> <p>2 M.</p> <p>13.4 M.</p>

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Baht)
			Lead	Supporting		
<p>2. Lack of Law enforcement related to coral reef</p> <ul style="list-style-type: none"> -Lack of personnel and equipment - Complex and protracted legal processes - No law against selling coral - Lack of awareness about value of coral <p>3. Coral damaged by catching beautiful fishes and shell</p> <p>4. Beaches degradation and erosion</p> <ul style="list-style-type: none"> - Beach Building construction - Garbage and wastewater pollution on the beach 	<ul style="list-style-type: none"> - Need approval from Royal Harbour Department and ONEB for all coral activity - Issue the Law of prohibit selling coral or coral product - Review Coral related law and institutional arrangements to introduce improvement - Strictly on catching approval and number - Educational campaign to the public about Environmental Impact 					

Problem/Issues	Management Response	Project Title for Action Plans	Organization Responsibility		Duration	Proposed Budget (Baht)
			Lead	Supporting		
<p>5. Lack of Public Access to Beaches</p> <ul style="list-style-type: none"> - Hotel and Bungalow construction blocking the public access from the road and treat the beach as a private resourcer with access only for their customers. 	<ul style="list-style-type: none"> - Strictly Law enforcement on controlling construction Beach development and increase penalty - Build in cinerators and wastewater treatment - Speed up introduction to the cause and measure of Beach Erosion - Inform Hotel of Beach access way for public - Study the possibility to preserve Phra Lan Beach as a public place and to convert adjacent area into a historical park 					

Key to Abbreviations

- DIW - Department of Industrial Works, Ministry of Industry
- DLD - Department of Land Development, Ministry of Agriculture and Cooperatives
- DMR - Department of Mineral Resources, Ministry of Industry
- DOF - Department of Fisheries, Ministry of Agriculture and Cooperatives
- NGO - Non government Organization
- ONEB - Office of the National Environment Board
- RFD - Royal Forest Department, Ministry of Agriculture and Cooperatives
- TAT - Tourism Authority of Thailand

8. Summary of Financial Status 1986-1991 and 1992 (1 January - 29 February 1992)

USASEAN

1986-1991 = 0 12,201,933.88

Actual Expenditure

1986-1991, and 1992 (1 January - 29 February 1992)

1986 = 0 196,482.25

1987 = 0 4,855,752.82

1988 = 0 4,433,523.99

1989 = 0 1,197,256.30

1990 = 0 830,316.50

1991 = 0 415,731.50

1992 (1 January - 29 February 1992) = 0 43,291.80

Total = 0 11,972,335.16

Total Actual Expenditure by Task (1986-1991 and 1 Jan. - 29 Feb. 1992)

	1986	1987	1988	1989	1990	1991	1992	Total
210/220	204.00	487,257.00	534,894.67	51,694.00	-	-	-	1,074,049.67
230	-	523,356.00	505,718.60	-	-	-	-	1,029,074.60
240	5,766.00	631,385.25	328,942.25	33,679.50	-	-	-	999,773.00
250	-	136,597.00	309,354.80	17,285.00	-	-	-	463,216.80
260	6,955.50	437,174.27	251,220.00	-	-	-	-	695,349.77
270	19,488.00	460,998.00	590,795.00	20,000.00	-	-	-	1,091,281.00
280	5,691.50	226,992.00	283,372.00	-	-	-	-	516,055.50
290	-	426,220.00	123,249.00	-	-	-	-	549,469.00
310	36,997.00	119,000.00	476,139.75	49,000.00	-	51,000.00	-	732,136.75
320	-	152,642.00	211,285.50	-	-	-	-	363,927.50
410	-	-	-	75,068.00	-	-	-	75,068.00
420	8,480.00	362,149.00	88,591.00	-	-	-	-	459,220.00
610	-	-	2,820.00	-	-	-	-	2,820.00
611	-	-	34,475.00	42,712.00	20,000.00	59,550.00	-	156,737.00
612	-	-	121,812.00	-	-	-	-	121,812.00

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	1986	1987	1988	1989	1990	1991	1992	Total
613	-	-	-	25,000.00	20,000.00	580.00	-	45,580.00
614	-	-	-	40,629.75	29,192.00	7,370.00	-	77,191.75
615	-	-	-	25,350.00	20,000.00	4,420.00	-	49,770.00
621	-	-	24,271.00	136,618.00	33,625.00	5,340.00	-	199,854.00
622	-	-	25,411.83	19,146.00	4,180.00	6,037.50	-	54,775.33
623	-	-	-	34,032.00	69,345.50	1,515.00	-	104,892.50
650	-	-	44,061.00	-	-	-	-	44,061.00
670	-	-	-	220.00	-	-	-	220.00
710	-	-	77,270.00	4,000.00	229,931.50	149,079.00	-	460,280.50
720	-	-	-	141.00	141,586.00	-	-	141,727.00
722	-	-	10,830.00	-	-	-	-	10,830.00
800	112,880.25	891,982.30	389,010.59	-	-	-	-	1,393,873.14
810	-	-	-	622,701.05	262,456.50	130,840.00	43,291.80	1,059,289.35
Total	196,462.25	4,855,752.82	4,433,523.99	1,197,256.30	830,316.50	415,731.50	43,291.80	11,972,335.16

