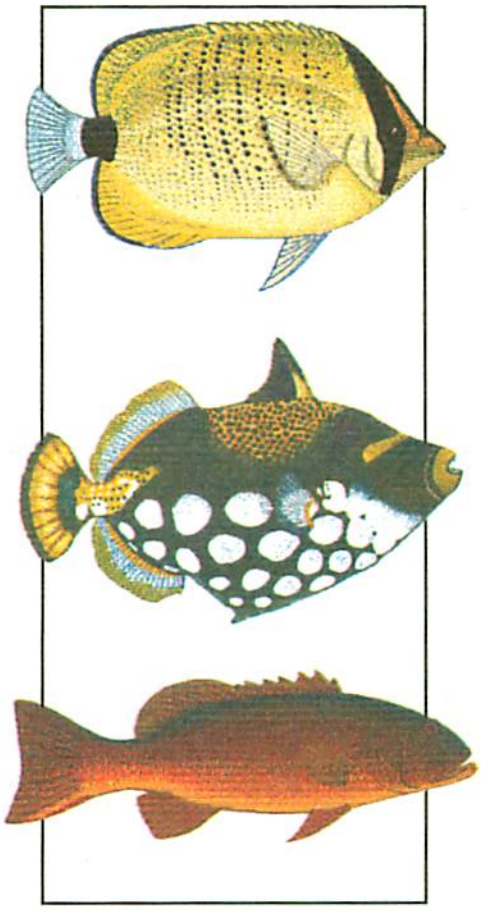

FROM STRATEGY TO ACTION

ICLARM'S MEDIUM TERM PLAN 1994-98

February 1993

#185

FROM STRATEGY TO ACTION:
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February 1993

ICLARM
International Center for Living Aquatic Resources Management

From Strategy to Action: ICLARM's Medium Term Plan 1994-1998

February 1993

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Cover: The abundance of certain fish species such as these provides an indicator of the health of a coral reef resource system. Coral reef systems are potentially very productive and ICLARM plans special global studies on their management and conservation.
Computer fish paintings from the FISHBASE project, by Robbie Cada.

Preface

ICLARM was established in 1975 by the Rockefeller Foundation with a mandate to maintain and operate an international aquatic resources center. The Center was incorporated in the Philippines in 1977. Since that time ICLARM has received international recognition in the fields of tropical aquatic resource dynamics, small-scale aquaculture and coastal resource management strategies.

In 1990, ICLARM was invited to prepare a strategic plan of research as a step towards joining the Consultative Group on International Agricultural Research (CGIAR). The process of strategic planning was completed in early 1992 and led to the admission of ICLARM to the CGIAR in May 1992.

This Medium Term Plan (MTP) presents ICLARM's agenda of research and research-related activities for the period 1994-98. The MTP planning was initiated in June 1992 and involved Center staff at headquarters and outreach as well as members of ICLARM's Board of Trustees and specially invited experts from NARS, advanced institutions and NGOs. Special consultations were held with ISNAR together with representatives of national aquatic research institutions (NARS) and NGOs particularly on ICLARM's National Research Support Program. In addition ICLARM has had a consultant to assess the needs for support to NARS in West Africa and also held consultations with a group of fisheries administrators from African countries.

ICLARM believes that the proposed work, based on an ecosystem approach, will be of interest to international agencies in the fields of conservation, environment and natural resources management as well as agencies primarily concerned with fisheries. We also believe that there are excellent opportunities for investment and partnership in the work by such agencies because the topics are important for sustainable development, the objectives are achievable, and the Center, through its 15 years of experience, is well qualified to undertake the research.

The planning process was facilitated by special grants from UNDP and DANIDA which are gratefully acknowledged. Responsibility for the contents of the Plan rests with the ICLARM Board and staff.

Peter A. Larkin
Chairperson
ICLARM Board of Trustees

Kenneth Tod MacKay
Director General

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Synopsis

Acting upon its strategy for international aquatic resources research and in accordance with the subsequent imperatives of UNCED and other recent events, ICLARM proposes to carry out a prioritized set of research and related activities over the period 1994 to 1998 that focus on improved natural resources management as the means to sustainable improvements in both capture fisheries and aquaculture. The management research will be supported by work to improve the productivity of key species.

Research activities are guided by principles of sustainability, equity, gender, user participation and a systems approach. They will take place in the three most critical aquatic resource systems - coastal (especially estuaries, lagoons, bays), coral reef and inland (focusing on ponds and rice floodwaters).

The regional priorities for core research during the period are for Asia followed by subSaharan Africa. Funding constraints will limit most core activities to Asian sites.

The research activities, which will be carried out in collaboration with many partners, consist of the following:

- understanding the dynamics of coastal and coral reef resource systems and of integrated agriculture-aquaculture systems;
- investigating alternative management schemes in these systems;
- improving the productivity of key species.

Outputs from the work will include new analytical tools for understanding coastal aquatic resource dynamics, new management concepts and schemes for managing coastal and coral reef fisheries, new farming systems for inland and coral reef resource systems and new breeds of fish. These products will be applied through complementary activities, information dissemination, and a national research support program of human resource development and institutional strengthening, which will provide a multiplier effect.

Feedback will be sought through a variety of mechanisms in order to assess the Center's impact and thus to guide future research.

Chapter 1. The Medium Term Plan

1.1 Introduction

Aquatic resources - fish, shellfish and seaweeds - comprise the fifth most important "agricultural" commodity (by value) providing 7.5% of the total food production in developing countries and 25% of animal protein supply.

ICLARM pointed out in its Strategy[1] that the status of aquatic resources in developing countries is grim - a levelling off in capture fisheries, with pollution and destructive fishing practices as catalysts of resource deterioration reaching alarming proportions.

The aquaculture sector, where increased production is needed, has made only modest gains. Aquaculture technology, particularly in marine resource systems, stands far behind agriculture in choice of species for farming. Technical advances in aquaculture have the potential to lead to increases similar to those in food crops and livestock, provided due regard is taken of environmental limitations and negative impacts on biodiversity.

Since preparing the Strategy, several events have sent a new note of urgency to, as well as confirming the direction of, ICLARM's research.

- UNCED's Agenda 21, approved by governments worldwide, demands new approaches to marine and coastal area management and development. It focuses on a number of priority needs related to sustainable development and integrated management of aquatic resources.

- A separate NGO Treaty on Fisheries was formulated[2] during UNCED. The Treaty gives priority to small-scale fisheries and fishers and emphasizes an ecosystem approach to management, using ecologically-sound practices and concern for environmental impact, and a commitment to equitable principles including the vital role played by women in fisheries.

- The Study on International Fisheries Research (SIFR), sponsored by the major fisheries donors, was published[3]. SIFR points out the strong needs for international fisheries research as well as for strengthening national aquatic research systems (NARS). ICLARM is cited as the main center for international strategic research in fisheries.

- The Final Report of the Fisheries Working Group for Ecologically Sustainable Development in Australia, the first of its kind, became available[4]. Noting that "fish are, though very important, only one component" of aquatic ecosystems, the Working Group considered that "ecosystem management" is "a more

integrated and conceptually complete framework for the management of a natural renewable resource," and placed highest priority in developing the management of Australian fisheries within an ecosystem management framework.

- The number of underexploited major fish stocks has decreased from nearly 30 to 7 over the past decade, and one in every three major stocks is overfished (Fig. 1). These phenomena were pointed out at the first World Fisheries Congress in Greece in May 1992[5]. Developing countries, whose populations will attain over 80% of the world's population by 2025, will be hardest hit if world fisheries production declines. The developed world will turn to other protein sources, but developing-country populations will have few, if any, alternatives.

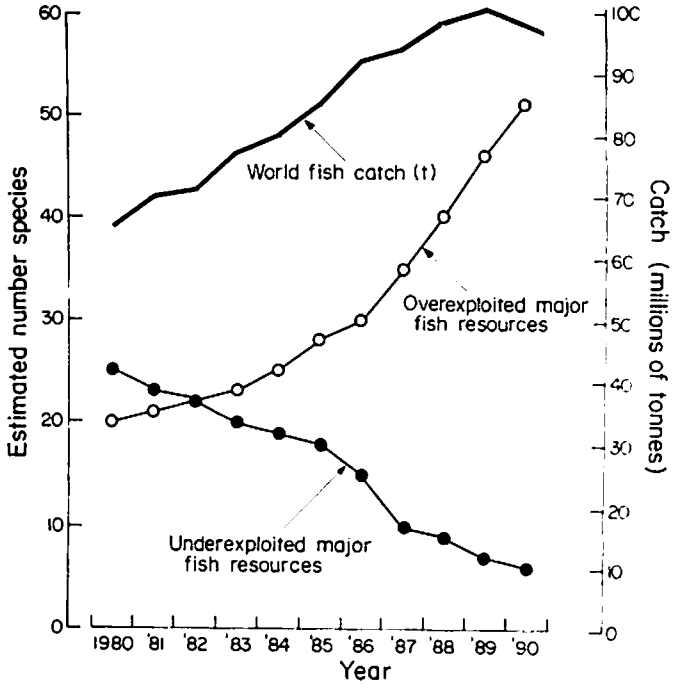


Fig. 1. World fish catch and numbers of overexploited and underexploited aquatic species. Source: Alverson and Larkin (1992).[5]

ICLARM will address these problems through concentrated research on natural resources management using an ecosystem approach, with supporting research on improving productivity of key aquatic species used by resource-poor families.

The Center's goal in this research is to improve production and management of fisheries resources for sustainable benefits, particularly for low-income users in developing countries.

1.2 Priorities in Program Development

In ICLARM's Strategy, priorities were determined through a set of filters as follows: current aquatic production was allocated to various resource systems. Modifiers were then applied - potential for increase, threats to sustainability and equity. The analysis indicated that ICLARM should give high priority to inland ponds, including rice floodwaters, as productive resources on farms; to estuaries and lagoons; and to coral reefs. These three resource systems thus became the basis of the three research programs: Inland Aquatic Resource Systems (ponds), Coastal Resource Systems (including estuaries and lagoons) and Coral Reef Resource Systems.

The analysis suggested the highest priority for Asia, then subSaharan Africa (SSA), followed by Latin America and Caribbean (LAC) and lastly West Asia and North Africa (WANA). The Strategy concluded that a headquarters in Asia with a critical mass of professional staff was required. The research would focus on Asia and the Pacific, with global networking. For the MTP period, core activities will focus on Asia, especially Southeast Asia, IndoChina and parts of South Asia and the Western Pacific. Inland activities will focus on the humid tropics in these regions.

A cautious approach was proposed in the Strategy for Africa: to establish research and NARS strengthening needs, develop a program to meet those needs which fall under ICLARM's comparative advantage and obtain funds, initially complementary, for implementation. A more detailed review suggests that in West Africa, the priority systems are the coastal upwelling whereas in East and Southern Africa, the priority is for the great lakes and reservoirs. The potential for integrated agriculture-aquaculture appears to be significant in both subregions.

