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**PROJECT PAPER  
ASIA REGIONAL**

*ASEAN*  
**COASTAL RESOURCES MANAGEMENT  
PROJECT**  
(498-0286)

**June 1985**

ASEAN Coastal Resources Management (498-0286)

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AGENCY FOR INTERNATIONAL DEVELOPMENT  <b>PROJECT PAPER FACESHEET</b>	1. TRANSACTION CODE <div style="border: 1px solid black; display: inline-block; padding: 2px;">A</div> A ADD C CHANGE D DELETE	PP  2. DOCUMENT CODE  3
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3. COUNTRY/ENTITY ASIA REGIONAL (ASEAN)	4. DOCUMENT REVISION NUMBER
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5. PROJECT NUMBER (7 digits) [498-0286]	6. BUREAU/OFFICE A. SYMBOL ASIA B. CODE [04]	7. PROJECT TITLE (Maximum 40 characters) [ASEAN COASTAL RESOURCES MANAGEMENT]
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8. ESTIMATED FY OF PROJECT COMPLETION yy [9][0]	9. ESTIMATED DATE OF OBLIGATION A. INITIAL FY [85] B. QUARTER [4] C. FINAL FY [88] (Enter 1, 2, 3, or 4)
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10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$) -						
A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FR	C. L/C	D. TOTAL	E. FR	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL			2700			5000
(GRANT)			2700			5000
(LOAN)						
OTHER U.S. 1.						
2.						
HOST COUNTRY & Beneficiaries						1750
OTHER DONOR(S)						
<b>TOTALS</b>						<b>6750</b>

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY <u>85</u>		H. 2ND FY <u>87</u>		K. 3RD FY <u>88</u>	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
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14. ORIGINATING OFFICE CLEARANCE	15. DATE DOCUMENT RECEIVED IN AID/W. OR FOR AID/W OCCU- MENTS. DATE OF DISTRIBUTION:
SIGNATURE Bruce Blackman <i>Bruce Blackman</i>	MM DD YY <div style="border: 1px solid black; padding: 5px; display: inline-block;">06 06 85</div>
TITLE AID/ASEAN Regional Development Officer	

## PROJECT AUTHORIZATION

Name of Country: Asia Regional on behalf of the Association of Southeast Asian Nations (ASEAN), including Brunei Darussalam, Indonesia, Malaysia, Philippines, Thailand and Singapore

Name of Project: ASEAN Coastal Resources Management Project No. 498-0286

1. Pursuant to Section 103 of the Foreign Assistance Act, as amended, I hereby authorize the Association of South East Asian Nations (ASEAN) Coastal Resources Management Project (the "Project") on behalf of the ASEAN countries of Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore and Thailand, involving planned obligations of not to exceed \$5,000,0000 in grant funds over a three-year period from the date of authorization, subject to the availability of funds in accordance with A.I.D. OYB/allotment process, to help finance foreign exchange and local currency costs for the Project. The planned life of the Project is five-years from date of initial obligation.
2. The Project will promote cooperation among ASEAN countries and provide research, technical assistance, training, information dissemination and other activities to help develop a comprehensive approach for managing living coastal resource systems. Emphases will be on analyzing living resource exploitation; focussing attention on better resource management policies; developing institutional arrangements linking research to living coastal resource assessment, planning and management; and encouraging technical and institutional solutions to resource conflicts and the loss of coastal development opportunities. The Project will be carried out through a specific support grant to the International Center for Living Aquatic Resource Management and by contracts for the services of administration, coordination, technical and evaluation experts.
3. The Project Agreement (s), which may be negotiated and executed by the Officer (s) to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority, shall be subject to the following essential terms and conditions, together with such other terms and conditions as A.I.D. may deem appropriate.
4. Source and Origin of Goods and Services. Goods and services, except for ocean shipping, financed by A.I.D. under the Project, shall have their source and origin in the United States or the ASEAN countries (Brunei, Indonesia, Malaysia, Philippines, Thailand, and Singapore) except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

Signature \_\_\_\_\_

\_\_\_\_\_ Date

## ASEAN COASTAL RESOURCES MANAGEMENT PROJECT (498-0286)

### I. PROJECT SUMMARY AND RECOMMENDATIONS

A. Recommendations. The sustained availability and use of renewable coastal resources is of primary importance to the economic and social development of the ASEAN nations. Authorization of \$5.0 million in grant funds to ASEAN is recommended to improve the management and multiple use development of coastal areas. The grant will provide approximately \$2.0 million to support resource assessment, applied research, and development of site-specific coastal management plans in participating ASEAN countries; \$1.5 million for training and information dissemination; \$1.0 million for technical support to regional activities by the International Center for Living Aquatic Resources Management (ICLARM) through which project resources will be channeled; and \$500,000 in contingency to be allocated to the above activities on the basis of a mid-term evaluation and approved annual work plans.

B. Summary Project Description. The primary goal of the project is to strengthen the capability of ASEAN countries to develop their renewable coastal resources on a sustainable basis. This will help ensure the long-term productivity of coastal fisheries and aquaculture, mariculture, forestry and other forms of primary resource dependent development.

The project's purpose is to help develop improved technical and institutional approaches for managing living coastal resource systems in the ASEAN countries. This purpose will be advanced by:

- analyzing, documenting, and disseminating information on trends in living coastal resources exploitation;

- focussing attention on the importance of better resource management policies, and identifying the critical information and manpower required to bring about improvements in management for sustainable development;

- developing institutional arrangements that link applied environmental and socio-economic research to coastal resource assessment, planning and management; and

- encouraging technical and institutional solutions to resource use conflicts and the loss of coastal development opportunities.

The project has two basic components: (1) resource assessment, planning and research; and (2) training and information dissemination. In addition, funding will be provided for regional coordination of and technical support for the activities in participating ASEAN countries.

The following results are expected during the life of the project:

- 1) Increased awareness among decision-makers of trends in renewable coastal resources depletion, and greater attention to the importance of sound coastal resources management policy.
- 2) Improved assessments of the capacity of living coastal resource systems to sustain intensive, multiple-use forms of development.
- 3) Cooperative research on topics relevant to renewable coastal resources management, such as improved forecasting techniques for predicting future demands for resources, and the identification and resolution of socio-political/legal problems of managing common property resources.
- 4) The derivation of management concepts and procedures for allocating and developing coastal areas for sustainable use, including the application of economic analyses to alternative forms of coastal resource use, and the development of site-specific coastal resources management plans.
- 5) The strengthening of ASEAN regional information dissemination channels on renewable coastal resources management, to include the publication of a regional newsletter and special activities such as the preparation of a coastal resources atlas, and the conduct of public awareness and education activities.
- 6) Strengthened ASEAN manpower base in renewable coastal resources assessment, research, planning and management through the provision of short and medium term (masters level) training.
- 7) Strengthened capability of ASEAN national institutions in association with a regional center, ICLARM, to facilitate and support the type of outputs specified in 1) through 6).

The focus upon improving the management of living, renewable coastal resources for sustainable development forms a unique contribution to ASEAN's Cooperative Program in Marine Sciences and complements (without duplicating) the assistance provided to ASEAN by other donors. Site-specific, pilot case studies will be prepared by Indonesia, the Philippines, Thailand and Singapore to address common theme coastal management issues and problems. Each of the case studies will: (1) examine the bio-physical, economic and social aspects relating to the improved management of renewable coastal resources; (2) explore options for coastal area development; and (3) devise strategies, policies and guidelines for achieving sustainable, multiple-use forms of development. The case studies and lessons learned from their respective experiences will be used to create an expanded information base for management training based on practical experience rather than theory.

C. Summary Findings. The project is based on the pillars of AID policy and fits logically within the strategy framework of the ASEAN/AID Development Cooperation Program. In particular, the project is appropriate to the natural resource and environmental elements of ASEAN development.

Technology Transfer. This project has a strong technical exchange dimension. It is embodied in the analysis, research and planning activities where the most appropriate techniques currently available for stock assessment, cooperative investigation and resource management will be demonstrated and used in ASEAN pilot areas by cooperating country institutions and staffs. Training and information dissemination activities will help diffuse project technologies through the ASEAN network.

Institutional Development. By its design, the project will strengthen ICLARM, particularly in its capacities to support comprehensive socio-economic assessment and research in coastal zones, along with the linked development of resource management plans. Related will be a better information dissemination and management capability. In turn, cooperating country institutions will be strengthened through infusion of the technical capacities noted above, e.g. fish stock assessment.

Private Sector. ICLARM is a private, not-for-profit, scientific agency based in Manila. Through the AID specific support grant, it will coordinate and technically support project implementation under the guidance and direction of an ASEAN Project Steering Committee. ICLARM will help assure the involvement in the project of private sector groups and non-governmental organizations that are associated with resource use in the pilot areas.

Policy Discussion. Through detailed assessment, research and planning efforts, the project will help develop systematic resource management frameworks in the cooperating countries. Such frameworks will be based on the analyses of benefits and costs of competing resource use patterns. They will facilitate discussions and appropriate actions among resource users, managers and policy decision-makers. Information dissemination and public awareness activities (e.g., through mass media messages) will extend the resource policy concerns to wider national and regional audiences.

D. PID Review Concerns. The APAC reviewed the Project Identification Document on February 1, 1985, and raised several issues (see Annex A). These issues and how the project is designed to deal with them are outlined below.

1) Possible Duplication of Effort. Activities in coastal resources/marine science are ongoing or planned within USAID bilateral programs in Indonesia, Philippines and Thailand plus within the Science and Technology Bureau's program. Also, other bilateral and multilateral donors are supporting parts of the general ASEAN

Cooperation Programme in Marine Sciences as well as related activities in the region. The project is designed to fit within this framework of U.S. and other donor assistance. See Part IID below for details.

2) Obligation Document. This issue concerns the form of project agreement to be executed in view of ICLARM's role in the project. Based on detailed design discussions with ASEAN and ICLARM, a specific support grant with the Center is expected to be the obligating document. This is per the APAC recommendation.

3) ICLARM's Financial Future. Project design takes account of ICLARM's continuing search and need for core financial assistance. One way it does so is by providing for additional expert staff to coordinate and support the project. Moreover, project planning and disbursement procedures, such as annual workplans and budgets, provide for the financing of direct project costs. While ICLARM's search for core support will continue -- e.g., it is requesting further assistance from the S&T Bureau -- this AID/ASEAN regional effort will help increase the Center's financial viability and provide the means for administrative and technical support of the project. See Part VD and Annex J, Institutional Analysis, for related details.

4) ICLARM and ASEAN Responsibilities. ICLARM will coordinate and support the project, by receiving and channeling grant funds to ASEAN implementing agencies for approved activities. An ASEAN Project Steering Committee will provide policy guidance and perform evaluative and oversight functions. See Part IV for further details about project administration.

5) AID Staffing Concern. Long-term experts will be grant-funded, as noted above, to help ICLARM meet its responsibilities under the project. This will help, in turn, to reduce project monitoring and technical support workloads on the ASEAN Regional Office and Asia Bureau Environmental Advisor, respectively. But such workloads will not be avoided and will in fact be substantial in the early stages of project implementation.

6) Gray Amendment. It is expected that ICLARM will sub-contract for short-term technical assistance and training under the grant project. Minority firms and individuals may benefit from such subcontracting. Upon receipt from AID/W, the ASEAN Regional Office will provide ICLARM with names of appropriate individuals and organizations in this context.

7) Research Identification. See Part III and Annex D for a discussion of cooperative research planned under the project.

8) Counterpart Support. See Part IIID and Annex F for a description of planned ASEAN support to the project.

See Part III and Annex C for other questions regarding project design including expected outputs and the end-of-project-status.

## **II. PROJECT BACKGROUND**

**A. Problem.** The ASEAN region is experiencing rapid rates of population growth and economic expansion. There is a corresponding drive to intensify and expand primary resource production to feed and clothe the population and to support secondary and tertiary economic development. Living resource systems found in coastal areas play a vital role in the development of the ASEAN nations. Efforts to exploit these resources, however, have led to environmental degradation and the foreclosure of development opportunities.

There are several basic issues concerning the long-term, sustainable development of living coastal resources in the ASEAN nations. These issues, which are not being adequately addressed through present policies and development strategies, are summarized below.

1) The diversity and biological richness of coastal areas offer opportunities for multiple use forms of development as well as intensive forms of renewable resource production which are superior to those of upland and purely marine systems. However, the majority of development programs and projects are oriented toward sectoral interests which largely ignore multiple use options whose benefits lie outside their economic or administrative area of concern. Thus, living resources such as mangrove forests, that can supply a wide range of economic and environmental goods and services, are often managed for the maximum production of single goods (wood chips) or converted to other single purpose uses (agriculture or aquaculture). In effect, the cumulative social and economic welfare which could be derived from living resource systems such as mangroves is discounted in favor of a very narrow range of products. The costs of such policies clearly can outweigh the benefits to society.

2) The richness and diversity of living coastal resources has led to the cultural evolution of ecologically sound strategies for multiple use by traditional coastal communities. Many of these traditional forms of use are very sophisticated and can respond well to the application of new technology and other forms of improved management. However, the multiple use nature of traditional resource management systems is largely ignored by planners, who adopt overly simple models of development which make coastal areas more prone to disaster and people more vulnerable to the loss of income, property and even life. In effect, there is a movement away from broadly based strategies of moderate and sustainable levels of resource use. Instead of incremental adaptation and improvement through sound management strategies, crash programs favoring short term economic gains are often adopted that ignore consequent hazards and risks.

3) Existing management approaches generally fail to consider the interrelated nature of upland, coastal and marine ecosystems. For example, heavy soil erosion in disturbed watersheds can produce

excessive sedimentation in shallow coastal wetlands, destroying natural spawning areas for fish. Creation of upstream water control structures can alter the hydrological regime, leading to changes in water salinity that affect living resources along the coast. Conversion of mangrove forests and vegetated tidelands to other uses (salt ponds, brackish-water aquaculture, agricultural crops) can reduce critical habitat for the shelter and reproduction of species valuable to marine fisheries. These simple, direct cause-and-effect relationships are not generally built into the management models of coastal development for the public and national good.

4) Resource managers are generally uninformed about the magnitude of the fisheries dilemma now emerging in Southeast Asia. Official views often hold that abundant under-utilized stocks still exist while, most likely, few do and many are already over-exploited. More importantly, official plans often call for rapidly increasing harvests of fish when this is not possible in many areas. A rather pessimistic view--supported by national fisheries statistics in the ASEAN region--points to alarming reductions of stock for several important demersal (bottom dwellers) and pelagic (open ocean) species. Moreover, and what the statistics often do not show, is the concurrent degradation of natural coastal systems (shallow sea beds, mangrove swamps, coral reef communities) and the direct relationship that this has on decreasing the carrying capacity of fisheries habitat. The problem becomes dual--over-exploitation of existing stocks and continuing decline of ecological carrying capacity--and progress toward solution will require concerted efforts along both fronts.

The resolution of such management issues in coastal areas is a tough, long-term problem. It will require more public awareness and coordinated efforts than has been evident to date. There is a basis of will and commitment at the technical level within ASEAN countries to pursue more comprehensive approaches to coastal resources management. This, however, is frustrated by institutional and administrative constraints that prevent effective interagency coordination. Clearly lacking at present are sound technical and administrative capabilities within resource management agencies (fisheries, agriculture, forestry, etc.) with which to coordinate their development activities so that optimal yields are realized as part and process of a coastal management plan. Deficiencies include: an inadequate information base; a lack of clearly defined research protocols directed by policy considerations as well as planning and management concerns; a poorly defined structure for linking information and results of applied research to planning and management; and insufficient numbers of personnel trained in coastal resources management and related disciplines.

B. ASEAN-US Cooperation in Marine Science. Since its formation in 1967, ASEAN has steadily developed the means for intra-regional cooperation and exchange in matters of mutual interest to its member countries. Its organizational approach has been to carefully work for

consensus in activities that address common concerns and to seek solutions to problems of economic development. To this end, standing committee structures have been established, among which is the Committee on Science and Technology (COST).

A cooperative program in marine science was first proposed within ASEAN in 1976. A working group on marine science was established under the COST and has been responsible for preparing project proposals for consideration during the ASEAN dialogues and fora with cooperating donor countries.

In March 1984, the COST presented its most recent proposal for ASEAN-US cooperation in marine sciences, comprising three areas of concentration: (1) application of satellite and local environmental data to assess and map coastal resources for coastal zone management; (2) effective development and management of fisheries resources; and (3) strengthening coastal remote sensing techniques through training. This proposal expanded somewhat upon an initial ASEAN proposal presented at the 1982 Dialogue.

~~In April 1984, AID began discussions with the U.S. National~~  
Oceanic and Atmospheric Administration (NOAA) to further review the ASEAN proposals, and discuss potential and appropriate U.S. responses to them. Several Asia Bureau meetings with NOAA representatives identified elements of the project concept conforming to Agency policy guidelines and development assistance criteria. Particular AID interest was seen in the institutional arrangements needed to link applied research to renewable coastal resources planning and management. Accordingly, it was determined that AID's partial response to the ASEAN request would emphasize institutional and technical solutions to resource use conflicts affecting living systems, including capture fisheries and coastal aquaculture. It was also determined that NOAA would consider a separate response to parts of the ASEAN request (especially satellite remote sensing) not included in the AID response.

A Project Identification Document entitled "ASEAN Living Coastal Resources Management" (498-0286) was prepared in late 1984. The PID served as a basis for discussions at the ASEAN-U.S. Project Preparatory Workshop on Marine Sciences, held in Manila in May 1984. The Workshop was attended by members of the ASEAN Marine Sciences Working Group, technical experts from five of the six ASEAN nations (Brunei was not represented), technical experts from the U.S. and ICLARM, as well as representatives from the Asia Bureau and AID/ASEAN Regional Office.

During the course of the Workshop, a detailed proposal for assistance in Coastal Resources Management was developed and presented by the ASEAN experts. This AID Project Paper is based upon the PID, the detailed proposal prepared at the Workshop, subsequent visits by the AID design team to the proposed pilot study sites, and discussions

with ICLARM and the counterpart institutions in the individual ASEAN countries.

C. Relationship to AID Policy and Strategy. The U.S. assistance strategy is to be as responsive to ASEAN proposals as policy and budgetary considerations permit. One key policy criterion is that proposals be based on clear regional needs and development objectives. Priority is given to regional cooperation and technical exchange among the ASEAN member countries, with the bulk of AID funds going to training and technical assistance. Priority sectors for assistance are agriculture and natural resources, energy, health and small/medium business development.

Where feasible and appropriate, private or technical non-governmental organizations are used as vehicles for the development assistance. Private technical agencies are proving out in the ASEAN/AID Program, e.g. the Asian Institute of Technology and the four private implementing entities under the Small and Medium Business Improvement Project (Asian Institute of Management, Institute for Southeast Asian Studies, Technonet Asia and the U.S.-ASEAN Center for Technology Exchange). These private agencies have established operational bases and footings in the region--as has ICLARM. Operational presence and the capacity to deliver goods/services on a regional basis are essential considerations in the selection of institutional means for the ASEAN/AID program.

The proposed project flows from this policy and strategy framework. It is the second instance of AID support to ASEAN's natural resource sector, the first being the ASEAN-US Watershed Project started in 1983. The primary goal of the project--the improvement of the capability of ASEAN countries to manage their renewable coastal resources on a sustainable basis--represents a direct response to the clearly articulated dependence upon living coastal resources in the promotion of regional economic and social development.

D. Other Donor Assistance and AID Bilateral Programs. In addition to U.S. assistance, ASEAN has sought support from Canada, Australia, Japan and the European Economic Community (EEC) for various elements of its cooperative program on marine sciences. The Canadian International Assistance Agency (CIDA) has signed a Memorandum of Understanding with ASEAN for studies on "resource management and development" and "pollution monitoring programmes", although final arrangements for funding have yet to be completed. Similarly, Canada's International Development Research Centre (IDRC) is pursuing arrangements for further support to ASEAN in the marine sciences sector. Official responses from Japan and the EEC are reportedly in progress.

Australia will be supporting two projects. The first concerns tidal phenomena and will establish a network of automatic tide gauges in the region. The second project aims to generate quantitative baseline information on the community structure, distribution and productivity of coastal ecosystems. Its main focus is upon mangrove systems and coral reefs, although attention will also be given to inter-ecosystem relationships.

This latter project will attempt to apply the information obtained to coastal zone management policies, but its primary focus is upon ecological research. It is expected that the ASEAN-Australia projects will eventually provide information of value to the proposed ASEAN-U.S. Coastal Resources Management project activities. The main theme of the ASEAN-U.S. project is the management of renewable (living) coastal resources to promote sustainable development, and care has been taken in the design of the project activities to avoid duplication of the efforts of other ASEAN projects. The ASEAN Working Group on Marine Sciences actively coordinates the various donor inputs.

The project complements ongoing multilateral donor assistance, including the United Nations Environment Program (UNEP) support to the Coordinating Body on the Seas of East Asia (COBSEA), as well as the Asian Development Bank's fisheries and aquaculture development program. One of these multilateral activities was a coastal resource management training workshop sponsored by UNESCO-AID-British Council and conducted in Thailand during April and May, 1985. It was partially supported through the USAID/Thailand Emerging Problems in Development II Project and offered in-service training for staff from the National Environment Board, the Land Development Department and the Thailand Institute for Scientific and Technological Research.

Care has been taken to avoid overlap and ensure complementarity with AID's on-going and planned bilateral projects in coastal resources management and/or the fisheries sector. Such on-going projects include the S&T/AGR Pond Dynamics CRSP, and the coastal zone management component of the Rainfed Resources Development Project in the Philippines, which will involve a geographic area distinct from the one chosen for this project. Planned projects include S&T/FNR's Coastal Resources Management Project and the Aquatic Resources Development Project in Indonesia. Another S&T/FNR project (Environment and Natural Resources Expanded Information Base) is supporting the development of coastal resources management case studies and design aids. An initial training of trainers workshop sponsored under this program was held in Thailand in March 1985.

Inter-country and intra-AID coordination will be required throughout implementation of the project. ICLARM and the ASEAN Working Group will help facilitate this process.

E. Lessons Learned. AID's experience in coastal resource management is steadily increasing. The S&T Environment and Natural Resources Expanded Information Base Project has published a series of case studies and planning guidelines on coastal resources management. The recent AID-assisted training workshops in Thailand provided valuable insight into the problems and issues facing developing coastal nations. Experience has also been gained during the design of the S&T Coastal Resources Management Project and USAID/Indonesia's Aquatic Resources Development Project. The feasibility study for this latter project indicated that potential benefits from individual aquatic resource development activities would be seriously reduced unless action is taken to improve the management of the coastal resource systems required to support those activities. In effect, improved standards of coastal resource management are a pre-requisite to improved fisheries and other coastal aquatic development activities in Indonesia and other ASEAN countries.

AID can also draw upon the experience in coastal zone management which has been derived through the activities of other U.S. federal agencies. The National Coastal Zone Management Act of 1972 set in motion a series of major studies on resources, management and planning which have been used to formulate coastal zone management plans in 30 coastal states. No other nation in the world has the experience and expertise represented by the U.S. federal and state coastal management initiatives. Caution is required, however, in transferring concepts, procedures and techniques developed under the U.S. Coastal Zone Management Act to the ASEAN region. Biological conditions, patterns of resource use and social and economic conditions in this humid tropic region require management perspectives and techniques different to those which have been advanced in a highly developed, predominantly temperate region.

Worldwide experience has documented the complexity of tropical coastal ecosystems, the interdependence among them and the direct linkages between upland, coastal and marine resource development. The most important lesson learned in developing these natural systems is that the management of coastal resources requires a high level of coordination of sectoral activities. Without such coordination and rudimentary integration of development policies, there is little long-term prospect for optimal economic and social development of the coastal areas of ASEAN countries.

At the same time, the feasible scope for interagency coordination and integrated effort varies from country to country in ASEAN, but finds a natural limit in all. The project thus does not assume or require more coordination or integration than is realistic. Rather, it takes a bottom-up, pilot area approach, using institutional and operational procedures to assure comprehensive and credible analyses, research and planning that can be effectively presented and raised to management and policy levels.

### **III. PROJECT DESCRIPTION**

**A. Goal and Purpose.** The primary goal of the project is to strengthen the capability of ASEAN countries to develop their renewable coastal resources on a sustainable basis. This will help ensure the long-term productivity of coastal fisheries and aquaculture, mariculture, forestry and other forms of primary resource dependent development.

The project purpose is to help develop improved technical and institutional approaches for managing living coastal resource systems in the ASEAN countries. This purpose will be advanced by:

-- analyzing, documenting and disseminating information on trends in living coastal resources exploitation;

-- focussing attention on the importance of better resource management policies, and identifying the critical information and manpower required to bring about improvements in management for sustainable development;

~~---~~ developing institutional arrangements that link applied environmental and socio-economic research to coastal resources assessment, planning and management; and

-- encouraging technical and institutional solutions to resource use conflicts and the loss of coastal development opportunities.

**B. Outputs and End-of-Project Status.** The project is expected to produce the following results after five years:

1) Increased awareness among decision-makers of trends in renewable coastal resources depletion, and greater attention to the importance of sound coastal resources management policy.

2) Improved assessments of the capacity of living coastal resource systems to sustain intensive, multiple use forms of development.

3) Cooperative research on topics relevant to renewable coastal resources management, such as improved forecasting techniques for predicting future demands for resources, and the identification and resolution of socio-political/legal problems of managing common property resources.

4) The derivation of management concepts and procedures for allocating and developing coastal areas for sustainable use, including the application of economic analyses to alternative forms of coastal resource use, and the development of site-specific coastal resources management plans.

5) The strengthening of ASEAN regional information dissemination channels on renewable coastal resources management, to include the publication of a regional newsletter and special activities such as the preparation of a coastal resources atlas, and the conduct of public awareness and education activities.

6) Strengthened ASEAN manpower base in renewable coastal resources assessment, research, planning and management through the provision of short and medium term (masters level) training.

7) Strengthened capability of ASEAN national institutions in association with a regional center, ICLARM, to facilitate and support the type of outputs specified in 1) through 6).

C. Project Components. The project is structured in two major components: (1) Resource Assessment, Planning and Research; and (2) Training and Information Dissemination. The composite activities of the two components will advance project results as described below.

1. Component One -- Resource Assessment, Planning and Research

Activity 1.1: Assessment and Planning. This activity will support area-specific coastal zone assessments, with priority given to resource use conflicts affecting coastal fisheries and related natural systems. Specific coastal areas have been selected by cooperating ASEAN countries on the basis of mutually agreed criteria:

- a) the presence of an economically significant coastal fishery, particularly small-scale capture fisheries and aquaculture;
- b) the co-existence of coastal development efforts that compete for limited resources;
- c) the direct relationship of management issues in the pilot coastal areas to national priorities for coastal development;
- d) the opportunity to cooperate with regional and local institutions in developing a comprehensive management and development plan for the coastal zone;
- e) complementarity/consonance with the development plans and projects of host country agencies, other donors and AID.

The assessments will focus on the bio-physical, socio-economic and institutional dimensions of managing living coastal resources. Resource allocation practices, particularly those associated with common property resources such as communal fishing grounds, reef systems and mangrove forests, will be examined in the context of ongoing and planned development in the same area. The information base that is compiled will be used to help improve resource allocation priorities and develop planning guidelines in cooperation with the agencies responsible for specific resource development and management activities (agriculture, fisheries, forestry, energy, water resources, etc.).

The ASEAN countries fully participating in this activity (Philippines, Indonesia, Thailand and Singapore) will establish interagency steering committees to help coordinate the work of the in-country institutions involved in resource assessment and planning in the pilot coastal areas. It is planned that each country's pilot will lead to and demonstrate model institutional arrangements linking university, governmental, non-governmental and private sector interests in the process of developing comprehensive approaches to coastal resources management. Annex D provides preliminary descriptions, budgets and work plans for these ASEAN country pilot activities.

Activity 1.2: Cooperative Research. Closely related to pilot resource assessment and planning activities will be the identification of existing information gaps. Project resources will assist work in supplying the specific information that is missing and critical for coastal area planning and management needs. Priority information needs will be reviewed by the country steering committees and a research protocol developed for each pilot geographic region. Applied research, directed by in-country research institutions with project-funded technical assistance, will be undertaken.

Project assistance for this activity will emphasize research design and management. It is planned that an information management system will be developed linking research results to coastal resources planning. A regional research network among ASEAN countries will promote the sharing of information by cooperating country research institutions on approaches and findings, especially with respect to "common theme" problems and information needs in managing living coastal resources. Further description of ASEAN regional networking is provided under Component Two--Training and Information Dissemination.

The scope of research undertaken in each pilot area will be largely determined by the nature of coastal resource use conflicts and the identification of primary data needs for the management of living resources. Research emphases and approaches will vary country by country. However, certain common factors cover the range of research

proposed by each ASEAN country and allow particular themes to be stressed in the networking approach. Examples, among possible others, include the following:

- a) improving forecasting techniques for predicting future demands on and use of living resource systems in coastal areas. The regional network might deal with this theme by sharing experience on the use of microcomputers in managing data, simulating trends, etc;
- b) using information from the area-specific resource assessments and related research to carry out economic analyses of alternative uses of coastal resources, bearing in mind their interdependencies and the complementarities and substitutions in their use. Developing improved methods of including and quantifying off-site factors (ecosystems maintenance), non-market elements and sociopolitical constraints in the economic valuation of coastal development projects is expected to be a major theme of the research network;
- c) addressing the socio-political and legal problems inherent in managing common property resources (capture fisheries, mangrove forests, coral reefs) on a sustained-yield basis. A network of social science research on this topic will help improve resource allocation policies and the development of stronger incentives for community management of living coastal resources in cooperating ASEAN countries.