FY 1986 Actual Expenditure

Task	Equip	Salaries	Consult	Hono.	Per Diem	Sup/Mat	Transport	other	Total
210/220-T	-	-	-	-	-	-	-	204.00	204.00
230-T	-	-	-	-	-	-	-	-	-
240-T	-	-	-	-	1,975.00	75.00	3,009.00	707.00	5,766.00
260-T	-	6,180.50	-	-	-	-	-	775.00	6,955.50
270-T	-	-	-	-	12,100.00	1,582.00	4,659.00	1,147.00	19,488.00
280-T	-	-	-	-	2,100.00	205.00	2,819.00	567.50	5,691.50
310-T	-	-	-	-	-	2,073.50	-	34,923.50	36,997.00
320-T	-	-	-	-	-	-	-	-	-
420-T	-	2,965.00	-	-	1,975.00	460.00	3,080.00	-	8,480.00
800-T	-	5,000.00	-	-	63,236.00	19,554.00	11,475.00	13,615.25	112,880.25
Total		14,145.50	-	-	81,386.00	23,949.50	25,042.00	51,939.25	196,462.25

FY 1987 Actual Expenditure

Task	Equip	Salaries	Consult	Hono	Per Diem	Sup/Mat	Transport	Other	Total
210/220-T	-	152,448.00	-	-	248,000.00	4,811.00	81,033.00	965.00	487,257.00
230-T	295,500.00	-	-	-	100,300.00	17,110.00	109,205.00	1,241.00	523,358.00
240-T	21,500.00	123,000.00	-	95,000.00	88,250.00	227,651.00	67,955.00	10,029.25	631,385.25
250-T	7,000.00	37,230.00	-	-	78,475.00	-	12,902.00	990.00	136,597.00
260-T	52,489.80	117,566.00	-	-	192,425.00	20,716.47	39,805.00	14,172.00	437,174.27
270-T	-	67,500.00	-	63,000.00	114,225.00	13,083.00	145,100.00	58,110.00	460,998.00
280-T	-	58,000.00	-	66,000.00	44,300.00	1,075.00	44,319.00	13,298.00	226,992.00
290-T	19,000.00	-	-	-	288,650.00	5,058.00	94,462.00	19,050.00	428,220.00
310-T	-	119,000.00	-	-	-	-	-	-	119,000.00
320-T	-	82,500.00	-	-	45,700.00	1,934.00	9,498.00	13,010.00	152,642.00
420-T	9,900.00	136,986.00	-	40,000.00	94,700.00	4,490.50	67,757.00	8,315.50	382,149.00
612-T	-	-	-	-	-	-	-	-	-
800-T	58,900.00	229,007.00	40,000.00	7,650.00	295,662.50	31,050.00	99,070.00	130,642.50	891,982.30
	525,978.00	464,289.80	40,000.00	271,650.00	1,588,687.50	331,725.27	771,106.00	274,923.25	4,865,618.82

FY 1988 Actual Expenditure

Task	Equip	Salaries	Consult	Hono	Per Diem	Sup/Mat	Transport	Other	Total
210/220-T	-	44,650.00	-	-	285,650.00	83,689.00	100,923.67	19,982.00	534,894.67
230-T	-	17,790.00	-	-	303,225.00	21,410.10	154,577.00	8,716.50	505,718.60
240-T	-	3,000.00	-	70,000.00	46,000.00	133,690.50	47,066.00	29,185.75	328,942.25
250-T	29,000.00	1,525.00	-	-	164,900.00	68,280.00	44,459.80	1,190.00	309,354.80
260-T	-	6,910.00	-	-	172,050.00	13,767.00	41,925.00	16,568.00	251,220.00
270-T	-	30,000.00	-	116,000.00	136,600.00	1,940.00	215,144.00	91,111.00	590,795.00
280-T	-	14,000.00	-	66,000.00	82,350.00	15,363.00	79,917.00	25,722.00	283,372.00
290-T	13,050.00	-	-	-	34,800.00	40,743.00	13,856.00	20,800.00	123,249.00
310-T	-	42,000.00	-	33,000.00	142,675.00	7,283.00	83,684.00	167,497.75	476,139.75
320-T	-	7,500.00	-	-	-	12,979.50	47,445.00	143,361.00	211,285.50
410-T	-	-	-	-	-	-	-	-	-
420-T	-	2,965.00	-	35,000.00	24,450.00	750.00	25,322.00	104.00	88,591.00

FY 1988 Actual Expenditure (continued)

Task	Equip	Salaries	Consult	Hono	Per Diem	Sup/Mat	Transport	Other	Total
610-T	-	-	-	-	-	-	-	2,820.00	2,820.00
611-T	-	-	-	25,000.00	-	-	-	9,475.00	34,475.00
612-T	-	-	-	-	83,075.00	719.00	37,117.00	901.00	121,812.00
621-T	-	-	-	-	12,150.00	445.00	11,175.00	501.00	24,271.00
622-T	-	-	-	-	6,000.00	2,522.00	16,889.83	-	25,411.83
650-T	-	-	-	-	33,975.00	-	9,421.00	685.00	44,061.00
710-T	-	-	-	-	24,325.00	1,909.00	22,096.00	28,940.00	77,270.00
722-T	-	-	-	-	7,375.00	-	3,455.00	-	10,830.00
800-T	6,336.00	186,589.00	-	-	12,400.00	15,214.09	62,599.00	69,872.50	389,010.59
Total	48,386.00	356,929.00	-	345,000.00	1,572,000.00	456,704.19	1,017,092.30	637,412.50	4,433,523.99