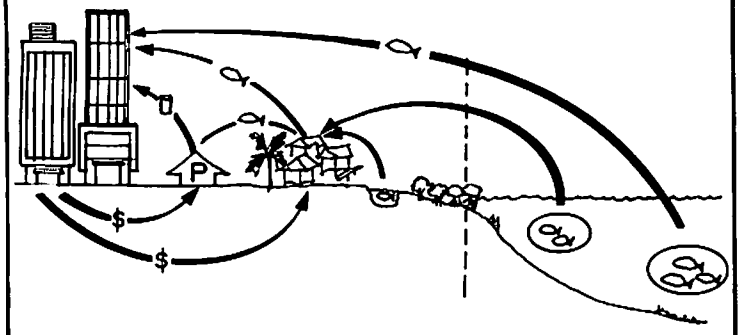
Within the three priority resource systems and priority regions, research directions were guided by the Center's guiding principles, comparative advantage, contributions to maximizing research efficiency and the likelihood of achieving impact during the MTP period. The CGIAR's priority research areas and its ecoregional approach were also taken into account.

Guiding Principles. The five guiding principles outlined in ICLARM's strategy - sustainability, equity, gender, user participation and a systems approach - will be applied in all research areas and provide integrative forces which will improve the efficiency of the research.

Maximizing Research Efficiency. Priority in selecting research tools and themes has also been guided by their potential to contribute across all the research programs to improve research efficiency. For example, the resource system research exploits user participation, a systems approach and sustainability principles. Extending agroecosystem transects to include water resources and combining them with ecological models developed at ICLARM, these transects describe and quantify resource and energy flows within systems (see Box 1).

Other examples of common tools to be applied are biological and economic modeling, while policy considerations and conduct of research at the community level are common themes. The community research will primarily concern co-management (see Box 2).

CGIAR Priority Areas. The priority areas of the CGIAR - germplasm issues; natural resource conservation and management; public policy and management issues; and information services - match ICLARM's proposed MTP activities. In fact, the prime focus in all the research - on accomplishing increased yields through improved natural resource management - coincides with the CGIAR priority on natural resources management.



BOX 1 COASTAL TRANSECTS

A hypothetical coastal cross-section illustrating biomass and cash flows between a community of small-scale fishers (near the shore), processors/intermediaries (hut marked "P") and a nearby city (leftmost blocks); these arrows which may be quantified represent the (value of) catches taken either close inshore (by the small-scale fishers) or further offshore (through an industrial operation which bypasses the coastal communities). Separate panels allow for information on the structure of the land and aquatic resource systems, while arrows can be used to express the "reach" of various ownership patterns (on land) or of tenurial rights (over coastal waters).

The medium/long-term CGIAR research prioritization is based on the assumption that NARS in developing countries will become increasingly capable over the coming decades of undertaking applied and adaptive research on natural resource conservation and management, development and management of production systems, and commodity improvement. ICLARM has developed a National Research Support Program to assist NARS in this respect.

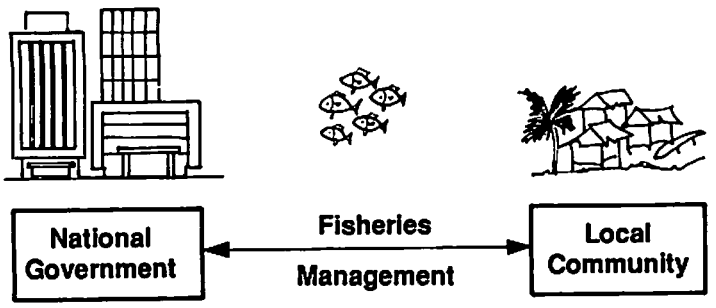
Ecoregions. The ecoregional approach of the CGIAR has been applied. Much of the proposed research, particularly in the inland program, is designed on an ecoregional basis. ICLARM can contribute to CGIAR ecoregional "mechanisms" in two ways: through collaboration with other IARCs where their respective priorities overlap; and through development of new tools and concepts to be tested in various ecosystems.

The modified transects approach will be used in natural resource management research in the inland program in the following regions and ecosystems: Southeast Asian ricelands, South Asian floodplains, and Eastern and Southern African 'dambo' lands. Plans are also being made to include West African wetlands and East Asian river deltas. At each 'ecoregional' site, ICLARM aims to transform existing farming systems through integrated resources management, including water resources, fish, and other aquatic life as catalysts for more profitable and sustainable farms, in collaboration with other IARCs and agencies.

Operating under a common integrated resource systems approach, both ecoregional and global generalizations should emerge. Moreover, this approach may permit the extension of ecoregional mechanisms over marine ecosystems as well. ICLARM has already begun to apply agroecosystem transects to coastal resource systems.

1.3 Research Program Overview

ICLARM's suite of research projects, developed in accordance with the principles and priorities outlined above, will follow a common strategy across the three programs - attacking the problems in the three selected resources systems through



BOX 2
CO-MANAGEMENT OF COASTAL AND CORAL REEF FISHERIES

There is a need for a rapid and substantial evolution of existing coastal fisheries management systems to support sustainable resource use. It is unlikely that local communities can accomplish this change on their own. But neither can the national government accomplish it entirely through bureaucratic instruments. There must evolve a more dynamic partnership arrangement building from the existing capacities and interest of the local community and complemented by the ability of the national government to provide enabling legislation and institutions and to provide assistance. This partnership can be called co-management. The amount of management authority that the national government and local community share will differ and depend upon country- and site-specific conditions.

research towards natural resource management, bringing into play both biological and social science perspectives, and through fish productivity research in support of the resource management objectives.

In terms of the TAC activity types, 30% of the core work will be directly on Resource Conservation and Management, 5% on Germplasm Enhancement and Breeding, 20% on Productivity, 22% on Social Sciences (Human Linkages, Socioeconomics and Policy) and 23% on Institution Building. In terms of regions, 70% will be allocated to Asia, 22% to SSA, LAC 5%, and WANA 3%.

Outlines of the three research programs follow. The activities described are central (core) to the programs except where indicated as complementary*.

1.3.1 Coastal Resource Systems Program (CRSP)

Tropical coastal aquatic resource communities consist of hundreds of interacting species, most of which are fisheries resources. The complex ecosystem dynamics and their increasing degradation were described in the Strategy. There are two basic issues: overfishing (see Box 3) driven by poverty; and competition with other sectors and the consequent pollution from them (e.g., agricultural chemicals/residues, deforestation, mining and urbanization).

Three research areas from the Strategy have been identified as of highest priority for the MTP period.

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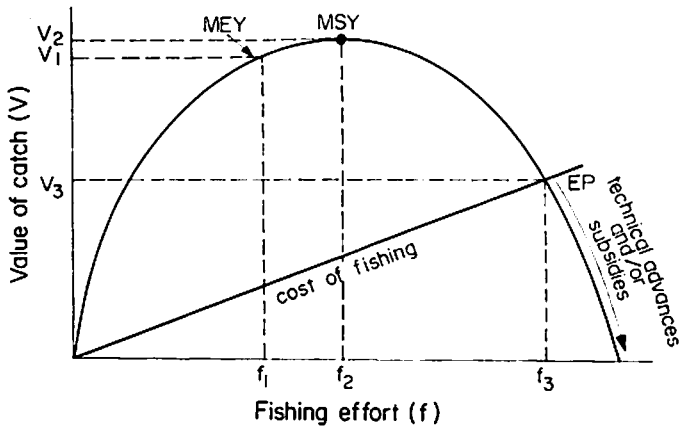
*ICLARM's core program comprises research and research-related activities that are: a) critical to making advancements in aquatic resources management, b) international in character, and c) within areas where the center has demonstrated comparative advantage and scientific leadership.

ICLARM's complementary program comprises research and research-related activities that: a) augment core program activities at locations in addition to those required for the core program, b) extend the application of the core program research, and c) explore potentials for new core and/or complementary activities.

Integrated Coastal Fisheries Management. The management of coastal fisheries in its broader coastal resource use/resource management context will be addressed. This research activity will focus on the development of an analytical framework for comparative coastal analysis, on methods for valuation of coastal resources, and on policies for integrated resource systems management, particularly from the fisheries perspective. The output will be methods and concepts for selecting options regarding coastal development schemes. Country-specific work will be complementary to the (core) theoretical research.



BOX 3 OVERFISHING

A simple economic model, illustrating the need for management of coastal fisheries. Maximum economic yield (MEY), the maximum difference between gross value of catch and cost of fishing, is achieved at a level of effort (f_1) lower than that needed (f_2) to obtain maximum sustainable yield (MSY). Under conditions of open access to fishing, fishing effort will increase until total costs equal the gross value of the catch (i.e., fishing reaches f_3, and the equilibrium point, EP) and at which profit for the average fishing unit is zero. Note also that lowering the cost line (e.g., by subsidizing the fishery) lowers the point at which equilibrium is reached, *and thus lowers the catch.*

Dynamics of Multispecies Resources. Research will be continued towards understanding the dynamics of the resource systems and developing the ability to monitor the resources and their exploitation. These are essential prerequisites for resource management. The output over the MTP period will be low-cost analytical tools, models and information databases.

Socioeconomic Dimension of Coastal Fisheries. Research on human aspects of coastal fisheries will continue. Based on the understanding of the social and economic forces which determine the fishing effort, and of the legal and institutional aspects of, particularly small-scale - fisheries, management regimes that optimize yields of coastal fisheries will be developed and applied. During the MTP period, special attention will be paid to possible co-management schemes, where indigenous knowledge and traditional management practices at the community level are integrated with national regulatory policies and measures. The key outputs will be management schemes tailored to various sets of ecological and socioeconomic conditions and which if implemented would lead to higher sustained catches and/or improved incomes.

Scope and mode and budgetary details of the planned research activities are presented in Chapter 2.1.

1.3.2 Coral Reef Resource Systems Program (CRRSP)

The dominance of coral reef systems in many parts of tropical seas, their complexity and extreme biodiversity, their high productivity and fisheries potential and their degraded state in some areas, were pointed out in the Strategy as factors justifying a research program on these resource systems.

During the MTP period, the Program will take up some of the most critical problems in two areas - improving resource management and improving reef productivity.

Improving Resource Management. The Program seeks to evaluate combinations of community-based management strategies for coral reef fisheries and to examine the scientific basis for implementation of marine protected areas. Work on co-management of fisheries will be shared with the CRSP. The development of a global database, Reefbase, on coral reef resource systems and of a cost-effective data acquisition system for coral reef fisheries are major components of the proposed work in this priority.

It is expected that by the end of the MTP period, successful new management strategies will have been demonstrated at pilot sites and be spreading elsewhere, reflected in increased catches, as monitored by the new data acquisition system(s). Additionally, the extent of the world's coral reef resource systems will have been accurately documented, leading to an enhanced perception of the potential harvests, management methods and threats to sustainability.