As noted, Annex D provides preliminary activity descriptions, budgets and work plans for area-specific pilots in the Philippines, Indonesia, Thailand and Singapore. Malaysia has opted to participate directly in only Component Two--Training and Information Dissemination. Brunei Darussalam has not been represented in ASEAN-AID project planning to date.

## 2. Component Two -- Information Dissemination and Training

The project's second component is a set of regional activities that will sponsor training for ASEAN personnel involved in coastal resources management and disseminate information on both analytical approaches and results. All ASEAN countries will participate in this component, as well as regional and other organizations offering technical support. Four types of training activities are planned, as illustratively outlined below.

Activity 2.1: Regional Short Courses. The project will sponsor a series of short courses of from one to three weeks. Courses will be held in various ASEAN countries and are designed to introduce new

concepts and techniques to scientists and researchers. Short course topics will vary and will be chosen based on the needs of the project. It is planned that a "core" course on the principles of coastal resources management will be presented several times, as appropriate, over the five-year life of the project (see Annex E). Other topics proposed by ASEAN countries for short courses include remote sensing applications, hydro-acoustic techniques in fish stock assessment, information systems management, and methods of socio-economic analysis.

It is envisaged that each short course will have from 15 to 20 participants and will be sponsored by an institution in the ASEAN host country. The course will be presented by ASEAN country resource persons as well as selected foreign technical advisors when necessary. Considerable ASEAN cost-sharing for facilities and support services is expected. AID funding has been estimated for 8 to 10 short courses (depending on length) over the life of the project. The timing of short courses will be decided during the preparation of annual work plans for project implementation.

Short courses are seen as a key way to introduce coastal resource management approaches to researchers involved with the project. This will also help provide a common framework within which pilot study results may be presented at a later date in conjunction with regional information dissemination.

Activity 2.2: Policy Seminars and Workshops. In addition to regional short courses, the project will support a series of policy seminars and workshops. These will last less than one week (generally from two to three days) and will be aimed at more senior policy-makers and decision-makers representing ASEAN country governments. The seminar/workshops will be used to both disseminate ideas about new approaches in coastal resources management and to inform policy-makers about results of the area pilot studies and related project activities. AID funding has been tentatively allocated for 8 to 10 seminar/workshops over the life of the project. Each one is anticipated to have 15 to 20 ASEAN participants and up to two expatriate resource persons. The timing and content of the seminar/workshops will be decided during the preparation of annual work plans for project implementation. It is expected that earlier on in the project, seminar/workshops will be focused more on principles and approaches to coastal resources planning and management, while in the last two years the focus will be more on actual results of project-funded pilot activities.

Activity 2.3: On-the-Job Training. One of the most valuable learning tools is on-the-job training for ASEAN personnel who are actively engaged in research and planning related to living coastal resources management. The project has allocated funds sufficient for 40 such training opportunities of approximately 10 weeks each. This

on-the-job training will be conducted largely within the ASEAN region at various institutions involved in ongoing resource assessment, planning and research activities. A limited number of training opportunities will be earmarked for appropriate institutions outside the region. The objective is to enable the researchers to spend enough time at the host institution to acquire new skills and observe applied work relating to their disciplines.

Given the large number of training opportunities available, it will be possible to have several trainees together at one institutional setting at the same time. This will both lighten the per-person load at the training site and help promote intra-ASEAN communication.

Training venues will include research laboratories, universities and resource management institutions within the ASEAN countries as well as ICLARM at its Manila headquarters. For selected topics other organizations may be considered.

Activity 2.4: Medium-Term Academic Training. Most project work will build on resources already in place--trained researchers, existing institutions and facilities, etc. Limited funds have been allocated for medium-term academic training at the M.S. level. This training is expected to take place both at ASEAN country universities (such as University of the Philippines at Los Banos, Asian Institute of Technology, Mahidol University Faculty of Environmental and Resource Studies in Bangkok, Universiti Pertanian Malaysia) as well as at selected U.S. academic institutions specializing in marine and coastal resource sciences. A total of 10 masters level degrees are tentatively budgeted; 5 within the ASEAN region and 5 in the U.S.

Candidates for academic training will be carefully considered and evaluated by the ASEAN Project Steering Committee as to their potential contribution to project objectives. To the extent possible, academic training will begin by the second year of the project so that students are able to return and participate in the last phase of project activities. Carefully selected academic training is viewed by ASEAN as a way to add new dimensions to research institutions, e.g. training in resource management, resource economics, rural sociology, etc.

Activity 2.5: Information Dissemination and Special Activities. Generating new information that can be applied to coastal resources management is one objective of the project; disseminating this information in a useful fashion is another. ASEAN countries have stated the importance of information dissemination in promoting improved coastal resources management approaches and policies. There are several audiences or beneficiaries of this communication process--the cooperative research network described under Component

One of the project; the wider body of scientists, resource managers and decision-makers; and the general population in ASEAN countries.

Project support for the above Component Two activities will move through ICLARM's existing training and information services division. Resources are budgeted for additional staff at ICLARM to help edit and coordinate information dissemination. A major initial task will be starting a project newsletter which will be issued regularly to participating institutions as well as to a broader body of interested parties. The newsletter will keep the research network informed of current work and planned activities. As results are obtained, they will be communicated in the newsletter and in other printed documents--technical reports, manuals, proceedings of seminar/workshops, and summaries of comprehensive coastal management plans for the area-specific pilot projects.

A series of special activities, endorsed at the ASEAN-U.S. Project Preparatory Workshop in Manila, will also be related to information dissemination. One anticipated activity is the preparation of an ASEAN Coastal Resources Management Data Atlas. It would present information on current patterns of resource distribution, conservation and utilization in the ASEAN coastal zone. By providing a synthesis of resource use trends and opportunities, it would promote attention to transnational issues and policy coordination in the region. A second aspect would be the incorporation of thematic mapping of the principle resource attributes, uses and management characteristics for each of the area-specific pilot activities in participating ASEAN countries.

Potential special activities relate to dissemination of project findings and general public awareness/education concerning coastal environments. It is anticipated such work would be conducted through existing information dissemination units in each ASEAN country and aimed at school children as well as the adult population (mass media approach).

3. Regional Coverage and Technical Support. Execution of this project (Components One and Two above) will require regional coverage and considerable technical support. ICLARM has been selected as the appropriate region-based and technical Center for these purposes. It currently assists research on fish stock assessment in several ASEAN countries as well as a network of ASEAN country universities engaged in socio-economic research on traditional fisheries and living aquatic resources.\*

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\*These universities include: University of the Philippines--Visayas; Kasetsart University, Bangkok; Universiti Pertanian Malaysia; and Universitas Diponegoro, Semarang, Indonesia.

As noted above, ICLARM has an ongoing training and information services program, which has been active in serving the needs of ASEAN country personnel working in the fisheries sector. Under the scope of this project, ICLARM's capabilities to coordinate activities and provide technical support in the area of living coastal resources management would be expanded and strengthened. This is a key institutional output envisaged in the project.

It is planned that ICLARM will function in several capacities related to the project and its objectives, under the overall direction of the ASEAN Project Steering Committee:

- a) perform selected administrative, contracting, disbursement, accounting and related functions;
- b) coordinate country-specific area coastal zone assessments and research activities;
- c) provide technical assistance for resource data collection and analysis, development of research protocols and implementation of research activities;
- d) disseminate information (planning guidelines, case studies, technical manuals) on living coastal resource systems and their management, as well as appropriate information resulting from the area-specific pilot studies in cooperating ASEAN countries;
- e) coordinate the planning and implementation of ASEAN regional training courses and policy-oriented seminar/workshops;
- f) monitor progress of the project and provide periodic reports to the ASEAN Project Steering Committee and AID.

To strengthen ICLARM's capacity to undertake the above functions, the project will augment existing staff with additional technical and administrative support. A long-term coastal resources management specialist will be provided over the life of project and is expected to assume the lead coordinating role for project purposes. A second technical advisor will be placed at ICLARM, initially for frequent liaison and advisory services to the country-specific pilot subprojects. This staff resource is expected to be needed for the first three years of project implementation. A third person will be provided for routine project administration and financial accounting (likely a Philippine national). Limited secretarial/clerical support will also be provided, although for the most part ICLARM will fulfill such requirements with existing staff resources. Further detail as to project support to ICLARM is provided in Annex F.

As noted, ICLARM will coordinate all short-term technical assistance associated with the ASEAN country-specific pilot resource assessment, planning and research activities. It is expected that ICLARM will contract directly for short-term technical services as deemed necessary for the project. Appropriate and agreed mechanisms will be used by ICLARM to access the best available technical services on a timely basis.

The project's Training and Information Dissemination Component activities also will be coordinated by ICLARM and to some extent will be incorporated into ICLARM's existing training and information services program. ASEAN host country institutions are expected to cooperate closely with ICLARM in arranging training sites, staff and facilities. The project will directly support ICLARM for this purpose by providing materials and technical assistance. Support services to ICLARM are available and may be arranged through cooperating institutions such as the East-West Center Environment and Policy Institute (EAPI), the U.S. National Park Service's Office of International Affairs (through the S&T Bureau's Natural Resources Expanded Information Base Project) and Oregon State University, among possible others.

A review of ICLARM's institutional capabilities and its relationship to ASEAN institutions for project purposes is provided in Annex J--Institutional Analysis. A description of ICLARM's role in project administration and implementation is found in Part IV.

ICLARM's role in assisting ASEAN to achieve results over a five-year time frame is critical to project success. However, the project purpose and goal must be viewed as long-term. Continued research, extended development and application of comprehensive approaches for managing living coastal resources, and incorporation of results into supporting regional and national policies and development strategies extend far beyond five years. This highlights the importance of continued ICLARM cooperation in a longer term process that will entail resource commitments of the ASEAN countries, AID and potential other donors.

It is expected that the project will generate follow-on assistance to, and investments in, coastal resources management in the ASEAN countries. Some of the downstream assistance and investment requirements are expected to be suitable for AID support, while others may be appropriate for other donors. Moreover, it is expected that the project will identify coastal resources planning and management approaches and actions the ASEAN countries can take on their own account without need of external support; such initiatives would be a key indicator of project success.

D. Project Financial Plan. Based on the afore-mentioned components and activities, it is expected that funds will be allocated to the project approximately as follows:

PROJECT FINANCIAL PLAN

<u>Use of Funds</u>	<u>Source of Funds</u> (US\$000)		
	<u>AID</u>	<u>ASEAN</u>	<u>TOTAL</u>
<u>Component One: Resource Assessment, Planning and Research</u>			
Country area-specific pilots:			
-- Philippines	500		500
-- Indonesia	500		500
-- Singapore	500		500
-- Thailand	500		500
<u>Sub-total</u>	<u>2,000</u>		<u>2,000</u>
<u>Component Two: Training and Information Dissemination</u>	1,500		1,500
Regional and Technical Support	1,000		1,000
Operating/Support Costs		1,750	1,750
Evaluation/Contingency	<u>500</u>	<u>      </u>	<u>500</u>
<u>GRAND TOTAL</u>	<u>5,000</u>	<u>1,750</u>	<u>6,750</u>

Supporting material for these line item estimates is contained in Annex F.

#### IV. PROJECT ADMINISTRATION

A. Implementation Schedule. Collaborative and detailed implementation planning was considerably advanced at the early May Project Preparatory Workshop in Manila. (See Annexes D and E.) The precise timetable for implementation will be determined in the annual project workplans. First year plans for each component and each country are expected to be firmed up within about three months of the signing of the specific support grant with ICLARM and designation of the ASEAN Project Steering Committee (PSC). Following is the anticipated scenario for implementation over the five year life of project.

First Year. After finance is authorized by AID and the grant contract is signed, several steps will be taken. One will be formation of the ASEAN PSC for overall project coordination and policy direction. ICLARM will begin recruitment of project staff.

An initial meeting of the PSC will be scheduled. This would mark beginning of the active phase of the project. Following the initial meeting would begin a series of country visits to further detailed project plans, including final selection of pilot sites, country-specific implementing arrangements, country project managers, etc. The annual work plans will be developed in detail as will more general plans covering the overall project period. Annual work plans will serve as the primary mechanism by which disbursement will be approved and provide a means to monitor and evaluate project progress.

During this start-up period, ICLARM would work with country coordinators and appropriate institutions to plan implementation of various discrete subproject activities, e.g. regional technical workshops and sites for long-term training. Other activities in this phase would be the rapid and cost-efficient expansion and diversification of ICLARM's roster of technical expertise, development of the newsletter and agreements (if needed) to access both regional and international data bases to support project activities.

Second and Third Years. This phase will be characterized by the implementation of: assessment and cooperative research activities; training (on-the job, workshops/seminars, and medium term); information dissemination, and the development of model planning protocols and institutional arrangements needed for comprehensive coastal resource management on a pilot site scale. Implementation at the local level would occur through the designated national implementing institutions with primary responsibility resting with country project managers. Extended implementation at the regional level would be facilitated through ICLARM and country coordinators, guided by the PSC.

Fourth and Fifth Years. The final two years of the project will focus on the development of comprehensive coastal management plans for each of the pilot sites; dissemination of the lessons derived from the

pilot sites through case studies, regional workshops and other means; and assessment of the relevance of results stemming from these pilot site activities to larger national policy questions.

**B. Administrative and Monitoring Arrangements.** As noted, the Working Group on Marine Sciences (WGMS) of ASEAN's Committee on Science and Technology (COST) determined that a PSC will be appointed under the direction of ASEAN/COST/WGMS. Responsibilities of the Committee will be to assure overall project coordination and develop policy guidelines regarding its implementation. The PSC itself will be composed of representatives from each participating ASEAN country. Due to the need for close coordination with the executing agency (ICLARM), the Steering Committee shall be chaired by the Philippines' representative. ICLARM and AID would attend Committee meetings on an ex-officio basis. Review of progress to date, discussion and approval of annual work plans and other project-related activities will occur at annual meetings whose venue is expected to rotate among the participating ASEAN nations.

In-country coordination will be the responsibility of the following agencies:

- Brunei : To be identified.
- Indonesia : Indonesia Institute of Sciences (LIPI)
- Malaysia : National Council for Scientific Research and Development
- Philippines : National Science and Technology Authority (NSTA)/Philippine Council for Agriculture and Resources Research and Development (PCARRD)
- Singapore : Science Council of Singapore
- Thailand : National Environment Board (NEB)

Due to the shortage of manpower, Malaysia and Brunei will not be participating in Component One of the Project but will participate in the training and information dissemination component.

As the project's executing agency, under the direction of the PSC, ICLARM's principal responsibilities will be for project administration, provision of technical assistance to participating countries in the design and implementation of pilot activities, training activities and the dissemination of information. See Annex J for a detailed analysis of ICLARM's institutional facilities.

With respect to ICLARM's project management needs, two scenarios are presently under consideration:

1) The recruitment of a senior level Project Coordinator responsible for all aspects of the project. The Coordinator would be assisted by an administrative assistant responsible for day-to-day administrative duties. Country project managers would be post-doctoral level individuals recruited from the United States and administratively housed with the lead implementing agency, but physically located at pilot sites.

2) The recruitment of two individuals: one responsible for overall project management, including the major elements of Component Two; and a technical specialist to assist the country pilot activities of Component One. Country project managers would be selected by the respective host country implementing institution and be host country nationals.

Beyond senior staff, at least two additional staff members at ICLARM (an editor and an accountant) are recommended for successful project implementation. In this context, the precise staffing approach to be used by ICLARM for the project will be determined in the process of grant negotiation.

C. Procurement Plan. It is planned that short-term technical assistance will be a significant input to the project. Short term TA can be provided in the most cost-effective manner by building on the existing facilities at ICLARM. This will be accomplished through the institution's network of tropical fisheries and resource scientists. To adequately meet the projected needs for the four field sites, this network will have to be expanded from its present base.

The procurement of technical equipment needed for Component One will be conducted locally wherever possible. Where equipment does not exist, it will be acquired either through a lease agreement, procurement services agent or the direct importation of equipment from the U.S. Where importation is required, appropriate arrangements will be made through the ASEAN host country institution to obtain import tax waivers.

Equipment and supplies for workshops and seminars are not perceived as a problem and can be purchased locally in all participating nations.

Publication of training materials will be completed through locally contracted services. ICLARM has considerable experience in this area and is prepared to select the most cost-effective means to produce printed materials.

Medium term training both within the region and the U.S will be procured through existing or newly-negotiated agreements between ICLARM and the appropriate academic institution.

D. Evaluation Plan. In-country project managers will monitor the progress of the pilot activities on a daily basis with ICLARM technical support. The PSC will meet annually together with representatives of ICLARM and AID to: review progress to date; consider and evaluate the

effectiveness of project activities in meeting stated objectives; and consider, where needed, modifications to ongoing project activities. A mid-term evaluation is planned three years after project start-up and will focus on pilot project results to date; the success of information dissemination efforts; and the effectiveness of training activities. A final evaluation will be conducted at the end of the project to assess how well project objectives have been met.

## V. PROJECT ANALYSES

Following are summary statements of analytical findings about the project. Detailed write-ups are in the Annexes indicated.

A. Technical Analysis. The project has been analyzed in terms of its fit with ASEAN policies and programs; major problems and issues in renewable coastal resource management; individual country initiatives in coastal zone management; management related research needs; and manpower training requirements. The project design reflects coastal management needs within ASEAN, and the individual country program components address basic issues relevant to ASEAN policies. Conclusions of these technical reviews show the project to be sound and feasible. For detailed analysis, see Annex G.

B. Economic Analysis. Coastal resources provide jobs for millions of people, are a major source of protein rich foods, and provide yearly exports worth over \$500 million to ASEAN. The potential benefits from improved coastal resources management are large; the costs of poor management decisions are potentially larger.

Given the focus on applied research, information dissemination, and management policies, the project's economic justification rests on its cost-effectiveness. It builds on in-place resource management institutions and research networks. As results are generated, they will be disseminated within each country through existing information networks. Emphasis will be placed on informing both researchers and public policy makers. Finally, the results of the project should improve the economic and environmental soundness of coastal resources management, thus promoting long-term productivity and sustainability of the living coastal resource base. For detailed analysis, see Annex H.

C. Social Analysis. The project meets the social soundness requirements within the ASEAN context. It builds on existing research institutions or units within each country and allows each country suitable flexibility in project design. Inter-country communication will be actively supported and strengthened by the project, thereby developing ASEAN cooperation.

Of greater social importance is the fact that the focus of the project -- coastal resources management -- is a topic that affects the welfare of a large number of people, frequently among the poorest in each country. Because of low income and lack of social mobility, coastal

communities have been difficult to help. Given the present lack of alternative social and economic opportunities for a majority of people in such communities, it is important that their resource base be managed on a sustainable basis to ensure future productivity. By seeking socially acceptable solutions to resource use conflicts or trade-offs in coastal areas, and by providing plans to minimize further degradation of living resources, the project will help stabilize the socio-environmental base of the coastal community economies. For detailed analysis, see Annex I.

D. Institutional Analysis. The institutional analysis has considered and concluded favorably about ICLARM's capacity and fitness for carrying out the project. It also reviews the organizational strengthening expected to result from the AID assistance. See Annex J for details.

E. Environmental Analysis. No environmental assessment is required, according to AID's revised Environmental Procedures, 22 CFR Part 216.2(c)(2). This is because the project consists of analyses, studies, research, training and information dissemination.

Because the focus of the project is on improved approaches to the management of living coastal resource systems for sustainable development, it is expected that beneficial environmental impacts will result from project-funded activities. The development of environmentally sound coastal management plans in selected pilot areas of participating ASEAN countries is expected to influence public policies and decision-making regarding the long-term, sustained use of renewable coastal resources. In addition, the project's training and information dissemination activities will promote institutional and human resource development throughout the region in the interdisciplinary field of coastal zone management.

## VI. PROJECT CONDITIONS, COVENANTS AND NEGOTIATING STATUS

The preceding, proposed Project Authorization contains recommended conditions to this grant assistance. No special covenants are envisaged.

The project has been collaboratively developed with the ASEAN Working Group on Marine Science and related agencies and committees. Project design was firming up at the ASEAN-US Project Preparatory Workshop held in Manila during early May 1985. ICLARM participated in that Workshop and has contributed to the project development process.

In late May, the Regional Inspector General (RIG) was requested to examine the adequacy of ICLARM's accounting system as well as its financial viability for carrying out the project. RIG findings on both counts are positive. Negotiation of a specific support grant with ICLARM, in coordination with the ASEAN Working Group, will follow project authorization.

ANNEXES

- A. PID Review Cable
- B. Papers from Experts' Meeting
- C. Logical Framework Matrix
- D. Detail of Component One Site-Specific Proposals
- E. Detail of Component Two
- F. Financial Plan Detail
- G. Technical Analysis Detail
- H. Economic Analysis Detail
- I. Social Analysis Detail
- J. Institutional Analysis Detail
- K. ICLARM Application Letter and Program Summary Update
- L. Statutory Checklist



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OFFICER TO MAKE THIS DETERMINATION.

26. ICLARM'S FINANCIAL FUTURE: ICLARM HAS AN EXCELLENT RECORD IN RESEARCH ON LIVING AQUATIC RESOURCES FOR TROPICAL DEVELOPING COUNTRIES, BUT HAS AN UNCERTAIN FINANCIAL FUTURE FOR ITS CORE PROGRAM ACTIVITIES. WE VIEW THIS AS THE MAJOR ISSUE. THE PROJECT DESIGN SHOULD ADDRESS THIS ISSUE TO ENSURE ICLARM WILL BE SUFFICIENTLY SUPPORTED TO REMAIN FINANCIALLY VIABLE AND CAPABLE OF ADMINISTERING USE OF PROJECT FUNDS WITHOUT UNDUE OVERHEAD CHARGES.

27. ICLARM AND ASEAN RESPONSIBILITIES: THE RESPONSIBILITIES OF BOTH ICLARM AND THE ASEAN PROJECT STEERING COMMITTEE SHOULD BE DISCUSSED IN THE FINAL PROJECT PAPER. THE APAC NOTED THAT THESE RESPONSIBILITIES STILL MUST BE WORKED OUT BY THE DESIGN TEAM OR BY THE ALO. SINCE THE POLICY CONCERNS OF THE ASEAN AUTHORITIES UNDOUBTEDLY WILL BE ADDRESSED THROUGH THE ASEAN STEERING COMMITTEE, THE APAC RECOMMENDS A THROUGH DISCUSSION AND UNDERSTANDING OF THE PART EACH WILL PLAY BEFORE THE PROJECT IS AUTHORIZED.

28. AID STAFFING: THE PID ACKNOWLEDGES THE NEED FOR AID TECHNICAL AND ADMINISTRATIVE SUPPORT DURING BOTH DESIGN AND IMPLEMENTATION OF THE PROJECT. OUR DISCUSSIONS WITH THE ALO IN MANILA INDICATED THAT THIS AREA MUST BE MORE FULLY EXPLORED TO KEEP THE AID MANAGEMENT ROLE TO A MINIMUM. CONSEQUENTLY, THE APAC RECOMMENDS THAT FURTHER DESIGN WORK EXPLORE USING AN AID DIRECT CONTRACT FOR THE INDIVIDUAL(S) ASSIGNED TO ICLARM AS LONG TERM, TECHNICAL PROJECT ADVISORS. THE APAC ALSO SUGGESTS THAT A MEMBER OF THE DESIGN TEAM BE IDENTIFIED AS A POSSIBLE CANDIDATE FOR ONE OF THE LONG TERM POSITIONS DISCUSSED IN THE PID.

29. MINORITY FIRMS OR INDIVIDUALS (GRAY AMENDMENT): THERE WAS NO MENTION IN THE PID ON OPPORTUNITIES FOR MINORITY FIRMS OR INDIVIDUALS TO PARTICIPATE IN THE PROJECT. UNDER THE EARLY ALERT SYSTEM, FULL CONSIDERATION MUST BE GIVEN TO THE USE OF PEOPLE OR ORGANIZATIONS WHICH FALL UNDER MINORITY CATEGORIES. ALO SHOULD MAKE AND RECORD DETERMINATION IN THE PROJECT PAPER. IF THERE MAY BE OPPORTUNITIES FOR MINORITY PARTICIPATION, THE PROJECT PAPER SHOULD ALSO DESCRIBE STEPS TO BE TAKEN TO FURTHER THE INVOLVEMENT OF SUCH INDIVIDUALS OR ORGANIZATIONS. SUE BUGG, ASIA/PD/PCS, WILL BE EXAMINING AND FORWARDING ANY SUGGESTIONS OF ORGANIZATIONS FOR CONSIDERATION BY ALO. PLEASE NOTE THAT ALL FUTURE PIDS AND PROJECT PAPERS MUST CONTAIN SUCH A DISCUSSION.

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20. RESEARCH IDENTIFICATION: EACH ASEAN COUNTRY HAS SPECIFIC PRIORITY RESEARCH NEEDS ASSOCIATED WITH THE PLANNING AND MANAGEMENT OF LIVING COASTAL RESOURCES. THE PID IDENTIFIED POSSIBLE COMMON THEMES FOR COOPERATIVE RESEARCH. INTRA-ASEAN AGREEMENT ON THE AREAS OF RESEARCH SHOULD BE DEVELOPED DURING THE PROJECT PAPER DEVELOPMENT.

20. HOST COUNTRY AND ICLARM PROJECT SUPPORT: THE DOLLARS 1.5 MILLION SHOWN IN THE PID AS ASEAN AND ICLARM SUPPORT IS AID'S BEST ESTIMATE OF INKIND SUPPORT TO THE PROJECT. THE DESIGN TEAM WILL BE EXPECTED TO FULLY IDENTIFY THE NATURE OF THIS SUPPORT IN THE PROJECT PAPER.

21. END OF PROJECT STATUS: THE PID WAS VAGUE ON THE MEASURABLE OUTPUTS TO BE ACHIEVED AT THE END OF THE FIVE-YEAR PROJECT. OUR DISCUSSION WITH THE ALO INDICATED THAT THE PROJECT PAPER WILL IDENTIFY MEASURABLE OUTPUTS IN TRAINING, RESOURCE ASSESSMENT AND RESEARCH TO BE USED FOR EVALUATION PURPOSES.

3. P D AND S FUNDS: ASIA/DP PREPARING SEPTEL TO MANILA CONTROLLER GIVING BUDGET ALLOWANCE FOR DOLLARS 75,000 FROM P D AND S FUNDS FOR PROJECT PAPER PREPARATION. ALO/MANILA SHOULD KEEP IN CLOSE CONTACT WITH MIKE PHILLEY, ASIA/TR/EFE, CONCERNING SCHEDULE AND MAKE UP OF DESIGN TEAM.

4. PLEASE ADVISE ASIA/PD IF ANY ADDITIONAL ASSISTANCE REQUIRED FROM AID/W TO MAINTAIN FY 85 OBLIGATION TARGET. SHULTZ

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A Perspective on the Management of Living Coastal  
Resources in the ASEAN Region

Dr. Peter Burbridge

Introduction

The purpose of this paper is to stimulate discussion of the coastal resource management problems and issues in the ASEAN region. It is a fairly easy task to draw up a "laundry list" of problems and issues. It is a more difficult task to separate problems from issues. The central issue we should be concerned with is maintaining options for intensive, multiple use forms of coastal resource exploitation which can be sustained until such time as those options are no longer needed to support the social and economic welfare of the ASEAN Nations.

Why Coastal Resources Management is a Key Issue

Within the ASEAN nations the social and economic significance of primary resources found in coastal areas is generally very high. The main exception is Singapore which has chosen to allocate most of its coastal land and water resources to urban and industrial development. Although Singapore is still dependent upon agricultural, forestry and fisheries products, it derives those through trade with its neighbors.

Perhaps in time all the ASEAN nations will follow the same path of development as Singapore. However, until those countries are able to substitute secondary and tertiary development for primary resource development, they will need to conserve the potential that coastal resources offer to meet the needs of their societies. With rapidly growing populations and the ultimate need to feed and clothe people, it may never prove logical to allocate all coastal areas to urban or secondary economic development. This issue cannot be resolved at this point in time, therefore, it makes sense to try to maintain coastal resource development options. However, there is increasing evidence that options are being lost through poor standards of resource management and the inappropriate allocation of land and water resources. This is seriously reducing the ability of coastal resource systems to sustain development.

How serious is this issue of managing coastal resources for long-term sustainable development? We would argue that if the management of coastal resources is not rapidly improved, we may lose forever the opportunity to meet the basic needs of the ASEAN region's growing populations and to promote desirable levels of economic and social welfare. There are four basic reasons which force this conclusion:

The first is that the diversity and biological richness of coastal areas offer opportunities for multiple use forms of development as well

as intensive forms of renewable resource production which are superior to those of upland and purely marine systems. However, the majority of our development programs and projects are oriented toward sectoral interests which largely ignore multiple use options whose benefits lie outside their economic focus. As a result we find resources such as mangrove, which supply a wide range of economic and environmental goods and services, being managed for the maximum production of single goods (e.g. mangrove Wood Chips) or converted to other single purpose uses (agriculture or aquaculture). In effect, the cumulative social and economic welfare of the mangrove resource system is discounted in favor of a very narrow range of products. In economic terms alone, the costs of such policies can outweigh the benefits to society. (Dr. Dixon addresses this concept more fully in his paper).

The second reason follows on from the first, the richness and diversity of coastal resources has long been recognized and has led to the evolution of sophisticated, ecologically sound multiple use strategies for coastal development. Many of these traditional forms of use are very sophisticated and can respond very well to improved management. However, we tend to ignore the wisdom of these examples of traditional knowledge and rush into simple models of development which make coastal areas more prone to disaster and people more vulnerable to the loss of income, property and even life. In effect, we are moving away from broadly based strategies of moderate and sustainable levels of resource utilization which minimize risk. Instead of incremental adaptation and improvement of sound strategies, we opt for crash programs favoring short term economic gains and ignore the consequent hazards and risks.