Task	Equipment	Saliries	Hono	Per Dien	Sup/Mat	Transport	Others	Total
210/220-T	-	21,450.00	-	-	30,244.00	-	-	51,694.00
240-T	-	-	28,000.00	-	370.50	-	5,309.00	33,679.500
250-T	-	6,100.00	-	-	11,165.00	-	-	17,265.00
270-T	-	5,000.00	15,000.00	-	-	-	-	20,000.00
310-T	-	49,000.00	-	-	-	-	-	49,000.00
410-T	-	-	68,000.00	1,875.00	-	5,193.00	-	75,068.00
611-T	-	-	40,000.00	-	-	-	2,712.00	42,712.00
613-T	-	-	25,000.00	-	-	-	-	25,000.00
614-T	-	-	20,000.00	7,000.00	188.00	11,630.00	1,811.75	40,629.75
615-T	-	-	20,000.00	750.00	255.00	3,115.00	1,230.00	25,350.00
621-T	-	-	-	19,375.00	4,984.00	23,179.00	89,080.00	136,618.00
622-T	-	-	-	-	19,000.00	-	146.00	19,146.00
623-T	-	7,500.00	20,000.00	2,375.00	-	2,550.00	1,607.00	34,032.00
670-T	-	-	-	-	220.00	-	-	220.00
710-T	-	-	-	-	-	-	4,000.00	4,000.00
720-T	-	-	-	-	-	-	141.00	141.00
810-T	269,900.00	241,547.00	-	32,875.00	15,234.05	25,610.00	37,535.00	622,701.05

Total 269,900.00 330,597.00 236,000.00 64,250.00 81,660.55 71,277.00 143,571.75 1,197,256.3000

FY 1990 Actual Expenditure

Task	Equipment	Honoraria	Salary	Per Dien	Sup/Mat	Transportation	Others	Total
410-T	-	-	-	-	-	-	-	-
611-T	-	20,000.00	-	-	-	-	-	20,000.00
613-T	-	20,000.00	-	-	-	-	-	20,000.00
614-T	-	20,000.00	-	2,250.00	345.00	6,077.00	520.00	29,192.00
615-T	-	20,000.00	-	-	-	-	-	20,000.00
621-T	-	29,570.00	-	-	-	-	4,055.00	33,625.00
622-T	-	-	-	2,800.00	-	1,380.00	-	4,180.00
623-T	-	42,000.00	-	7,900.00	2,451.00	12,860.00	4,134.50	69,345.50
710-T	-	-	-	44,300.00	14,343.00	111,210.00	60,078.50	229,931.50
720-T	-	-	-	15,000.00	-	11,344.00	115,242.00	141,586.00
810-T	-	-	179,013.00	6,825.00	16,077.00	6,858.00	53,683.50	262,456.50
Total	-	151,570.00	179,013.00	79,075.00	33,216.00	149,729.00	237,713.50	830,316.50

FY 1991 Actual Expenditure

Task	Equipment	Honoraria	Salary	Per Diem	Sup/Mat	Transportation	Others	Total
310-T	-	51,000.00	-	-	-	-	-	51,000.00
613-T	-	-	-	-	-	-	580.00	580.00
614-T	-	-	-	-	-	-	7,370.00	7,370.00
615-T	-	-	-	-	-	-	4,420.00	4,420.00
621-T	-	430.00	-	-	-	-	4,910.00	5,340.00
623-T	-	-	-	-	-	-	1,515.00	1,515.00
611-T	-	50,860.00	-	-	-	-	8,890.00	59,550.00
622-T	-	5,000.00	-	-	-	-	1,037.50	6,037.50
710-T	-	-	-	61,125.00	3,309.00	48,030.00	36,615.00	149,079.00
810-T	-	-	29,200.00	1,775.00	52,781.00	3,865.00	43,219.00	130,840.00
Total	-	107,290.00	29,200.00	62,900.00	56,090.00	51,895.00	108,356.50	415,731.50

FY 1992 Actual Expenditure (1 January - 29 February)

Task	Equipment	Honoraria	Per Diem	Sup/Mat	Transportation	Others	Total
810-T	-	-	-	-	-	43,291.80	43,219.80
Total	-	-	-	-	-	43,291.80	43,291.80

9. Summary of in-country contribution

No.	Description	Duration	Amount (Baht)	Total (Baht)	Remark
1.	Thailand's Contributing in 5 year period	1987-1988	2,340,800	2,340,800	Allocated amount
		1989	998,800	998,800	
		1990	558,800	558,800	
		1991	301,600	301,600	
2.	Team of management personnels - Deputy Secretary general ONEB Dr.Pakit Kiravanich allocated 20% of his time	Jun.1986 - Sept.1986		16,000	Estimated cost
	- Secretary general ONEB Mr.Arthorn Suphapodok acting as Project Director allocated 20% of his time	Oct.1986 - Dec. 1991	48,000/ year	252,000	Estimated cost
	- Director of Environmental Impact Evaluation Division Mr.Chalerm Sak Wanichsombat acting as Assistant Project Director allocated 20% of his time	July.1986- Sept. 1990	31,200/ year	140,400	Estimated cost
	- Director of Natural Resources and Environmental Management Coordination Division Dr.Saksit Tridech acting as Assistant Project Director allocated 20% of his time	Sept.1990- Dec. 1991	36,000/ year	48,000	Estimated cost

No.	Description	Duration	Amount (Baht)	Total (Baht)	Remark
	- Chief of Communication Section Dr. Teerayuth Poopeth acting as Project Manager allocated 60% of his time	July 1986- June 1987	72,000/ year	144,000	Estimated cost
	- Chief of Technical and Procedural Section Mrs. Chandhana Indhapanya acting as Project Manager allocated 60% of her time	Feb. 1988 - Nov. 1991	108,000/ year	486,000	Estimated cost
	- Chief of Water Resources Section Mrs. Orapin Wongchumpit acting as Assistant Project Manager allocated 70% of her time	July 1987- Dec. 1991	84,000/ year	462,000	Estimated cost
	- Senior Environmental Technologist Dr. Sirikul Bumpapong acting as Assistant Project Manager for technical aspect allocated 70% of her time	July 1986 March 1989	57,600/ year	158,400	Estimated cost
3.	Team leaders who are in Senior executive level and university professors from various government agencies and universities who involve	July 1986 Dec. 1989	54,000/ year	216,000	Estimated cost