Improving Productivity. The productivity research is intended to improve income-earning opportunities as well as food availability for coral reef fishing communities through village-based aquaculture and fisheries enhancement. In aquaculture, ongoing giant clam farming systems and socioeconomic research will continue into the early MTP period. Experience gained will be used for complementary investigation of the culture of other bivalve shellfish and of new species which may be used in aquaculture or for fisheries enhancement. These complementary activities will include reviews, biological research on hatchery development and economic assessments of their potential.

The outputs over the MTP period will be documented guidelines on village-based aquaculture systems and indications of the potential of new species for fisheries enhancement and aquaculture.

For Program details, see Chapter 2.2.

1.3.3 The Inland Aquatic Resource Systems Program (IARSP)

The rationale for this Program is the present vast underdevelopment of inland aquaculture and enhanced fisheries (regular stocking of water bodies from hatcheries) in most developing countries. A key to sustainable aquaculture expansion is its potential to raise total farm productivity and profitability, particularly among resource-poor farm families. This will require wise management of natural resources; care for the environment; conservation of biodiversity; and equitable distribution of benefits among producers and consumers. As pointed out in the Strategy, new breeds of fish and new approaches to integrated resources management (see Box 4) are needed.

For the MTP period, the Program will work on both the fish productivity and the management aspects. Both are critical. The focus will be on fishponds and rice floodwater in irrigated and rainfed systems, here collectively termed ponds.

Fish Productivity. In fish productivity, expansion of ongoing research on genetic improvement of farmed fish will take place; and documentation of germplasm towards biodiversity conservation. During the MTP period, the output will include new tilapia and carp breeds, guidelines on breeding strategies, potential social and economic impact and a database of fish germplasm. The guidelines and database are expected to be in use by network members and other researchers. A complementary activity will be the development of a genetics research network covering Asia and Africa.

Also in fish productivity, studies on pond foodchains in integrated farming systems will be carried out to determine optimal usage of farm residues and affordable supplements.

Integrated Resources Management. Research will explore the role of aquaculture in transforming ongoing farming systems through integrated management of resources so as to improve total farm productivity and sustainability. Bioeconomic and ecological models will provide sustainability indicators for the system transformations. Socioeconomic impact of, and constraints to, adoption of integrated agriculture-aquaculture systems by resource-poor farmers will be identified along with their policy implications.

In subSaharan Africa, a different agricultural history and a greater traditional reliance on inland capture fisheries than on fish farming pose special challenges. As complementary activities, the program will explore future strategic research directions by reviewing information on other inland aquatic systems (e.g., reservoirs, small lakes, floodplains and wastewaters) that might support inland aquaculture and enhanced fisheries.

The integrated resources management research, which will be interactive with that on the pond foodchains, should produce, within the MTP period, new systems in use by pilot groups of new entrants.

The specifics of the research activities are presented in Chapter 2.3.

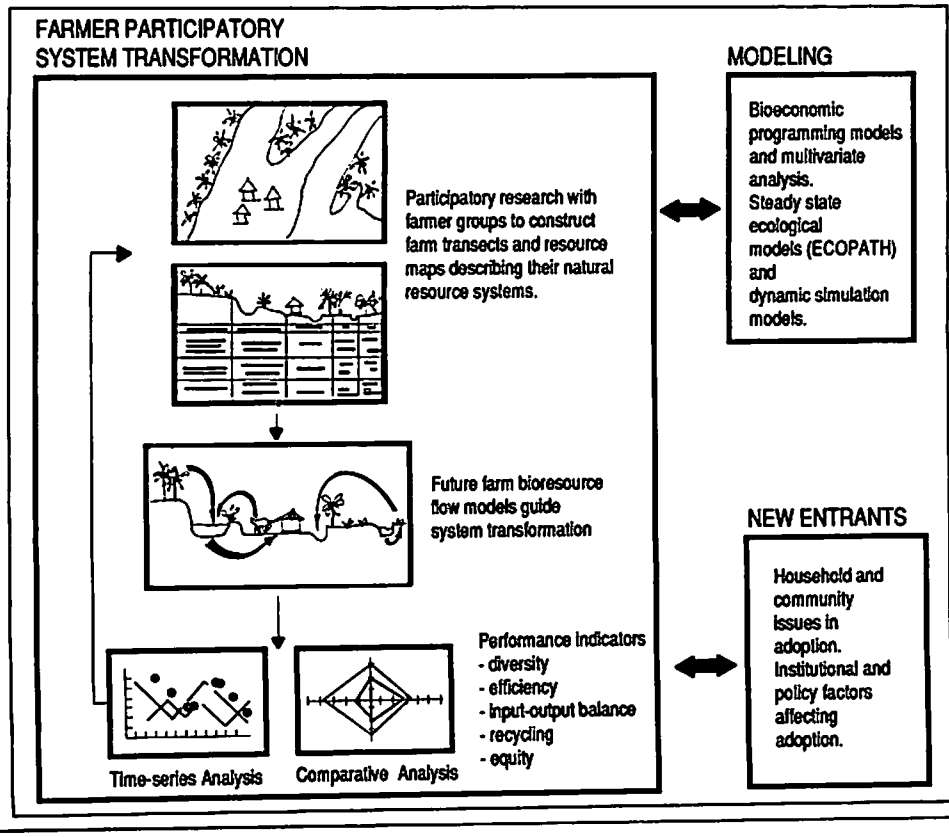
BOX 4 INTEGRATED RESOURCE SYSTEMS APPROACH

- integrates aquaculture with other enterprises of farm systems so that opportunities for synergism can be exploited;
- encourages households to see aquaculture as a mechanism to improve overall farm system performance and natural resource management;
- adopts a farming systems perspective for interdisciplinary research in close partnership with farmers.

The approach will assist ICLARM's clients and beneficiaries by:

- enabling NARS researchers to assess the impact of integrated agriculture-aquaculture on households, communities and natural resource systems and to identify technical support and policy strategies that will foster adoption of integrated systems;
- improving farmers' decision-making skills in integrated resource management in terms of rehabilitating and sustaining their natural resource base, and increasing enterprise diversity and nutrient recycling through integration;
- providing extensionists and NGOs with tools to stimulate and monitor adoption of integrated systems, and to assess the impact of adoption.

The approach operates through three interactive research areas shown below:



1.4 Making Use of the Results

The products of ICLARM's research with its partners will be used initially by recipient clients. The research results will also be applied through the Center's efforts in human resource development and institutional strengthening under the National Research Support Program (NRSP). Results will be widely disseminated through a variety of media by the Information Division. The latter, together with the NRSP, will seek feedback to measure the Center's impact, which will be used as a guide in future planning. Details follow.

1.4.1 National Research Support Program (NRSP)

Aquatic research institutions and NGOs often have inappropriate skills to meet the needs of future research challenges, and national research agendas are therefore often inadequate to meet future resource management needs.

ICLARM has considerable experience in assisting NARS through research and information networks, training activities, visiting scientists and theses supervision. The NRSP will build on this experience and serve as the vehicle to convey the research findings, methodologies and tools developed by ICLARM to these NARS and NGOs, and to communicate feedback to the research programs. The program will also focus on fisheries research policy and management at the national and institutional levels. Assistance in information management will be included. These will be done in collaboration with ISNAR.

Human Resource Development. During the MTP period, regular training courses in ICLARM-generated research methodologies and tools are planned at headquarters. Closely linked is preparation of training and self-learning materials. Research fellowships at ICLARM, preferably for Ph.D. candidates, will be provided annually. Training at national and regional levels will be carried out as complementary activities.

This work is expected to generate a core group of scientists who may work closely with the Center in future collaborative research. A multiplier effect is expected through implementation of national training by those trained at ICLARM.

Strengthening of National Institutions. At the institutional level, a pilot project to assist selected NARS in their research planning and research management will take place, possibly leading to more extensive work in this field. An ongoing institutional network, the Asian Fisheries Social Science Research Network, will be expanded to include other Asian and Pacific countries. The possibility of transferring this networking experience to Africa will be explored as a complementary activity.

The fisheries planning support is expected to lead to increased recognition of the need for more attention to fisheries research at the national policy level in the countries involved in the Program, as well as NARS better able to implement research directed to sustainable resources management.

1.4.2 Information Division

ICLARM has a long comparative advantage in technical publication and dissemination, information services and information research (impact assessment). These will be combined with the Center's software development and translation expertise to form an Information Division. A public awareness initiative to link with a CGIAR-wide activity in this area will also be included.

Thus, ICLARM will: continue to produce relevant material in print and electronic media, paying increasing attention to the needs of clients in nonEnglish speaking countries; continue to provide information services in its area of expertise for clients and beneficiaries as well as for staff; assist its researchers to conceptualize and develop broadly useful software products and maintain them; set up a public awareness campaign addressing specific audiences such as development agencies, donors and the general public; and conduct bibliometric and other surveys to assess the usefulness of the Center's research and information products.

1.5 Feedback and Potential Impact

Feedback. A number of techniques, some to be developed during the MTP, will be used to obtain feedback on the impact ICLARM's work has made amongst partners, clients and beneficiaries.

Numbers of farmers or coral reef villagers who adopt an improved system or begin to include aquatic commodities as crops will provide an indicator of increased production, because such yields, sold locally or consumed within the household, will not appear in national statistics. As for slowing down coastal resource degradation, ICLARM will investigate how well its research findings penetrate the national consciousness through the use of the Center's publications and public awareness material in national media - from technical publications to newspapers to television. Measuring the Center's impact on NARS will require special surveys and their acknowledgement of improved research capabilities and programs.

The two kinds of impact implied here, direct and indirect results of research and related activities, suggest a two-pronged approach to assessment:

(i) ICLARM will continue to refine methodology for "research on research", e.g., using citations in context of and/or reference to the Center's work as an index of adoption by and hence impact on NARS, ASIs and other clients. Further, this methodology will be elaborated with other IARCs for the development of common CGIAR standards for this approach.

(ii) ICLARM will collaborate with IARCs involved in resource management to develop indicators of impact on beneficiaries for yield or revenue increases not likely to be captured by national/regional agricultural or fisheries statistics. This project is crucial for ICLARM and other resources-oriented IARCs in that without such new measures of impact, they will continue to be evaluated using criteria appropriate only to commodity-oriented centers.

Potential Impact. The potential impacts of the research that will be executed during the MTP period are very large. The Philippines is used as a case study in the following examples.

- In natural resources management, there are indications that 15% increases in rice yields by efficient rice-fish farming (as well as substantial fish harvests) are within reach. If only 5% of Philippine farmers in suitable areas adopt the practice, the overall income gain would be over $30 million annually. More fully integrated farming systems are showing signs of even better improvements in income - up to 40%.