The third concern lies in our failure to look at the interrelated nature of upland, coastal and marine ecosystems. Water is the primary link in transmitting and converting solar energy into physical processes (e.g. movement of materials-erosion) and biological processes (solution of plant nutrients-plant growth). As a result of gravity and the hydrologic linkages between upland and marine systems, what takes place in terms of upland management has a consequent effect upon coastal and marine ecosystems. For example, the conversion of upland forests to agriculture can lead to accelerated water run-off, increased erosion and the transport of sediments and agricultural chemical residues downstream. Similarly poor road construction practices or the creation of water control structures upstream of coastal areas have implications for the management of coastal and marine resources.

When we examine fishery management questions, the productivity of coral reefs can support up to 30% of artisanal capture fisheries. Siltation of reefs due to upland erosion or mining is a primary cause of reef destruction and has a consequent effect upon fish stocks in Indonesia, Thailand, the Philippines and parts of Malaysia. Therefore,

coastal fishery management projects will have to consider upland management practices as a key variable in any plans for increased production or improved habitat management.

These simple and direct cause-and effect-relationship do not appear to be generally built into the management models we adopt for coastal development. As a result, we spend more effort defining abstract definitions of coastal zone management boundaries and less effort in defining key management parameters for developing coastal ecosystems. Failure to incorporate factors such as predictable hydrologic changes due to upland development policies and projects makes public programs aimed at increasing coastal production (e.g. fishponds or irrigated rice) subject to increasing hazards, risks, and uncertainty regarding their long-term performance.

The fourth concern centers on our continuing inability to effectively coordinate and integrate development efforts. In spite of special coastal zone management initiatives in countries such as the Philippines and Thailand, we see continuing problems of inter-sectoral conflict, environmental degradation and the loss of development options. We must all give due credit to the spirit of genuine concern that has resulted in these coastal management initiatives, however, we must ask ourselves why they may not be bringing about rapid and significant improvements in the way coastal development opportunities are managed for our future and our children's future.

There is no simple answer. However, two factors may play very significant roles - information, and poor standards of decision making.

The first factor centers upon our failure to translate bio-physical, social and economic data into information which is of assistance to decision makers charged with the formulation of development policy. As scientists, we tend to treat data as information and get frustrated when we talk about the nutrient exchange capacity of mangrove and decision makers fail to respond. While it is fair to say we lack a lot of basic data, placing emphasis upon enriching our data banks will do no real good unless we find ways of translating data or scientific analyses into terms which convey the ecological social and economic significance of coastal resources to society and the needs of people. To do this, we need to be aware of information needs of decision makers and we need to integrate our scientific approaches to derive principles and practical techniques for integrated management for coastal ecosystem development. This will help us to more effectively communicate the importance of improved coastal resource management and to create more effective management guidelines which can be implemented by decision makers.

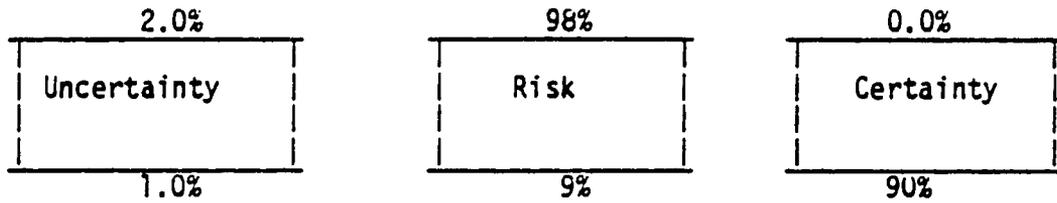
The second factor concerns the very different perceptions that technical specialists and decision makers have concerning the predictable results of management decisions. People assume management and decision making are highly rational processes, however this is not necessarily so.

Herbert Simon (1960) demonstrated this very clearly in the case of a major industrial firm and the model is equally valid for coastal development. Simon suggests there are three states of nature "uncertainty" (we do not have any real idea of what will happen if we pursue a course of action), "risk" (we can calculate the probability of something good or bad happening as a result of a given course of action) and "certainty" (we have no doubt as to the action producing the intended results). A group of technical experts within the firm were asked to assess the uncertainty, risk and certainty associated with the expected results of a major new development project (see figure 1). They judged that there was a 2% level of uncertainty about what might result, a 98% risk of the result being different than expected and a 0% certainty

Figure 1

Management Decisions and Perceptions of Risk:  
Perceived Levels of Risk Associated with Decision Making

How The Technical Experts Viewed Reality



How Decision Makers Perceived Reality

(based upon H. Simon, 1960, The New  
Science of Management Decisions, Harper  
and Row Publishers, New York).

of what the result may in fact be. In complete contrast the decision makers assessed a 1% level of uncertainty, a 9% level of risk of things not proceeding as expected and a 90% level of certainty. This not only suggests there are huge gaps between what technical experts perceive and what decision makers believe they understand, it also indicates that the decision making process may not incorporate a rational assessment of reality.

Such poor bases for management decisions may not prove disastrous for a large firm which can write off a mistake against taxes. However, in managing scarce and ecologically fragile coastal resources, our management mistakes lead to reduced production, loss of development options and real social and economic hardship.

If we are to improve the process of coastal development we must pay attention to the use of information in helping the decision maker become more aware of the great degree of uncertainty surrounding current development programs and practices. The large risks we face in not being very selective about our priorities for information gathering, analyses and dissemination will have serious long-term consequences. The same is true of the priorities we place in manpower development. Do we want more basic scientists or applied scientists who are capable and prepared to work in interdisciplinary teams with problem solving objectives oriented to practical management solutions. The question is a loaded one, but it can be legitimately loaded even further by asking if we should also place great emphasis on improved management training.

It is hoped that the above comments will expand our discussions of the individual problems and issues facing the ASEAN nations. The presentations of the following problems and issues has been purposely delayed so that we might consider their resolution in terms of:

1. information needs for improved coastal resource management;
2. manpower training; and
3. improvements in institutional arrangements to link applied research, information dissemination and coastal planning and management.

#### Major Problems and Issues in Coastal Resource Management in the ASEAN Region

Figure 2 (attached at end of Annex B - see page B-16) charts a variety of major problems and issues related to coastal resource management. These have been based upon a survey carried out during the USAID/National Park Service Workshop on "Coastal Area Management and Planning" held in Bangkok, (March, 1985) and a wide variety of papers and reports.<sup>(1)</sup> Information is given for 5 of the 6 ASEAN Nations and it will be seen that there are problems which are common to all the countries and some which are unique to only one, or at most only a few of the countries.

No claim is made that this is complete and some people may dispute one or more of the entries, however the problems and issues are representative of the management challenge which faces us. No attempt has been made to rank the problems/issues for three reasons:

(A) Many of the problems/issues are the result of several separate actions or activities which together create a series of consequences whose sum is greater than the simple addition of the separate parts. For example, declining water quality in an estuary can result from increased seasonality of fresh water flows which can increase the impact of: salt water intrusion, urban sewage, industrial effluents or agricultural chemicals—all of which condition water quality. The synergetic effects of these individual problems can have very severe effects upon surrounding coastal land and water areas and upon deeper water marine environments;

(B) A coastal ecosystem can be the subject of more than one problem, any of which can reduce its ability to sustain development. For example, the range of goods and services provided by a mangrove forest can be reduced through poor enforcement of fuel wood harvesting regulations and a decline in the quality of fresh water entering the mangrove. These same goods and services can be eliminated through conversion of the forest to agriculture. Both cumulative impacts and outright conversion require careful assessment in terms of their influence on the management of activities such as Chanos-chanos (milk fish) fry collecting to supply brackish water pond culture which are dependent upon the continuing health and condition of a natural system; and

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(1) See-Soysa, C., Chia, L.S. and W.L. Collier (eds) 1981, Man Land and Sea, the Agricultural Development Council, Bangkok, chaptus 9, 11, 14, 15, 17 and 19.

Valencia M.S. (ed) Proc. Workshop on Coastal Area Development and Management in Asia and the Pacific, 3-12 Dec. 1979, published by the East West Center, Honolulu. pp. 67-74; 85-88; 101-102.

MAB Coord Comm of Japan 1984, Man's Impact on Coastal and Estuarine Ecosystems, 13-16 November 1984, Tokyo pp. 21-25; 27-32; 51-58; 79-84; 85-102; 121-125; 131-139; 157-172.

(C) The information and the resource management expertise available differs from one country to another. As a result, similar problems can assume different levels of importance in one country versus another. While the relative importance of individual problems may vary, it is important for the ASEAN countries to share information and management experience to resolve common problems and to create complementary research programs which avoid duplication of effort and promote the more effective use of scarce manpower.

### Broad Issues Common to All the ASEAN Nations

Although no attempt has been made to rank the individual problems in Figure 2, broad categories of issues can be identified including:

Population (growth and concentration);  
 Economic Development (urban expansion, mining, agriculture, fisheries, forestry, industry, dams, roads, coastal structures, tourism, power generation);  
 Conservation of Resources;  
 Hazards; and  
 Management issues (Institutions, Manpower, Technical, Regulation and Enforcement)

These categories are by no means mutually exclusive and they generally concern a series of ecological systems. Each category is worthy of detailed examination, however there are two broad sets of issues common to all of the ASEAN countries which are central to the development and sustained management of living marine and coastal resources. The first centers upon the general lack of integration in development planning and the emphasis upon sectoral development programs and their largely single purpose forms of development projects. The second relates to the decreasing ability of coastal resource systems to sustain development. While these two broad sets of issues are directly linked, it is useful to separate them so that the consequences of sectorally oriented management frameworks can be shown to have a series of impacts upon a variety of related coastal resource systems and their ability to sustain development.

- A. Lack of Integration in Development Planning and Management: Problems related to the current bias toward Sectoral Development
1. Forecast of Land and Water Resources Demand Related to Population Growth and Economic Development.

During 1983 ten major Indonesian government agencies representing activities such as forestry and fisheries met to discuss future land demands. Forecasts of the land required by those agencies totalled more than 225 million hectares. These demands far exceed the actual land area of Indonesia (191 million hectares).

These estimates suggest that: (a) single purpose land-uses dominate assessments of land and water resource potential, (b) there may not be sufficient land to meet demands based upon exclusive single purpose development, (c) that multiple use concepts are the most logical alternative for fulfilling development objectives given both increasing land scarcity and the ability of coastal resources to support multiple objectives and, (d) increased emphasis upon improving the productivity of existing land and water uses will help to reduce the need to expand activities.

## 2. Inter-sectoral Conflicts Arising from Development:

(a) Conflicting guidelines: The sectoral approach to development often results in a series of conflicting demands upon coastal resources and conflicting management guidelines and incentives. A good example is the current debate over the width of a "greenbelt" or zone of protected mangrove in Indonesia. The Directorate General of Fisheries issued a policy instruction<sup>(2)</sup> aimed at protecting estuarine and coastal fish stocks dependent upon mangrove, which stated that a "Greenbelt" of mangrove should be established along all coastlines. This instruction conflicts with the 50 meter wide belt of "protection forest" incorporated in the silvicultural regulations and attempts to assert authority over areas the former Directorate General Forestry considered their responsibility. To resolve their conflict, the Minister of Agriculture instructed the Directorate Generals of Fisheries and of forestry to seek a compromise which would protect mangrove related fish stocks. However, the issue is still being debated 8 years later and no satisfactory compromise has been reached.

Even if the compromise is worked out between fisheries and forestry, it will not necessarily mean that a variety of other mangrove related activities will be protected or sustained.

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(2) Instruction Mp/ HI/4/2/18/1975 followed by Instruction No. E1/5/8/4/1976 issued to all provincial governors to set aside a 400 meter wide greenbelt of mangrove along their coastlines.

(b) External Effects. The productivity of existing coastal uses is often depressed by conflicts arising from the negative effect of one form of development activity upon another. For example, a new port is being developed near Jakarta at Marunda to handle logs brought in from the Outer islands for processing into secondary wood products. The port will be sited only a few hundred meters away from a planned brackish water fishpond development area and threatens the viability of the ponds.

The sustained utilization of existing coastal resources requires management perspectives which reduce conflict. As in the case of the siltation of coral reefs, appropriate management perspectives may require attention to the linkages between different natural resource systems as well as linkages between individual forms of activity.

3. Conflicts Within Individual Sectors: Apart from inter-sectoral conflicts in the allocation of coastal resources, there are conflicting policies within the agencies which also create coastal development problems. A good example is the promotion of fishpond development in the Cilacap Mangrove. Despite a policy aimed at preserving a "greenbelt" of mangrove around the coasts of Indonesia, the Directorate General of Fisheries is eager to increase shrimp exports through the construction of brackish water ponds. In the Cilacap area the mangrove already supports a mangrove-cum-fish production system utilizing canals interspersed with mangrove. This system will be replaced with large shrimp ponds which would reduce the area of mangrove.

This proposal not only contradicts the arguments put forward by the Directorate General of Fisheries concerning the value of mangrove in supporting coastal fishstocks, it also displaces an existing fishery. That fishery is very productive<sup>(3)</sup> and meets domestic needs for fishery products and some exports of shrimp. By placing emphasis upon shrimp exports alone, the Fishery Department may reduce domestic food production and reduce the ability of the Cilacap mangrove to support offshore shrimp harvests.

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(3) Aprilani 1983, 1984 has shown that the mangrove-cum-fish culture system can be very productive. He argues that the proposed conversion to large open water ponds will not necessarily improve the production of shrimps and may reduce wild shrimp capture due to damage to the mangrove ecosystem.

(See. Aprilani Soegiarto, 1984 Man's Impact on Mangrove Ecosystem in Java with particular reference to the Cilacap and Northcoast of West Java Regions, Regional Seminar on Man's Impact on Coastal and Estuarine Ecosystems, Tokyo, Japan (13-16 Nov. 1984).

4. Need for Coordination of Development: From an examination of major Donor Agency Projects and government programs it is evident that current approaches to questions pertaining to the management of resources, such as those surrounding food requirements, focus upon factors of production. Less attention is given to issues such as the improved management of existing development to fulfill projected demands as an alternative to the expansion of areas in production. The identification of future constraints on production are also often ignored.

Where the characteristics of the resources base (soil, topography, water supply, etc) are of direct significance to the supply of basic human needs, it is important to consider future pressures such as competition for fertile, level sites with a good water supply, resulting from different sectoral interests such as agriculture, fisheries or forestry. The resolution of potential conflicting demands and the allocation of resources requires a far more coordinated approach to environmental management than has been adopted to date.

It is clear that there is a political will to face the challenge of achieving sustainable forms of development. This, however, is frustrated by: (1) a lack of clear articulation of the rate and scale of change that will result from the growth of population; (2) the lack of attention to the identification of existing and potential conflicts in demands for land; (3) poor perceptions of the strategic social and economic significance of multiple use opportunities in coastal areas; (4) a common assumption that there are few limits to the ability of resources to support sectoral approaches to development and that money can always be found to overcome such limits; and (5) the absence of clear and practical guidelines for managing development in the short-term. This is symptomatic of the broad objectives stated in national development guidelines which often are not complemented by explicit policies to guide the allocation of resources between competing activities.

#### B. The Decreasing Ability of Coastal Resources Systems to Sustain Development

The failure to coordinate and integrate development policies and to regulate the exploitation of coastal resources can lead to loss of productive potential due to stress within ecosystems. The complete loss of goods and services can follow the conversion of natural ecosystems to alternative uses.

A modest amount of research has been carried out on the major sources of pollution which cause stress in coastal ecosystems including: siltation, chlorinated hydrocarbons, hydrocarbons related to petroleum products, and domestic and industrial wastes. A potential weakness of some of the studies which have been carried out is their focus upon the effects of single pollutants. Little research attempts to document the cumulative, synergetic effect of pollutant stress upon the productive functions of coastal ecosystems. However, it is not suggested that this

is a suitable topic for the ASEAN project. Such research will be both expensive and time consuming. It is more important to assess the capacity that coastal ecosystems have to respond to development initiatives. Unfortunately, several of the major development initiatives in coastal ecosystem development are proving less successful than anticipated and the ecosystems are being degraded.

2. Coastal Ecosystem Degradation. Three coastal ecosystems are particularly vulnerable to the indirect and direct impacts of unregulated development - tidal swamps, mangrove and coral reefs.

Tidal Swamps - While both mangrove and coral reefs have attracted a good deal of scientific attention in Asia, estuarine areas and tidal swamp forests or grass swamps have received less attention. In the case of tidal swamplands, the Indonesian Government has projected major development of these lands for tidally irrigated rice fields associated with the Transmigration program. After committing vast areas of these fragile and generally agriculturally marginal lands and millions of dollars of loan funds, it is not certain that their use for agriculture can be sustained. Reports are circulating of decreasing rice yields, accelerating management costs and deteriorating soil and water conditions. One person interviewed in Bogor stated that yields of unhulled rice had fallen to 1.50 tonnes per hectare which is less than 1/5 of yields from irrigated paddy in Java.

Tidal swampland areas are often subject to acid sulphate potential soil conditions and related poor buffering capacities in terms of fertilizer applications. As a result much of the nutrient which is applied is bound up by the soils and is not released for plant growth. Acid conditions also slow plant growth and reduce yields. Problems also have to be faced concerning shrinkage of the organic layers (Peaty materials) due to oxidation or moisture loss. This increases the problems of water control and corresponding problems of oxidation of mineral soils.

Apart from the marginal nature of these lands for agriculture, development planners have consistently failed to evaluate the impact upon estuarine and coastal fish stocks resulting from their conversion. To date there have been no definitive studies to determine what the nature and scale of the impact upon fisheries may be. It is reasonable to expect that major alteration to these systems will alter nutrient cycling in the estuarine system, will increase acid drainage and will reduce spawning and nursery areas. In addition, the commercial value of the swamp forest is generally discounted to zero when assessing the benefits from conversion. In fact the long-term sustained yield of timber can be substantial and equates with many upland forest areas (Burbridge et al, 1981).<sup>(4)</sup>

(4) Burbridge P.R. Dixon, J.A. and B. Soewardi, 1981 Forstry and Agriculture: Options for Resource Allocation in Choosing Land for Transmigration Development, Applied Geography Vol. 1, No. 4, 1981, London.

### Mangroves

Mangrove areas are also cited in different contexts as either worthless swamps or as highly valued natural ecosystems supporting a variety of economic activities. Even where their value in supporting fisheries in their natural state is recognized by agencies such as the Indonesian Directorate General of Fisheries, mangrove are often cited by those same agencies as prime locations for destruction and replacement by fishponds. As this time the government of Indonesia plans to open up 30,000 hectares of shrimp and fishponds, much of which will be in mangrove. Current policies concerning mangrove management are not leading to the conservation of these resource systems as the basis for sustained development. Apart from questionable estimates of the extent and areal distribution of mangrove, the rate of loss of these areas is often obscured by piecemeal, small scale erosion of both the area, extent and viability of the mangrove habitat. During recent field work in Indonesia, in all the coastal areas we visited the mangrove were heavily exploited for fuelwood and large tracts had either been reclaimed for fishponds, saltponds or other uses. Many were subject to pollution or interference in fresh water flows or tidal flushing. It was a rare occasion when we found a relatively undisturbed mangrove area.

Research in Malaysia into the utilization of mangrove for traditional uses such as charcoal production, modern woodchip production and conversion to fishponds (based upon current FAO guidelines) has shown that, of the three alternatives, only a 30 year rotational cycle of mangrove charcoal production is sustainable (Gong et al, 1984).<sup>(5)</sup> These results suggest that both current forestry policies favoring large scale wood chip production and the conversion of mangrove to fishponds may not promote sustainable development.

### Coral Reefs

The most significant factor in coral reef damage is the burial and sedimentation of living reefs from upland soil erosion caused by short-cycle swidden agriculture, deforestation, overgrazing by game and livestock, urbanization, road construction and mining. Although corals and other reef life can withstand moderate amounts of sediment for short periods, they will succumb to heavy or prolonged sedimentation and all species will die if buried. Recovery of reefs after cessation of

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(5) Gong, W.K., Ong J.E. and C.H. Wong, 1984. The Different Uses of Mangroves and their Possible Impacts on Mangrove and Adjacent Coastal Fisheries, MAB Seminar on Man's Impact on Estuarine and Coastal Ecosystems, Tokyo - Nov. 13-16, 1984.

sedimentation is slow or non-existent. The variety of sources and the long distance between the sources of the sediments and the reefs complicates management and control. This problem offers a great challenge, and will require cooperation from all sectors in terms of reforestation, livestock and game management, use of long cycle swidden - particularly in arid areas, controls over excavation, mining and dredging, and management of storm water flows.

Over exploitation of reef fisheries and use of inappropriate techniques for exploiting coral reef resources is causing destruction and damage to many important coral reefs and declines in the stocks of species of importance to subsistence and commercial fisheries. A cycle of heavy fishing on a particular reef may cause stocks to decline to such low levels that explosives and poisons may be used in desperation to catch fish which accelerates the destruction of the reef. The practice of dynamiting reefs to obtain fish is cultivated out of ignorance and the inability of many non-diving "fishermen" to realize the consequences.<sup>(6)</sup> Greater enforcement and penalties for unauthorized use and sale or distribution of explosives would be particularly important. Public education on the consequences of dynamiting and training in alternative fishing practices and vocations may help reverse existing trends.

Heavy exploitation of live and dead reef corals for construction materials and live reef and precious (black) corals for the jewelry and the curios trade can damage reef habitat and cause shoreline erosion. A decline in subsistence fisheries could also take place because of loss of coral habitat. Evaluation and use of upland sources of limestone to obtain construction rock appear to be important remedial actions.

Aside from their many other valuable functions, reefs are most valuable from the standpoint of providing vital sources of animal protein for many people. A concerted effort to manage coral reefs is needed to sustain subsistence, artisanal or small scale fisheries and other valuable functions. Management options should also consider controlling access to certain reefs and discouraging large scale commercial exploitation (in order to reserve the resources for subsistence fishermen). Studies using remote sensing techniques should be considered to identify problem areas or sources of pollution and sediment. Other studies should focus on documenting the extent of damage, effect on fisheries, rates of recovery and identification of remedial actions.

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(6) Surveys of explosive fishing have shown that a small proportion of the fish that are killed or injured actually float to the surface where they are collected. The majority sink to the sea floor or drift away.

One fact that needs to be stressed is that all of the coastal systems are interrelated. Therefore, national policy guidelines and local controls in accordance with those guidelines are critical factors in promoting the sustained development of any of these resource systems. At both levels, major improvements are needed to refine policies and to impress upon the public and officials alike the need to promote their conservation. Even though they are fragile, they offer great scope for fulfilling future development objectives. The integration of multiple use strategies for each of these systems will promote the greatest net contribution to long term social welfare. Therefore, sectoral assessment of resource utility will need to be enhanced to incorporate many more of the pecuniary and environmental values to society represented by the natural functions of these three systems.

### The Need for Improved Economic Analyses of Coastal Resources and Alternative Development Options

There are two lessons to be learnt from our past experience in developing coastal resource systems such as mangrove or coral reefs. The first is that they can provide a wide range of products and services which support a number of different forms of economic activity. The examination of specific forms of development potential, such as the conversion of mangrove to fishponds, involves many bio-physical and economic trade-offs which need to be included in the analyses of development policies and projects. The second lesson is that the maintenance of the functional integrity of coastal resource systems is the key to the development of sustainable, multi-purpose forms of development. The sum of the benefits from these often exceed the benefits from either preservation or conversion and destruction of the natural system. Except for activities such as ports or power stations which cannot be developed without radical alterations to coastal areas, the greatest economic returns from coastal resource development will lie in skilfully managed, multiple-use activities based on natural resource systems. Therefore, it makes great economic sense to attempt to harmonize economic and ecological development perspectives in coastal resource management.

Sound environmental management and well constructed economic analyses are complementary aspects of the development process. Many of the environmental problems could be reduced by improving the definition of the boundaries for economic analysis and project evaluation. The unique nature of coastal resource systems (e.g. coral reefs, mangrove, tidal swamps), as compared to an industrial site, requires that unambiguous boundaries relevant to the physical properties of the systems be defined so that economic analyses can incorporate major externalities. For example, a project to convert mangrove should have analytical boundaries broad enough to include the expected benefits or costs that occur offsite. Examples of such benefits or costs are changes in coastal fish catch resulting from the conversion of the mangrove-based breeding areas inland, or storm damage following the destruction of the mangrove buffer

function. There is a danger that, by placing too much emphasis upon ecological remedies in development planning, the major problems created through the use of narrow definitions of the relevant boundaries for economic analyses and project planning will be ignored. Therefore, increased emphasis must be placed on incorporating improved environmental and economic approaches in policy formulation, project design and management guidelines.

FIGURE 2

ISSUE	PROBLEM	Singapore	Philippines	Malaysia	Indonesia	Thailand
<b>Population</b>						
1.	Growth		X		X	X
2.	Concentration		X		X	X
<b>ECONOMIC DEVELOPMENT</b>						
1.	Urban Expansion - unplanned, uncontrolled					
	- inadequate infrastructure		X		X	X
	- conversion of biologically rich areas to non-resource dependent uses	X	X	X		X
	- increased vulnerability of sites and populations to coast hazards		X	X	X	X
2.	Mining					
	- Tin			X	X	X
	- Mineral/Construction sand	X	X	X	X	
	- Coral		X		X	X
3.	Agriculture					
	- conversion of mangrove, peat swamps		X	X	X	X
	- acid sulphate soils		X	X	X	X
	- soil salinization		X	X	X	X
4.	Fishery					
	- underexploitation of marine stock			X		
	- overexploitation of coastal stock	X	X	X	X	X
	- poor standards of management and enforcement		X	X	X	X
5.	Forestry					
	- conversion of freshwater and tidal swamp forest for aquaculture/agriculture		X	X	X	X
6.	Industry					
	- siting		X	X	X	X
	- land fill	X	X	X	X	
	- pollution (chemical/thermal)	X	X	X	X	X
7.	Dams					
	- change in hydrologic conditions		X	X	X	X
	- sedimentation		X	X	X	X
	- reduction in nutrient flows	X	X			X

ISSUE PROBLEM	Singapore	Philippines	Malaysia	Indonesia	Thailand
8. Roads - siting and construction - barriers to tidal water flows; - erosion; impedes fresh-water drainage	x x	x x x	x x	x	x x
9. Coastal Structures - ports - sea defenses - airports	x x x		x x x	x	x x x
10. Tourism - hotel siting - loss of access/amenity	x x	x x	x	x x	x x
11. Power Generation - thermal discharge - siting	x	x	x	x x	x x
<b>CONSERVATION OF RESOURCES</b>					
1. Coastal erosion		x		x	x
2. Coral reef destruction	x	x	x	x	x
3. Mangrove destruction	x	x	x	x	x
4. Sea grass destruction	x	x	x	x	
5. Loss of habitat/species	x	x	x	x	x
6. Reduction in estuarine production	x	x	x	x	x
7. Poor upland management		x	x	x	x
<b>HAZARDS</b>					
1. Increased storm damage		x	x		
2. Increased flooding		x	x	x	x
3. Loss of life		x		x	x
4. Drought				x	x
5. Salinization of water supply		x		x	x
6. Low water quality (public health)		x	x	x	x
7. Pests, diseases				x	x

	Singapore	Philippines	Malaysia	Indonesia	Thailand
<b>MANAGEMENT ISSUES</b>					
1. Lack of institutional mechanism to coordinate coastal resource development		x	x	x	x
- sectoral agencies each responsible for single purpose interests		x	x		
- lack of integrated perspective and optimal mix and levels of exploitation	x	x	x	x	x
- poor conversion of data to information		x	x	x	x
- inadequate communication and understanding of CZM issues		x	x	x	x
2. Manpower				x	x
- shortage of well-trained decision makers		x		x	x
- inappropriate use of manpower		x		x	x
- poor distribution of manpower		x		x	x
3. Technical					
- mismatch of physical vs. social or economic aspects in project evaluation		x			
- Incomplete EIA statements	x			x	x
- poor information base			x	x	x
4. Regulation and Enforcement					
- lack of enforcement of policies and regulations		x	x	x	x
- conflicting and often contradictory policies and regulations		x	x		
5. Shortage of manpower of all forms therefore low priority given to allocation of scarce manpower and capital to conservation				x	x
6. Lack of consistency in programs and projects; leading to redundancy				x	x

**PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK**

Life of Project:  
From FY 1981 to FY 1985  
Total U. S. Funding \$1,000,000  
Date Prepared: May 1981