No.	Description	Duration	Amount (Baht)	Total (Baht)	Remark
	in doing studies researches and performing in some parts of the project allocated 50% of their time				
4.	A furnished office space with air conditioning and a laboratory with facilities	June 1986- Dec. 1991	120,000/ year	600,000	Estimated cost
				0	
5.	Two Vehicles to be used for project activities, including gasoline, supplies and maintenance	July 1986- Dec. 1991	240,000/ year	1,080,000	Estimated cost
6.	Provincial meeting, discussion, and Co-ordination for Upper South Provincial Working Group meeting allocated budget, facilities, Overtime for staffs, manpower, transportation and etc.	Jan.1987 - Dec. 1990	80,000/ year	320,000	Estimated cost
7.	To carry on the activities of Mangrove Reforestation in Phangnga and Surat Thani this estimate cost included all expenses of provinces concerning Reforestation campaign such as Posters, Manpower, Food, Drink	Jan.1989 - Dec.1990.	100,000/ year	200,000	Estimated cost

No.	Description	Duration	Amount (Baht)	Total (Baht)	Remark
8.	<p>Volunteers, transportation and etc.</p> <p>Workshop/Technical seminar (3 workshops, 2 technical Seminars) in Surat Thani, Phangnga and Krabi.</p> <p>Provincial expenditure allocated for co-ordinating to related agencies in the provinces, facilities for conducting Workshops/technical Seminar, Manpower, local participation and etc.</p>	Jan.1989 - Dec.1990	100,000/ each Workshop/ technical	500,000	Estimated cost
9.	<p>Donors from private agencies amount of B 99,450 and provincial expenditure, facilities, local participation, Manpower newspaper advertisement and etc.</p> <p>devoted to the activities of Coral Exhibition at Ko Samui, Surat Thani</p>	25 April - 5 May 1989		199,450	

10. Equipment purchased

Inventories of Office Equipment. Thailand, October 1985 - April 1991

<u>Description/serial no.</u>	<u>QTY</u>	<u>Location</u>	<u>Remarks</u>
1. Computer with accessories (IBM Pc/XT Compatible with printer) Serial no. 347467	1 set	DIEIE, ONEB	good working condition
2. Van Vehicle - Nissan Urvan white in colour, serial no. Z20-786448, plate no.41138	1 unit	DIEIE, ONEB	good working condition
3. Viewer for slides (CENEI Scoper 400)	1 unit	DIEIE, ONEB	good working condition
4. Solar dual calculator (CITIZEN SDC - 865)	1 unit	DIEIE, ONEB	good working condition
5. Portable pH meter (CHEM - TRIX TYPE 400)	1 set	LDD	good working condition
6. Conductivity meter (HATCH model 17250 mini type with probe and battery)	1 set	LDD	good working condition
7. Spectrophotometer 301 220 V., 50 Hz.	1 unit	CU	good working condition
8. Acid purifying apparatus (Berghof)	1 unit	CU	good working condition
9. Go Flo bottle with accessores (Teflon coat)	1 set	CU	good working condition

<u>Description/serial no.</u>	<u>QTY</u>	<u>Location</u>	<u>Remarks</u>
10. Portable pH meter (Orion SA 250)	1 set	CU	good working condition
11. Water Sampler (Kammerer type : 1.2 liters, O.D. 3.0)	1 unit	EQSD, ONEB	good working condition
12. Van vehicle serial 2L-14647 (Toyota Hi-ace), white in colour	1 unit	MFD, DOF	good working condition
13. Microscope stereozoom (Bausch Lom)	1 set	MFD, DOF	good working condition
14. Salinity refractometer	1 set	PMBC	good working condition
15. Vacuum Pump (General electric, Vacuum 0 - 30 in Hg. serial no.0887)	1 set	PMBC	good working condition
16. Towing Flow meter (T.S.K., Towing distance 4 miles, Depth measuring range 500 m. Serial no.4758)	1 set	PMBC	good working condition

<u>Notes</u>	DEIE :	Division of Environmental Impact Evaluation
	ONEB :	Office of the National Environment Board
	LDD :	Land Development Department
	CU :	Chulalongkorn University
	EQSD :	Environmental Quality Standard Division,
	MFD, DOF :	Marine Fisheries Division, Department of Fisheries
	PMBC :	Phuket Marine Biological Center, Phuket Province

11. TRAINING

11.1 Short - term training course

a. Principles in Coastal Resources Management

Duration : 1 - 13 March 1987

Participants : Ms.Ampai Harakunarak
Mr.Surapon Vadhanakul
Miss.Surang Thipyothin
Mr.Wuttichart Sirichuaychoo
Mr.Vipak Jintana

Duration : 10 - 21 August 1987

Participant : Mr.Pongsak Wongwisnupong
Mr.Suparp Pripanapong

Duration : 3 - 16 April 1988

Participants : Ms.Anong Chanamol
Ms.Somsri Watcharasinthu

- Principle of Economic Valuation of Coastal Resources

Duration : 7 - 20 May 1990

Participants : Mr.Noppadol Thiyachai
Dr.Ampan Pintukanok

b. Information Research and Management

Duration : September 29 - October 12, 1986

Participants : Dr.Sittiporn Kajornatiyudh
Mr.Preeraphol Tejjate

c. Remote Sensing Application in Coastal Resources Management
- Geographical Information System (GIS)

Duration : 1 - 12 November 1988

Participants : Mr. Adisak Kanjanasakha
Mr. Pramote Nilthanom

- Remote Sensing and GIS

Duration : 3 - 15 December 1990

Participants : Mrs. Wilailux Sangtaksin
Mrs. Indhira Euamonlachat

d. Method of Socioeconomic Analysis in Coastal Resources
Management

Duration : 3 - 15 November 1987

Participants : Mrs. Orapin Wongchumpit
Mr. Songsith Limsakul
Ms. Titaya Tweesak

11.2 On - the - Job - Training

a. In ASEAN Countries

: Fish Stock Assessment

Duration : 4 November - 4 December 1990

Participant : Mr. Taweep Boonwanich

Nature of Training : - Participate in scheduled activities and follow the timetable prepared for the course unless otherwise revised by the local coordinator

- Prepare a full report which would include the knowledge and skills gained, information obtained during the course as well as an assessment of the course.