- The small schooling fish that comprise nearly half of Philippine fisheries, are severely overfished. Managed properly and equitably, they would provide some $250 million in annual resource rent, currently being dissipated[6]. This situation is widespread in developing countries. The potential gains in food supply and income are enormous.

- On the productivity side, the new fish strains being developed by ICLARM and collaborators will easily improve yields by 40%. Their widespread adoption in the Philippines would improve farm incomes by some $35 million/ year.

The scenarios can be reversed. Unchecked increases in fishing effort as populations double by 2025 will extinguish some fisheries, place all major stocks in a state of overfishing and reduce fish supply dramatically. With regard to productivity, various farmed species and strains are showing signs of decline due to inbreeding and bad management practices. Decreased yields are inevitable unless breeding and resource management programs as pioneered by ICLARM and its collaborators are undertaken.

1.6 Implementation

Three noteworthy aspects of how the research and related activities will be carried out are (i) the primarily collaborative mode of the proposed research; (ii) the role of networking; and (iii) a divisional personnel structure.

Collaboration. The research programs are to be carried out both in HQ and field sites in collaboration with many partners. Such collaboration will be primarily with NARS in Asia and Africa; with advanced institutions worldwide, particularly FAO; with increasing numbers of NGOs; and with other international centers. Amongst the last mentioned, work with IRRI will continue, while new involvements with ISNAR, IFPRI and possibly WARDA are planned for the MTP period.

Networks. The importance of networking in achieving results was described in the Strategy. During the MTP period, existing global information networks for tropical fisheries and aquaculture scientists will be maintained and the Asian research network in social sciences expanded to include more institutions/countries in the region (including the Pacific). A new fish genetics research network comprising NARS in Asia and Africa will be established and a special effort made to inititate regional, institutional networking activities in Africa.

Research Divisions. The Center's scientific capabilities and resources have now been organized into two research divisions - Life Sciences and Social Sciences. While the Programs will bear the responsibility of managing tasks, these divisions will be responsible for scientific capability management, including the planning, development, allocation and evaluation of the Center's technical resources, the most critical of which are its scientific staff. The aim is to provide maximum flexibility of staff to take part in multidisciplinary projects across program areas, as well as to provide better career opportunities for all levels of technical staff.

1.7 Organization and Administration

ICLARM has begun to implement a slightly modified version of the organizational structure presented in the Strategic Plan. The modified organogram, which is expected to remain in force during the MTP period, is presented in Fig. 2.

The organizational structure was designed to foster coordination and communication within the Center. The Center's resources and capabilities have been organized into five divisions which are then allocated, via a matrix structure, to the Center's tasks, as represented by the programs and projects.

The two research divisions, Life Sciences and Social Sciences, and the Information Division were described above. Two further Divisions, a Research Support Division and Management Services Division complete the matrix.

The Research Support Division

This division will be implemented in 1994 under the Deputy Director General, who will be responsible for overall coordination of: the Center's research and research-related activities; and the supervision of the design and construction of the new headquarters facilities. The Computer Services Unit supporting the programs in software development and maintenance will be transferred from the Information to the Research Support Division.

Management Services Division

The key elements of the work of the Management Services Division during the MTP period are the following:

Project Administration. The strengthening required for the provision of administrative support to programs and projects will be done in two ways. The first is the recruitment of Management Associates who will be directly responsible for providing the one-on-one management support required by the Project Leaders. The second is the development of computerized project and management information systems (MIS) that will allow the Project Leaders and Management Associates to plan and manage the various projects within the Center's Programs effectively.

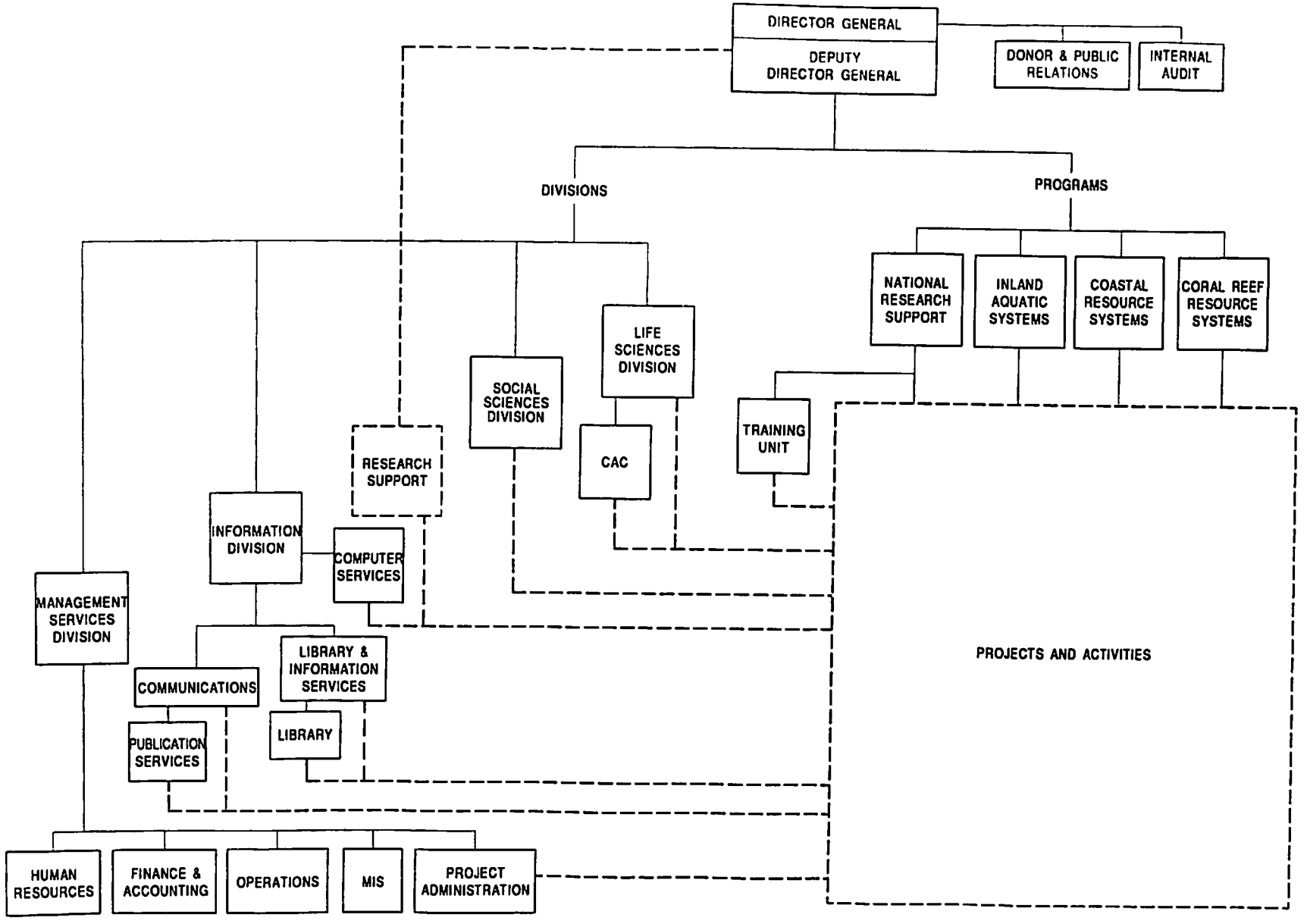


Fig. 2. Proposed ICLARM structure for the MTP period 1994-1998.

Human Resources. A Human Resources Manager will be appointed to oversee the development of the human resources management system. The major components are: computerized staff records; staff development programs; performance evaluation; and staff orientation.

Operations. Management of the Center's operations worldwide will be centralized with the establishment of responsibility and reporting linkages between the field station in the Solomon Islands, project offices in Bangladesh and Malawi, and ICLARM headquarters.

Finance and Accounting. Development of the accounting systems work will focus on the generation of management reports for budgeting and expense monitoring purposes as well as on the linkages between the accounting systems and the other components. Full integration of the financial reporting systems with project management and the Center's MIS should be achieved in early 1994.

1.8 Staffing and Accommodation

ICLARM would need an annual increase in senior staff of 16.5% during the MTP period for realization of its program. However, the urgency of research-supported management action to reverse the grim status of aquatic resources in developing countries requires a "front-end loading" of the MTP in senior staff year terms as shown in Table 1.

The expansion in staffing will primarily take place at headquarters. ICLARM in 1992 extended the lease area of its headquarters office facilities in central Manila by 400 m^2. Further extension to meet additional needs for office space up to late 1996, when ICLARM expects to move to permanent headquarters, is optional. The increase in staff at existing outreach sites can be accommodated without major problems.

The Strategy envisages that ICLARM will take possession of a new headquarters facility during the MTP period. At present, potential sites in the Philippines, in the vicinity of Manila, are being considered and a decision is likely to be made shortly. The new headquarters will initially comprise some 5,000 m^2 of office space as well as facilities for fish breeding research, germplasm conservation and pond trophic dynamics research. The construction costs of the new facilities, which should be ready for occupation in late 1996, are estimated at US$6.0 million. Donor funding will be requested outside that of the operations program.

1.9 Funding Requirements 1994-98

1.9.1 Operations Budget

The funding requirements for the Center's operations (core and complementary activities) are summarized in Table 1. Budget details are given in the Tables section (Chapter 2). The funding requirements in 1998 for all core activities represent a

doubling of ICLARM's 1993 core budget. Complementary activities are envisaged to quadruple during the MTP period.

1.9.2 Capital Budget

The capital requirements during 1994-98 (Table 2) reflect the increase in core senior staff. Investments will comprise office equipment and computers. Capital expenses for the Coastal Aquaculture Centre include rehabilitation and expansion of the laboratory and housing facilities.

Capital requirements related to the occupancy of the new headquarters facility are included in the Construction budget for which separate funding will be sought. It is assumed that as of 1998, ICLARM's annual capital requirements will be marginal as no expansion in core senior staff is envisaged beyond that time. Capital expenses related to complementary activities (and staff) will be recovered within project budgets.

The consequences of a 25% reduction of core funding as well as the consequences of meeting the TAC 1998 Core Resource Envelope are discussed in Appendix 2.

1.10 References

1. ICLARM's Strategy for International Research on Living Aquatic Resources Management. ICLARM, Manila. March 1992.

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3. A Study of International Fisheries Research. The World Bank, Washington, D.C. June 1992.

4. Ecologically Sustainable Development Working Groups. Final Report - Fisheries. Commonwealth of Australia. November 1991.

5. Fisheries: Fisheries Science and Management. Century 21. Alverson, D.L. and P.A. Larkin. Paper presented at the World Fisheries Congress, Greece. May 1992.

6. Estimation of Maximum Sustainable Yield and Maximum Economic Rent from the Philippine Small Pelagic Fisheries. Dalzell, P., P. Corpuz, R. Ganaden and D. Pauly. Tech. Pap. Ser. Bur. Fish. Aquat. Resour. (Philipp.) 10(3). May 1987.