Project Title & Number: ASEAN COASTAL RESOURCES MANAGEMENT (1981-85)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																																																
<p><b>Program or Sector Goal: The broader objective to which this project contributes. (A-1)</b></p> <p>Strengthen the capability of ASEAN countries to develop their renewable coastal resources on a sustainable basis. (This will help ensure the long term productivity of coastal fisheries and aquaculture, horticulture, forestry and other forms of primary resource dependent development.)</p>	<p><b>Measure of Goal Achievement: (A-2)</b></p> <p>Increased awareness among decision-makers of trends in renewable coastal resources depletion, and greater attention to the importance of sound coastal resources management policy.</p> <p>Greater incorporation of coastal resources management activities and programs in development plans/budgets.</p>	<p><b>(A-3)</b></p> <p>National government statistics National development plans and annual budgets</p>	<p><b>Assumptions for achieving goal targets: (A-4)</b></p> <p>ASEAN country political and economic stability.</p>																																																
<p><b>Project Purpose: (B-1)</b></p> <p>Help develop improved technical and institutional approaches for managing living coastal resources systems in the ASEAN countries.</p>	<p><b>Conditions that will indicate purpose has been achieved: End-of-Project Status: (B-2)</b></p> <ol style="list-style-type: none"> <li>Improved assessments of the capacity of living coastal resource systems to sustain intensive, multiple use forms of development.</li> <li>Improved institutional arrangements that have applied environmental and socio-economic research to coastal resources planning and management.</li> <li>Verification of management concepts and procedures for eliminating and developing coastal areas for sustainable use.</li> <li>Strengthening of ASEAN regional information dissemination channels on renewable coastal resources management.</li> <li>Strengthened ASEAN member base in renewable coastal resources assessment, research, planning and management.</li> <li>Strengthened capacity of ASEAN national institutions in association with ICLARM to facilitate and support 1) through 5) above.</li> </ol>	<p><b>(B-3)</b></p> <p>Annual work plans National and regional seminars/workshops Progress reports from ICLARM Semi-annual meetings of ASEAN Project Steering Committee AID PIR reports</p>	<p><b>Assumptions for achieving purpose: (B-4)</b></p> <p>ASEAN officials receptive to improved concepts and procedures for renewable coastal resources management.</p> <p>Financial stability and adequacy of staffing at ICLARM through life of project.</p> <p>Improved technical and institutional approaches to coastal resources management do not present significant financial/cultural burden on implementors and beneficiaries.</p>																																																
<p><b>Project Outputs: (C-1)</b></p> <ol style="list-style-type: none"> <li>Comprehensive resource assessments in selected pilot coastal areas.</li> <li>Comparative research results on topics relevant to living coastal resources management.</li> <li>Site-specific coastal resources management plans for the selected pilot areas.</li> <li>ASEAN project newsletter, ASEAN coastal data atlas, case studies and related publications derived from pilot area studies.</li> <li>Short and medium term (masters level) training, policy seminar/workshops.</li> </ol>	<p><b>Magnitude of outputs: (C-2)</b></p> <p>Outputs 1) through 3) completed by at least 6 ASEAN countries (Philippines, Indonesia, Singapore, Thailand). Details to be quantified in annual site-specific work plans.</p> <p>Quarterly newsletter through life-of-project, data atlas available to all appropriate institutions in ASEAN countries &amp; case studies, 10-15 related publications.</p> <p>Approximately 10 short courses, 10 policy seminar/workshops, 10 on-the-job training opportunities, 10 academic (M.S. level) degrees.</p>	<p><b>(C-3)</b></p> <p>Annual project and site-specific pilot work plans National and regional seminar/workshops Progress reports from ICLARM Joint site team evaluation</p>	<p><b>Assumptions for achieving outputs: (C-4)</b></p> <p>Appropriate pilot sites and technical services obtained, counterparts and support facilities identified and established, appropriate individuals identified and release for training.</p>																																																
<p><b>Project Inputs: (D-1)</b></p> <p>AID U.S. and ASEAN professional and training services, travel and per diem, grant to ICLARM, U.S. technical contracts, evaluation and contingencies.</p> <p>ASEAN Operational/support costs (person years, facilities, local expenses).</p>	<p><b>Implementation Target (Type and Quantity) (D-2)</b> (Contributions to Project component as follows: (\$100s))</p> <table border="1"> <thead> <tr> <th>Component</th> <th>AID</th> <th>ASEAN</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>1. Resource Assessment, Planning and Research (country area specific pilots)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>    Philippines</td> <td>500</td> <td></td> <td>500</td> </tr> <tr> <td>    Indonesia</td> <td>500</td> <td></td> <td>500</td> </tr> <tr> <td>    Singapore</td> <td>500</td> <td></td> <td>500</td> </tr> <tr> <td>    Thailand</td> <td>500</td> <td></td> <td>500</td> </tr> <tr> <td>    Sub Total</td> <td>2000</td> <td></td> <td>2000</td> </tr> <tr> <td>2. Training &amp; Information Dissemination</td> <td>1500</td> <td></td> <td>1500</td> </tr> <tr> <td>Regional and technical support</td> <td>1000</td> <td></td> <td>1000</td> </tr> <tr> <td>Operating/Support Costs</td> <td></td> <td>1750</td> <td>1750</td> </tr> <tr> <td>Evaluation/Contingency</td> <td>500</td> <td></td> <td>500</td> </tr> <tr> <td><b>GRAND TOTAL</b></td> <td><b>5000</b></td> <td><b>1750</b></td> <td><b>6750</b></td> </tr> </tbody> </table> <p>Source of Project paper provides further details.</p>	Component	AID	ASEAN	TOTAL	1. Resource Assessment, Planning and Research (country area specific pilots)				Philippines	500		500	Indonesia	500		500	Singapore	500		500	Thailand	500		500	Sub Total	2000		2000	2. Training & Information Dissemination	1500		1500	Regional and technical support	1000		1000	Operating/Support Costs		1750	1750	Evaluation/Contingency	500		500	<b>GRAND TOTAL</b>	<b>5000</b>	<b>1750</b>	<b>6750</b>	<p><b>(D-3)</b></p> <p>Semi-annual reports from ICLARM AID PIR and PIR reports</p>	<p><b>Assumptions for providing inputs: (D-4)</b></p> <p>Grant agreement can be negotiated, qualified organizations and individuals can be identified and contracts negotiated.</p>
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Best Available Document

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**Descriptive Profiles, Illustrative Activities, and Budgets  
for  
Potential Pilot Sites under Component One  
of  
ASEAN/AID Coastal Resources Management Project**

## Pilot Site Planning and Financing

1. Planning. Specific coastal pilot areas for Component One activities in cooperating ASEAN countries have been proposed, and in the case of Thailand and Indonesia identified, on the basis of mutually agreed criteria. See page 12 of the text.

As noted, Thailand and Indonesia have identified firm pilot sites in accordance with the above criteria. At the time of Project Paper preparation, the Philippines had not yet made its final selection among three alternative sites all of which meet the criteria. Singapore represents a special case in view of its small area and level of development as an island city-state. Accordingly, the entire nation of Singapore may be considered as the "site" for resource assessment, planning and applied research activities of relevance to its own coastal management issues as well as to common issues found throughout the ASEAN coastal region.

Descriptive profiles and illustrative activity proposals/budgets have been prepared for the Thailand and Indonesia pilot sites, two of the proposed Philippine sites, and for Singapore. These proposals are considered preliminary at the present stage of Component One planning. They will be presented in much greater detail in the first annual work plans for each cooperating country. This more detailed site planning process will constitute the first phase of project implementation and will require a close working relationship among ICLARM, each country's lead coordinating agency, and the key in-country institutions expected to play a prominent role in pilot site activities.

It is anticipated that detailed annual implementation plans and schedules will be developed at country-level workshops which bring together project staff, development planners, resource managers, scientists and researchers likely to be involved in pilot site work. ICLARM's direct participation at such planning/coordinating workshops will be critical to the progress and success of Component One activities. Therefore, it is vital that the additional senior staff (Project Coordinator and Technical Advisor) be recruited in advance of the first round of workshops.

2. Financing. Annual country work plans will include financial plans and provide a firm basis for ICLARM's release of project funds/resources to participating institutions and their activities. They will also be the mechanism for mobilizing counterpart resources and facilitating financial accounting and monitoring. As such, the workplans and financial plans will drive project implementation and allow appropriate mid-course adjustments to it on an annual, on-line basis.

**Component One: Resource Assessment, Planning and Research****Indonesia Pilot Activity****1. Objective.**

Resource Assessment, planning and research activities will be implemented in a pilot coastal area where primary resource dependent development is subject to competing sectoral interests. The objective of the pilot will be to foster an integrated management approach for resolving resource use conflicts and sustaining the long-term productivity of multiple renewable resources in the coastal zone. A comprehensive, intersectoral coastal management plan will be produced as a model to assist other coastal planning and development efforts throughout Indonesia.

**2. Site Selection.**

The pilot area proposed by Indonesia is near Cilacap on the southern coastal plain of Java. It encompasses a major tropical estuary and the only extensive mangrove forest remaining on Indonesia's most populated island. The estuarine ecosystem includes a large brackish water lagoon--the Segara Anakan--which supports several traditional fishing villages, as well as the economically important shrimp fishery along the southern coast.

The Segara Anakan is subject to high rates of sedimentation from agricultural land use in the upland watershed. Other sources of ecosystem degradation include clearing of mangrove for fish ponds, illegal cutting of protected forest for firewood, agricultural land encroachment, and pollution from an oil refinery and deep water port facility at Cilacap.

Planners have proposed several strategies for development of the Segara Anakan and surrounding area. An initial plan called for engineering measures to block tidal flows and accelerate the filling in of the lagoon from natural sedimentation. Projected economic use was based on the establishment of a freshwater lake for fisheries development and conversion of reclaimed land to rice fields. Several years of environmental impact analyses and other studies resulted in a decision by the government not to pursue the reclamation project because of the greater benefits that could be derived from maintaining the estuarine system for its coastal and marine fisheries potential.

Recently, planners have proposed an alternative development strategy that would convert extensive mangrove area to brackish water fish ponds, while conserving a residual tidal forest for spawning and protection of the immature stages of several important species. The strategy is intended to raise productivity and improve socio-economic conditions in the scattered and relatively isolated fishing villages. Plans again are calling for interventions to advance the conversion of a natural estuarine fishery to a managed agricultural system able to support a larger population.

Because of the potential tradeoffs in pursuing single sector economic development in a coastal zone primarily dependent on multiple and traditional forms of resource use, the Segara Anakan and surrounding area has become a "test case" that challenges Indonesia's capacity to manage renewable coastal resources on a sustainable basis. Therefore, the site is ideally suited to the purpose of the ASEAN-AID Coastal Resources Management project. The project will support a multi-year program of resource assessment and research to provide information in a form directly related to management issues and needs. It will also foster institutional arrangements linking these activities to informed decision-making about the future optimal use and development of the Segara Anakan coastal area.

### 3. Site Activities.

Resource assessment, research and planning activities will include:

- a) Assessment
  - fish stock assessment and monitoring (lagoon and near-shore fisheries);
  - mangrove ecosystem baseline study and monitoring;
  - watershed resources assessment (hydrology, land use, sediment transport, etc.);
  - demographic and socio-economic profile of coastal population in pilot area;
  - assessment of pollution sources, transport mechanisms and rates;
- b) Research
  - analysis of correlation among fisheries, mangrove, pollution and other factors;
  - socio-economic and marketing studies of existing resource utilization;
  - study of aquaculture development patterns and potential;
  - study of institutions (informal and formal) that control resource ownership and use rights;
  - study of administrative and legal factors regulating resource exploitation;
  - conduct of extended benefit-cost analyses of alternative methods of resource utilization;
- c) Planning
  - seminar/workshops bringing together researchers, resource managers and development planners;
  - application of extended benefit-cost analyses to the derivation of management concepts and procedures for allocating resource utilization among competing sectoral priorities;
  - use of computer-based forecasting methods for predicting future demands for renewable coastal resources;
  - development of a framework for resolution of socio-political and legal problems related to common property resource management;

- development of a comprehensive, intersectoral management plan for renewable coastal resources in the Segara Anakan pilot area;
- documentation and publication of pilot study results for national and ASEAN region information dissemination.

#### 4. Coordination and Project Management.

The pilot activities will be directed by the Indonesian Institute of Sciences (LIPI) through its National Institute of Oceanology (LON). An interagency advisory body, responsible to LIPI, will be formed at the national level. This body will consist of representatives from:

- a) National Institute of Oceanology (LON)
- b) Ministry for Population Affairs and Environment (KLH)
- c) Ministry of Agriculture; Agency for Agricultural Research and Development (AARD)
- d) Ministry of Forestry
- e) National Development Planning Agency (BAPPENAS)

The lead agency for pilot project implementation will be the Marine Fisheries Research Institute (BPPL), an arm of the Agency for Agricultural Research and Development (AARD). This research institute is responsible for guiding the development of coastal and marine fisheries. It has carried out several studies of the Segara Anakan area, which require integration into the resource assessment and research planned under the ASEAN-AID pilot activity. A senior research coordinator will be provided by BPPL to the project.

At the site level, LON and BPPL will invite the participation of the following agencies:

- University research institutes and environmental study centers (Bogor Agricultural University, Gajah Mada University, Diponegoro University)
- Provincial Bureau for Population and Environment (BKLH)
- Department of Forestry Estate Management (PERHUTANI)
- Department of Public Works (DPMA)
- Provincial Planning Unit (BAPPEDA)
- Regency and Sub-district Local Government

The above institutional structure (with BPPL as the lead implementing agency) will interact with the International Institute for Living Aquatic Resources Management (ICLARM), based in Manila, for the purpose of

coordinating technical assistance and management support services. It is envisioned that ICLARM would advise the conduct of resource assessment, research and planning activities primarily through the field Technical Coordinator provided under the ASEAN-AID project. It may be necessary for the ICLARM advisor to spend considerable time in Indonesia during pilot start-up and the first year or more of implementation.

The basis for pilot activity coordination and management in Indonesia will be defined in greater detail during the first ICLARM site visit, expected in September-October, 1985.

#### 5. Implementation Plan and Schedule.

The Indonesia pilot site activities are expected to cover the period October 1985 through September 1988 (three years). Documentation of results, linking the pilot effort to the information dissemination and training activities of Component Two of the ASEAN-AID Coastal Resources Management project, will involve Indonesian scientists and resource planners/managers through the life-of-project (1985-1990).

Detailed implementation planning and scheduling will result from an initial workshop, tentatively timed for late 1985, which will bring together the Indonesian agencies outlined above, ICLARM, and resource persons from other organizations including USAID and Ford Foundation. The output of this initial planning workshop will be a general three-year implementation schedule and a more detailed work plan for the first year. Administrative arrangements for transfer of project funds from ICLARM to Indonesian institutions and personnel involved in the pilot will also be decided at the first workshop.

Workshops will be repeated on an annual basis for the purpose of forming yearly work plans and monitoring the progress of the pilot activities. Additional site-specific workshops involving local implementing institutions and personnel will be conducted on a more ad hoc schedule as required, and will provide information for the annual workshops.

#### 6. Relationship to Other GOI Efforts and AID Bilateral Program.

The resource assessment and research activities at the Segara Anakan site on the south coast of Java will be complementary to similar efforts undertaken elsewhere by the GOI with AID and other donor financing. The Agency for Agricultural Research and Development (AARD), with assistance from The Ford Foundation and USAID Jakarta, is strengthening an interdisciplinary, multi-institutional network of research groups whose work is focussed on selected agro-ecosystems of increasing importance to Indonesian agricultural development. The research network (KEPAS) has formed field-level working groups to examine (1) tidal swamplands; (2) critical uplands of Eastern Java; (3) dryland cultivation of semi-arid lands of East Nusa Tenggara; and (4) brackish water fish pond (tambak) development on the north coast of Java.

Case studies for each of these four agro-ecosystems will provide information of vital importance to Indonesia's long-term agricultural development strategy and policy.

The KEPAS working group on tambak fisheries on Java's northern coast is expected to develop an informal association with the pilot work carried out at the Segara Anakan under the ASEAN-AID project. Both the north coast (KEPAS) and south coast (ASEAN) research efforts will examine the resource system context and socio-economic context of coastline mangrove conversion and aquaculture development. The AARD senior agricultural policy group will monitor the progress at both sites and is expected to encourage collaboration among institutions and individual researchers. At a minimum, regular sharing of experience and analyses will be maintained through KEPAS workshops and seminars.

Related to USAID support for KEPAS is the mission's proposed \$20 million project in aquatic resources development. Work on the PID has begun and PP development is planned for October-November 1985, enabling project authorization and first obligation in FY 1986. The USAID mission, through its Agriculture and Rural Development Office, is interested in the ASEAN-AID pilot activity at the Segara Anakan site because of the resource management and socio-economic issues attending tambak development and intensification. The bilateral program would benefit from liaison with the Segara Anakan case study, and it is possible that technical assistance through ICLARM could play a key role in fostering progress on several fronts: Segara Anakan studies, KEPAS working group on tambak fisheries of the north coast of Java, and field activities under the mission's aquatic resources development project. Of principal interest to USAID is the possibility of a long-term ICLARM technical advisor assigned to the Segara Anakan pilot, but available also for regular consultation with AARD and other institutions involved in KEPAS and the new bilateral activity. A potential collaborative mode for ICLARM technical assistance to the ASEAN-AID and AID bilateral project activities will be discussed with mission staff during the initial ICLARM site visit in September-October 1985.

7. Budget.

The three-year Segara Anakan pilot studies and related planning activities are expected to require an AID contribution of \$500,000. An illustrative budget is as follows:

	<u>(US\$)</u>
a) <u>Technical Assistance</u>	
-- short-term (contracted through ICLARM)	100,000
-- senior Indonesian research coordinator (3 person-years)	45,000
b) <u>Equipment/Supplies and Maintenance</u>	150,000
c) <u>Resource Mapping, Remote Sensing, Data Storage/Processing</u>	75,000
d) <u>Workshops</u>	
-- 3 annual planning workshops	30,000
-- <u>ad hoc</u> site workshops	15,000
e) <u>Reports and Documentation</u>	15,000
f) <u>Operating/Support Costs</u>	
-- honoraria for Indonesian personnel	50,000
-- local transportation; miscellaneous	<u>20,000</u>
AID TOTAL	\$500,000
g) <u>GOI Contribution (In-kind)</u>	
-- salaries, local travel and per diem, equipment, office space, other physical facilities, secretarial and clerical services, etc.	<u>250,000</u>
AID/GOI TOTAL	\$750,000

8. Evaluation.

Monitoring and evaluation of the Indonesia pilot activity will be undertaken in the course of the overall ASEAN-AID project evaluation plan. ICLARM will be responsible for periodic monitoring and evaluation of progress at the Segara Anakan site, and will submit annual evaluation reports to the ASEAN Project Steering Committee. These ICLARM-assisted evaluation activities will be complemented by an overall mid-project and final project evaluation, which will involve AID, ASEAN and other participants. The budget for the two formal project evaluations is outlined in the PP Financial Plan.

Country: Philippines

Pilot Site Option No. 1: Pagbilao (Tayabas Bay, Luzon)

1. Project Identification

Project Name: Integrated Coastal Resources Management (CRM)

Cooperating Agencies:

Coordination : National Science and Technology Authority (NSTA)/  
Philippine Council for Agriculture and Resources  
Research and Development (PCARRD)

Implementation: Forestry Research Institute/Ministry of Natural  
Resources (FORI/MNR); Bureau of Fisheries and  
Aquatic Resources/Brackishwater Aquaculture  
Demonstration and Training Center (BFAR/BADTC);  
Natural Resources Management Council (NRMC);  
University of the Philippines System (UP); Local  
Governments.

Duration of Project : 5 years  
Total Cost of Project: US\$500,000 (USAID)  
Country Counterpart : Office facilities, supplies,  
secretarial support, partial travel  
costs (FORI); training/lodging  
facilities (BFAR/BADTC); one junior  
scientist (FORI); one boat/motor (FORI).

2. Objectives

- 2.1 Identify the existing biophysical relationships between economically-important coastal fishstocks and mangrove systems;
- 2.2 Identify where possible, changes in status of coastal fishstocks which may be attributable to mangrove loss/degradation;
- 2.3 Characterize recent trends in mangrove loss/degradation from which projections can be estimated (to include type, pattern, location, extent, and socio-economic conditions which affect the status of the resource);
- 2.4 Characterize the attendant socio-economic "costs" associated with system loss/degradation;
- 2.5 Develop viable alternative management strategies which provide for the sustainable development and utilization of mangrove systems;
- 2.6 Develop a site-specific systems model and comprehensive coastal resources management plan;

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- 2.7 Further the development of local research institutions;
- 2.8 Promote greater institutional cooperation at the local and regional levels.

### 3. Project Description

#### 3.1 Rationale

Capture fisheries represents one of the Philippines most important economic sectors. The industry is both large and diverse in scope ranging from the small subsistence fisherman to fleets of large offshore purse-seiners. A present key concern for the local fisherman is the nature and extent of impact on the coastal capture fisheries' subsector attributed to the continuing loss of the nation's mangrove forests. The basis for this concern relate to the critical role of these forests as both nursery grounds and sources of nutrients to many economically-important coastal fishstocks. The principal driving force behind mangrove loss appears to be its conversion for construction of fish ponds, shrimp ponds, and salt pans. In addition to the possible reduction of coastal fish production, their conversion also signifies the diminishment of these resources as communal sources of fuelwood, honey, building materials, tannin, etc. There exists a growing body of evidence which suggests that the full social and economic significance of these resources is rarely considered in the decision-making process leading to the permitting of conversion. The socio-economic consequences of mangrove conversion together with an increasing incidence of pond abandonment due to poor siting strategies and management techniques, justifies a re-evaluation of present and the examination of alternative approaches to mangrove utilization. A key element in this process is the design of a broader management framework which takes into account the full range of socio-economic and biophysical characteristics of these systems to ensure their sustained utilization.

The proposed project is an attempt on a pilot-site basis to develop an integrated coastal resource management scheme which will ensure: 1) maximum sustainable production of economically-important renewable resources; 2) an economically-viable and sustainable utilization of the coastal area; 3) the maintenance of the integrity of the different natural systems which support the coastal environment; and 4) the continued building of local coastal communities' ability to manage their own resources with a minimum of institutional intervention.

#### 3.2 Pilot Area

The proposed study site is situated in the central coastal plain of Tayabas Bay, a large open bay located approximately 110 kms. southeast of Manila. The coastal basin's drainage pattern is

funnel-shaped characterized by high relief on its eastern and western extremities and by intermittent broad low-lying coastal plain in its central portions. Extensive mangrove forests (prior to conversion) were common to many of the estuarine areas associated with the larger rivers which empty into the bay (e.g. Bombong, Malaquing Ilog, and Pagbilao).

The mangrove research station of the Forestry Research Institute of the Ministry of Natural Resources (FORI/MNR) is unique in the region in providing a relatively large and near pristine stand of mangroves extending over 100 has. in area. The area not only provides an experimental control to provide much of the baseline information needed for comparing data collected in other areas/activities of the project, but is ideal for examining the results of experimental interactions.

In close proximity to the site is the Brackishwater Aquaculture Demonstration and Training Center of the Bureau of Fisheries and Research (BADFC/BFAR). BADFC currently is operating a number of fish/shrimp ponds for training and research purposes. The proximity of the two activities provides an extraordinary opportunity to observe the interactions of the two systems, a first step towards developing siting strategies which mitigate conflict between natural and human-imposed system.

The site is further enhanced by a second FORI research station focusing on various aspects of agro-forestry and situated in the uplands draining into bay. A portion of the station's lands extend into the watershed feeding into the coastal mangrove reserve. This provides a suitable institutional mechanism for studying upland/coastal interactions, a key element to the development of an effective coastal resources management plan.

Basic office infrastructure and services can be provided by FORI at the central office located in Talipan (approximately 15-20 minutes from the mangrove research station). Office space is available with operating telephone and electrical service.

Housing arrangements for long-term staff could be provided through the conversion of one or more of the offices in the FORI's central complex, the construction of a new structure on FORI land, or renting in Pagbilao.

An existing boat is in need of repair (or possibly replacement) and a 4-wheel drive truck will be needed.

Training facilities could be provided by BADFC where capabilities exist to house and feed up to 25 people. Past training programs have extended up to 6 weeks. The planning cycle is developed a year in advance and projected workshops/seminars would have to be integrated accordingly.

Access to all sites is relatively-easy and is only 3 1/2-hour drive from Manila.

### 3.3 Broad Tasks

1. On-site reconnaissance and ecological survey.
2. Review of existing development plans and programs for the pilot area.
3. Construction of a conceptual model of the Pagbilao system to depict key elements, their links and feedbacks to best assess the data requirements and disciplinary/sectoral participation. An interdisciplinary workshop will be convened for this purpose.
4. Sociocultural studies of the residents: the types or strata of groups, their attitudes toward the natural resources, their knowledge systems and decision-making process; inventory and analysis of the functioning of local institutions (e.g. town government, fishing clans, etc.).
5. Case study evaluations of the capabilities of institutions (e.g. government bodies) dealing with coastal resources, particularly their effect on coastal resources management.
6. Socio-economic studies detailing the current patterns of mangrove and fisheries exploitation and attendant economic systems (e.g. extra-regional export markets, extra-regional fishing pressure, etc.).
7. Time-series comparative analysis of areal change in mangrove cover, present cover (including coastal land use), and projected cover estimates.
8. Resource base inventory:
  - 1) Review of existing information and the development of an appropriate data base management system (DBMS) for the project;
  - 2) Assessment of harvestable resources and key interlinkages between mangroves and coastal fisheries.
9. Experimental interventions:
  - 1) Mitigation of conflict between pond construction and mangrove system loss;
  - 2) Mitigation of upland land and water use patterns and mangrove system degradation.
10. Preparation of systems model and integrated management plans optimized for several goals.

4. Budgetary Requirement

	AID Grant (US \$000)
Personal Services	295
Country Coordinator (60 man-months)	75
Short-Term Consultants (20 man-months)	200
Senior Scientists (10 man-months)	20
Maintenance and Operating Expenses	175
Supplies and Materials	30
Travel	30
Sundries	
- Workshops	25
- Data Storage/processing	25
- Reports/publications	25
- Experimental intervention	40
Equipment (see below for list of items)	30
TOTAL	<u>500</u>

Country Counterpart:

Office facilities, supplies, housing costs, secretarial support, partial travel costs (FORI); training/lodging facilities, (BFAR/GADTC): junior scientists, technicians, driver-mechanic, boat (FORI)

<u>Person Years</u>	90
2 junior scientists (120 man-months)	100
Short-term technical staff (20 man-months)	40
<u>Facilities and Local Expenses</u>	110
TOTAL GOP	<u>250</u>
GRAND TOTAL (AID/GOP)	<u>750</u>

5.

List of Equipment

Land rover (1) - - - - -	12,500
Computer (including peripherals, software) (1)	3,000
Skiff (1) - - - - -	5,000
Outboards (2) - - - - -	3,000
Portable Generator (1)- - - - -	2,000
Ink-jet plotter (1) - - - - -	500
SCUBA equipment	1,000
Hack water quality kits - - - - -	1,000
Scales, boards, etc. - - - - -	1,000
Camera, binoculars - - - - -	500
Tents, sleeping bags - - - - -	500
TOTAL	<u>30,000</u>

Country: Philippines

Pilot Site Option No. 2: Bolinao - One Hundred Islands (Lingayen Gulf-Luzon)

1. Project Identification

Project Name: Integrated Coastal Resources Management (CRM)

Cooperating Agencies:

Coordination : National Science and Technology Authority (NSTA)/  
Philippine Council for Agriculture and Resources  
Research and Development (PCARRD)

Implementation: University of the Philippines, Marine Sciences  
Research Institute (UP/MSRI); Bureau of Fisheries  
and Aquatic Resources/Oceanographic Research  
Institute (BFAR/ORI); Don Mariano Marcos  
State University, College of Fisheries (DMMSU)

Duration of Project : 5 years

Total Cost of Project: US\$500,000 (USAID)

Country Counterpart : Office facilities, supplies,  
secretarial support, partial travel  
costs (UP/MSRI); training/lodging  
facilities (DMMSU); one junior  
scientist (UP/MSRI); one junior  
scientist (BFAR/ORI); one boat/motor (UP/MSRI).

2. Objectives

- 2.1 To document the socio-economic importance of coral reef systems in the Philippines;
- 2.2 Identify the critical inter-system linkages which account for the high productivity of these systems;
- 2.3 Identify the sources, relevant pathways and underlying causes of stress to these communities which result in declining rates of productivity;
- 2.4 Design and test new approaches which mitigate impacts to natural systems associated with human interventions;
- 2.5 Develop a comprehensive site-specific management plan which provides for maximum sustainable utilization of reef system resources for human benefit;
- 2.6 Foster participation of local institutions in coastal resources management.

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### 3. Project Description

#### 3.1 Rationale

Coral reefs represent one of the most productive ecosystems known to man. Comparable to tropical rain forests in terms of biomass and diversity, these systems support abundant fish populations, many of significant economic value. The Philippines is fortunate to possess some of Southeast Asia's most luxuriant coral communities. From a socio-economic perspective, this country's coral reef communities are an important national resource not only in supporting a large artisanal fishery, but serve as a renewable source-area for shells used in the making of local handicrafts, tourist attractions, natural breakwaters, and sources of construction material (sand and block) and lime. Despite the obvious economic importance of these ecosystems, the failure to manage them as systems has led to their rapid decline throughout the archipelago. Typical of the sources of stress leading to their degradation are the continued (though illegal) use of poisons and explosives to stun fish, the dredging of reef flats for shell collection, and the indiscriminate collection of shells and corals by tourists. The effects of these direct sources of stress on corals are exacerbated by less-discernible but equally severe stresses originating from inland source-areas (e.g. increased sedimentation/turbidity associated with deforestation, toxic effects associated with discharges of mine tailings, and agrochemical runoff). To achieve the maximum-sustainable economic benefit from these communities, an appropriate management framework must be designed and implemented which can address both the direct and indirect sources of stress. The goal of the proposed project is to develop such a framework for a specific pilot-site and build on the local institutions' and community resources to ensure its effective implementation.

#### 3.2 Pilot Area

The Bolinao-Hundred Islands area in the northwestern portion of the Lingayen Gulf (Luzon) is an attractive site for a pilot project activity. The area represents one of the few readily accessible sites near Manila (4-5 hours by car) where large expanses of reef flat can be found, portions of which are still relatively healthy.

Large reef flats exist immediately to the north of Bolinao and encompass most of the northern and eastern sides of Santiago and Cabarruyan islands extending south to the Hundred Islands marine park. The reef is interesting not only from its biophysical characteristics but its importance as a resource in the local, regional, and over national economies. Numerous small fishing communities depend on the reef as a source of food and local income. Portions of the reef are harvested for shells which provide the basis for local handicraft industries for the tourist trade centered in

Bolinao and Lucap. Other portions of the reef support an export fishery to Japan based on sea cucumber and sea urchin. The reef also represents a source of interest to the many tourists which are drawn to the area due to the Hundred Islands marine park, a series of Karst islands located off of Lucap.