Scope : 1. To learn the fundamental techniques in field data collection for fish stock assessment.

2. To participate in UPV-CF and MSI on - going projects related to fish stock assessment.

3. To apply the ELEFAN method in data analysis.

Coastal Habitat Management

: Mangrove Management

Duration : 4 November - 4 December 1990

Participant : Miss Preeyaporn Prompitak

Nature of Training : Participate in all training activities and to do the assigned work accurately, conscientiously and diligently including field works.

: Undertake a case study on habitat management mangrove in the context of application in Thailand and prepare relevant materials for such case study prior to attending the training.

Scope : The training will cover introduction to various coastal habitats - mangroves, and how the ecosystems are inter-related and function. The importance of mangrove (biological and economic) will be covered. Case studies on mangrove management will be undertaken to include resources assessment, monitoring, formulation of management strategies and assessment of implemented management measures.

b. In U.S.A.

: The Summer Institute in Coastal Management
The University of Rhode Island, U.S.A.

Duration : June 2 - 29, 1991

Participant : Mrs. Chandhana Indhapanya

Nature of Training :

1. Lectures (Indoors and Out doors ie. on Shorefront Dev't)
2. Group Discussions and Presentations
3. Case Studies
4. Field Trips
5. Frequent Evaluations (of the Course) and Improvements.

Scope of the Training :

1. Environmental Conservation and Management
 - Sustainable Development
 - Importance of Coastal Environment

- U.S. Experience in Coastal Management
- URI-USAID Program Approach in CRM
- 2. Habitat Protection
- 3. Health and the Environment
- 4. Population and the Environment
- 5. Shorefront Development
- 6. Water Quality
- 7. Tourism Development
- 8. Introduction to the CRM Process
- 9. Creating a Focus for a CRM Program
- 10. Designing a Framework CRM Strategy for Shrimp Mariculture
- 11. Designing a Geographically Specific CRM Strategy
- 12. Implementing CRM Programs
- 13. A Case Study in CRM Implementation : Coral Mining in Sri Lanka
- 14. Cape Cod Field Trip
- 15. How CRM Programs Evolve and Change (The Rhode Island Example)
- 16. Implementing CRM Programs : An Administrative Perspective
- 17. Skills and Roles for the CRM Manager
- 18. Training Assessment and Applications to Job at Home.

Required Core Courses :

ECN 3210	Microeconomic Theory I
ECN 3220	Macroeconomic Theory I
ECN 3240	Statistical Inference
ECN 3241	Econometrics I

Economic Fields :

Available economic fields are listed below. Under each field are stated the required field courses and the elective field courses. Students must take at least twelve quarter hours in one field of concentration. In all fields, the first listed required course in the field ordinarily should be taken first by the student majoring in the field. For students not majoring in the field, courses in the field may be taken in any sequence.

Manpower Economics

Required field courses :

ECN 3350	Economics of the Labor Market and Labor Force I
ECN 3352	Economics of Manpower Planning I
ECN 3359	Seminar in Human Resource Development

Elective field courses :

ECN 3351	Economics of the Labor Market and Labor Force II
ECN 3353	Economics of Manpower Planning II
ECN 3354	Economics of Medical Care & Health Manpower
ECN 3355	Economics of Human Capital
ECN 3356	Local Labor Market Research Methods & Problems
ECN 3357	Human Resources Planning at State and Local Areas
ECN 3358	Economics of Education & Training Policy

Urban/Regional Economics

Required field courses :

ECN 3360	Regional Economics
ECN 3363	Urban Economic Systems
ECN 3364	Urban Economic Development

Elective field courses :

- ECN 3365 Urban Transportation Economics
- ECN 3371 Regional Development
- ECN 3383 Intergovernment Finance

Development Economics

Required field courses :

- ECN 3370 Economic Development
- ECN 3371 Regional Development
- ECN 3379 Developmental Planning Seminar

Elective field courses :

- ECN 3352 Economics of Manpower Planning I
- ECN 3360 Regional Economics
- ECN 3372 Comparative Economic Development
- ECN 3373 Developmental Finance and Trade

Public Finance

Required field courses :

- ECN 3390 Public Finance Theory I
- ECN 3391 Public Finance Theory II
- ECN 3392 Public Policy and Finance

Elective field courses :

- ECN 3373 Development Finance and Trade
- ECN 3379 Development Planning
- ECN 3381 Monetary Policy
- ECN 3399 Seminar in Public Finance

Economics of Money and Finance

Required field courses :

- ECN 3380 Monetary Theory
- ECN 3381 Monetary Policy
- ECN 3389 Money Credit Banking Seminar

Elective field courses :

ECN 3373 Development Finance and Trade
ECN 3382 Public Policy & Finance
ECN 3383 Intergovernment Finance
ECN 3384 Capital Markets

11.3 Medium - term Academic training (Masteral level)

: Master of Arts in Economics Northeastern University
Massachusetts, U.S.A.

Duration : 2 year Training programs
(Sept 1987 - 1989)

Participant : Mr. Saksayam Varakamin

Course description : Forty quarter hours of academic work is required. This program comprises sixteen quarter hours of required core coursework and twenty - four quarter hours of electives, of which a minimum of twelve quarter hours must be selected from one of the economic fields listed below. The required core courses must be completed as soon as possible. With the prior approval of the graduate director, a student may select a maximum of six quarter hours from graduate courses offered by other departments or two advanced undergraduate courses in economics carrying three quarter hours of graduate credit each

Comprehensive Examination :

A comprehensive examination, which will be held in accordance with the general Graduate School regulations, must be taken by all students during the quarter in which the student completes the forty quarter hours of academic work. The examination may be repeated only once.