Table 1 ICLARM Staffing and Operations Budget Requirements, 1994-98
(in SSY and $'000)

Operations Budget	1994		1995		1996		1997		1998	
	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000
I. CORE										
A. PROGRAMS										
1. CRSP	6.0	1,366	7.0	1,591	8.5	1,926	9.5	2,164	9.5	2,164
2. CRRSP	4.5	1,088	5.5	1,328	7.0	1,685	8.5	1,875	7.75	1,875
3. IARSP	6.25	1,618	7.25	1,874	9.0	2,319	9.5	2,589	10.5	2,719
4. NRSP	2.5	724	3.0	854	3.5	974	4.0	1,104	4.0	1,104
Total, Programs	19.25	4,796	22.75	5,647	28.0	6,904	31.5	7,732	31.75	7,862
B. RESEARCH SUPPORT	2.0	711	2.5	796	2.5	836	2.5	881	2.5	881
C. INFORMATION	2.0	657	2.5	760	3.0	927	3.0	966	3.0	966
D. MANAGEMENT/ADMINISTRATION	2.0	1,535	2.5	1,745	3.0	1,945	3.0	2,045	3.0	2,055
Total, Core	**25.25**	**7,699**	**30.25**	**8,948**	**36.5**	**10,612**	**40.0**	**11,624**	**40.25**	**11,764**
II. COMPLEMENTARY										
A. PROGRAMS										
1. CRSP	2.0	680	2.0	680	3.0	750	3.0	750	3.0	750
2. CRRSP	1.5	405	1.5	405	2.5	675	3.5	945	4.0	1,080
3. IARSP	5.75	1,265	7.0	1,595	8.5	1,997	10.0	2,450	11.0	2,750
4. NRSP	1.5	710	2.0	722	3.0	910	3.0	1,152	3.0	1,215
Total, Programs	10.75	3,060	12.5	3,402	17.0	4,332	19.5	5,297	21.0	5,795
D. MANAGEMENT/ADMINISTRATION	-	228	-	210	-	292	-	310	-	320
Total, Complementary	**10.75**	**3,288**	**12.5**	**3,612**	**17.0**	**4,624**	**19.5**	**5,607**	**21.0**	**6,115**

Table 2 ICLARM Capital Budget 1994-98
(in $'000)

	1994	1995	1996	1997	1998
	$'000	$'000	$'000	$'000	$'000
CAPITAL BUDGET *	425	325	175	75	10

*Excluding new headquarters facility estimated at $6.0 million.

Chapter 2. MTP Tables

The tables that follow summarize the resources (in senior-staff (SSYs) and dollar terms) required for the implementation of the proposed MTP. They have been prepared in accordance with the format outlined in document "CGIAR Medium-Term Resource Allocation Process, 1994-98".

Table 1 presents the center requirements in accordance with the management/ organizational structure (cost centers).

Table 2 presents the Program and Activity requirements broadly in line with the management/organizational structure, i.e., research, research support, training and information activities, management/administration, general operations and other institutional charges (inflation, depreciation, operating fund, capital program). The research programs and training and information activities are identified following the most recent, common activity structure used by TAC.

Table 3 presents the full operating costs of the five major activities as defined by TAC by subactivity, and it presents relative shares of each activity/subactivity. In this presentation, the institutional costs are allocated: dollar resources related to research support, management/administration, general operations and other institutional charges (depreciation and inflation) are allocated to the five activities (and the subactivities) as follows :

(1) research support: costs are allocated to research activities proportionally;

(2) management/administration, general operations and other institutional charges (depreciation and inflation) : costs are allocated to research and research related activities proportionally.

The sum total in each column equals the line "Total Operations Program" of Table 1.

Table 4 presents the "loaded" costs of the activity categories broken down by region in dollar as well as in relative terms. The definition of the four regions — sub-Saharan Africa (SSA), Asia, Latin-America and Caribbean (LAC), West Asia and North Africa (WANA) — is according to usage by TAC.

Tables 6** through 11 are the customary budgetary and financial tables, with some adjustments to formats mainly to reflect the newly introduced depreciation policy.

**Table 5, on Commodity Research Requirements by Activity and Region, is not included as it is not relevant to ICLARM. Table 9, on Price Assumptions is not included as all figures are in 1993 prices.

Table 1: Program and Activity Requirements By Cost Center
(Senior Staff Years and US$'000)

a: Core

	1992 (act.)		1993 (est.)		1994 (proj.)		1995 (proj.)		1996 (proj.)		1997 (proj.)		1998 (proj.)	
	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000
I. OPERATIONS PROGRAM														
RESEARCH														
Coastal Resource Systems	6	1,158	4	911	6	1,366	7	1,591	8.5	1,926	9.5	2,164	9.5	2,164
Coral Reef Resource Systems	2	372	2.25	544	4.5	1,088	5.5	1,328	7	1,685	7.75	1,875	7.75	1,875
Inland Aquatic Resource Systems	5	1,212	6.5	1,683	6.25	1,618	7.25	1,934	9	2,319	10	2,589	10.5	2,719
Subtotal, RESEARCH	13	2,742	12.75	3,138	16.75	4,073	19.75	4,853	24.5	5,930	27.25	6,628	27.75	6,757
RESEARCH SUPPORT														
Office of the Deputy DG	0.5	116	0.75	107	1	226	1	226	1	226	1	226	1	226
Research Divisions			0.25	163	0.5	220	0.5	250	0.5	270	0.5	290	0.5	290
Computer Services				33	0.5	85	1	140	1	140	1	165	1	165
Coastal Aquaculture Center		95		164		180		180		200	0	200	0	200
Subtotal, RESEARCH SUPPORT	0.5	211	1	467	2	711	2.5	796	2.5	836	2.5	881	2.5	881
TRAINING/COMMUNICATION/LIBRARY														
National Research Support	1	296	2	714	2.5	724	3	854	3.5	974	4	1,104	4	1,104
Information Division	1	475	1	566	2	657	2.5	760	3	927	3	966	3	966
Subtotal, TRAINING/COMM/LIB	2	771	3	1,280	4.5	1,381	5.5	1,614	6.5	1,901	7	2,070	7	2,070
ADMINISTRATION/OPERATIONS														
Office of the DG	1	245	1	273	1	290	1.5	365	2	420	2	420	2	420
Board of Trustees	0	127	0	135	0	135	0	135	0	135	0	135	0	135
Management Services Division	1	282	1	482	1	500	1	520	1	520	1	520	1	520
Operations	0	316	0	476	0	610	0	725	0	870	0	970	0	980
Subtotal, ADMIN/OPERATIONS	2	970	2	1,365	2	1,535	2.5	1,745	3	1,945	3	2,045	3	2,055
TOTAL OPERATIONS	17.5	4,695	18.75	6,250	25.25	7,700	30.25	9,008	36.5	10,612	39.75	11,624	40.25	11,763
Price Increase														
TOTAL OPERATIONS PROGRAM	17.5	4,695	18.75	6,250	25.25	7,700	30.25	9,008	36.5	10,612	39.75	11,624	40.25	11,763
Additional Operating Funds				200		200		200		200		200		200
TOTAL OPERATING REQUIREMENTS	17.5	4,695	18.75	6,450	25.25	7,900	30.25	9,208	36.5	10,812	39.75	11,824	40.25	11,963
Less: Other Income		(128)		(180)		(250)		(300)		(350)		(375)		(375)
Overhead Income		(300)		(200)		(459)		(510)		(650)		(795)		(870)
TOTAL OPERATING FUNDS REQUIRED		4,267		6,070		7,191		8,398		9,812		10,654		10,719
II. CAPITAL PROGRAM														
New		137		355		425		325		175		75		10
III. TOTAL FUNDING REQUIREMENTS		4,404		6,425		7,616		8,723		9,987		10,729		10,729

Table 1: Program and Activity Requirements By Cost Center
(Senior Staff Years and US$'000)

b: Complementary

	1992 (act.)		1993 (est.)		1994 (proj.)		1995 (proj.)		1996 (proj.)		1997 (proj.)		1998 (proj.)	
	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000
I. OPERATIONS PROGRAM														
RESEARCH														
Coastal Resource Systems	0.5	331	1.5	567	2	680	2	680	3	750	3	750	3	750
Coral Reef Resource Systems	0	-	0.75	195	1.5	405	1.5	405	2.5	675	3.5	945	4	1,080
Inland Aquatic Resource Systems	3	704	2.5	445	5.75	1,265	7.25	1,595	8.5	1,997	10	2,450	11	2,750
Subtotal, RESEARCH	3.5	1,036	4.75	1,207	9.25	2,350	10.75	2,680	14	3,422	16.5	4,145	18	4,580
RESEARCH SUPPORT														
Office of the Deputy DG														
Research Divisions														
Computer Services														
Coastal Aquaculture Center														
Subtotal, RESEARCH SUPPORT														
TRAINING/COMMUNICATION/LIBRARY														
National Research Support				284	1.5	525	1.75	538	3	700	3	907	3	945
Information Division				118		185		185		210		245		270
Subtotal, TRAINING/COMM/LIB				402	1.5	710	1.75	723	3	910	3	1,152	3	1,215
ADMINISTRATION/OPERATIONS														
Office of the DG														
Board of Trustees														
Management Services Division														
Operations				80		153		170		217		265		290
Subtotal, ADMIN/OPERATIONS	-	-		80		153		170		217		265		290
TOTAL COMPLEMENTARY OPERATIONS	3.5	1,036	4.75	1,688	10.75	3,213	12.5	3,573	17	4,549	19.5	5,562	21	6,085
II. CAPITAL PROGRAM														
New		74		38		75		40		75		45		30
III. TOTAL COMPLEMENTARY FUNDING		1,109		1,726		3,288		3,613		4,624		5,607		6,115