Despite the economic importance of the reef, there exists widespread concern for its ability to sustain the present levels of exploitation. There exists no management plans for the harvesting of most of the previously mentioned reef dependent organisms. Further, the absence of harvest data precludes determination of the present levels of exploitations, a key element to the development of such plans. Another concern is the absence of certain basic studies establishing the existing linkages between the system's harvestable resources of and the coral reef itself, critical information needed to predict future reef conditions under present patterns of exploitation. There also exists grounds for concern related to the increased sediment loads originating from the denuded highland areas emptying into Tambac Bay. Interestingly, one aspect of increased rates of sedimentation has been coastal land accretion providing the basis for extending existing fish pond construction further into the bay in increasingly closer proximity to local reefs.

In summary, the area between Bolinao and Hundred Islands is a highly productive, economically-important coastal area which is currently subjected to a number of unrelated and unplanned human uses. In light of its importance and growing sources of stress threatening system stability, this could be an ideal site for the development of a comprehensive management approach to the area.

The Marine Research Laboratory of the University of the Philippines Marine Sciences Research Center located in Bolinao is ideally located for much of the projected field work. The first phase of the laboratory which is presently under construction, is due to be completed in mid-Fall. At this time the facilities will consist of a fully functioning laboratory and offices. Dormitories will not be added until the completion of a second phase and for the present sleeping quarters for project staff will have to be obtained outside of the present facility.

The laboratory is located adjacent to the coast and access is provided by an existing concrete jetty. Two small boats will be operational by Fall.

Telephone service is presently lacking in both the laboratory and the other facilities described below.

A five-year project beginning in the Fall of 1985 at the laboratory and under the direction of the UP/MSRC and consists of an assessment of the area's coral reef fisheries through an AID/CRSP with the University of Rhone Island. This activity could be coordinated with the proposed pilot site.

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In addition to these research facilities, BFAR operates the Oceanographic Research Laboratory in Lucap (some 40 kms. south from Bolinao near Hundred Islands). A second small extension facility is located in the Hundred Islands Marine Park. Present research emphasis is on Tilapia and milkfish production. These facilities could be made available where field work is required in the southern portions of the proposed management area and/or concerned with the study of interactions between pond construction and operations and the reefs.

Conference and lodging facilities for workshops and seminars can be provided by the Don Mariano Marcos State University, College of Fisheries located in Santo Tomas on the eastern side of the Gulf (approximately 80 kms from Lucap). Alternatively, facilities could be arranged through one of a number of resort areas located on the western peninsula or in the larger towns of Lingayen or Dagupan.

Finally, the Lingayen Gulf is an attractive site for a pilot activity due to the existence of several previous and ongoing studies in the region which can serve as a nucleus to build a large data base for use in base-line comparisons input to the development of a management plan, and other uses. These studies include a mapping survey of the coral reefs of the Hundred Island Marine Park, socio-economic survey of the fishing communities of Santo Tomas, and a resource assessment of the Lingayen Gulf.

### 3.3 Broad Tasks

1. On-site reconnaissance and ecological surveys.
2. Identification, collection and analysis of relevant information available to date.
3. Review of existing or proposed development plans, programs, research activities relevant to the pilot site.
4. Construction of a conceptual model of the Bolinao-Hundred Islands area depicting key components, inter-system linkages and feedback loops for use in assessing data requirements and disciplinary/sectoral inputs.
5. Sociocultural studies of the local communities, the types or strata which compose these communities, perceptual attitudes toward natural resources generally and the coral reefs specifically, and analysis of the responsibilities and functioning of local institutions.
6. Completion (if required) of earlier reef mapping surveys.
7. Identification of stress points on the reef and the design of analytical and monitoring mechanisms to establish cause-and-effect relationships and probable source areas of stress.

8. Socio-economic survey of current exploitation patterns affecting the reef (e.g. shells harvested for handicrafts, tourist curios, aquarium trade reef fish, etc., to be conducted in collaboration with the previously-cited coral reef fish assessment).
9. Development of species-focused management strategies for highly-pressured reef inhabitants.
10. Experimental interventions dependent on previously obtained information. These may consist of small-scale experimental activities in upland sites focused on reducing sources of sediment or alternatively, one could conduct recruitment trials of economically-significant reef inhabitants from different portions of the reef to identify critical replenishment areas.
11. Preparation of systems model and an integrated management plan for the pilot site.

## 3.4 Program of Activities

Activity	YEAR				
	1	2	3	4	5
1. On-site reconnaissance/surveys	:(1-1/2 mos):				
2. Literature compilation and analysis	:(1 month)				
3. Review of ongoing/proposed activities	:(1 month)				
4. Conceptual model development	:(17/2 mo.)				
5. Social Cultural studies					
a) Institutional Analysis	:( 2 mo.)				
b) Perceptual Analysis	:(24 mos.):				
6. Reef Mapping	:(18 mos.)				
7. Stress site analysis and monitoring	:(24 mos.):				
8. Socio-economic survey	:(18 mos.):				
9. Species focused management strategies	:(24 mos.):				
10. Experimental interventions	:(24 mos.):				
11. Preparation of system model and: and pilot site management plan	:(6 mos.)				
12. Circulation of plan for review	:(3 mos.)				
13. Incorporation of comments and finalization of plan	:(3 mos.)				

4. Budgetary Requirement

AID Grant (US \$000)

Personal Services		295
Country Coordinator (60 man-months)	75	
Short-Term Consultants (20 man-months)	200	
Senior Scientists host country nationals (10 man-months)	20	
Maintenance and Operating Expenses		175
Supplies and Materials	30	
Travel	30	
Sundries		
- Workshops	25	
- Data Storage/processing	25	
- Reports/publications	25	
- Experimental intervention	40	
Equipment (see below for list of items)		30
	TOTAL	<u>500</u>

Country Counterpart:

Office facilities, supplies, secretarial support, partial travelling costs, housing costs, (UP/MSRI); training/lodging facilities (DMMSU); one boat/motor (UP/MSRI); one junior scientist (UP/MSRI); one junior scientist (BFAR/FORI); short-term technical staff (multiple institutions).

<u>Person Years</u>		140
2 junior scientists (120 man-months)	100	
Short-term technical staff (20 man-months)	40	
<u>Facilities and Local Expenses</u>		110
	TOTAL GOP	<u>250</u>
	GRAND TOTAL (AID/GOP)	<u>\$750</u>

5.

List of Equipment

Land rover (1) - - - - -	12,500
Computer (including peripherals, software) (1)	3,000
Portable Generator- - - - -	2,000
Ink-jet plotter - - - - -	500
Scuba equipment - - - - -	3,000
Sediment analysis equipment - - - - -	3,000
Water quality monitoring equipment - - - - -	1,000
Current meters - - - - -	2,500
Scales, boards, etc. - - - - -	1,000
Camera, binoculars - - - - -	500
Tents, sleeping bags - - - - -	<u>500</u>
TOTAL	<u>30,000</u>

Component One -- Resource Assessment, Planning and Research  
Singapore Pilot Activity

1. Project Identification.

Project Title: Cooperative Research on Living Coastal Resource Systems

Cooperating Agencies: (to be identified in work plan)

Coordination: Science Council of Singapore (SCS)

Implementation: National University of Singapore (NUS)  
Primary Production Department (PPD)

Duration of Project: 5 years

Estimated Costs: US\$500,000 (AID); \$300,000 (Singapore)

Country Counterpart: Office facilities, supplies; secretarial support (NUS/PPD); partial travel costs (host-country personnel); training/lodging facilities (NUS/PPD); two project coordinators (NUS/PPD); short-term technical staff; regional travel/per diem

2. Objectives.

- 2.1 Support research on living resource systems important to coastal development in the ASEAN region.
- 2.2 Support and expand on relevant research themes of several Singaporean government and academic institutions.
- 2.3 Facilitate regional cooperation, information exchange and development of institutional linkages within the region.
- 2.4 Develop alternative management strategies for coastal resource use in the context of urban development.

3. Project Description.

3.1 Rationale. Singapore is unique among the ASEAN nations participating in the ASEAN/AID Coastal Resources Management project. With a total land area of approximately 600 km<sup>2</sup> and a population of 2.5 million, Singapore possesses one of the world's highest population densities. Undeveloped natural resources are scarce as most of the

national territory has been transformed into a modern city state. Few mangroves remain and those small remnants are primarily confined to the Johore Straits. Coral reefs are dominated by small patch and fringing reefs mostly confined to the nation's southern islands. The more extensive reefs found along the southern coast of the Singapore mainland were destroyed by land reclamation programs which began in the 1960's.

As presently envisioned, Singapore pilot activities would utilize the country's well developed research facilities and technical resources to conduct applied research on living resource issues relevant to coastal development in the ASEAN nations. For example, a well-documented source of mangrove degradation in many ASEAN countries is clear cutting for purposes of shrimp and fish pond construction. However, there are methods of mariculture, such as floating (nearshore) shrimp and fin-fish cages, which do not require removal of mangrove. Research focused on the technical and economic aspects of developing floating cage culture to relieve pressure on mangrove systems could have immediate relevance toward resolution of an issue common throughout the region. A complementary research activity might focus on the restoration of seagrass habitat near urban development for purposes of increasing fish production.

Other applied pilot activities under consideration include: mitigation of adverse impacts to highly-productive living coastal systems caused by land reclamation schemes; and technology transfer involving a modification of Singapore's well-developed water quality monitoring program, which can be applied to coastal mariculture activities in other ASEAN nations (a potential or real issue in all participating ASEAN country pilot sites).

The above technical research approaches planned for the Singapore pilot can be justified by the following factors: (1) much of the coastal area of Singapore is already developed and new area for development is continually being created through reclamation; (2) the absence of extensive, highly productive natural systems which support coastal fisheries; (3) the well-developed physical and technical resources to support the type of research envisaged; and (4) appropriate fit with the research proposed by the Singapore delegates at the ASEAN-U.S. Project Preparatory Workshop in Manila.

Singapore's role in the ASEAN/AID project will be coordinated by the Science Council of Singapore. The final selection of host-country implementing institutions will be based on the coastal management issues requiring applied research, as identified by the Science Council of Singapore in cooperation with the ASEAN Project Steering Committee and ICLARM. As presently envisioned, the two institutions most likely to take a leading role are the Primary Production Department of the Ministry of National Development and the National University of Singapore.

**3.3 Broad Tasks.**

1. Review and identify national research priorities in the field of living tropical coastal resources management.
2. Identify those research themes which can be addressed satisfactorily within the project's financial and time budget and which best suit the interests and capabilities of Singapore institutions.
3. Submit the list of research topics to the ASEAN project Steering Committee for review/comment/modification.
4. Finalize research protocols.
5. Initiate research design.
6. Implement the research program.
7. Where appropriate and relevant, disseminate information on research approaches, methods and technical expertise required during the implementation phase, making it available to relevant Singaporean institutions as well as other ASEAN countries.
8. Analyze research results and interpret their significance for increasing effectiveness in the management of natural coastal ecosystems characteristics of the region.
9. Work with the other participating ASEAN countries in integrating the relevant research findings into the development of their respective pilot site management plans.
10. Disseminate the results of the various research activities through appropriate vehicles (journals, technical publications, etc.) to reach a wider regional and international audience.

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3.4 Program of Activities

<u>Activity</u>	<u>YEAR</u>				
	1	2	3	4	5
1. Country/pilot site visits	<u>(1 mo)</u>				
2. Preliminary Research topic Identification	<u>(1 mo)</u>				
3. ASEAN/ASC Review	<u>(1 mo)</u>				
4. Finalization of Research Agenda	<u>(1 mo)</u>				
5. Research design	<u>3 mo</u>				
6. Research Implementation	<u>(30 mos.)</u>				
7. Data, information and technical dissemination	<u>(30 mos)</u>				
8. Management relevance analysis	<u>6 mos</u>				
9. Integration into pilot-site management plans	<u>12 mos.</u>				
10. Dissemination of results	<u>12 mos.</u>				

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4. Budgetary Requirements (to be finalized in annual work plans)

	<u>AID Grant (US\$000)</u>	
<u>Personal Services</u>		120
Country Coordinators (60-man months)	60	
Short-term consultants (20 man-months)	40	
Senior Scientists (host contry nationals) (10 man mos)	20	
<u>Maintenance and Operating Expenses</u>		
Supplies and Materials	30	120
Travel	60	
Sundries		
- workshops	30	
- data storage/processing	60	
- reports/publications	60	
<u>Equipment</u>		140
	TOTAL AID GRANT	500
<u>Country Counterpart: Office facilities, supplies, secretarial support</u>		
partial travelling costs; housing costs (NUS/PPD);		
training/lodging facilities (NUS); one boat/motor (PPD);		
one junior scientist (NUS); technical equipment (NUS/PPD)		
<u>Person Years</u>		
1 Junior Scientist (5 person-years)	75	
Short term technical staff (2 person-years)	24	
<u>Facilities, Equipment and Local Expenses</u>		200
	GOS TOTAL	300
	AID/GOS GRAND TOTAL	<u>800</u>

Country: Thailand

Pilot Site: Phang-nga Bay (Andaman Sea)/Ban-Don Bay (Gulf of Thailand)

1. Project Identification

**Project Name:** Integrated Coastal Resources Development and Management Planning: Upper South Coastal Development Zone, Thailand

**Cooperating Agencies:**

**Coordination :** Office of the National Environment Board (ONEB)  
National Economic and Social Development Board (NESDB)

**Implementation:** Royal Forestry Department (RFD); Phuket Marine Biological Center (PMBC); Thailand Tourism Authority (TTA); Office of the National Environment Board (ONEB); Kasetsart University (KU); Chulalongkorn University (CU); Department of Fisheries (DOF); Land Development Department (LDD); National Institute of Coastal Aquaculture (NICA).

**Duration of Project :** 4 years  
**Total Cost of Project:** US\$500,000 (USAID)

**Country Counterpart :** Office facilities, supplies, secretarial support, (ONEB, PMBC); partial travel costs (all government personnel); training/lodging facilities (PMBC, DOF); one project manager (PMBC); short-term technical staff (multiple institutions).

2. Objectives

- 2.1 To develop a management plan which will assist in ensuring the sustainable utilization of the coastal resources in the Upper South Development Zone of Thailand;
- 2.2 To increase public awareness of trends in living coastal resources depletion and significance of potential impacts originating from proposed activities of the Upper South Development Project;
- 2.3 To expand the country's existing body of information related to the present status of coastal and near-shore living resources and natural ecosystems;
- 2.4 To foster the development of institutional arrangements which will facilitate the integration of results stemming from applied research into the coastal resources planning and management process.

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### 3. Project Description

#### 3.1 Rationale

In recent years Bangkok has firmly established its economic primacy over the country's other urban centers. In an effort to stimulate a more balanced national economic growth pattern, the Royal Thai Government has launched several regional development projects. The most advanced, the Eastern Seaboard Development Project located to the east of Bangkok, is presently establishing a large-scale urban and industrial complex based on the development of nearby off-shore natural gas resources. A second regional development project, the Upper South Development Project located in the "neck" of the country's peninsula, covers most of the area in Surat Thani, Phan-nga, Krabi, and Phuket provinces. The area is characterized by a rich and diverse natural resource base. It is the relatively undeveloped state of this base together with its strategic geographical location as a terrestrial and maritime crossroads which makes it attractive for the promotion of economic growth.

The draft regional development study for the area completed in December 1984 identifies 10 high priority projects proposed for implementation over the period 1987-2000. These include the development of industrial estates in Surat Thani and Phuket, the construction of an international port at Surat Thani, the development of an oil refinery and pipeline in Krabi, and the development of the Tapi-Phum Duang River for multiple-use. Many of these projects will have a significant effect on the region's coastal resources.

The two economic development poles identified in the study, Surat Thani and Phuket, are both coastal cities. As a result many of the capital-intensive economic development projects will be concentrated in or near these cities with direct impacts on coastal ecosystems and human uses. Further, if those economic activities produce their desired effects an increase in locally-generated development activities may well represent an additional source of stress to these natural systems. Finally, the more distantly-located development projects such as the hydroelectric dam and irrigation schemes on the Tapi-Phum Duang River should also be considered for their potential consequences to the coastal zone (e.g. salt water intrusion, subsidence, etc.).

The principal coastal ecosystem to be affected will be the region's abundant mangrove forests. Existing coastal dependent human uses which potentially will be affected include shrimp and fish aquaculture activities, capture fisheries, tourism, and water supply.

Several individual activities related to the proposed project elements are already underway while pre-feasibility studies are being conducted for other elements. The opportunity exists through the implementation of the pilot site activities, one located in Phang-nga Bay (near Phuket) and a second in Ban Don Bay (near Surat Thani), to develop management plans which could play an important role in mitigating future coastal impacts associated with the proposed economic development activities presently being considered/implemented in the region, thus providing for a more optimal economic approach to coastal resources development.

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### 3.2 Pilot Areas

The two proposed pilot areas Phang-nga Bay (facing the Malaca Strait) and Ban Don Bay (facing the Gulf of Thailand) are located opposite to one another in the upper southern peninsula area of Thailand (Figure 1). Both sites are characterized by the extensive presence of mangroves, rich and diverse fishstocks, and widespread capture and aquaculture activity. Phang-nga Bay represents some of the country's most spectacular scenery due to the presence of numerous vegetated Karst islands situated nearshore. Due to these formations and the nearby beaches of Phuket, the area already represents an existing and still growing tourist market. With the exception of Phuket island, much of the proposed pilot site is relatively underdeveloped with coastal use dominated by capture fisheries and aquaculture. A major coastal conflict issue centers on the impacts on the area's fisheries and supporting natural systems originating from both inland and offshore tin mining.

In contrast to Phang-nga, Ban Don Bay is characterized by more intensive economic development. A new road is currently under development to facilitate transport linkages, the construction of an LNG terminal is presently underway, new industrial estates are being cleared and it is the site of several of the region's petroleum storage facilities. In part, this area's development has been spurred by the presence of navigable rivers and the existence of offshore gas reserves. The site is similar to Phang-nga in the importance of brackish water capture fisheries and aquaculture though the greater intensity of economic development in Ban Don increases the possibilities of resource use conflicts.

The two pilot sites represent an interesting contrast distinguished by their differences in stage of economic development. This relationship will change as the Upper South Economic Development Project will spur new development enterprises at the Phang-nga site while intensifying existing activities at the Ban Don Bay site.

Project activities can be supported at both proposed sites due to the presence of project-related facilities in the cities of Phuket and Surat Thani near the Phang-nga and Ban Don Bays, respectively. A key institution will be the Phuket Marine Biological Center, located near Phuket City. The Center, which became operational in 1971, is one of the country's leading marine research institutions. Facilities include a large and well endowed research laboratory, modern dormitories and housing, library and two research vessels. In addition to these facilities, the Center runs a modern public aquarium which is used for public education and occasionally research activities. Existing staff include 17 marine scientists, 65 technical assistants and 5 administrative personnel.

While it is clear the Center would be the most appropriate lead implementing institution at the Phang-nga site, the logistics required to support field activities at Ban Don would be more difficult. For this reason and the desire to foster inter-institutional cooperation, the Department of Marine Science of Chulalongkorn University is presently

being considered for a leading role in the Gulf of Thailand site. The Department is similarly well-staffed though lacking a suitable field research station near the proposed site. This drawback would have to be remedied, perhaps through the modification of an existing structure or a cooperative agreement with an appropriate local institution.

Each site has a brackish water fisheries research station nearby operated under the Department of Fisheries. Research activities are focussed on increasing fisheries production primarily through aquaculture training and basic research. Both stations maintain offshore concessions for research purposes in the proposed sites respectively and will share some responsibility for one or more subproject elements during the course of the project.

As presently proposed, project coordination will be the responsibility of the newly proposed regional office of the National Environment Board, to be located in the Engineering Department of the University of Prince of Songkhla, Songkhla. The new regional office will be responsible for the southern half of Thailand focusing primarily on the second phase of the Songkhla Lake Basin Development Project.

### 3.3 Broad Tasks

#### 1. Data Collection/Collation/Presentation

The initial step is to collect and review all available literature relating to the subject, screen these and select relevant information, and then prepare abstracts containing the salient information. Items would be selected and categorized into the following categories:

- (a) items specific to the pilot areas;
- (b) items for other coastal areas in Thailand;
- (c) items for other coastal areas in Southeast Asia;
- (d) items for other tropical monsoon climate regions outside Southeast Asia; and
- (e) technical references of value, such as those published by U.S. EPA, East-West Center, etc.

The over all data collection should include subcategories for each resource of interest, such as fisheries, corals, mangroves, beach/recreational zones, scenic areas, and others of possible importance such as existing coastal zone urban/industrial development.

The next step is to prepare a report which summarizes the findings by using abstracts.

#### 2. Environmental base maps

A parallel initial activity is to collect all available maps of the study area, including aerial photos and satellite imagery (if found useful) for use in the preparation of environmental base maps for the two pilot areas. Greater priority would be given to the natural resources and systems (fisheries, mangroves, etc.) found in coastal zones, with limited detail on existing land use. These basemaps could then be used for the project's specific sector studies, and updated periodically when additional sector-specific data became available.

3. Color aerial photography

For Step 3 and other purposes, a complete set of color aerial photography is needed which covers the two study areas at the appropriate scales. Where existing photos are not available, they will be produced. In addition to the individual photos, a mosaic map of each study area would be prepared and used for the preparation of an ecological base map..

4. Coastal Economic Development

This activity would attempt to assess and quantify the present situation, and make projections for the following categories:

- (a) community development and infrastructure;
- (b) ports and harbours;
- (c) industrial development;
- (d) beaches and resorts;
- (e) agricultural development.

Where appropriate, information will be presented on base maps.

5. Pollution from Coastal Development

This activity would emphasize the issue of pilot-site waste production and management (presented and projected on an appropriate base map) and include both liquid and solid wastes, the environmental effects of differing water quality, and the present and required monitoring programs.

6. Analysis of Coastal Zone Development materials. To include:

- (a) indicative potentials (based on available information);
- (b) optimal roles under overall strategy; and
- (c) development of options for the following resource/systems/human intervention complexes:
  - 1. fisheries/aquaculture/mangroves;
  - 2. scenic/wildlife/tourist areas;
  - 3. beaches and resorts.

7. Identification of data gaps and design and implementation of proposed studies/pilot projects for filling gaps.

8. Development of coastal environmental management plan (including institution aspects, costs, financing alternatives).

To include the following issues/conflicts:  
fisheries/aquaculture/mangroves; scenic/wildlife/tourist areas/coral reefs; and beaches and resorts.

9. Circulation of plan for review, comment and modification

10. Recommended continuing comprehensive environmental monitoring program.

## 3.4 Program of Activities

Activity	Y E A R			
	1	2	3	4
1. Data Collection, Collation, Presentation	:(12 mos.)	:	:	:
2. Environmental Base Maps	:(3 mos.)	:	:	:
3. Aerial Photo/Interpretation	:(6 mos.)	:	:	:
4. Coastal Economic Development Analysis	:(3 mos.)	:	:	:
5. Land Base Pollution Study/ Pollution from Coastal Development	:(9 mos.)	:	:	:
6. Coastal Zone Development Potentials	:	:	:	:
6.1 Indicative Potentials	:(3 mos.)	:	:	:
6.2 Fisheries	:	:(24 mos.)	:	:
6.3 Aquaculture	:	:(24 mos.)	:	:
6.4 Mangroves	:	:	:	:
6.5 Beaches and Resorts	:	:(24 mos.)	:	:
6.6 Scenic/Wildlife/Tourism	:	:(24 mos)	:	:
7. Identification of Data Gaps/Special Studies	:	:(15 mos)	:	:
8. Integrated Coastal Zone Development/ Management Planning	:	:	:	:
8.1 Indicative Planning	:	:	:	:
8.2 Alternative/Optimal Growth Strategy	:	:	:(12 mos.)	:
8.3 Fisheries Role	:	:	:(12 mos)	:
8.4 Aquaculture Role	:	:	:(12 mos)	:
8.5 Mangrove Role	:	:	:(12 mos)	:
8.6 Beaches and Resorts	:	:	:(12 mos)	:
8.7 Scenic/Wildlife/Tourism	:	:	:(12 mos)	:
9. Recommended Plan/Review	:	:	:	:(12 mos.)
10. Recommended Continuing Monitoring	:	:	:	:(6 mos.)

4. Budgetary Requirement

		<u>AID Grant (US \$000)</u>
Personal Services		310
Short Term Consultants	120	
Travel/Per Diem (Thai)	70	
Assistants	120	
Maintenance and Operating Expenses		190
Supplies and Materials	190	
	TOTAL	<u>500</u>

Country Counterpart:

Office facilities, supplies, secretarial support; (ONES, PMBC), partial travel costs (all government personnel); training/lodging facilities (PMBC, DOF); one project manager (PMBC); short-term technical staff (multiple institutions).

<u>Person Years</u>	180	
1 senior project manager (48 man-months)	60	
Short-term technical staff (48 man-months)	120	
Facilities and Local Expenses	70	
	TOTAL GOT	<u>250</u>
	GRAND TOTAL (AID/GOT)	<u>\$750</u>

Component Two--Training and Information Dissemination

Short Courses

A. Core Course on Coastal Resources Management. It is planned that a core short course on the principles and techniques of coastal resources management (CRM) will be presented several times, as appropriate, over the five-year life of the project. Such a course would help create a common analytical and philosophical base for CRM in the participating ASEAN countries. It would be modelled on similar short courses carried out in Thailand under the sponsorship of AID's centrally-funded Environment and Natural Resources Expanded Information Base Project and USAID/UNESCO/British Council.

Course objectives would be to introduce researchers, resource managers and policy-makers to the principles of CRM, the rationale behind its approach, and to demonstrate how it can be implemented. The focus would be on synthesis and integration across disciplines, not on narrow sectoral concerns. As presently planned, the core course will likely be presented as a two-week short course. In addition, it is planned that a two to three day policy seminar/workshop on CRM will be developed for senior policy-makers and decision-makers.

The core course will use lectures, case studies, participant reports, field trips and working groups. It is envisaged that each course will have from 15 to 20 participants and will be sponsored by an institution in the ASEAN host country. The course will be presented by ASEAN country resource persons as well as selected foreign technical advisors when necessary. Considerable ASEAN cost-sharing for facilities and support services is expected. AID funding has been estimated for 8 to 10 short courses (depending on length) over the life of the project.

A representative list of topics to be covered in the core CRM course is as follows:

- 1) The rationale for integrated coastal resources management
  - bio-physical
  - social
  - economic
  
- 2) Principles of coastal resources management for sustainable development
  - interdisciplinary
  - multiple use management
  - management information needs
  - intersectoral coordination
  - integration of policy, management, and research

- 3) Major resource systems found in coastal areas
  - agricultural lands
  - mangroves and other forest systems
  - aquaculture
  - sea grasses
  - coral reefs
  - fisheries
  - mariculture
- 4) Major economic systems found in coastal areas
  - agricultural
  - fisheries
  - forestry
  - transport and communication
  - tourism
  - urbanization
  - industrialization
- 5) Social systems of coastal areas
  - existing traditional systems
  - newly introduced systems
- 6) Institutional systems of coastal areas
  - traditional resource management institutions
  - government and quasi-governmental institutions
  - policies, legal frameworks, regulation and enforcement
- 7) Economic Analysis and CRM
  - existing economic interactions
  - how to model and analyze a diverse, integrated system
  - the use of extended benefit-cost analysis
- 8) Technology demonstrations for research and information management
- 9) Case studies of CRM problems and solutions
- 10) Other topics

The actual core course will be built on a series of modules and will be modified slightly to reflect concerns and resources in the host country. The course is easily justified, for as coastal resources management moves towards the fully integrated approach in ASEAN countries there is an exponential increase in complexity. This complexity is due to the consideration of social, economic, bio-physical, scientific, institutional and legal factors. It is therefore of utmost importance that key researchers, planners and managers, and decision-makers in the ASEAN countries are exposed to the subject of CRM and become familiar with the needs, opportunities, and problems associated with it.

In addition to resource persons available in the various ASEAN countries, there is expertise and interest in CRM in ASEAN countries in a number of other places including the U.S. National Park Service, Dalhousie University, and the East-West Center Environment and Policy Institute.

B. Other Short Courses. Other topics proposed by ASEAN countries for short courses include: remote sensing applications; hydro-acoustic techniques in fish stock assessment; information systems management; and methods of socio-economic analysis. At the ASEAN/AID Project Preparatory Workshop held in May 1985, the following countries tentatively volunteered to host such courses, subject to coordination with ICLARM and preparation of annual work plans:

<u>Course Title</u>	<u>Host Country</u>	<u>Implementing Agency</u>
Integrated CRM	Thailand	National Environment Board (NEB)
Remote Sensing Applications	Indonesia Philippines Thailand	LAPAN, BAKUSORTANAL NRMC, UPLB NRC, NEB, AIT
Hydro-acoustics	Malaysia	UPM Fisheries Research Institute
Information Research and Management	Philippines	ICLARM
Socio-economic Analysis	Philippines Singapore Malaysia	UPLB, UPV NUS UPM

Each of the tentative host countries presented proposals with course outlines, tentative budgets, etc., which are expected to be worked out in greater detail in the project's annual work plans.

Short courses are seen as a key way to introduce the coastal resource management approach to researchers involved with the project. This will also help provide a common framework within which pilot study results will be presented at a later date in conjunction with regional information dissemination.