Master's Thesis :

A master's thesis for six quarter hours of credit is optional with the approval of the graduate adviser. Approval will be granted only in those instances in which a student's previous graduate work indicates capacity for independent study.

12. In - Country, Regional and International meeting

1. Title : The Meeting with ASEAN CRAMP National Staff
(NEB)
- Place : Pattaya, Chonburi
- Date : October 16, 1986
- Objective : Discussion on administration and financial matters concerning sub-project implementation
- Participants : Dr. Chua Thia-Eng
Mr. Chalernsak Vanichsombat
Dr. Teerayut Poopetch
Dr. Sirikul Bunpapong
- Results : The resolution of the Meeting are as follows :
- Personnel Matter, agreed to hire two staffs under project funds
 - Renting a xerox machine
 - Workshop Expense
 - Communication
 - Procurement of Equipment
 - Per Diem Calculation
 - Mails/Telephone

2. Title "Training Course on Principles of Coastal Resources Management"

Place : Bangkok, Phangnga Bay

Duration : 1 - 13 March 1987

Objective : To introduce researchers, resource managers and policy makers to the principles of integrated CRM. Such a course would create a common analytical and philosophical base for CRM in the participating ASEAN Countries.

Participants :

Malaysia : Mr. Jebasingam Issace
Mr. Abdul Karim Bin Haji Hassan

Brunei : Mr. Abdul Halidi Bin Mohd Salleh

Indonesia : Mr. Ben Burhanuddin Abdul Malik
Mr. Sri Yono Wirjosuwarno

Singapore : Ms. Maylene Loo Geok Kuan
Mr. Hoe Beng Lee

Philippines : Dr. Liana Mc. Manus
Ms. Ester Zaragoza

Thailand : Ms. Surang Thipyothin
Ms. Ampai Harakumrak
Mr. Vipak Jintana
Mr. Watthichat Sirichuaychoo
Mr. Surapon Wattanakul

Results : Fruitful lectrue and have a great deal for the formal and informal interactions

3. **Public Forum on the Feasibility of Management strategies and Planning, Place Suratthani province**

Date August 7, 1987

Objective

1. To introduce the project to the local community
2. To provide information to date in the main management problems
3. To find out of the management a strategies and identification of project follow up activities and of project implementation structure.

Participants : 28 participants from central government agencies
43 participants from local government agencies
29 participants in Surat Thani and form other agencies

Result : Major points had been discussed and several strategies were recommended as follows :

1. Improving efficiency in land use through allocation of land development zone by means of preparing a land use development plan and national land policy
2. Reviewing and amending the existing laws and regulations which are related to land utilization and ownship of shorelines areas (including beaches and manpowers)
3. Initiating coordinated programs among the profession of government agencies and committee with responsibilities for land in order to provide technical assistance, demonstrations and advice directly to famers regarding the selection of suitable crops, improvement of land or the conservation of soil and water.

4. National Workshop on Coastal Resource Management
strategies and Planning of Upper South

Place : Phangnga Province

Duration : 11 - 12 April 1988

Objective : Aims to stimulate government agencies's and local people's interest in CRM plan and to solicit from both public and private sectors the ideas and inputs for the formulation of preliminary management plan at the early stage.

Participants : Over a hundred participants attending the Workshop Comprised members of the National Steering Committee, project management team representing the ONEB, Department of Fisheries, Royal Forestry Department Chulalongkorn University Kasetsart University, Mahidol University Department of Land Development and Phuket Marine Biological Center, Representative from central, provincial and local government agencies, private sectors as well as interested individuals.

Results : Main points discussed at the workshop include the resources issues identification prioritization of those issues recommendation for strategies and brainstorming for alternative approaches for coastal management and planning. The environmental issues and findings of Phangnga Bay were conveyed to local people concern. Group discussions of various aspects of issues with sequential priorities were reached Integrated management strategies were proposed from the forum

5. Coral Exhibition,

Place : Ko Samui, Surat Thani

Duration : 25 April - May 5 1989

Objective :

1. To formulate strategies and implementation means for coral use and conservation at Ko Samui and it sattelete island.
2. To identify implementation framework for coral management plan.
3. To promote public awareness in coral conservation at Ko Samui.

Participants : Participants from ONEB Chulalongkorn University Tourism Authority of Thailand, Kasetsart University, World wildlife Fund, Mahidol University, TISTR and the province of Surat Thani.

Results : The seminar initiated the idea and help of local residents in conserve local Natural Resources. The plan for coral Management in Ban Don Bay was discussed in the meeting. Participants were wildly aware of Touisim Development impact on Coastal Resources. Recommendation made will serve as the Framework for Tourism Resources Management plan in Ban Don Bay. The Multidisciplinary concerns and some possible solution will be published as the proceeding before the year ends.

6. Technical Seminar "Natural Resources and Environment
Administration and Management

Place : Phangnga, Krabi and Surat Thani Provinces.

Duration : July 24, 25 and August 3 1990:
Phangnga July 24, 1990 :
Krabi July 25, 1990
Surat Thani August 3, 1990

Participants : Participants of the seminar comprised of members of the National Steering Committee, project investigators, representatives from local and provincial government agencies with interests in CRM, private sectors as well as interested individuals.

Phangnga	100	participants
Krabi	170	participants
Surat Thani	100	participants

Objective :

1. To use Public forums/Technical Seminars to solicit support from a broad political spectrum and to create public understanding of the approach of the project.
2. To stimulate the RTG agencies interest and sense of participation of the final product of CRM Plan and to fit the CRM ideas into existing sectoral plans.
3. To promote discussion with various agencies the technical findings of CRM Plan and the feasibility of management strategies developed by the project. Follow up activities and project implementation will be identified with the agreement of RTG agencies.