Table 2: Program and Activity Requirements
(Senior Staff Years and US$'000)

a: Core

		1992 (act.)		1993 (est.)		1994 (proj.)		1995 (proj.)		1996 (proj.)		1997 (proj.)		1998 (proj.)	
		SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000
1. Operations Program															
A. Research Activities															
1. Conservation and Management of Natural Resources	1.1 Ecosystem Conservation and Management	4.0		3.0	738	4.75	1,155	5.25	1,274	6.75	1,634	8.5	2,067	8.5	2,033
	1.2 Germplasm Collection, Conservation Characterization, and Evaluation	2.0		2.0	492	2.25	547	2.25	546	2.25	545	2.5	608	2.5	598
	Total Activity 1	6.0		5.0	1,230	7.0	1,702	7.5	1,820	9.0	2,179	11.0	2,675	11.0	2,631
2. Germplasm Enhancement and Breeding	2.4 Fish Germplasm Enhancement and Breeding	1.0		1.5	369	1.5	365	1.75	425	2.0	484	2.0	486	2.0	486
	Total Activity 2	1.0		1.5	369	1.5	365	1.75	425	2.0	484	2.0	486	2.0	486
3. Production Systems Development and Management	3.4 Aquatic Systems	4.0		4.0	984	4.25	1,033	5.0	1,213	6.0	1,452	6.0	1,459	6.5	1,663
	Total Activity 3	4.0		4.0	984	4.25	1,033	5.0	1,213	6.0	1,452	6.0	1,459	6.5	1,663
4. Socioeconomic, Public Policy, and Public Management Research	4.1 Economic and Social Analysis	2.0		2.25	554	4.0	973	5.25	1,334	7.0	1,694	7.25	1,763	7.25	1,734
	4.2 Policy Analysis							0.25	61	0.5	121	1.0	243	1.0	243
	Total Activity 4	2.0		2.25	554	4.0	973	5.5	1,395	7.5	1,815	8.25	2,006	8.25	1,977
	Total Research Activities	13.0		12.75	3,137	16.75	4,073	19.75	4,853	24.5	5,930	27.25	6,626	27.75	6,757
B. Research Support		0.5		1.0	467	2.0	711	2.5	796	2.5	836	2.5	881	2.5	881
C. Institution Building	5.1 Training and Conference	0.5		0.5	213	1.0	307	1.0	293	1.5	439	2.0	591	2.0	591
	5.2 Documentation, Publication and Dissemination of Information	1.0		1.0	427	2.0	613	2.5	734	3.0	877	3.0	887	3.0	887
	5.3 Organization and Management Counselling			1.0	427	1.0	307	1.5	440	1.5	439	1.5	444	1.5	444
	5.4 Networks	0.5		0.5	213	0.5	153	0.5	147	0.5	146	0.5	148	0.5	148
	Total Institution Building (Activity 5)	2.0		3.0	1,280	4.5	1,380	5.5	1,614	6.5	1,901	7.0	2,070	7.0	2,070
D. Administration/ Operations	1. Administration	2.0		2.0	1,365	2.0	1,535	2.5	1,745	3.0	1,945	3.0	2,045	3.0	2,055
	2. Utilities														
	3. Depreciation														
	Total Administration/Operations	2.0		2.0	1,365	2.0	1,535	2.5	1,745	3.0	1,945	3.0	2,045	3.0	2,055
	Subtotal Operations Program	17.5		18.75	6,249	25.25	7,699	30.25	9,008	36.5	10,612	39.75	11,622	40.25	11,763
Price Increase															
	Total Operations Program	17.5		18.75	6,249	25.25	7,699	30.25	9,008	36.5	10,612	39.75	11,622	40.25	11,763
2. Additional Operating Funds	Working Capital				200		200		200		200		200		200
	Total Operations Requirements				6,449		7,899		9,208		10,812		11,822		11,963
3. Less: Center Income	1. Investment Income														
	2. Overhead Income (on Compl. Program)				200		459		510		650		795		870
	3. Other Income (sales, etc.)				180		250		300		350		375		375
	Total Income				380		709		810		1,000		1,170		1,245
	Total Operating Funds Required				6,069		7,190		8,398		9,812		10,653		10,718
4. Capital Program					355		425		325		175		75		10
	Total Funding Required				6,424		7,615		8,723		9,987		10,727		10,728

Table 2: Program and Activity Requirements
(Senior Staff Years and US$'000)

b: Complementary

		1992 (act.)		1993 (est.)		1994 (proj.)		1995 (proj.)		1996 (proj.)		1997 (proj.)		1998 (proj.)	
		SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000
1. Operations Program															
A. Research Activities															
1. Conservation and Management of Natural Resources	1.1 Ecosystem Conservation and Management	0.5		2.25	572	2.75	699	2.75	699	2.25	550	2.0	502	2.0	509
	1.2 Germplasm Collection, Conservation Characterization, and Evaluation														
	Total Activity 1	0.5		2.25	572	2.75	699	2.75	699	2.25	550	2.0	502	2.0	509
2. Germplasm Enhancement and Breeding	2.4 Fish Germplasm Enhancement and Breeding					0.75	191	0.75	191	1.0	244	1.5	377	1.5	382
	Total Activity 2					0.75	191	0.75	191	1.0	244	1.5	377	1.5	382
3. Production Systems Development and Management	3.4 Aquatic Systems	3.0		2.5	635	4.0	1,016	5.25	1,242	6.0	1,467	7.5	1,884	8.5	2,163
	Total Activity 3	3.0		2.5	635	4.0	1,016	5.25	1,242	6.0	1,467	7.5	1,884	8.5	2,163
4. Socioeconomic, Public Policy, and Public Management Research	4.1 Economic and Social Analysis					1.75	445	2.25	548	4.75	1,161	5.5	1,382	6.0	1,527
	4.2 Policy Analysis														
	Total Activity 4					1.75	445	2.25	548	4.75	1,161	5.5	1,382	6.0	1,527
	Total Research Activities	3.5		4.75	1,207	9.25	2,351	11.0	2,660	14.0	3,422	16.5	4,145	18.0	4,581
B. Research Support															
C. Institution Building	5.1 Training and Conference					1.0	350	1.0	359	1.0	350	1.0	350	1.0	350
	5.2 Documentation, Publication and Dissemination of Information										210		245		270
	5.3 Organization and Management Counselling					0.5	185	0.5	185	0.5	175	1.0	278	1.0	293
	5.4 Networks						175		179	0.5	175	1.0	278	1.0	293
	Total Institution Building (Activity 5)				402	1.5	710	1.5	723	2.0	910	3.0	1,151	3.0	1,216
D. Administration/ Operations	1. Administration				80		153		170		217		265		290
	2. Utilities														
	3. Depreciation														
	Total Administration/Operations				80		153		170		217		265		290
	Subtotal Operations Program	3.5		4.75	1,689	10.75	3,214	12.50	3,573	16.0	4,549	19.5	5,561	21.0	6,087
Price Increase															
	Total Operations Program	3.5		4.75	1,689	10.75	3,214	12.50	3,573	16.0	4,549	19.5	5,561	21.0	6,087
2. Additional Operating Funds	Working Capital														
	Total Operations Requirements														
3. Less: Center Income	1. Investment Income														
	2. Overhead Income (on Compl. Program)														
	3. Other Income (sales, etc.)														
	Total Income														
	Total Operating Funds Required			4.75	1,689	10.75	3,214	12.5	3,573	16.0	4,549	19.5	5,561	21.0	6,087
4. Capital Program					38		75		40		75		45		30
	Total Funding Required			4.75	1,727	10.75	3,289	12.5	3,613	16.0	4,624	19.5	5,606	21.0	6,117

Table 3: Research and Research-related Activity Requirements
(In US$'000 and Percentage distribution 1)

a: Core

1. Research and Research-related Activities		1992 (act.)		1993 (est.)		1994 (proj.)		1995 (proj.)		1996 (proj.)		1997 (proj.)		1998 (proj.)	
		$'000	%	$'000	%	$'000	%	$'000	%	$'000	%	$'000	%	$'000	%
1. Conservation and Management of Natural Resources	1.1 Ecosystem Conservation and Management			1,050	60%	1,623	68%	1,754	70%	2,229	75%	2,775	77%	2,717	77%
	1.2 Germplasm Collection, Conservation Characterization, and Evaluation			700	40%	764	32%	752	30%	743	25%	829	23%	812	23%
	Total Activity 1			1,750	28%	2,387	31%	2,505	28%	2,971	28%	3,603	31%	3,529	30%
2. Germplasm Enhancement with Breeding	2.4 Fish Germplasm Enhancement and Breeding			500	100%	539	100%	626	100%	637	100%	697	100%	706	100%
	Total Activity 2			500	8%	539	7%	626	7%	637	6%	697	6%	706	6%
3. Production Systems Development and Management	3.4 Aquatic Systems			1,375	100%	1,463	100%	1,700	100%	2,016	100%	1,976	100%	2,235	100%
	Total Activity 3			1,375	22%	1,463	19%	1,700	19%	2,016	19%	1,976	17%	2,235	19%
4. Socioeconoomic, Public Policy, and Public Management Research	4.1 Economic and Social Analysis			813	100%	1,386	100%	1,785	95%	2,270	93%	2,250	88%	2,277	88%
	4.2 Policy Analysis							94	5%	171	7%	307	12%	311	12%
	Total Activity 4			813	13%	1,386	18%	1,879	21%	2,441	23%	2,557	22%	2,588	22%
5. Institution Building	5.1 Training and Conference			290	16%	424	22%	403	18%	586	23%	809	29%	785	29%
	5.2 Documentation, Publication and Dissemination of Information			616	34%	847	44%	1,007	45%	1,172	46%	1,200	43%	1,163	43%
	5.3 Organization and Management Counselling			616	34%	424	22%	604	27%	586	23%	586	21%	568	21%
	5.4 Networks			290	16%	231	12%	224	10%	204	8%	195	7%	189	7%
	Total Institution Building (Activity 5)			1,812	29%	1,925	25%	2,237	25%	2,547	24%	2,790	24%	2,705	23%
	Total Research and Research-Related Activities[2]			6,250	100%	7,700	100%	8,947	100%	10,612	100%	11,624	100%	11,763	100%

b: Complementary

1. Research and Research-related Activities		1992 (act.)		1993 (est.)		1994 (proj.)		1995 (proj.)		1996 (proj.)		1997 (proj.)		1998 (proj.)	
		$'000	%	$'000	%	$'000	%	$'000	%	$'000	%	$'000	%	$'000	%
1. Conservation and Management of Natural Resources	1.1 Ecosystem Conservation and Management			811	100%	855	100%	795	100%	601	100%	561	100%	612	100%
	1.2 Germplasm Collection, Conservation Characterization, and Evaluation														
	Total Activity 1			811	47%	855	26%	795	22%	601	13%	561	10%	612	10%
2. Germplasm Enhancement with Breeding	2.4 Fish Germplasm Enhancement and Breeding					230	100%	217	100%	277	100%	449	100%	428	100%
	Total Activity 2					230	7%	217	6%	277	6%	449	8%	428	7%
3. Production Systems Development and Management	3.4 Aquatic Systems					1,217	100%	1,445	100%	1,618	100%	2,131	100%	2,446	100%
	Total Activity 3					1,217	37%	1,445	40%	1,618	35%	2,131	38%	2,446	40%
4. Socioeconoomic, Public Policy, and Public Management Research	4.1 Economic and Social Analysis			915	100%	526	100%	686	100%	1,295	100%	1,570	100%	1,773	100%
	4.2 Policy Analysis														
	Total Activity 4			915	53%	526	16%	686	19%	1,295	28%	1,570	28%	1,773	29%
5. Institution Building	5.1 Training and Conference					304	66%	315	67%	276	33%	296	33%	283	33%
	5.2 Documentation, Publication and Dissemination of Information														
	5.3 Organization and Management Counselling					157	34%	155	33%	276	33%	296	33%	283	33%
	5.4 Networks									283	34%	305	34%	291	34%
	Total Institution Building (Activity 5)					460	14%	470	13%	832	18%	897	16%	856	14%
	Total Research and Research-Related Activities[2]			1,726	100%	3,288	100%	3,612	100%	4,624	100%	5,607	100%	6,115	100%