Grant Budget for Component Two

-	Information Dissemination and Training	\$1,500,000
2.1	Regional Short Courses	280,000
2.2	Policy Seminars and Workshops	220,000
2.3	On-the-job Training	300,000
2.4	Medium Term Academic Training	250,000
2.5	Information Dissemination and Special Activities	450,000

Detail for Activity 2.1: Regional Short Courses

A. Regional Short Course (2 weeks long); 17  
ASEAN participants (5 from host country,  
12 from other countries):

Participants:

-- Airfare (12 at \$500)	\$ 6,000
-- Per diem (17 at \$50 x 14)	11,900
	<u>\$17,900</u>

ASEAN Resource Persons (1 from host  
country, 7 from other ASEAN)

-- Airfare (1 at \$500)	\$ 500
-- Per Diem (2 at \$50 x 14)	1,400
-- Honorarium (2 at \$1000)	2,000
	<u>\$3,900</u>

Foreign Technical Assistance (per person)

-- Airfare	\$ 2,500
-- Per Diem (\$50 x 14)	700
-- Consulting Fee	3,500
	<u>\$ 6,700</u>

Materials and Support	5,000
	<u>\$11,700</u>

B.

Short Course with three resource persons, two ASEAN, one foreign TA	\$33,500
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Short Course with four resource persons, two ASEAN, two foreign TA	40,200
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Average cost of short course, about	35,000
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Therefore, 2 short courses per year for four years (2 x \$35,000 x 4)	\$280,000
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Detail for Activity 2.2: Policy Seminars and Workshops

- A. Policy Seminar or Workshop (3 days); 17 from ASEAN participants (5 from host country, 12 from other countries):

Participants:

-- Airfare (12 at \$500)	\$ 6,000
-- Per diem (17 at \$80 x 3)	<u>4,080</u>
	<u>\$10,080</u>

Technical Assistance (foreign), per person:

-- Airfare	\$ 2,500
-- Per Diem (1 at \$80 x 7)	560
-- Consulting Fee (\$250/day x 7)	<u>1,750</u>
	<u>\$ 4,810</u>
Support	<u>2,500</u>

Total \$17,390

- B.

Per Policy Seminar with one TA	\$ 17,390
Per Policy Seminar with two TA	22,200
2 per year at \$22,000 each	<u>\$ 220,000</u>

Detail for Activity 2.3: On-the-Job Training

A. Within the ASEAN Region (per person for 10 weeks)

Participants:

-- Airfare	\$ 500
-- Living Expenses (\$350 per week)	3,500
-- Training Fee (\$250 per week)	<u>2,500</u>
	\$ 6,500

B. At U.S. locations (per person for 10 weeks)

-- Airfare	\$ 2,500
-- Living Expenses (\$350 per week)	3,500
-- Training Fee (\$250 per week)	<u>2,500</u>
	\$ 8,500
	\$ 8,500

C.

20 participants within ASEAN at \$6,500	\$130,000
20 participants at US locations at \$8,500	<u>170,000</u>
	<u>\$300,000</u>

Detail for Activity 2.4: Medium Term Academic Training

A. Within the ASEAN Region	
-- Airfare (two round trips)	\$ 1,000
-- Tuition, fees and supplies	4,400
-- Stipend (24 months @ \$400)	<u>9,600</u>
	\$15,000
B. At U.S. Universities	
-- Airfare (one roundtrip)	\$ 2,500
-- Tuition, fees and supplies (2 yrs x \$6,650)	13,300
-- Stipend (24 months x 800)	<u>19,200</u>
	\$35,000
C.	
5 MS at ASEAN Universities	\$ 75,000
<u>5 MS at U.S. Universities</u>	<u>175,000</u>
10 MS participants	<u>\$250,000</u>

Detail for Activity 2.5: Information Dissemination  
and Special Activities

A.	Preparation, production and distribution of publications, printed materials and educational aids	\$200,000
B.	Special Regional Activities -- Examples:	
	ASEAN Coastal Resources Management Atlas	\$150,000*
	Mass Media Activities	
	Other Activities of Public Education such as school materials, posters, etc.	<u>\$300,000**</u>
	TOTAL	<u>\$450,000</u>

\*Illustrative budget for atlas:

--	Coordinator and editor - 28 person-months at \$2,850 per month	80,000
--	Travel for coordinator and ASEAN personnel (10 roundtrips at 2000)	20,000
--	Per Diem and Stipend	10,000
--	Cartographic help	20,000
--	Production	20,000
		<u>\$150,000</u>

\*\*Illustrative budget for mass media and other activities:

--	message and material design (24 person-months at \$3000 per month)	\$ 72,000
--	message publication/broadcasting and materials production/dissemination (workshop estimate for all all 6 asean countries)	<u>228,000</u>
	TOTAL	<u>\$300,000</u>

Tentative Detail for Regional and Technical Support  
(ICLARM Project Staff)

\$1,000,000

1. Project Coordinator

- Salary 60,000  
- Fringes 15,000

75,000 x 5 years \$ 375,000

2. Technical Advisor

- Salary 50,000  
- Fringes 15,000

65,000 x 4 years \$ 260,000

3. Admin. Asst./Communicator

- Salary 14,000  
- Fringes 6,000

20,000 x 5 years \$ 100,000

4. Editorial Support (Part time)

- 6,000 x 5 years \$ 30,000

5. Administrative Support (secretary,  
part-time accountant)

- 7,000 x 5 years 35,000

Sub-Total \$ 800,000

6. Overhead Cost (24% of above costs)\* \$ 192,000

TOTAL \$1,000,000 (rounded)

\*24% overhead rate used in 1983 AID/ICLARM contract.

Detail for Evaluation and Contingency

ASEAN Project Steering Committee	\$100,000	
Other	<u>\$400,000</u>	
Total	<u>\$500,000</u>	
Steering Committee for 6 meetings		75,000
Transportation		
5 participants 1 meeting \$500 each	2,500	
9 participants 5 meetings \$500 each	22,500	
Per Diem		
6 participants one 4 day meeting \$100 each/day	2,400	
11 participants five 4 day meetings at \$100 each/day	22,000	
Secretariat services \$2,600 per meeting (10 days services)	15,600	
Materials and incidental \$1,650/meeting (rounded)	10,000	
Other PSC Activity Support		25,000
Services (part time) \$1,000 p.a.	5,000	
Communications \$1,500 p.a.	7,500	
Materials, travel, incidentals \$2,500 p.a.	<u>12,500</u>	
PSC Total		<u>100,000</u>
Other (mid-term and final evaluation and contingency)		<u>400,000</u>
TOTAL		<u>\$500,000</u>

\*Includes the Chairman of the Working Group on Marine Science, but does not include representatives from ICLARM and/or USAID.

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FUNDING BY SOURCE

1. AID Funding

AID will provide \$5.0 million in Section 103 Funds as follows:

Component One: Resource Assessment, Planning and Research in

Indonesia	\$500,000
Philippines	500,000
Singapore	500,000
Thailand	<u>500,000</u>

Sub-Total \$2,000,000

Component Two: Training and Information Dissemination

Short Courses	\$200,000
Policy Seminars and workshops	222,000
On-the-job training	300,000
Medium Term Academic Training	250,000
Information Dissemination and Special Activities	<u>450,000</u>

Sub-Total 1,500,000

Regional and Technical Support 1,000,000

Evaluation and Contingency ( including PSC support) 500,000

TOTAL AID FUNDING \$5,000,000

2. ASEAN Contribution

The expected ASEAN contribution is substantial in terms of both person years and facilities/local cost coverage. Actual contributions will be shown in and brought forth in annual workplans of activity descriptions, budgets and related data.

Estimated ASEAN Contribution (over 5 years)

	<u>Person Years</u>	<u>Facilities &amp; Local Expenses</u>	
Indonesia	20	95,000	
Malaysia	5	45,000	
Philippines	20	95,000	
Singapore	20	145,000	
Thailand	20	<u>95,000</u>	
	<u>85</u>		
	x \$15,000 (weighted ASEAN average)		
	<u>\$1,275,000</u>	<u>475,000</u>	<u>\$1,750,000</u>

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### Technical Analysis Detail

Coastal Resource Management Policies and Programs in ASEAN. The development of administrative concepts, agencies, legislation and programs for managing coastal resources has reached different levels of sophistication in the ASEAN nations. This to a large extent parallels the stage of economic development and the availability of scientific and management manpower. Singapore has exhibited great economic strength and has a well educated scientific and management community. However, Singapore has largely converted its mangrove, tidal flats and estuaries to urban or industrial related uses. In the process, its seagrass and coral reefs have been severely affected and this prompts the country's need for resource management assistance and participation in the project.

The other ASEAN countries have largely rural, agrarian societies and until they are able to substitute secondary and tertiary development for primary resource development, they will need to conserve the potential that coastal resources offer to meet the needs of their societies. Policies and programs are being developed to promote coastal resource management but none have achieved a level sufficient to curb the degradation or outright destruction of coastal development opportunities. For example: National Committees for Mangrove have been set up in Thailand and the Philippines. The objective of these committees is to make recommendations on the allocation of mangrove forest resources among preservation, conservation and development needs. Staffed mainly by scientists, the authority of these committees is limited and many of their recommendations are not adopted.

Although attempts are being made to formulate national mangrove conservation policies, these are proving less than effective due to: (a) ambiguous national policies such as the "60:40" rule in the Philippines, which set a standard that 60% of all forested area would be allocated to alternative development and 40% kept for forestry or watershed protection; (b) poor perceptions of the economic and social significance of mangroves, which makes its conversion to other uses appear more beneficial; and (c) lack of enforcement of policies and regulations.

The absence of soundly based, authoritative policies reduces the role of advisory committees to one of adjudicating over incremental allocation decisions which, piece by piece, whittles down the remaining mangrove resources. The same is true for coral reefs and other living coastal resources.

Thailand has adopted a coastal zone management approach based upon the U.S. Coastal Zone Management Act of 1972. A Master Plan and six

sub-regional plans have been created and work is progressing on the provincial level plans. To date, 12 of the 23 provincial plans have been completed. Unlike the U.S. coastal zone management structure, where a federal initiative encourages the state governments to prepare the management plans, Thailand has taken a centralized planning approach. Plans are prepared in Bangkok and are disseminated to the provincial authorities for implementation. Implementation is hampered by the lack of trained manpower at both the national and provincial levels. This affects both the resource management competence of the plans and the guidelines they provide, and it impairs the administration of planning concepts at the local level.

The Thais recognize the weakness of their current coastal zone management framework and discussions are taking place between the Land Development Department and the Office of the National Environment Board (NEB) to work out a cooperative arrangement for the planning and management of coastal areas. The NEB has broad environmental and resource management responsibilities and, if the cooperative arrangement is worked out, will be able to develop improved policies, management guidelines and procedures.

The NEB has played a key role in the design of the Thai component of this project and has placed great emphasis upon assessment, research and coordination of living coastal resource development.

The Philippines also has what appears to be a reasonably sophisticated approach to coastal management. Responsibilities have shifted from the Natural Resource Management Council to the National Environmental Protection Agency. This latter agency will be responsible for developing and implementing coastal policies. Many of the observations concerning Thailand also apply to the Philippines. Both countries suffer from a lack of clearly articulated national policies for coastal management, have continuing inter-sectoral and interagency conflicts, lack coordination in development programs and have tended to adopt land use allocation procedures rather than long-term management approaches to complex coastal resource systems. As noted, ICLARM's technical and "neutral" orientations will help overcome institutional rigidities and advance meaningful work at pilot sites.

Indonesia is attempting to promote coastal resources management. The Third Five-Year Plan (1979-84) provides a series of broad development objectives including "the exploitation of natural resources in a manner which will not destroy the living environment and which provides the basis for sustainable development and the promotion of human welfare" (Chapter III). A series of specific objectives relating to resource management are also stipulated, namely:

- a) improved resource management;
- b) application of appropriate forms of technology;
- c) integration of development efforts between sectors of the economy and within regions;
- d) the rehabilitation of natural resources damaged through poor management and the adoption of improved management approaches to river basins, forests and other land and water resources;
- e) the improved use of coastal areas, territorial waters and national air space (Chapter VI).

Based upon the current State Policy Guidelines (GHBN), the new Fourth Five-Year Plan (1984-1988) provides specific directives concerning the use of natural resources, including:

- a) development should be sustainable in terms of the ability of the natural resource system/environment to respond to individual and cumulative development pressures;
- b) no individual form of use should degrade another natural resource development opportunity;
- c) future development options must be maintained (Chapter II).

The general objective of the natural resource development and environmental policies is to safeguard public welfare. To this end, ecosystem concepts are stressed as tools to be used in reducing environmental stress and preventing harmful effects resulting from development. By pursuing this objective, it is hoped to reverse current trends in resource degradation and to provide a strong basis for long term development during the Fifth Five Year Plan.

These policies and objectives clearly set the stage for improved coastal resource management. However, no single agency is charged with the development and management of coastal areas. Conceptually, the State Policy Guidelines and Five-Year Plans present a very comprehensive series of statements concerning the management of development. There is, however, that major and often seen gulf between centrally-prescribed policies and the implementation of them.

Malaysia has not developed a special emphasis on coastal management. However, there is evidence of national concern about improving coastal resources development. In this project, Malaysia has not put forward a proposal for resource assessment and applied research; instead, it has focused its attention on information dissemination and training.

A point which needs to be stressed is that, although each of the ASEAN nations will approach coastal management in its own manner, they

share common bodies of water and the resources they exploit are often common property. Many of the problems facing individual ASEAN countries have causes and effects which transcend national boundaries. Mutually beneficial solutions to such problems could be derived by pooling experience, data on resources, manpower, and facilities. The project aims to do this.

2. Major Problems Associated with the Development of ASEAN Coastal Areas. The following summary presents some of the major management considerations concerning alternative forms of coastal development.

Agriculture. Increased agricultural production in ASEAN coastal areas requires careful choice of soil sites, continuous high levels of management and the improvement of socio-cultural conditions. Agricultural development often takes place in fragile ecosystems where potentially harmful side-effects (e.g. alteration of habitats) result from the release of agricultural chemicals into adjacent riverine and coastal waters.

The marginal nature of many coastal areas for agricultural use raises the issue of whether alternative management strategies outside the coastal zone may produce more viable and less hazardous agricultural opportunities. Such broad appraisals of development options require a balanced perspective on the ability of upland, coastal and marine resource systems to respond to and sustain national development objectives.

Fisheries. The general decline in capture fishery harvests affects both domestic supplies of protein and valuable export earnings. A basic issue which is not being adequately addressed is the extent to which this decline is the result of overfishing or the degradation and destruction of coastal habitats that support fishery activities. Components of this issue which need to be addressed are:

-- The management of mangrove swamps is often considered to be directly related to coastal primary production and the spawning, early growth and shelter of fin and shellfish. Destruction of mangrove and other vegetated tidelands may be a direct cause of declining fishery stocks;

-- Thermal discharges and agricultural chemicals, industrial wastes and sewage dumped into coastal waters can be extremely harmful to aquatic life and can seriously disrupt biological productivity;

-- Deforestation and infrastructure development projects can have a major influence on the hydrologic regime and sediment budgets of coastal systems. There is some evidence of increased flooding and damage to coastal aquaculture development resulting from poor standards of upland planning and management.

Each of these problems or their combined synergetic effect can increase the complexity and cost of managing coastal resources that support living resource development activities such as nearshore capture fisheries or mariculture.

A problem fundamental to each of the above development activities is the lack of sound criteria for defining which areas/resource systems are capable of sustaining different forms or combinations of development. Recent research in Malaysia\* has shown that the selection of mangrove areas for charcoal production, woodchip production and conversion to fishponds (current FAO guidelines were adopted for fishpond site selection) did not produce the planned results. Of the three uses, only controlled harvesting of mangrove for charcoal production was sustainable. After only a relatively short period of time some of the aquaculture sites were abandoned.

**3. Basic Components of Coastal Resource Management Programs.** The institution of viable coastal zone management programs which can operate effectively within nations and across political boundaries will have to incorporate the following basic elements: (a) evaluation of the physical resource base, e.g. land-use mapping and fish stock assessment; (b) basic information on resource use--including traditional resource management, pressures for development and potentially competing demands on resources; (c) assessment of resource use conflicts, including existing and proposed developments; (d) socio-economic problems associated with the management of coastal resource opportunities; (e) plans for coordinating development efforts and resolving conflicts between sectoral interests at the private and public levels; (f) a series of alternative management strategies; (g) a framework for implementing and enforcing management guidelines; and (h) methods for monitoring the effectiveness of the management strategies and measures.

Though interest is increasing in bio-physical, social and economic problems in coastal zones, detailed studies of these questions are at an early stage of development in the ASEAN countries. By extending from and expanding its resource assessment/management planning approach (one example of which is the San Miguel Bay Study in the Philippines) ICLARM will help to begin covering these complex issues and concerns in a systematic, cooperative way.

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\*Gong, W.K., Ong, J.E. and C.H. Wong, 1984. The Different Uses of Mangroves and Their Possible Implants on Adjacent Coastal Fisheries. Proceedings of Man and Biosphere Seminar, "Man's Impact on Coastal and Estuarine Ecosystems", Tokyo, November 13-16, 1984.

4. The Application of Remote Sensing to Coastal Management. Remote sensing--including satellite imagery, radar, aerial photography and video techniques--can provide a useful tool for coastal resources assessment and monitoring development. To be a cost-effective tool, remote sensing must be applied to specific, stated objectives related to resource assessment, planning and management. Certain forms of remote sensing are of general use while others are so specialized that their utility is limited in coastal situations. Examples of the application of remote sensing include:

- a) Multi-Spectral Scanning (mainly satellite data) and digital analysis for analysis of mangroves, coral reefs, mudflats, sedimentation and bathymetric factors;
- b) Aerial photography (color, black and white, infra-red) for detailed vegetation, land use and livestock/wildlife surveys.

The uses of these and other techniques are often complementary. Ground surveys, aerial photographs and satellite images are often used together to help the interpreter understand what the satellite image is recording. Images alone are of limited value.

Examples of how ASEAN countries are using remote sensing techniques include:

-- Philippines. The Ministry of Natural Resources has surveyed mangrove and coral reef resource systems (areal extent, condition, use and rates of conversion) using multi-spectral analysis of LANDSAT data.

-- Thailand. The Ministry of Science and Technology has applied various satellite imagery techniques to the study of mangroves and tidal mudflats (area, condition, species diversity and distribution).

The Asian Institute of Technology has conducted training in remote sensing applications for ASEAN professionals (from several sectors/agencies)

-- Indonesia. The Ministry of Interior, National Resource Survey and Mapping Agency, has conducted broad land use surveys, vegetation analyses and project site appraisals using satellite imagery and aerial photographs. The Ministry of Forestry has used similar techniques for mangrove area assessment.

Component Two of the ASEAN/AID project includes funding for training in appropriate remote sensing techniques. Where appropriate, existing sources of remotely sensed data will be used in the Component One pilot area studies, e.g. resource inventory/mapping and fish stock assessment.

## Economic Analysis Detail

1. The Economics of Coastal Resources. Coastal resources present a unique management challenge. This is due to the variety of goods and services produced in coastal areas, the different groups using the resource base, the interactions of coastal resources and, not least, issues of administrative jurisdiction and wherewithal. In contrast, land based resource systems, such as agricultural lands, are more easily studied and the main on-site and off-site effects can be identified. For example, agricultural activities result in "crop production" (the on-site effect) and some related off-site effects such as, soil erosion, or run-off of agricultural chemicals. Coastal systems are rarely this simple and the effects are usually harder to observe.

The unique nature of coastal resources as physical systems thus presents corresponding challenges in economic analyses. Because of the extended interactions of various components, the range of individuals and communities effected, and the common-property character of some of the resources, traditional economic analysis is not sufficient. A broader perspective is required to adequately reflect the benefits and costs, and the trade-offs involved, in coastal resources management.

a) Types of Goods and Services Produced. Although fisheries are an important part of the economic benefits derived from coastal areas, there are other very valuable components. Not all of these components are represented by goods that are directly bought or sold in the market. Nevertheless, the production of goods and services, whether they have market prices or not, directly affects the welfare of the coastal zone population.

Mangroves are an example of a coastal resource common in Southeast Asia. Although traditionally considered as a low-valued resource that should be converted to other uses, mangroves are now being re-evaluated and their various uses re-assessed. The problem of economic analysis of mangroves is illustrated by Figure 1. This matrix divides the various goods and services produced by a mangrove ecosystem into four quadrants.

Figure 1

Relation Between Location and Type of  
Mangrove Goods and Services and Traditional Economic Analysis

		Location of Goods and Services	
		On-site	Off-site
		1	2
	Marketed	Usually included in an analysis (e.g., poles, charcoal, woodchips, mangrove crabs)	May be included (e.g. fish or shellfish caught in adjacent waters)
	Nonmarketed	Seldom included (e.g., medicinal uses of mangrove domestic fuel-wood, food in times of famine, nursery area for juvenile fish, feeding ground for estuarine fish and shrimp, viewing and studying wildlife)	Usually ignored (e.g. nutrient flows to estuaries, buffer to storm damage)

One dimension of this matrix refers to the location of goods and services produced by mangrove systems. The location may be either on-site within the mangrove ecosystem and be represented by such products as poles, charcoal or mangrove crabs -- or off-site, represented by such products as nutrient flows or off-shore fish. The other dimension of the matrix refers to the valuation of the goods and services produced. Some are easily valued using market prices (e.g. poles, charcoal, fish), while other goods and services do not have recognized market prices (e.g. medicinal uses, recreational benefits, nutrient flows). The point is that traditional economic analysis (and planning) has focussed on only those goods and services found in the first (and sometimes the second) quadrant. Direct on-site, marketed goods or services are valued and included; most other effects are ignored. This narrow approach is acceptable when the first quadrant includes most benefits and costs of a resource system, such as a traditional agricultural system. When mangroves, or most coastal resources, are evaluated in this way, a large amount of benefits or costs may be ignored. This leads to the need for a broader approach to economic analysis of coastal resources. This will be discussed in the next section.

The previous example focussed on mangroves, but the problems are common to other components of the coastal system. Coral reefs are commonly found in ASEAN countries and present another example of a coastal resource that is under pressure from multiple users. Coral reefs are important breeding grounds for various fish species; reef fisheries have developed to take advantage of this. Reefs also serve other functions such as protection of beaches and other coastline formations from storm waves, and as a resource for recreational diving. The exploitation of reefs is intense in some areas, e.g. reefs may be heavily fished, sometimes using destructive practices such as dynamiting. Reefs are frequently mined for building material or lime production and they are especially vulnerable to damage by sedimentation. When these actions result in reef destruction or reduced productive capacity, the welfare of those people dependent on the reefs also suffers.

Fisheries, as previously mentioned, are the most easily valued part of the coastal resources system. Fish productivity is heavily influenced by the intensity of fishing activities, the condition of spawning and nursery areas, and the extent of nutrient flows. Action in one part of the ecosystem may have major impacts on a fishery located in another area.

Other parts of the coastal environment -- lagoons, sea grass beds, or tidal flats, are all important in some locations and pose similar challenges to economic analysis. The point is that management and economic analysis both have to recognize the multiple uses of coastal resources and the interdependencies that exist. Planners and managers

are then better understand the effects of their actions -- both on the natural ecosystem and on human welfare.

b) The Economic Importance of Coastal Resources. Resources only become valuable in economic terms when they are used. Economic analysis, therefore, focusses on the use of the various goods and services produced by coastal systems. As with the resources themselves, these economic uses take various forms.

Employment (and income generation) is a major economic benefit derived from the coastal resource system. Many millions of people in the ASEAN countries depend directly on coastal resource activities for their jobs; a large share of these jobs are related to fishing. In addition, millions of additional people are involved in the processing, marketing and trade of coastal resource products, and the industries serving this sector (e.g. shipbuilding, fish packing, ice plants, charcoal manufacturing). In Indonesia, for example, it is estimated that the fishery sector and related activities provide jobs for 2.2 million workers.

Exports of fishery products are important to the ASEAN countries. In 1982, the value of fishery exports was estimated by FAO to range from \$108 million for the Philippines to \$465 million for Thailand. This sector is an important, and potentially renewable, source of foreign exchange earnings. The coastal resource system also produces other products that are exported including shells, corals, and mangrove products.

The fishery sector is also an important food source, especially for animal protein. Although most people in the ASEAN countries receive most of their protein from staple grains, the percentage of animal protein derived from fish is very high. This percentage ranges from a low of 35% in Singapore to 60 to 65% in the Philippines, Malaysia and Indonesia.

A less tangible benefit of coastal resources are amenity values. These are the benefits that individuals receive from visiting or using the beaches, reefs, and waters of coastal areas. When tourism is developed, either domestic or international, these amenity values are translated into concrete economic benefits. International tourism can bring important foreign exchange earnings.

Other economic benefits could be listed. The exact benefits in each area will vary depending on the natural system and the form of human use. The challenge to resource management is to set up a framework for analysis that recognizes both the range of physical interdependencies as well as the values of the various goods and services produced.

2. Major Economic Considerations in the Management of Living Coastal Resources. There is a symmetry in the economic analysis of benefits and costs. A cost that is avoided can be counted as a benefit, just as a

benefit that is lost becomes a cost. This can be a useful device in analyzing resource management options for coastal areas. Sometimes, the focus is on costs avoided (retaining a mangrove system may avoid the cost of constructing seawalls to protect inland areas); other times the analysis examines benefits lost (a decrease in shrimp production as a result of mangrove destruction).

In all cases, the economic analysis of management options for coastal resources needs special care because of the unique attributes mentioned earlier. These are largely due to the common property nature of these resources and the existence of economic externalities.

a) Common Property Resources. This term merely means that many of the coastal resources are open for use by many individuals. Private property rights are difficult, if not impossible, to enforce for coral reefs, water quantity or quality, fish stocks. The danger inherent in common property resources is that over-exploitation will result in a decrease in the total amount available. Fishery resources are the most notable example but coral reefs, kelp beds, and mangrove ecosystems can also be over-exploited with consequent loss of valuable products.

This characteristic is a powerful reason why management is required to use these resources in a sustainable manner. Individuals will not have the incentive to manage the resource properly, especially if many individuals are involved. Proper management requires either social sanctions (frequently applied by traditional village units) or government regulations. The history of demersal and pelagic fisheries in the ASEAN region shows constant trade-offs between small-scale traditional fisheries, managed in a sustainable fashion, and modern trawlers whose fishing efforts are often unregulated.

b) "Economic Externalities". The second important characteristic of coastal resources management is the existence of economic externalities. This merely means that the action of one individual has an economic effect on another individual who has no part in the decision making process. For example, a villager clears a mangrove to build fish ponds. This increases his income but results in a decrease in coastal fish catch due to the loss of a traditional spawning ground. The fish pond developer has imposed a (negative) economic externality on the coastal fisherman.

Externalities can also be positive. An upland farmer terraces his fields to increase crop productivity. This also results in decreased soil erosion and consequently, decreased reef destruction from sedimentation. The upland farmer has imposed a (positive) economic externality on the users of the off-shore reefs.

As a result of these kinds of effects, it is important that economic analysis of coastal resource management options be done within a

framework that includes benefits and costs wherever they occur and attempts to place values on as wide a range of goods and services as possible. (In economic jargon, this is a social, economic analysis as opposed to the private, financial analysis done for an individual).

Since one of the goals of coastal resources management is to create the greatest benefit for the largest number of people, and to do so in a sustainable manner, it is imperative that economic analysis be comprehensive. A narrow, sectoral approach is not adequate; too many important benefits or costs may be ignored.

3. The Economic Analysis of Trade-offs. The actual economic analysis should consider various alternative management or development options. Each alternative has certain benefits, and costs, associated with it. For example, a mangrove can be used in one of several ways -- it can be left undeveloped; selective harvesting of mangrove products can be carried out; or it may be converted to an alternative use (a fishpond, a port, a housing site). Each management option entails certain benefits and costs. When one option is chosen (say conversion to a housing site), trade-offs occur: the goods and services produced by the mangrove under alternative uses are lost. The proper role of the social, economic analysis is to identify the true benefits and costs (including lost opportunities) of any management alternative.

As indicated earlier, this analysis should include both on-site and off-site effects, and those goods and services that have easily observed market prices as well as those that are more difficult to value. This type of economic analysis is challenging because of the wide range of goods and services produced by coastal systems and because of difficulties in assigning monetary values. Still, a great deal can be done using existing data and prices if the proper analytical framework is used.

a) One Approach to Analyzing Resource Systems. The following points outline one approach to analyzing projects or resource systems when the analyst expects to find common property resources and economic externalities.

-- Identify Effects. The first step is to understand the system or project under consideration, and to identify the main types of interactions. In a typical coastal area, this include the mangrove and coral reef system and nutrient flows. Upstream influences (such as sediment inflow) may also have to be considered. At the same time, it is true that analyses far beyond the mouth of the river become increasingly costly, subject to assumptions and administratively ambiguous in terms of presenting management plans.

-- Define the Boundary of Analysis. The next step is to set a limit on what should be included in the analysis. The boundary should be broad enough to include most important effects but not so broad as to

make data collection and analysis impossible. Common sense can be very useful here, e.g. the analysis of mangrove conversion project should include the fishery dependent on that mangrove, just as changes in sediment inflow should also be considered in terms of their impacts on a mangrove or a coral reef.

-- Quantify Effects. The next step is to quantify the magnitude of expected, or observed, effects. This can be difficult but a great deal can be done using existing data and information from other sites. For example, in analyzing the costs of mangrove conversion, it will be necessary to identify the loss of direct products from the mangrove (e.g. poles, charcoal, mangrove crabs...) as well as estimate the loss in fish catch after the mangrove breeding ground is destroyed and nutrient flows are lost. These latter effects will be more difficult to quantify.

-- Place Monetary Values on Effects. A key step is the placing of monetary values on effects. Monetary values are then used in the actual analysis of alternatives to try and understand what are the true benefits and the true costs of various options. Important effects (aesthetics, gene pool diversity, others) that cannot be quantified or valued are not ignored. They are kept in the analysis, but in a qualitative, rather than a quantitative manner.