Results : Information and recommendation presented in the seminar help local agencies and the province authorities to understand and be aware of the status of coastal resources of the province which in turn will lead to appropriate management of coastal resources of the Upper South region.

7. Official Forum

Place : Pattaya, Chonburi

Duration : 8 - 10 May 1991.

Objective :

1. To stimulate the Royal Thai Government agencies' interest sense of participation of the final product of CRMP.
2. To set CRMP proposal for submitting to the cabinet for National Development Policy.
3. To present guidelines for the management of coastal development based on CRMP which can facilitate implementation.
4. To distribute CRMP information to the public and related agencies to promote CRM awareness.

Participants : Participants from ONEB, DOR, RFD, LDD, Provincial authorities in Phuket Surat Thani, Phangnga and Krabi Provinces

Results : Participants' brainstorming in major issues of Coastal Resources utilization and Conservation approaches leading to plan development and project follow up activities under CRM plan Formulation and Implementation Division and CRMP Proposal had been set to submit to the cabinet for the National policies.

International Meeting attended

1. 1st - 7th PSC. Meeting 1986 - 1991.
2. Technical Workshop on Integrated Tropical Coastal Area Management - Singapore.
3. Seminar on Coastal Area Management - Malaysia.
4. Two weeks Training course on Integrated Coastal Water Management - Indonesia
5. Management and Training Workshop on Pyrodinium red tides - Brunei Darussalam
6. The Tropical Coastal Area Resource Management and Planning Workshop - Southeasten U.S.A.
7. CRM Policy Meeting - Manila Philippines
8. The Sixth Symposium on Coastal and Ocean Management - South Carolina, U.S.A.
9. Conference on Combatting Waste Management Problem in the Coastal Area of the ASEAN Region - Singapore.
10. Regional Workshop on Coastal Area Planning and Management in ASEAN : Lessons Learned 27 - 30 April 1992, Bandar Seri Begawan Brunei Darussalam.

13. List of publications from the project

No.	Date	Task	Title	Quantity	Amount (Baht)
1.	10 Apr.89	621-T	Posters for Publicizing	500 pieces	9,000
2.	10 Apr.89	621-T	Scheduling Brochure in Thai	500 pieces	900
3.	10 Apr.89	621-T	Scheduling Brochure in English	500 pieces	900
4.	27 Apr.89	621-T	Coral Books	3000 books	29,985
5.	27 Apr.89	621-T	Stickers for Coral Exhibition	500 sheets	1,500
6.	17 May 90	720-T	Poisonous and Venomous of the Marine Animals	1000 books	30,000
7.	3 Aug.90	20-T	The Sea my Dear Friend	2,000 books	38,000
8.	3 Aug.90	720-T	Beaches, Shorelines	2,000 books	42,000
				Total	152,285

14. List of Reports/Publications arising from the project.

In English

No.	Task	Title
1.	210-T	Annex : Integrated Coastal Resources Development and Management Planning Upper South Coastal Development Zone Thailand Coastal Aquaculture
2.	210-T	Final Report : Integrated Coastal Resources Development and Management Planning Upper South Coastal Development Zone Thailand Coastal Aquaculture
4.	230-T	Natural Marine Resources Survey in Ban Don Bay
5.	230-T	Evaluation of Fisheries Development Potential and Feasibility for Sustainable Management
6.	240-T	Assessment of the Coastal Environmental at Ban Don Bay
7.	250-T	Final Technical Report on Coastal Environment of Phangnga During January 1987 - August 1988
8.	250-T	Guidelines for the Environmental Management of Phangnga Bay
9.	260-T	Final Report : Land - Based Pollution Study/Pollution From Vol.1A Coastal Zone Development
10.	260-T	Annex : Land - Based Pollution Study/Pollution From Coastal Vol.1b Zone Development
11.	260-T	Executive Summary and Management Plan Vol.2

No.	Task	Title
12.	270-T	Evaluation of Mangrove Development Potential of Phangnga and Ban Don Bays for Coastal zone Management, Thailand.
13.	280-T	Final Report on Wildlife Resources of Ban Don Bay
14.	280-T	Final Report on Wildlife Resources of Phangnga Bay
15.	290-T	Evaluation of Land Capability Use Development Potentials
16.	410-T	Legal and Institutional Arrangements for Management of Coastal Resources in Thailand
17.	420-T	Management of Coastal Tourism Resources at Phangnga Bay
18.	420-T	Management of Coastal Tourism Resources at Ban Don Bay
19.	611-T	An Issue Based Action Plan for the Upper South Sub-Regions' Coastal Zone: A Contribution forwards regional sustainable development
20	611-T	Integrated Technical Reports of the Coastal Resources Environmental Studies of the Upper South, Thailand
21.	613-T	Management Guidelines for Coastal Resources and Activities
22.	613-T	Policies and Measures for the Management of Coastal Resources /Activities in Ban Don Bay and Phangnga Bay, Thailand.
23.	614-T	Management Plan for Coastal Water Quality in Ban Don Bay and Phangnga Bay
24.	621-T	Management Planning for Coral Reef and Island of Ko Samui, Ko Phangan and Ko Taen

No.	Task	Title
25.	621-T	Management Planning for Coral Reef, Beaches and Island Environments in Ban Don Bay, Surat-thani
26.	623-T	Management Plan for Fishery Resources in Ban Don Bay, Surat-Thani
27.	623-T	Management Plan for Fishery Resources in Phangnga Bay, Thailand,