[1] Percentage distribution: sub-activities as % of activity, activities as % of total
[2] Sum total equals Total Operations Program in Table 1

Table 4: Research and Research-related Activity Requirements by Region
(In US$'000 and Percentage distribution [1])

a: Core

1. Research and Research-Related Activities		Regions	1992 (act.)		1993 (est.)		1994 (proj.)		1995 (proj.)		1996 (proj.)		1997 (proj.)		1998 (proj.)	
			$'000	%	$'000	%	$'000	%	$'000	%	$'000	%	$'000	%	$'000	%
1. Conservation and Management of Natural Resource	1.1 Ecosystem Conservation and Management	SSA					264	15%	376	20%	467	20%	697	25%	706	25%
		WANA					-		-		-		-		-	
		Asia					1,440	85%	1,409	75%	1,751	75%	1,953	70%	1,976	70%
		LAC					-		94	5%	117	5%	139	5%	141	5%
		Total			1,050		1,694	22%	1,879	21%	2,335	22%	2,790	24%	2,823	24%
	1.2 Germplasm Collection Conservation, Characterization and Evaluation	SSA					127	15%	121	15%	111	15%	139	20%	141	20%
		WANA					17	2%	16	2%	37	5%	35	5%	35	5%
		Asia					678	80%	644	80%	557	75%	488	70%	494	70%
		LAC					25	3%	24	3%	37	5%	35	5%	35	5%
		Total			700		847	11%	805	9%	743	7%	697	6%	706	6%
	Total Activity 1	SSA					407	16%	483	18%	585	19%	837	24%	847	24%
		WANA					25	1%	54	2%	62	2%	35	1%	35	1%
		Asia					2,084	82%	2,067	77%	2,339	76%	2,441	70%	2,470	70%
		LAC					25	1%	81	3%	62	2%	174	5%	176	5%
		Total			1,750		2,541	33%	2,684	30%	3,077	29%	3,487	30%	3,529	30%
2. Germplasm Enhancement and Breeding	2.4 Fish Germplasm Enhancement and Breeding	SSA					108	20%	125	20%	189	25%	174	25%	176	25%
		WANA					27	5%	31	5%	32	5%	35	5%	35	5%
		Asia					404	75%	470	75%	446	70%	488	70%	494	70%
		LAC					-		-		-		-		-	
	Total Activity 2				500		539	7%	626	7%	637	6%	697	6%	706	6%
3. Production System Development and Management	3.4 Aquatic Systems	SSA					308	20%	358	20%	403	20%	552	25%	559	25%
		WANA					-		-		-		-		-	
		Asia					1,232	80%	1,432	80%	1,613	80%	1,656	75%	1,676	75%
		LAC					-		-		-		-		-	
	Total Activity 3				1,375		1,540	20%	1,789	20%	2,016	19%	2,209	19%	2,235	19%
4. Socioeconoomic, Public Policy, and Public Management Research	4.1 Economic and Social Analysis	SSA					219	15%	282	15%	350	15%	465	20%	471	20%
		WANA					-		-		-		-		-	
		Asia					1,244	85%	1,597	85%	1,868	80%	1,744	75%	1,764	75%
		LAC					-		-		117	5%	116	5%	118	5%
		Total			803		1,463	19%	1,879	21%	2,335	22%	2,325	20%	2,353	20%
	4.2 Policy Analysis	SSA					-		18	20%	42	20%	46	20%	47	20%
		WANA					-		-		-		-		-	
		Asia					-		72	80%	170	80%	174	75%	176	75%
		LAC					-		-		-		12	5%	12	5%
		Total					-		89	1%	212	2%	232	2%	235	2%
	Total Activity 4	SSA					219	15%	295	15%	382	15%	511	20%	518	20%
		WANA					-		-		-		-		-	
		Asia					1,244	85%	1,575	80%	2,038	80%	1,918	75%	1,941	75%
		LAC					-		98	5%	127	5%	128	5%	129	5%
		Total			803		1,463	19%	1,968	22%	2,547	24%	2,557	22%	2,588	22%
5. Institution Building	5.1 Training and Conference	SSA					58	15%	54	15%	106	20%	174	25%	176	25%
		WANA					-		18	5%	27	5%	35	5%	35	5%
		Asia					327	85%	268	75%	371	70%	418	60%	423	60%
		LAC					-		18	5%	27	5%	70	10%	71	10%
		Total			290		385	5%	358	4%	531	5%	697	6%	705	6%
	5.2 Documentation, Publication and Dissemination of Information	SSA					139	20%	179	20%	212	20%	262	25%	265	25%
		WANA					35	5%	45	5%	53	5%	52	5%	53	5%
		Asia					485	70%	626	70%	690	65%	628	60%	635	60%
		LAC					35	5%	45	5%	106	10%	105	10%	106	10%
		Total			616		693	9%	895	10%	1,061	10%	1,046	9%	1,059	9%
	5.3 Organization and Management Counselling	SSA					-		-		133	25%	232	50%	235	50%
		WANA					-		-		-		-		-	
		Asia					385	100%	447	100%	398	75%	232	50%	235	50%
		LAC					-		-		-		-		-	
		Total			616		385	5%	447	5%	531	5%	465	4%	471	4%
	5.4 Networks	SSA					-		18	10%	32	15%	93	20%	94	20%
		WANA					-		-		-		23	5%	24	5%
		Asia					154	100%	161	90%	180	85%	325	70%	329	70%
		LAC					-		-		-		23	5%	24	5%
		Total			290		154	2%	179	2%	212	2%	465	4%	471	4%
	Total Activity 5	SSA														
		WANA														
		Asia														
		LAC														
		Total			1,812		1,617	21%	1,879	21%	2,335	22%	2,674	23%	2,705	23%
	Total Research and Research-Related Activities 2/	SSA					1,155	15%	1,342	15%	2,122	20%	2,567	22%	2,588	22%
		WANA					-		-		212	2%	349	3%	353	3%
		Asia					6,545	85%	7,605	85%	7,959	75%	8,137	70%	8,234	70%
		LAC					-		-		318	3%	581	5%	588	5%
		Total			6,250		7,700	100%	8,947	100%	10,612	100%	11,624	100%	11,763	100%

[1] Percentage distribution: sub-activities as % of activity, activities as % of total
[2] Sum total equals Total Operations Program in Table 1

Table 4: Research and Research-Related Activity Requirements by Region
(In US$'000 and Percentage Distribution [1])

b: Complementary

1. Research and Research-Related Activities		Regions	1992 (act.)		1993 (est.)		1994 (proj.)		1995 (proj.)		1996 (proj.)		1997 (proj.)		1998 (proj.)	
			$'000	%	$'000	%	$'000	%	$'000	%	$'000	%	$'000	%	$'000	%
1. Conservation and Management of Natural Resources	1.1 Ecosystem Conservation and Management	SSA			65	15%	171	20%	159	20%	120	20%	126	25%	138	25%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			367	85%	684	80%	636	80%	481	80%	378	75%	413	75%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			432	25%	855	26%	795	22%	601	13%	505	9%	550	9%
	1.2 Germplasm Collecti Conservation, Characterization and Evaluation	SSA			-	-	-	-	-	-	-	-	22	20%	24	20%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			-	-	-	-	-	-	-	-	90	80%	98	80%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			-	-	-	-	-	-	-	-	112	2%	122	2%
	Total Activity 1	SSA			65	15%	171	20%	-	-	-	-	148	24%	161	24%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			367	85%	684	80%	-	-	-	-	469	76%	511	76%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			432	25%	855	26%	795	22%	601	13%	617	11%	673	11%
2. Germplasm Enhancement and Breeding	2.4 Fish Germplasm Enhancement and Breeding	SSA			-	-	35	15%	33	15%	42	15%	56	20%	61	20%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			-	-	196	85%	184	85%	236	85%	224	80%	245	80%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
	Total Activity 2				-	-	230	7%	217	6%	277	6%	280	5%	306	5%
3. Production Systems Development and Management	3.4 Aquatic Systems	SSA			129	15%	243	20%	289	20%	324	20%	589	25%	642	25%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			734	85%	973	80%	1,156	80%	1,295	80%	1,766	75%	1,926	75%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
	Total Activity 3				863	50%	1,217	37%	1,445	40%	1,618	35%	2,355	42%	2,568	42%
4. Socioeconomic, Public Policy, and Public Management Research	4.1 Economic and Social Analysis	SSA			43	10%	79	15%	108	15%	194	15%	303	20%	330	20%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			388	90%	447	85%	614	85%	1,101	85%	1,211	80%	1,321	80%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			432	25%	526	16%	723	20%	1,295	28%	1,514	27%	1,651	27%
	4.2 Policy Analysis	SSA			-	-	-	-	-	-	-	-	-	-	-	-
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			-	-	-	-	-	-	-	-	-	-	-	-
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			-	-	-	-	-	-	-	-	-	-	-	-
	Total Activity 4	SSA			43	10%	79	15%	-	-	-	-	303	20%	330	20%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			388	90%	447	85%	-	-	-	-	1,211	80%	1,321	80%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			432	25%	526	16%	723	20%	1,295	28%	1,514	27%	1,651	27%
5. Institution Building	5.1 Training and Conference	SSA			-	-	44	15%	43	15%	42	15%	56	20%	61	20%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			-	-	252	85%	246	85%	236	85%	224	80%	245	80%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			-	-	296	9%	289	8%	277	6%	280	5%	306	5%
	5.2 Documentation, Publication and Dissemination of Information	SSA			-	-	-	-	-	-	-	-	-	-	-	-
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			-	-	-	-	-	-	-	-	-	-	-	-
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			-	-	-	-	-	-	-	-	-	-	-	-
	5.3 Organization and Management Counselling	SSA			-	-	-	-	36	25%	69	25%	140	50%	153	50%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			-	-	164	100%	108	75%	208	75%	140	50%	153	50%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			-	-	164	5%	145	4%	277	6%	280	5%	306	5%
	5.4 Networks	SSA			-	-	-	-	-	-	55	20%	70	25%	76	25%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			-	-	-	-	-	-	222	80%	210	75%	229	75%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			-	-	-	-	-	-	277	6%	280	5%	306	5%
	Total Activity 5	SSA			-	-	46	10%	-	-	-	-	269	32%	294	32%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			-	-	414	90%	-	-	-	-	572	68%	624	68%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			-	-	460	14%	434	12%	832	18%	841	15%	917	15%
	Total Research and Research-Related Activities 2	SSA			242	14%	559	17%	614	17%	879	19%	1,254	22%	1,345	22%
		WANA			-	-	-	-	-	-	-	-	-	-	-	-
		Asia			1,484	86%	2,729	83%	2,999	83%	3,745	81%	4,373	78%	4,770	78%
		LAC			-	-	-	-	-	-	-	-	-	-	-	-
		Total			1,726	100%	3,288	100%	3,613	100%	4,624	100%	5,607	100%	6,115	100%