-- The Actual Economic Analysis. The last step is the actual analysis, usually some form of benefit-cost analysis. It depends entirely upon the information that is used and the assumptions made in the previous steps.

It may seem that this approach is too complex and asks too many difficult-to-answer questions to be used in complicated systems like those found in coastal areas. However, if such a broad view is not taken, important effects will be overlooked and the true nature of trade-offs not considered. Natural and social systems and their interactions are brought together. The task of the economic analysis is to try and capture as much of these interactions as possible.

b) Further Considerations in the Economic Analysis. Further considerations enter into the analysis. Among others, these include regional development objectives, income distribution, basic human needs and, of course, environment protection and conservation. These are likely to be major environmental effects associated with various options. For purposes of management plans/interventions, these should be included even if not all effects can be quantified and monetized.

4. The Economics of the ASEAN Coastal Resources Management Project. This ASEAN project is not an economics project per se. Rather, its goal is to improve the capability of participating ASEAN countries to manage their living coastal resources on a sustainable basis. This goal, therefore, means that economic considerations have to be taken into

account since management and use of a resource are closely related to the economic benefits and costs of using the resource.

Since the project will focus on understanding and managing coastal resource systems, it is not possible to state that the project will result in the savings of a certain amount of dollars. It is possible to say, however, that the coastal resources of ASEAN countries play an important role in the economics of all of the ASEAN countries. Employment, exports, recreational opportunities and tourism are all involved. If better management measures can be developed as a result of this project, the potential economic impacts are very large.

For example, the export value of only one coastal resource product (fish products) in one country (Indonesia) totalled \$254 million in 1982. The entire five-year ASEAN/AID project costs less than three percent of this amount -- two percent (\$5 million) from USAID and one percent (\$2 million) from the ASEAN countries. While it will be very difficult to say that the project resulted in increases in mangrove production or fish catch by a certain percent, the potential impacts in terms of increased productivity of coastal resource product (or decreased losses) are judged substantial. A confirmation of this is the interest in and investment by other bilateral and multilateral donors in this area.

Perhaps the strongest argument for an explicit economic component of coastal resources planning and management is that the cost of not having one may be very high. Narrow, sectoral approaches focussing on only one aspect (no matter how important) may easily overlook important interconnections. For instance, there is little use in conducting studies of one resource (say a reef fishery) if other actions (mangrove conversion, destructive fishing practices) will destroy the same resource.

It is planned that comprehensive economic analyses will be used in the pilot site activities in participating countries. The focus will be on living resource assessments, cooperative research and socio-economic aspects. Various short courses and workshops/seminars will be used to help implement this approach in the participating country institutions.

## Social Analysis Detail

### 1. The Structure of Decision-Making in Coastal Resources Management.

The diverse set of goods and services produced by coastal resource systems (products from fisheries, aquaculture, mariculture, mangroves, among others) suggests the interests in, and the management of these goods and services to be similarly diverse and diffuse. In each ASEAN country, a number of different government institutions and ministries as well as private and non-governmental organizations are involved. Not infrequently, they work at cross-purposes.

Since programs are often implemented on a sectoral basis, and interventions arise from single interest concerns, one objective of the project will be to broaden the planning and management perspectives so that separate entities will see how their activities fit into a larger resource economics framework. It is probably not possible (or desirable) to actually manage a coastal area through a single integrated unit. Research and analysis, however, should use a broader perspective. Here, ICLARM's technical and "neutral" orientation--as well as the institution's proven capacity to bring separate entities together regarding common concerns--is of central, operational importance to project implementation, especially Component One--Resource Assessment, Planning and Research.

As part of the training and information dissemination component of the project, a series of policy seminars will be held to present conceptual approaches, and situation-specific options, to decision-makers. The project aims to help to ensure that results of the individual activities are transmitted to those people who can influence how coastal resources are managed.

2. The Social Dimension. There are several social reasons why the focus on coastal resource management is important. First, coastal areas are usually densely populated and large numbers of people are dependent on coastal resources for their livelihood. In addition, coastal people (especially fishermen) are frequently among the poorest members of society in each country. When these two factors are combined with the rather unique (and fragile) nature of many coastal resources, management becomes important to the public interest. Since alternative employment opportunities in coastal areas are usually limited, it is necessary to manage the resource base on a sustainable basis to ensure future productivity. The proper management of coastal resources, therefore, has economic, social, and political implications.

Another social dimension is the interaction of environmental and economic factors. Coastal resources are affected by activities in the

uplands and the effects of coastal activities may extend far into the ocean. Actions that yield short-term economic gains to some individuals (such as forest clearing in an upland area) may easily result in long term negative effects on the welfare of others. Environmental externalities have major economic impacts, often negatively affecting those who are economically weak and politically unrepresented.

The welfare of coastal populations is dependent on the wise management of coastal resources, and this welfare can be hurt by both off-site, unstream actions as well as by mismanagement within the coastal zone. If poor management leads to declining welfare levels, another likely outcome is migration of coastal people to cities or inland areas. Incremental migration into ASEAN's already crowded urban areas and capital cities is a costly price to pay for poor coastal resources management.

3. Social Appropriateness of the Project. The project meets the social soundness requirements of the ASEAN context. The national agencies involved in the project are familiar with the socio-economic context of their coastal zones. ICLARM, has extensive knowledge of the ASEAN countries. Although ICLARM's focus has tended toward the fishery issues of living coastal resources, the project is designed to assist the Center in developing capacity for, and leading to a broader resource management effort.

One project objective is to develop awareness of (and capability in) comprehensive resource management techniques. Traditional societies often manage coastal resources in sensitive and comprehensive fashions. As populations grow and newcomers begin to use coastal resources, however, management practices may prove inadequate. The research component of the project will help to increase understanding of the dynamics of coastal resource use and impart this awareness to others, especially government decision-makers.

The various project components are designed to be mutually re-inforcing in terms of resource management. Individual country case studies will use a living resource management approach and socio-economic considerations will be emphasized. There is considerable experience within the ASEAN countries in socio-economic analysis and the project will incorporate this into the overall research effort.

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## ANNEX J

### Institutional Analysis Detail

1. Summary. In light of the regional nature of the project and its focus on developing a comprehensive approach for managing living coastal resources in Southeast Asia, the International Center for Living Aquatic Resources Management (ICLARM), an international, non-governmental, non-profit organization based in Manila, has been identified as the most appropriate institution for project execution.

ICLARM's institutional mandate is to assist in conducting interdisciplinary research on fisheries and other living aquatic resources in tropical developing countries. At present, the Center has four ongoing, major programs: Resource Assessment and Management; Aquaculture; Education and Training; and Information Services. (An updated summary of ICLARM program activities is found in Annex K.)

The institution's principal strengths related to the ASEAN/AID project are:

- a) Its formal linkages with several national and regional institutions which could be involved with the project;
- b) Extensive experience in education and training throughout the region which includes conducting short courses, workshops and specialized advanced training.
- c) The Center's information service, which serves as a support arm for ongoing research programs through on-line connections with various data base systems, and which publishes and disseminates research results, reviews, bibliographies, translations and conference proceedings

Two concerns have been raised by AID regarding ICLARM's ability to coordinate and manage project activities: (a) Its sector-specific - albeit interdisciplinary - focus on fisheries research and management offers limited in-house technical capability to backstop a comprehensive approach to coastal resources management; and (b) Its financial status.

The first issue will be addressed by the addition of staff members to complement the Center's existing strengths, and the provision of short-term technical assistance where warranted. Increasing ICLARM's capacity/experience in wider resource management activity is an important institutional improvement planned under the project. The additional technical staff positions at ICLARM provided for with project funding are described further in Section 9 of this Annex. The issue of ICLARM's financial status is addressed in Section 8.

2. ICLARM's Permanent Senior Technical Staff. ICLARM's present senior staff complement is below desired levels. There is a Director-General, but a vacancy exists for the Deputy Director-General position. In the program areas, a program leader vacancy exists in Education and Training and a further program leader vacancy will soon exist in Resource Assessment and Management. While the Institution's desire is to fill these vacancies, sufficient funding does not presently exist for salaries (see Section 8 of this Annex).

In terms of technical expertise, senior staff personnel share a common training and experiential base in fisheries science, which includes: small scale fisheries and aquaculture economics; fisheries management and development policy; tropical fisheries and fish stock assessment; population dynamics, fishery biology and genetics; and aquaculture technology. One senior scientist has interest and expertise in systems management (coral reefs) but the majority of his time is required for ICLARM project commitments in the South Pacific. The Director-General has broad training in resource economics.

The present status and nature of ICLARM's senior staff presents both difficulties and opportunities for the AID/ASEAN project. Low staff complement and the heavy emphasis on fisheries assessment and management limits the in-house technical expertise available to be drawn for project-related activities. AID views this situation as an opportunity to help ICLARM diversify its present technical capabilities through selected and appropriate staff build-up.

3. Technical Assistance. At present, ICLARM would not be able to provide all the short-term technical assistance needed for project components one and two. Instead, short-term assistance would be obtained through agreements with one or more organizations which maintain a broad range of natural resource scientists with Asian experience to facilitate quick start-up. In the interests of long-term institution building, it is planned that ICLARM will begin to develop its own roster of regional specialists to be used increasingly in the middle and later phases of project implementation.

4. Information Management. A major element of Component One will require the provision of specific information for research purposes. As presently envisioned, field requests can be handled by ICLARM with existing facilities. The present data accession capability is an on-line interactive information system that can access data bases in both the United States (DIALOG) and Australia (AUSINET AND CSIRONET). Other potentially useful data bases which can be accessed include INFOTERRA and the Agricultural Information Bank for Asia. For field requests that are urgent, results from the data searches can be transmitted on-line. If urgency is not a consideration, full abstracts of relevant articles can be printed off-line and shipped to the Center in 5-7 days. Where follow up requests for the full article are made, it will be ICLARM's responsibility to supply this information on a timely basis. Where

computer link-ups between ICLARM and the lead implementing institution in participating countries are not possible due to uncertain telecommunications, it will be the responsibility of the implementing institution to field information searches and requests from the pilot project site and forward the request to ICLARM. Similarly, upon receipt of the results, it will be the same institution's responsibility to forward the information in an expeditious manner to the user.

At present, the record of ICLARM's holdings is not computerized but can be made available through hard copy or microfiche. Discussions are currently underway with another bilateral assistance agency for the development of software and the purchase of appropriate hardware to list all holdings for accession purposes.

5. Information Dissemination and Publications. One key to maintaining interest in the ASEAN/AID project at the regional level and promoting the relevance of its outputs is through information dissemination. The "workhorse" of this element will be a newsletter which will circulate to both the institutions responsible for project implementation and a wide range of governmental, non-governmental and academic institutions with interests in coastal resources management. It is planned that the newsletter will have sections describing the progress of various site-specific activities; a technical section describing research methodologies currently in use at project sites or potentially applicable for investigative purposes; a section devoted to the application of research results in the formulation of coastal resources management plans; brief accounts of regional activities with relevance to the project; and a bibliography of recent articles from relevant serials available to users upon request. Sources for the material will include articles by field staff, short-term technical advisors (where appropriate), ICLARM staff, other researchers in the field, and information/public relations personnel. The newsletter will be supplemented by occasional technical bulletins which describe the approach, results, and significance of discrete research activities at each of the project sites.

Upon completion of the research elements at the four project sites and the development of a management plan for the site's living coastal resources, a case study of all elements of the process leading up to the development of the management plan will be published. Four case studies are presently envisioned which will be packaged together in a multi-volume set to include an introductory and summary volume and a listing of the various data bases generated from project sites. This set would be made available at no cost to all participating institutions, and other selected national and regional institutions. Its availability, at cost, will be advertised through international information networks to other institutions.

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6. Data Base Management. The need and feasibility for a regional data base management system (DBMS) for project activities is under review. The status of the region's telecommunications network precludes the use of an interactive computer-based system which could access data collected from one pilot site and subsequently formatted and stored at ICLARM for use at other sites. At this juncture of the project the applicability and usefulness of much of the site-specific raw data to other sites is unknown. What appears as potentially more useful for purposes of regional coordination are detailed accounts of the relevant bio-physical characteristics of each project site, the major coastal resource management issues, the significance of these issues in terms of their socio-economic importance and their causes, the design of investigative approaches to seek solutions to their mitigation, and the application of results into the development of comprehensive coastal resources management plans.

#### 7. Training.

Asian Fisheries Social Science Research Network. This network represents an agreement among ICLARM and several academic institutions within the ASEAN region\* to sponsor research and both non-degree and degree training programs in fisheries economics. Entry into these programs is dependent on the number of candidates applying. The network, developed through a joint grant from Ford Foundation and the International Development Research Centre of Canada, provides a mechanism by which faculty can conduct relevant research on social science aspects of fisheries management and aquaculture development. Where relevant, this could prove to be a valuable in-place mechanism to facilitate short and medium-term training under the ASEAN/AID project and identify potential interested researchers in the region for pilot area studies.

Medium-Term Training. As presently envisioned, medium-term training will provide masters level academic programs in disciplines related to coastal resources management for candidates from each ASEAN nation. Candidates will be selected by participating country lead agencies in cooperation with the ASEAN Project Steering Committee (PSC). Where the academic institution and degree objectives are already known by the host country, ICLARM's role will be to facilitate the candidates' application. Where the range of options is not known by the host country, ICLARM's role will be to obtain information to assist the candidate in matching training objectives with appropriate choices of academic programs and institutions.

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\*As noted in Part III, these academic institutions include: University of the Philippines--Visayas; Kasetsart University, Bangkok; Universiti Pertanian Malaysia; and Universitas Diponegoro, Semarang, Indonesia.

In-region training can be facilitated through the Asian Fisheries Social Science Research Network. Where the curriculum desired is more life-or physical sciences-oriented, alternative arrangements would be needed. These may entail direct institution-to-institution contact. If interest in regional training in non-social science curricula is of sufficient level, ICLARM may develop further institutional networks patterned after the existing social sciences network.

8. ICLARM's Financial Status. The current financial situation at ICLARM stems from a declining source of unrestricted financial support, and a mix increasingly dominated by restricted support. The result has been a reduction in the Center's scientific personnel and administrative staff during 1984/85. ICLARM's principal concerns are its reduced ability to function as a research-catalyzing institution with staffing reductions, the increasing need to depend on externally-funded research projects, and growing dependence on research-related consultancies. At present, the Center has unrestricted core funding to maintain the present staff level until November 1985.

Project sources of new unrestricted funding (presently being considered, negotiated or newly approved) include: phase one of the Rainfed Resources Stock Assessment Project in the Philippines (BFAR/USAID); Small-scale Fisheries Management Options (Ford Foundation); Wastefed Aquaculture Development in Africa (German Agency for Technical Cooperation); and Indonesian Reservoir Management (World Bank); and a possible new unrestricted grant from the AID/W Science and Technology Bureau. (A full list of projects is given in Annex K.) The Center's longer-term strategies are to continue focussing on raising unrestricted funds from new donors and application for support from the Consultative Group on International Agricultural Research (CGIAR).

In a worst-case scenario of severely limited unrestricted funding, further staff cuts would be required with the research capability at the headquarter's level reduced accordingly. At the project level, the Center's Information Program is considered a priority area and in all probability, will be the least likely to be affected. Similarly, the Resource Assessment and Management Program is adequately covered for the next two to three years. The Social Science Research Network is covered through 1988. This leaves the Aquaculture Program most vulnerable to reduced levels of support, as the funding of several projects is due to come to an end in 1985.

From the perspective of the ASEAN/AID project and the form of its support, there appears no threat of loss of essential support staff or physical infrastructure required for project implementation. (As noted in the project design, the Center's Information Program and its Resource Assessment and Management Program will be considerably strengthened by AID resources.) Rather, the concern is with the potential reduction of a human technical resource base at headquarters which could provide valuable input into a project characterized by its multidisciplinary nature. While this concern is real, it is not considered fundamental to

chances of project success. In-house technical staff will be available for consultation on the project, albeit at possibly reduced levels due to competing demands from other project activities. In cases where technical staff are reduced or taken up by other project activities in the field, technical input (where warranted) will be provided by short-term technical assistance.

9. Technical Staff Position Descriptions (Project-funded). Based on the projected demands of the ASEAN/AID project, two senior staff positions are recommended at ICLARM headquarters. In addition, it is planned that the project will provide a full-time administrative officer/facilitator, a part-time assistant editor, and additional accounting, secretarial and clerical support. For the ASEAN countries participating in Component One activities, there will be the need for host-country project coordinators (with the possible exception of Singapore). Preliminary position descriptions for senior project staff and host-country project coordinators are listed below and will be subject to modification, as appropriate, following ICLARM's active engagement in project implementation.

#### Project Coordinator

a) Qualifications. Doctoral Degree with at least 5 years experience in the area of coastal resources policy and management. Experience in project management is essential. Other important qualities include a sound understanding of information and training principles, good interpersonal skills, and knowledge of Southeast Asia. Early availability is desirable.

#### b) Duties.

- Manage and coordinate overall project activities
- Serve as ICLARM's focal point for the ASEAN/AID project and coordinate with the AID/ASEAN Liaison Office (ALO) and ASEAN Project Steering Committee
- Negotiate contracts (as needed) for discrete subproject activities
- Coordinate with national and regional institutions to conduct regional seminars
- Facilitate the placement of trainees
- Submit annual work plans to AID/ALO
- Supervise all project personnel and specify reporting duties

**Technical Advisor**

a) Qualifications. At minimum a Master's Degree (preferably a Ph.D) with at least 5 years experience in coastal resources management in tropical developing countries. Specifically, this person must be able to demonstrate a thorough understanding of tropical coastal ecosystems, including their structure, processes and linkages with adjacent bio-physical systems, and their socio-economic importance to coastal development. Candidates must demonstrate sound interpersonal skills, the ability to live and function effectively in developing countries, and express a willingness to travel frequently and possibly to relocate for medium-term time periods. Early availability is desirable.

b) Duties.

- Assist host-country project coordinators in the conduct of resource assessments, institutional analyses, socio-economic surveys and research design by: direct inputs; facilitating the prudent application of short-term technical assistance; backstopping information/data requests; mobilizing ICLARM expertise; and facilitating local inputs.
- Assist in work plan preparation.
- Monitor pilot project progress and intervene where needed.
- Assist in technical information dissemination by: working with ICLARM staff to develop an information management system; organizing contributions to the project newsletter; and preparing technical reports and other project materials with editorial assistance.
- Promote complementarity of pilot site activities among participating countries (where possible).
- Coordinate project activities with other national and regional efforts (where possible) including data and information sharing.
- Provide short-term assistance to workshops and seminars.
- Report to the Project Coordinator.

**Country Project Coordinators**

a) Qualifications. Higher Degree or equivalent experience in coastal/marine sciences and experience in project management. Willingness to relocate to project site for 2-3 years may be necessary. Early availability is desirable. Depending on host-country wishes, host-country nationals and/or expatriates will be considered.

b) Duties.

- Coordinate site-specific and sector specific resource assessments.
- Coordinate institutional analysis.
- Foster a climate to encourage the institutional cooperation needed to address resource use options and develop a comprehensive approach to coastal resources management.
- Identify information gaps and project needs for short-term technical assistance; request needed assistance from the Project Coordinator.
- Build a local data base for ongoing use by in-country personnel and TA specialists
- Contribute progress reports and other written materials to ICLARM and the ASEAN Project Steering Committee as defined in the country work plans.
- Contribute articles to project newsletter.
- Contribute technical assistance and guidance to project activities where warranted.
- Coordinate with the respective implementing institutions for national workshop/seminars.

10. Project Administration. ICLARM's primary responsibility will be for project execution in cooperation with the ASEAN Project Steering Committee and the designated national lead agencies identified in Part IVB. These lead agencies are expected to coordinate pilot site activities and country participation in the project's training and information dissemination component. In most cases, an in-country Steering Committee composed of representatives from relevant national agencies will assist project coordination. Additional guidance, where warranted, may be provided through ad hoc advisory committees composed of resource users, managers, scientists and others who have special interest in and input to the pilot site activities. Figure 1 below provides a preliminary structural diagram of ICLARM and ASEAN institutional linkages for project administration. Administrative arrangements between ICLARM and these entities will be defined in greater detail in the first annual project work plan.

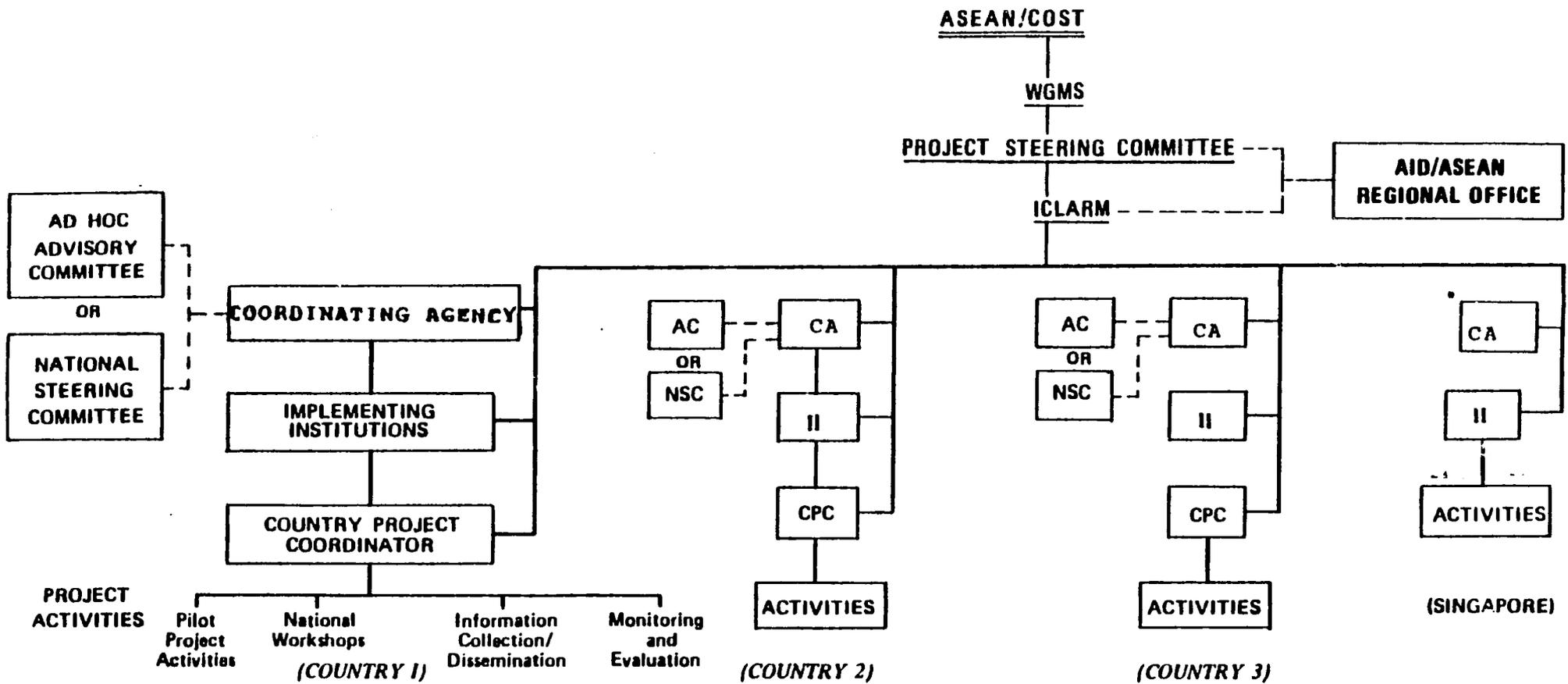


FIGURE 1: Schematic Depicting Proposed Institutional Structure for Project Implementation.

\*Note: Due to the unique role of Singapore in the AID/ASEAN Coastal Resources Management Project, no Advisory Committee or National Steering Committee is felt warranted.

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06 June 1985

Mr. Bruce Blackman  
ASEAN Liaison Officer  
U.S. Agency for International  
Development  
Ramon Magsaysay Center  
Roxas Boulevard  
Manila

Dear Mr. Blackman,

The International Center for Living Aquatic Resources Management (ICLARM) is honored to have been selected by the Association of Southeast Asian Nations (ASEAN) Subcommittee on Marine Science and by USAID as the executing agency for the ASEAN/USAID Integrated Coastal Resources Management Project. ICLARM is most agreeable and enthusiastic to serve in this capacity.

We have participated in technical discussions with ASEAN and USAID officials regarding this project and believe that ICLARM, as a non-governmental international research organization with strong institutional links in the ASEAN region, is capable of executing the project. As reflected in the project document, we will need to add additional staff and technical expertise and would like to request the assistance of USAID to enable us to do so.

We recognize that certain details remain to be negotiated between USAID and ICLARM regarding contractual and financial matters, but in principle we are certainly agreeable to serving as executing agency for this project. ICLARM is grateful to have been considered for this role by ASEAN and USAID.

Sincerely yours,

IAN R. SMITH  
Director General

:mrq

international center for living aquatic resources management

17th floor, metrobank plaza, buendia ave. ext., makati, metro manila

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# **ICLARM: Summary of Activities to Date**

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**Updated  
April 1985**



**INTERNATIONAL CENTER FOR LIVING AQUATIC RESOURCES MANAGEMENT  
MANILA, PHILIPPINES**

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**LIST OF AGENCIES WITH WHICH ICLARM HAS HAD  
LINKAGES, IN COOPERATIVE ACTIVITIES OR AS DONORS**

AARD	– Agency of Agricultural Research and Development, Indonesia
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ADAB	– Australian Development Assistance Bureau
ADB	– Asian Development Bank
ADC	– Agricultural Development Council, New York HQ
AIOT	– Aparri Institute of Technology, Philippines
AIT	– Asian Institute of Technology, Thailand
ASEAN/COST	– Association of Southeast Asian Nations, Committee on Science and Technology
AU	– Agricultural University, Wageningen, The Netherlands
BAEcon	– Bureau of Agricultural Economics, Philippines
BFAR	– Bureau of Fisheries and Aquatic Resources, Philippines
BFDP	– Burma Fisheries Development Project (FAO/UNDP)
BIO-AQUA	– Aquatic Biotic Resources Program of INIREB, Mexico
BOBP	– Bay of Bengal Programme, Madras, India (FAO/UNDP)
BPPL	– Research Institute for Marine Fisheries, Indonesia
CAER	– Center for Agro-Economic Research, Bogor, Indonesia
CAPD	– Council for Agricultural Planning and Development, Taiwan
CFMC	– Caribbean Fisheries Management Council, U.S.A.
CIADP	– Cagayan Integrated Agricultural Development Project, Philippines
CLSU	– Central Luzon State University, Philippines
CMFRI	– Central Marine Fisheries Research Institute, Cochin, India
CSIRO	– Commonwealth Scientific and Industrial Research Organisation, Australia
DANIDA	– Danish International Development Agency
DFMTW	– Department of Fisheries, Ministry of Tourism and Wildlife
DGF	– Directorate General of Fisheries, Indonesia
DLSU	– De La Salle University, Manila, Philippines
DMSCU	– Department of Marine Science, Chulalongkorn University, Bangkok, Thailand
DOFK	– Department of Fisheries, Kenya
DOFM	– Department of Fisheries, Malaysia
DOFT	– Department of Fisheries, Thailand
DOFZ	– Department of Fisheries, Zambia
DPI	– Department of Primary Industries, Queensland, Australia
DPP	– Division Proteccion Pesquera, Ministeria de Agricultura, Chile
DTEC	– Department of Technical and Economic Cooperation, Thailand
EASRT	– Egyptian Academy of Scientific Research and Technology
EDI	– Economic Development Institute, Philippines
FAC	– Freshwater Aquaculture Center of CLSU, Philippines
FAO	– Food and Agriculture Organization of the United Nations
FF	– Ford Foundation
FIDC	– Fishery Industry Development Council, Philippines

<b>FSDC</b>	– Farm Systems Development Corporation, Philippines
<b>GTZ</b>	– German Agency for Technical Cooperation
<b>HIMB</b>	– Hawaii Institute of Marine Biology
<b>IADS</b>	– International Agricultural Development Services, Bogor, Indonesia
<b>IDRC</b>	– International Development Research Centre, Canada
<b>IFDR</b>	– Institute of Fisheries Development and Research, Philippines
<b>IIRR</b>	– International Institute for Rural Reconstruction, Philippines
<b>IMARPE</b>	– Instituto del Mar del Peru
<b>INIREB</b>	– Instituto Nacional de Investigaciones sobre Recursos Bioticos, Mexico
<b>IO</b>	– Institute of Oceanology, Academia Sinica, People's Republic of China
<b>IOC</b>	– Intergovernmental Oceanographic Commission
<b>IOLR</b>	– Israel Oceanographic and Limnological Research Ltd.
<b>IRRI</b>	– International Rice Research Institute, Los Baños, Philippines
<b>ISEAS</b>	– Institute of Southeast Asian Studies, Singapore
<b>IUCN/WWF</b>	– International Union for the Conservation of Nature, World Wildlife Fund
<b>JCUNQ</b>	– James Cook University of North Queensland, Australia
<b>KISR</b>	– Kuwait Institute for Scientific Research
<b>KU</b>	– Kasetsart University, Bangkok, Thailand
<b>MAFD</b>	– Ministry of Agriculture and Fisheries Development, Sabah
<b>MAFF</b>	– Ministry of Agriculture and Fisheries, Fiji
<b>MLENR</b>	– Ministry of Lands, Energy and Natural Resources, Solomon Islands
<b>NACA</b>	– Network of Aquaculture Centers in Asia (FAO/UNDP)
<b>NARA</b>	– National Aquatic Resource Agency, Sri Lanka
<b>NCHU</b>	– National Chung Hsing University, Taichung, Taiwan
<b>NDC</b>	– National Development Company, Manila, Philippines
<b>NEDA</b>	– National Economic and Development Authority, Philippines
<b>NIFI</b>	– National Inland Fisheries Institute, Bangkok, Thailand
<b>NJMSF</b>	– New Jersey Marine Science Foundation
<b>NSYSU</b>	– National Sun Yat Sen University, Kaohsiung, Taiwan
<b>NZ</b>	– New Zealand Government
<b>ODA</b>	– Overseas Development Administration, U.K.
<b>OI</b>	– Oceanic Institute, Hawaii
<b>PCARRD</b>	– Philippine Council for Agriculture and Resources Research and Development
<b>PLN</b>	– Indonesian Power and Light Company
<b>PPI</b>	– Planters Products, Inc., Philippines
<b>RFF</b>	– Resources for the Future, Inc., U.S.A.
<b>SCSIO</b>	– South China Sea Institute of Oceanology, Academia Sinica, People's Republic of China
<b>SCSP</b>	– South China Sea Fisheries Development and Coordinating Programme
<b>SEAFDEC</b>	– Southeast Asian Fisheries Development Center

<b>SEARCA</b>	– Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Philippines
<b>SF</b>	– Skaggs Foundation, U.S.A.
<b>SMC</b>	– San Miguel Corporation, Philippines
<b>SPC</b>	– South Pacific Commission, New Caledonia
<b>SU</b>	– Silliman University, Dumaguete, Philippines
<b>UH</b>	– University of Hawaii
<b>UNA</b>	– Universidad Nacional Agraria, Lima, Peru
<b>UNC</b>	– University of Nueva Caceres, Bicol, Philippines
<b>UNDIP</b>	– Diponegoro University, Semarang, Indonesia
<b>UNDP</b>	– United Nations Development Programme
<b>UNESCO/IOC</b>	– United Nations Educational, Scientific and Cultural Organization/Intergovernmental Oceanographic Commission
<b>UNPAD</b>	– Institute of Ecology, Padjadjaran University, Indonesia
<b>UNU</b>	– United Nations University, Tokyo, Japan
<b>UP</b>	– University of the Philippines, Manila
<b>UPLB</b>	– University of the Philippines at Los Baños
<b>UPM</b>	– Universiti Pertanian Malaysia
<b>UPMSC</b>	– University of the Philippines Marine Sciences Center
<b>UPNG</b>	– University of Papua New Guinea
<b>UPVCF</b>	– University of the Philippines in the Visayas, College of Fisheries
<b>USAID</b>	– United States Agency for International Development
<b>USP</b>	– University of the South Pacific, Fiji
<b>WB</b>	– World Bank
<b>WECAF</b>	– Western Central Atlantic Fishery Commission

## INTRODUCTION

ICLARM's activities include:

- (1) Cooperative Research Activities in major program areas of aquaculture, traditional fisheries, resource development and management and information services.
- (2) Education and Training
- (3) Conferences and Workshops
- (4) Commissioned Reviews
- (5) Advisory Services

ICLARM's research activities have focused on Asia and the Pacific, but cooperative projects have also been undertaken in Africa, Latin America and the Middle East. Several of these activities, such as research and information networks, are global or regional in nature. In addition to these networks, ICLARM has completed or ongoing activities in 23 countries worldwide. A complete listing of these activities follows.