In Thai

No.	Task	Title
1.	230-T	Natural Marine Resources Survey in Ban Don Bay
2.	230-T	Natural Marine Resources Survey in Phangnga Bay
3.	310-T	Knowledge, Attitudes and Behavior of Villagers and Business People on Natural Resources Cousevration and the government Program for Tourism Promotion, Samui Island District, Surat Thani Province
4.	310-T	Administration and Management of the Upper South Region Coastal Resources Associated with Toursim : A Case Study of Surat Thani Province
5.	310-T	Mangrove Deforestation and uses in Ban Don Bay, Thailand
6.	320-T	A Plan for the Utilization of Natural Resource in Ban Don Bay
7.	320-T	A Qualitative Socio-Economic Study on a Natural Resources Utilization Plan, Phangnga Bay.
8.	612-T	Initial Environmental Impact Examination of Coastal Development Project in the Upper South - Phunphin Industrial Estate - Highway 4037 and Oil Pipeline - Khanom Deep Sea Port - Highway and Railway
9.	615-T	Mangrove Aqualculture and Land use Management Plan, Phangnga Bay
10.	615-T	Management Planning for Mangrove Aquaculture and land use in Ban Don Bay, Surat-Thani

No.	Task	Title
11.	622-T	Statement for Management for Mu Ko Ang Thong National Park
12.	622-T	Statement for Management for Ao Phangnga National Park
13.	622-T	Statement for Management for Noparat Beach, Mu Ko Pe Pe
14.	623-T	Management Plan for Fisheries Resources in Ban Don Bay, Surat-Thani
15.	623-T	Management Plan for Fisheries Resources in Phangnga Bay.

15. The coastal management plans and the national plans.

The coastal management plans had been discussed in the Official Forum at Pattaya in July 1991. According to the meeting four management plans had been finalized namely;

1. Coastal water quality Management Plan.
2. Mangrove Aquaculture and Land Use Management Plan.
3. Fisheries Resources Management Plan.
4. Coral Reef Beaches and Shorelines in Ban don Bay Surat Thani

The integrate Upper South CRMP was used as the inputs for ONEB to create the "National Policy/Measures and Action Plan for Coastal Resource Management of Thailand which will be used as the guideline for coastal resources management of Thailand.

16. The follow up actions for the implementation of the CRM Plan developed

The implementation of the CRM Plan will be jointly implemented by the group consists of the following :

- ONEB
- Representatives of other central government agencies involved in plan implementation.
- Representatives of provincial and local government.
- Representatives of local community groups or organizations.
- Representatives of NGOs mentioned in the plan.

The project implementation will be part of the government's resources management activities during the Seventh National Economic and Social Development Plan Period (1992 - 1996).

The follow up actions will be managed and refined by the project implementation groups.

17. Experiences learned in the implementation of the in country project.

This report will present Thailand's experience of implementing the Upper South Integrated Coastal Resource Management Project at the planning process in the following aspects :

1. ONEB is the appropriate lead and coordinating agency for the Upper South Project, since ONEB is the only Thai government agency with the mandate to develop and coordinate policies for all environmental and natural resources. The crucial factor in gaining the cooperation from other participating Thai agencies is probably that ONEB's mandate is seen by these agencies to include coordinating their natural resources and environmental management efforts at the national level.

2. problems on organizational structure :

On formulating of action plans ONEB had appointed four technical working groups, each coordinated by ONEB staff. These consist of members drawn from the various sectoral study teams and have two main functions : to review sectoral reports and to integrate two or more reports to formulate integrated action plans. The groups are responsible for creating integrated plans for coastal land use-aquaculture-mangroves, fisheries, national parks and other coastal tourism resources, and water quality. They were originally envisaged to consist of members of the various study teams and representatives of the local administrations. However, time and budgetary constraints have made it impossible for them to attend meetings regularly.

3. Problems also arisen in the process of planning working group. This group, again coordinated by ONEB, reviews the integrated action plans and formulates the final CRM plan for the whole Upper South subregion. The group consists of members of the various working groups, a local planning consultant and representatives of the local administration concerned. Again, time and budgetary constraints have made it impossible for the local administration representatives to attend meetings regularly. Greater thought should have been given to participation by local administration representatives at the very beginning of the process.

4. Manpower Shortages. In order to manage the Upper South Project, ONEB has had to draw on staff from various divisions. However, these staff also had their respective routine duties as well, causing some project tasks to fall behind. Another factor to delays is that temporary staff hired by ONEB at the project's inception have left for permanent positions with other government agencies or higher-paying work with the private sector. This was a major problem which lasted till ending of the project.

5. Problem on Professional competence :

The sectoral reports of the Upper South Project's first phase are technically competent in terms of methodology and of the quality of data produced. However, many of the reports do not spell out the management implications of their findings. This may have arisen for these reasons:

First, because many of the sectoral study teams are made up of academics who lack planning or management experience, the reports tend to be written with the specialist in mind. Second, ONEB probably did not stress to project participants the need to spell out management implications, formulate clear management objectives and policies and provide a clear rationale for resource conservation. This leads to another weakness in terms of human resources : lack of experience with plan integration.

ONEB's role as coordinator of the early CRMP initiatives was mentioned above; all of these have had substantial expatriate contributions in terms of plan integration. There has been a general reliance on foreign experts to guide the various sectoral study teams and to take their results and produce an integrated plan. Clearly, considerable effort is needed to produce a core of Thai staff able to perform this task.

6. Another weakness, in terms of human resources, is that Thailand does not have a sufficiently large body of resource economists to carry out economic evaluation of natural systems. Many important natural systems and environmental quality values are not sufficiently accounted for in Thai development planning, and decision makers have an inadequate concept of the costs and the benefits involved.

7. The important conclusion is the need to educate the general public, local administration officials, politicians and entrepreneurs on the importance of healthy natural systems which can be utilized on a sustainable basis.