## COOPERATIVE RESEARCH ACTIVITIES

Project Title	Cooperating Institution(s)	Duration
<b>A. Aquaculture</b>		
1) REGIONAL—AFRICA		
Tropical aquaculture for rural Africa	GTZ; research institutions to be selected	Jun 1985-Jun 1988
2) REGIONAL—ASIA		
Rice-fish Culture	ADB, IRRI	(under negotiation)
3) CHILE		
The Southern Ocean Salmon Project	OI, DPP	1975-1976
4) EGYPT/ISRAEL		
Controlled Reproduction of Commercially Important Fishes	NJMSC, USAID, EASRT, ICLR	Aug 1980-Jul 1982
5) KUWAIT		
Intensive Mariculture of Tilapia	KISR	Jan 1982-Jun 1985
6) PHILIPPINES		
a) Applied Research on Integrated Animal-Fish Farming	FAC-CLSU, RF	Jan 1978-Jan 1981
b) Genetic Improvement of Tilapia Broodstock in the Philippines	FAC-CLSU, RF	Jun 1979-Aug 1981
c) Milkfish Production Economics	BAEcon	Jun 1979-Sep 1981
d) Economics of Integrated Poultry-Fish Farming	FAC-CLSU	Nov 1981-Jun 1982
e) Mass Production of Tilapia Fry	FAC-CLSU	Jul 1980-Dec 1982
f) Milkfish Production Dualism: a Socio-economic Perspective	BAEcon, BFAR, FAO	Jul 1981-Apr 1983
g) <i>Azo</i> lla in Tilapia Nutrition	UPVCF, IFDR	May 1982-Dec 1983
h) Tilapia Incubation Systems	UPVCF, IFDR	May 1982-Dec 1983
i) Economics of the Philippine Tilapia Industry	PCARRD	Aug 1982-Jul 1983
j) Genetic Characteristics of Food Fishes	UPMSC	Jan-Dec 1983
k) Tilapia Seed Supply and Management in the Philippines	UPMSC	Jul 1983-Jun 1984
l) Economics of Philippine Tilapia Hatcheries and Evaluation of Farmed Stocks and Species	IDRC, 12 months only; UPMSC	Apr 1984-Dec 1985
m) Rice-fish Culture	ADB, IRRI	(under negotiation)
7) SOLOMON ISLANDS		
Giant Clam Hatchery	MLENR, ODA	3 years (under negotiation)

Project Title	Cooperating Institution(s)	Duration
<b>8) TAIWAN</b>		
a) Production and Marketing of Milkfish in Taiwan	NCHU	Jun 1980-May 1981
b) Evaluation of Mariculture Potential of Tilapia	CAPD	May 1981-Jun 1982
c) Economic Analysis of the Tilapia Industry of Taiwan	NCHU	Jul 1982-Jun 1983
d) Cooperative Tilapia Research Project	CAPD, NSYSU	Jul 1982-Jun 1985
e) Controlled Reproduction and Mass Fry Production of Commercially Important Fishes	CAPD	Jul 1982-Jul 1985
<b>9) THAILAND</b>		
a) Catfish Production Economics	KU	Aug 1979-Dec 1980
b) Applied Research on Coastal Aquaculture	DOFT, GTZ	Dec 1981-Nov 1985
c) Economics of Snakehead Fish Culture in Thailand	NIFI	Mar 1982-Dec 1984
d) Food Webs in Wastefed Aquaculture	AIT, RF	Oct 1983-Oct 1985
e) Marketing Systems of Shellfish Products	KU, DOFT, GTZ, IDRC	Aug 1983-Jul 1984
f) Economics of Shellfish Processing in Thailand	KU, DOFT, IDRC	Oct 1983-Sep 1984
<b>10) U.S.A.</b>		
Development of a Seed Production System for <i>Mugil cephalus</i>	OI	Jan 1976-Apr 1977
<b>B. Traditional Fisheries</b>		
<b>1) GLOBAL</b>		
Management Options for Tropical Small-Scale Fisheries	Numerous universities and government institutions and individuals.	Continuous from 1979
<b>2) REGIONAL—SOUTH PACIFIC</b>		
Improvement of Small-Scale Fisheries in the Pacific	SPC	1975-1976
<b>3) REGIONAL—SOUTHEAST ASIA</b>		
a) Small-scale Fisheries, Management Options	FF, BOBP	2 years (under negotiation)
b) Asian Fisheries Social Science Research Network	UPM, UPV, UPLB, KU, DOFT, UNDIP, SEAFDEC, CAER, IDRC, FF	1983-1988
<b>4) INDONESIA</b>		
Indonesian Small-Scale Fisheries: Research Review & Synthesis	DGF, BPPL	Oct 1981-Dec 1982

Project Title	Cooperating Institution(s)	Duration
<b>5) MALAYSIA</b>		
Improvement of Small-Scale Fisheries in Malaysia	SCSP	Oct 1976-Oct 1977
<b>6) PHILIPPINES</b>		
a) Philippine Municipal Fisheries: A Review of Resources, Technology and Socio-economics	FIDC	Jan-Sep 1980
b) Small-Scale Fisheries of San Miguel Bay, Philippines: A Multidisciplinary Analysis	IFDR, UPVCF, UNU, PCARRD	Sep 1979-Dec 1983
<b>7) SOLOMON ISLANDS</b>		
Skipjack and Traditional Fisheries: a Solomon Islands Case Study	RF	Nov 1978-Oct 1980
<b>C. Resource Development and Management</b>		
<b>1) GLOBAL</b>		
a) Tropical Fish Stock Assessment Research Project	Predominantly in-house study, with informal linkages with (colleagues in) various research institutions	Continuous from 1979
b) Management-Oriented Fisheries Research Project	BPPL, DOFZ, IMARPE, GTZ, SF	Continuous from 1982
c) Network of Tropical Fisheries Scientists and Fishbyte Newsletter	FAO, DANIDA, plus individual member scientists in institutions throughout the world	Continuous from 1982
d) International Giant Clam Mariculture Project	JCUNQ, ACIAR, ADAB, NZ <i>Other cooperating institutions:</i> DPI, UPNG, DLSU, SU, UP, MAFF, MLENR, IUCN/WWF, NARA	1983-1988
<b>2) REGIONAL-SOUTHEAST ASIA</b>		
a) ASEAN Living Coastal Resources Management	USAID, ASEAN/COST	(under negotiation)
b) Fisheries Management and the Law of the Sea in Southeast Asia and the Southwest Pacific	In-house study, with informal linkages to fishery and legal experts from various institutions in the regions concerned; RFF	Jun 1977-Mar 1978
<b>3) REGIONAL-SOUTH PACIFIC</b>		
Skipjack Tuna Assessment in the Central and Western Tropical Pacific	SPC	Sep 1975-Dec 1976
<b>4) INDONESIA</b>		
Reservoir Management/Aquaculture	WB, PLN, UNPAD	(under negotiation)
<b>5) PHILIPPINES</b>		
Rainfed Resources, Stock Assessment	USAID, BFAR	(under negotiation)
<b>6) THAILAND</b>		
Preliminary studies on biomass production in the Gulf of Thailand	DMSCU, AIT	Oct 1983-Sep 1985

## EDUCATION AND TRAINING

Description	Cooperating Institution(s)	Duration
<b>A. GLOBAL</b>		
1) Stock Assessment Internships (23 individuals trained by end of 1984)	Individuals participating in the Network of Tropical Fisheries Scientists	Continuous from 1980
2) In-Service Training	ICLARM research programs and projects conducted in cooperation with various institutions (see Section II)	Continuous from 1975
3) ICLARM staff taught in various stock assessment training courses	FAO, DANIDA	Continuous since 1980
<b>B. REGIONAL—SOUTHEAST ASIA</b>		
1) Scholarships for study of M.Sc. and non-degree study of Fisheries Economics (9 awards by end of 1984)	UPM, IDRC, FF	1983-1985
2) ICLARM staff taught in the NACA course for senior aquaculturists from Asia and the Pacific	NACA	1983-1985
<b>C. REGIONAL—SOUTH PACIFIC</b>		
ICLARM consultant assisted with the development of a Regional Program in Marine Science at the University of the South Pacific	USP	Jul 1976-Jan 1977
<b>D. INDONESIA</b>		
Five-week training course on fisheries information for four participants from Indonesia	AARD	May-Jun 1983
<b>E. MALAYSIA</b>		
ICLARM provided a staff member to assist with the development of the M.Sc. and module programs in Fisheries Economics offered by Universiti Pertanian Malaysia	UPM, IDRC, ADC	1983-1984
<b>F. PHILIPPINES</b>		
1) Graduate Study Program in Aquatic Resources (graduate scholarships)	PCARRD	Oct 1979-Oct 1981
2) Training awards to 10 private tilapia hatchery cooperators who participated in ICLARM's record-keeping project in Laguna and Rizal provinces	BFAR	1983
3) Training seminar on tilapia culture	BFAR, BAEcon	1983
4) Training in milkfish economics for extension workers	BFAR, BAEcon, UNDP/FAO	1983

## INFORMATION SERVICE

<b>A. GLOBAL</b>		
Selective Information Service for tropical fisheries researchers	IDRC	1984-1986
<b>B. REGIONAL—ASIA</b>		
Assistance with formation of the Asian Fisheries Society and the Asian Fisheries Forum	Individuals in numerous universities and fisheries organizations within Asia	Continuous from 1983

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## CONFERENCES AND WORKSHOPS

Title	Cooperating Institution(s)	Duration
<b>A. GLOBAL</b>		
1) Conference on Physiological and Behavioral Manipulation of Food Fish as Production Management Tools	RF, HIMB	2-8 Nov 1977
2) Conference on Integrated Agriculture-Aquaculture Farming Systems	SEARCA, RF	6-9 Aug 1979
3) The Biology and Culture of Tilapias	RF	2-5 Sep 1980
4) Workshop on the Theory and Management of Tropical Multispecies Stocks	CSIRO	12-21 Jan 1981
5) The Theory and Application of Length-Based Stock Assessment Methods	KISR, FAO	10-15 Feb 1985
6) Detrital Systems for Aquaculture	RF, GTZ	Aug 1985
<b>B. REGIONAL—SOUTH PACIFIC</b>		
Small Boat Design	SPC	27-28 Oct 1975
<b>C. REGIONAL—SOUTHEAST ASIA</b>		
Workshop on the Law of the Sea: Problems of Conflict and Management of Fisheries in Southeast Asia	ISEAS	26-29 Nov 1978
<b>D. REGIONAL—ASIA</b>		
1) Workshop on Appropriate Technology for Alternative Energy Sources in Fisheries	ADB	18-21 Feb 1981
2) Workshop on Economics of Aquaculture Research in Asia	IDRC	2-5 Jun 1981
<b>E. PHILIPPINES</b>		
Workshop on the Economics of the Philippine Tilapia Industry	PCARRD, PPI, SMC	10-13 Aug 1983

## COMMISSIONED REVIEWS

<b>A. GLOBAL</b>		
1) Biology and culture of tropical oysters	C. Angell	1984
2) Biology and culture of tropical mussels	M. Vakily	1984
3) Biology and culture of tropical arc shells and cockles	M. Broom	1984
4) Aspects of the nutrition of microphagous tilapias	S. Bowen	1983
5) Tilapia culture in saline waters	W. Watanabe and K. Hopkins	1985
<b>B. MALAYSIA</b>		
Malaysian Small-Scale Fisheries: Options for Development, a Research Review	Dr. Chua Thia Eng, Dr. Lim Teck Ghee, Ms. Jahara Yahaya	1979-1980

<b>C. PHILIPPINES</b>		
Economics of the Milkfish Resource System, Philippines	ICLARM staff for UNU	1980-1981
<b>D. TAIWAN/ISRAEL</b>		
Aquacultural Trends and Development Prospects: Country Case Studies	Studies individually commissioned	First country case studies began in mid-1981
<b>E. THAILAND</b>		
Economics and Management of Thai Marine Fisheries	Dr. Theodore Panayotou and Mr. Songpol Jetanavanich	1984

### ADVISORY SERVICES

Particulars	Cooperating Institution(s)	Duration
<b>A. GLOBAL</b>		
1) Preparation of a manual on socioeconomic information systems for small-scale fisheries management and development	FAO	1984-1985
2) Lectures on tropical stock assessment at the FAO/DANIDA Training Course, Denmark, for the benefit of participants from West Africa and the West Indies	FAO, DANIDA	1984
3) Advised on worthwhile oceanographic research topics useful for fisheries scientists in developing countries, as a member of the "Group of 4", a gathering of scientists at FAO headquarters, Rome	UNESCO/IOC	1980
4) Consultations on development of materials for the FAO/DANIDA training courses in fish stock assessment	FAO/DANIDA	1982
<b>B. REGIONAL-ASIA</b>		
1) Assistance with Regional Technical Assistance Project on Research and Training in Aquaculture, concentrating on carp hatchery/nursery technology; missions to Bangladesh, Burma, Indonesia, Nepal, Pakistan and Sri Lanka and involvement in all-Asia workshop, Manila, Philippines and preparation of hatchery manual	ADB	1983-1985
2) Participation in a Regional Technical Assistance Project and Workshop on Carp Hatchery/Nursery Technology	ADB	1983-1984
3) Teaching the use of the ELEFAN stock assessment programs to participants from six countries of the Bay of Bengal region at a course held in Colombo, Sri Lanka	BOBP	1984
4) Finfish Mariculture Assessment	ADB	(under negotiation)

Particulars	Cooperating Institution(s)	Duration
<b>C. REGIONAL—SOUTHEAST ASIA</b>		
1) Survey of socioeconomic data collection and information systems for fisheries in Malaysia, Thailand and the Philippines	FAO	1983
2) Stock Assessment Training	FAO, DANIDA	1985
<b>D. REGIONAL—AFRICA</b>		
Stock Assessment Training	WECAF/UNDP	1985
<b>E. REGIONAL—MIDDLE EAST</b>		
Cooperative Marine Technology Program for the Middle East	USAID	1980
<b>F. REGIONAL—SOUTH PACIFIC</b>		
Review of UNDP/FAO regional fisheries development project	UNDP	1984
<b>G. ALGERIA</b>		
Stock Assessment Training	FAO	1985
<b>H. BURMA</b>		
Advice on the analysis of previous survey results, conducting preliminary training of Burmese scientists in stock assessment techniques and preparing plans for future research	BFDP	1983
<b>I. CHINA</b>		
Seminars, lectures and discussions on research planning and on prospects for aquaculture development	IO, SCSIO	1984
<b>J. ECUADOR</b>		
Interpretation of project data	ODA	1981
<b>K. EGYPT</b>		
1) Preparation of guidelines for fish hatchery/nursery development	USAID, Egypt	1978
2) Advice on the establishment of a freshwater aquaculture research center	USAID, Egypt	1979
<b>L. INDIA</b>		
1) Training on reproductive physiology and advice on research projects and facilities	CMFRI	1981
2) Advice on socioeconomic aspects and seed supply of shrimp-pen culture project in Killai Backwaters, Madras, India	BOBP	1983
<b>M. INDONESIA</b>		
1) Design of facilities and equipment for two new aquaculture research stations in Indonesia	USAID, Indonesia	15-20 Dec 1980
2) Recommendations on the design, construction and staffing of aquaculture research stations	IADS	11-22 May and 15-19 Jun 1981
3) Aquaculture research and development planning	AARD	May 1982

Particulars	Cooperating Institution(s)	Duration
4) Advice on stock assessment and economics sections of the Indonesian Small-Scale Fisheries Review	DGF, BPPL	1982
5) Assistance with development of programs in small-scale fisheries and aquaculture	AARD, USAID, Indonesia, UNDP	1982
<b>N. KENYA</b>		
1) Provided a series of lectures at the FAO/DANIDA training course on fishery science methodology in Mombasa, Kenya	FAO/DANIDA	May 1980
2) Advice on research and development work in integrated farming, tilapia culture and trout culture in the Central and Eastern Provinces	DFMTW	Aug 1982
<b>O. MALAYSIA</b>		
1) Assisted the faculty of UPM with design of their fisheries economics curriculum and selection of reading materials	UPM	1982
2) Site selection for and design of a marine hatchery for research on the controlled breeding of marine fish, Sabah	MAFD	1982
3) Preparation of a project document on the development and management of the Malaysian cockle ( <i>Anadara granosa</i> ) industry and subsequent project reviews; provided a consultant, Jan-Mar 1985, to advise on cockle induced spawning and larval rearing	DOFM, BOBP	1984-1985
4) Grouper Rearing	MAFD	(under negotiation)
<b>P. MEXICO</b>		
Advice on small-scale freshwater aquaculture and socioeconomics	BIO-AQUA (INIREB)	1981
<b>Q. NEPAL</b>		
Small Ruminants-Fish Culture	ADB	(under negotiation)
<b>R. PERU</b>		
1) Advice and a series of lectures on stock assessment methodology	GTZ, IMARPE	Nov 1981
2) Consultation on assessment of Peruvian demersal fisheries	GTZ, IMARPE	1983
3) Participation in expert panel reviewing progress in wastewater-fed fish culture project (part of a global resource recovery program), Lima, Peru	WB, GTZ, UNA	1985
<b>S. PHILIPPINES</b>		
1) A study of the Philippine fisheries sector	USAID, Philippines	1977
2) Case study on aquaculture economics for Asian countries	EDI	1980

Particulars	Cooperating Institution(s)	Duration
3) Review a fisheries development project for NEDA and preparation of a set of recommendations for improvement of the project for the BFAR Regional Office in Cebu	NEDA/BFAR	1981
4) Assessment of the potential for mullet production along the northern coast of Luzon	BFAR, CIADP	1981
5) Assistance in demonstration and extension activities on integrated animal-fish farming	IIRR	1981
6) Planning of USAID activities in coastal zone management for a seminar and subsequent follow-up program	USAID, Manila	1981
7) Worked with an inter-agency research group in Northern Luzon on attempts to breed the migratory mullet, <i>Cestraeus plicatilis</i>	CIADP, AIOT, BFAR	1982
8) Assisted with design and implementation of fisheries socioeconomic surveys	SU, UNC	1982
9) Advice on alternative energy projects in rural fishing communities	NDC	1982
10) Provided consultant to USAID on the impact of water abstraction from Lake Buhi, Bicol Region on the culture and capture fisheries in the lake	USAID, Philippines	1983
11) Consultation to a proposed project to introduce gasifiers and ice-making plants in remote Philippine fishing communities	USAID, FSDC	1983
12) Assessment of the status of the Philippine fishery resources	USAID, Philippines	1984
13) Stock Assessment Training	GTZ	1985-1986
14) Small-Scale Fisheries Socioeconomics	GTZ	(under negotiation)
<b>T. PUERTO RICO &amp; THE US VIRGIN ISLANDS</b>		
Assessment of the sustainable yields for the neritic fisheries of Puerto Rico and U.S. Virgin Islands	CFMC	1984
<b>U. SRI LANKA</b>		
Evaluation of potential for giant clam cultivation	NARA	1984
<b>V. THAILAND</b>		
1) Development of graduate courses in marine physiology at Chulalongkorn University	UNESCO/UNDP	Jun 1980; March, May 1981
2) Lectures at the joint FAO Regional Training Course on Stock Assessment and Fishery Statistics, Thailand	FAO	Sep 1981
3) Review the fisheries of Thailand and assessment of potential harvests and the potential of artificial reefs	AOB	1984
4) Assistance to the Fisheries Economics Subsection, Dept. of Fisheries on issues relating to fisheries and aquaculture economics	DOFT	1983-1985

## PUBLICATIONS

In addition to the ICLARM Newsletter which is widely distributed around the globe, ICLARM publishes Conference Proceedings, Studies and Reviews, Technical Reports, Bibliographies and Translations. Generally speaking these series contain results of cooperative activities reported on the previous pages. ICLARM staff also have contributed many articles and monographs to the international literature on fisheries and aquaculture. These publications are compiled in the ICLARM Contribution Series.

## ICLARM CONTRIBUTION SERIES

1. Ritterbush, S. 1975. An assessment of the Ponape dory project. International Center for Living Aquatic Resources Management, Hawaii. 29 p.
2. ICLARM. 1976. Program development statement. International Center for Living Aquatic Resources Management, Manila, Philippines. 35 p.
3. Nash, C.E., T. Joyner and R.D. Mayo. 1976. Seeding the southern ocean with salmon. International Center for Living Aquatic Resources Management, Hawaii. 68 p.
4. Nash, C.E. 1976. The southern ocean salmon project phases I and II. International Center for Living Aquatic Resources Management, Hawaii. 141 p.
5. Christy, F.T., Jr. 1978. Changes in the law of the sea and effects on fisheries management. ICLARM Newsletter 1(1): 5-6.
6. Pauly, D. 1978. Management of multispecies stocks: a review of the theory. ICLARM Newsletter 1(2): 3.
7. Pauly, D. 1980. On the interrelationships between natural mortality, growth parameters and mean environmental temperature in 175 fish stocks. J. Cons., Cons. Int. Explor. Mer 39(2): 175-192.
8. Smith, I.R. 1978. Preliminary analysis of the performance of the fry industry of the milkfish (*Chanos chanos* Forskal) in the Philippines. Aquaculture 14(3): 199-219.
9. Christy, F.T., Jr. 1979. Fishery problems in Southeast Asia, p. 217-223. In D.M. Johnston (ed.) Regionalization of the Law of the Sea. Ballinger Publishing Co., Cambridge, Mass.
10. Pauly, D. and G. Gaschütz. 1979. A simple method for fitting oscillating length growth data, with a program for pocket calculators. International Council for the Exploration of the Sea, CM 1979/G:24 Demersal Fish Committee, 26 p.
11. Pauly, D. 1979. Biological overfishing of tropical stocks. ICLARM Newsletter 2(3): 3-4.
12. Pullin, R.S.V. 1979. Thailand's first technical seminar on marine resources. ICLARM Newsletter 2(3): 7, 14.
13. Shehadeh, Z.H. 1979. EIFAC workshop focuses on mass production of fish seed. ICLARM Newsletter 2(3): 8-9.
14. Marr, J.C. 1979. Fishery management problems in Southeast Asia, p. 211-215. In D.M. Johnston (ed.) Regionalization of the law of the sea. Ballinger Publishing Co., Cambridge, Mass.
15. Smith, I.R. 1979. Traditional fisheries development in the Philippines. ICLARM Newsletter 2(3): 16-18.
16. Shehadeh, Z.H. 1979. Conference on integrated farming systems. ICLARM Newsletter 2(4): 18-21.
17. Pullin, R.S.V. 1979. Seminar on research methodology. ICLARM Newsletter 2(4): 24.
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### **Unrestricted**

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- U.S. Agency for International Development (USAID)
- Australian Development Assistance Bureau (ADAB)
- San Miguel Corporation

### **Restricted**

- Asian Development Bank
- Australian Development Assistance Bureau (ADAB)
- Central Luzon State University, Philippines
- Food and Agriculture Organization (FAO) of the United Nations
- Ford Foundation
- German Agency for Technical Cooperation (GTZ)
- International Development Research Centre (IDRC) of Canada
- Kuwait Institute for Scientific Research
- New Jersey Marine Science Foundation
- New Zealand Ministry of Foreign Affairs
- Philippine Council for Agriculture and Resources Research and Development
- Planters Products, Inc.
- Rockefeller Foundation (RF)
- San Miguel Corporation
- Skaggs Foundation
- United Nations Development Programme
- United Nations University
- U.S. Agency for International Development (USAID)

CHECKLIST OF STATUTORY CRITERIA

PROJECT CHECKLIST

A. GENERAL CRITERIA FOR PROJECT

1. FY 1985 Continuing Resolution  
Sec. 525; FAA Sec. 634A;  
Sec. 653(b).

(a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or nor more than \$1 million over that amount)?

(a) Congressional notification will be submitted to Congress in June 1985.

(b) Yes.

2. FAA Sec. 611 (a) (1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial or other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

Yes. See Project Paper details.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

N/A

4. FAA Sec. 611(b); FY 1985 Continuing Resolution Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973, or the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See AID Handbook 3 for new guidelines.)

N/A

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5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project? N/A
6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information conclusion whether assistance will encourage regional development programs. Yes. This is a regional project.
7. FAA Sec. 601(a). Information and conclusions whether projects will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; (f) strengthen free labor unions. This Project does not focus on those kind of concerns.
8. FAA Sec. 601 (b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise). Due to limited nature and focus of this project, there will be minimal relationship to this provision.
9. FAA Sec. 612(b), 636(h); FY 1985 Continuing Resolution Sec. 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars. ASEAN countries will contribute an estimated 25% of total project costs through local operating/support costs.

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10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release? No. N/A
11. FAA /sec, 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes.
12. FY 1985 Continuing Resolution Sec. 522. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity? N/A
13. FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16? Does the Project or program taken into consideration the problem the destruction of tropical forest? Yes. No environmental assessment is required since all Project activities are categorically excluded from environmental review under Section 216.2(c) of Regulation 16.
14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)? N/A
15. FY 1985 Continuing Resolution Sec. 536. Is disbursement of the assistance conditioned solely on the basis of the policies of any multi-lateral institution? No.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project  
Criteria

- a. FAA Sec. 102(b), 111, 113, 281(a). Ext to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop co-operatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status, (e) utilize and encourage regional cooperation by developing countries?
- (a) The project will support efforts of ASEAN to improve their capability to manage their living coastal resources on a sustainable basis. The Project will benefit poor small farmers/fishermen by making possible or ensuring long-term productivity of coastal fisheries and aquaculture development. It will promote the participation of women in the national economies and improve the status of women by making project training activities available to women on an equal basis. As an ASEAN activity it encourages and depends on regional cooperation.
- b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used? Yes.
- c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)? N/A.

- d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed country")? Yes.
- e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project for more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"? (M.O. 1232.1 defined a capital project as "the construction, expansion, equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not more than \$100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character." N/A. Not capital assistance.
- f. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth? Yes.
- g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government. This project is designed to enhance institutional and human resource development for managing living coastal resources systems in ASEAN. The training and research activities financed by this project will seek to alleviate this problem. All project components will be implemented by ASEAN based on the preparation of annual work plans.

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2. Development Assistance Project  
Criteria(Loans Only)

- a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest. N/A
- b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan? N/A

3. Economic Support Fund Project Criteria

- a. FAA Sec. 531(a). Will this assistance promote economic and political stability? To the extent possible, does it reflect the policy directions of FAA Section 102? N/A
- b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities? N/A
- c. FAA Sec. 534. Will ESF funds be used to finance the construction of, or the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to nonproliferation objectives? N/A
- d. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart arrangements been made? N/A