[1] Percentage distribution: sub-activities as % of activity, activities as % of total

[2] Sum total equals Total Operations Program in Table 1

Table 6: Summary of Operating Costs by Object of Expenditure
(in US$'000)

	1992	1993	1994	1995	1996	1997	1998
1. Core Operations							
Personnel Costs	2,704	3,709	4,620	5,368	6,367	6,974	7,058
Supplies and Services	1,115	1,469	1,771	2,058	2,441	2,674	2,705
Operational Travel	422	584	693	805	955	1,046	1,059
Other [1]	454	488	616	777	849	930	941
Subtotal	4,695	6,250	7,700	9,008	10,612	11,624	11,763
Price Increase							
Total Core Operations	4,695	6,250	7,700	9,008	10,612	11,624	11,763
2. Complementary Operations							
Personnel Costs	676	776	1,478	1,643	2,093	2,558	2,799
Supplies and Services	239	846	1,606	1,786	2,274	2,781	3,042
Operational Travel	121	66	129	144	182	223	244
Subtotal	1,036	1,688	3,213	3,573	4,549	5,562	6,085
Price Increase							
Total Complementary Operations	1,036	1,688	3,213	3,573	4,549	5,562	6,085
3. Total Operations Costs							
Personnel Costs	3,380	4,485	6,098	7,011	8,460	9,532	9,857
Supplies and Services	1,353	2,315	3,377	3,844	4,715	5,455	5,747
Operational Travel	543	650	822	949	1,137	1,269	1,303
Other [1]	454	488	616	777	849	930	941
Subtotal	5,730	7,938	10,913	12,581	15,161	17,186	17,848
Price Increase	0	0	0	0	0	0	0
Total Operations	5,730	7,938	10,913	12,581	15,161	17,186	17,848

[1] This item includes both depreciation and rent expense. It is assumed that the depreciation and maintenance expense for a new ICLARM headquarters building will be offset by the discontinuation of rent payments once ICLARM moves.

Table 7: Staff Composition

a: Core

	1992	1993	1994	1995	1996	1997	1998
1. International Staff Positions							
Research (by program/activity)							
CRSP	6	4	7	7	8	9	9
CRRSP	2	3	5	6	7	8	8
IARSP	6	8	8	8	9	10	11
Subtotal	14	15	20	21	24	27	28
Research Support	1	1	2	3	3	3	3
Training/Communications/ Information/Library	2	3	5	6	7	7	7
Administrative/Operations	2	2	2	3	3	3	3
Subtotal	19	21	29	33	37	40	41
2. Supervisory Positions							
Research (by program/activity)							
CRSP	7	7	10	10	12	14	14
CRRSP	3	6	7	8	9	10	10
IARSP	2	6	8	10	10	12	12
Subtotal	12	19	25	28	31	36	36
Research Support	2	3	4	6	6	6	6
Training/Communications/ Information/Library	6	8	10	12	14	15	15
Administrative/Operations	7	11	14	16	16	16	16
Subtotal	27	41	53	62	67	73	73
3. Support Positions	106	120	150	160	170	180	190
4. Total Positions	152	182	232	255	274	293	304

b: Complementary

	1992	1993	1994	1995	1996	1997	1998
1. International Staff Positions							
Research (by program/activity)							
CRSP	1	2	2	2	3	3	3
CRRSP	0	2	2	2	3	4	4
IARSP	3	3	7	7	9	10	11
Subtotal	4	7	11	11	15	17	18
Research Support							
Training/Communications/ Information/Library	0	1	2	3	3	3	3
Administrative/Operations							
Subtotal	4	8	13	14	18	20	21
2. Supervisory Positions							
Research (by program/activity)							
CRSP	4	4	4	6	6	6	6
CRRSP	0	2	3	4	5	6	8
IARSP	0	2	4	7	10	12	12
Subtotal	4	8	11	17	21	24	26
Research Support	0	0	0	2	2	3	3
Training/Communications/ Information/Library	0	1	2	4	4	4	4
Administrative/Operations	0	0	0	0	0	0	0
Subtotal	4	9	13	23	27	31	33
3. Support Positions	38	50	58	64	68	76	80
4. Total Positions	46	67	84	101	113	127	134

Table 8: Capital Expenditure and Assets
(in US$'000)

	1992	1993	1994	1995	1996	1997	1998
1. New Core Capital Expenditures							
Research equipment	0	0	0	50	25	10	0
Operating equipment	0	0	0	0	0	0	0
Furnishing and office equipment (includes computers)	137	255	165	155	80	65	10
Vehicles	0	40	40	20	20	0	0
Buildings/Leasehold Improvements	0	50	200	100	50	0	0
Infrastucture	0	10	20	0	0	0	0
Others	0	0	0	0	0	0	0
Total New Capital Expenditures [1]	137	355	425	325	175	75	10
2. Complementary Capital Expenditures							
New: Research equipment	0	0	15	10	20	15	0
Operating equipment	0	0	0	0	0	0	0
Furnishing and office equipment	74	38	40	30	35	30	10
Vehicles	0	0	20	0	20	0	20
Building and site improvements	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0
Total Complementary Capital Expenditures [1]	74	38	75	40	75	45	30
3. Capital Stock							
Fixed Assets (at beginning of the year)	441	445	763	1,019	1,143	1,102	917
Acquisition [2]	137	478	520	485	400	320	200
Disposal							
Depreciation Accumulated	133	160	264	361	441	505	385
Fixed Assets (at year-end) [3]	445	763	1,019	1,143	1,102	917	732

[1] At cost
[2] Includes core replacements
[3] Net Book Value

Table 10: Sources and Application of Funds (in US$'000)

			Donor [1]	1992	1993	1994	1995	1996	1997	1998
Sources of Funds										
1. Grants	a. Core		see attached schedule							
		Subtotal		4,838	6,425	7,625	8,726	9,987	10,729	10,728
	b. Complementary [2]		see attached schedule							
		Subtotal		1,247	1,926	3,738	4,123	5,274	6,402	6,985
	Total Grants			6,085	8,351	11,363	12,849	15,261	17,131	17,713
2. Self-generated Income				128	180	250	300	350	375	375
	Total Sources			6,213	8,531	11,613	13,149	15,611	17,506	18,088
Application of Funds										
1. Operations Program	Core			4,695	6,250	7,700	9,008	10,612	11,624	11,763
	Complementary			1,036	1,688	3,213	3,573	4,549	5,562	6,085
2. Capital Program	Core			137	355	425	325	175	75	10
	Complementary			74	38	75	40	75	45	30
3. Additional Operating Funds and Resources	Core			271	200	200	200	200	200	200
	Complementary			0	0	0	0	0	0	0
				6,213	8,531	11,613	13,146	15,611	17,506	18,088
Memo Items										
Operating Fund at Year End				842	1,042	1,242	1,442	1,642	1,842	2,042
Reserves at Year End				0	0	0	0	0	0	0

[1] See annexed schedule for 1992 and 1993 breakdown
[2] Inclusive of overhead charges

Schedule to Table 10: Sources and Application of Funds (in US$'000)

List of Donors (in US$'000)

	Donor	1992	1993
a. Core	United States (USAID)	883	507
	UNDP	335	840
	World Bank	688	500
	Germany (BMZ/GTZ)	444	572
	Denmark (DANIDA)	609	604
	Rockefeller Foundation	16	82
	United Kingdom (ODA)	55	18
	IDRC	312	231
	France	94	74
	Ford Foundation	162	150
	Asian Development Bank	101	0
	European Community (CEC)	341	658
	FAO	16	0
	Forum Fisheries Agency	20	0
	Australia (AIDAB)	258	192
	Canada (CIDA)	252	156
	Norway	231	193
	Philippines	21	25
	Netherlands	0	275
	Others (incl. pending requests/proposals)	0	1348
Subtotal		4,838	6,425
b. Complementary	United States (USAID)	196	193
	UNDP	0	25
	Germany (BMZ/GTZ)	439	371
	Denmark (DANIDA)	150	54
	IFAD	77	26
	IDRC	44	88
	European Community (CEC)	60	40
	Philippines	179	492
	SAREC	12	0
	Ford Foundation	73	0
	Others (incl. pending requests/proposals)	17	637
Subtotal		1,247	1,926
Total Grants		6,085	8,351

Table 11: Balance Sheet
(in US$'000)

		1992	1993	1994	1995	1996	1997	1998
Assets								
Current Assets	Cash and Cash Equivalents	1,208	1,985	2,728	3,130	3,790	4,296	4,462
	Accounts Receivable							
	Donors	1,121	1,588	2,183	2,504	3,032	3,437	3,570
	Employees	225	314	427	491	592	667	690
	Others	296	397	546	626	758	859	892
	Inventories	12	23	34	37	47	55	57
	Prepaid Expenses	128	231	338	370	472	545	575
	Other Current Assets	80	139	202	222	283	327	345
	Total Current Assets	3,070	4,677	6,458	7,380	8,974	10,186	10,591
Fixed Assets	Property, Plant, & Equipment [1]	645	1,123	1,643	2,128	2,528	2,848	3,048
	Less: Accumulated Depreciation	(200)	(360)	(624)	(985)	(1,426)	(1,931)	(2,316)
	Total Fixed Assets - Net	445	763	1,019	1,143	1,102	917	732
	Total Assets	3,515	5,440	7,477	8,523	10,076	11,103	11,323
Liabilities and Fund Balances								
Liabilities	Bank Indebtedness	0	0	0	0	0	0	0
	Accounts Payable							
	Donors	1,639	2,882	4,175	4,749	5,890	6,712	6,851
	Employees	38	0	0	0	0	0	0
	Others	298	396	550	626	760	860	895
	In-Trust Accounts	0	0	0	0	0	0	0
	Accruals and Provision	259	357	491	563	682	773	803
	Long-term Debt	0	0	0	0	0	0	0
	Total Liabilities	2,234	3,635	5,216	5,938	7,332	8,345	8,549
Fund Balances	Capital Invested in Fixed Assets	440	763	1,019	1,143	1,102	917	732
	Capital Fund							
	Operating Fund	842	1,042	1,242	1,442	1,642	1,842	2,042
	Other Funds							
	Total Fund Balances	1,282	1,805	2,261	2,585	2,744	2,759	2,774
	Total Liabilities & Fund Balances	3,516	5,440	7,477	8,523	10,076	11,104	11,323

[1] Includes assets in custody on which no depreciation is provided - see annexed schedule

Appendix 1. Program Specifics

1.1. THE COASTAL RESOURCE SYSTEMS PROGRAM (CRSP)

1.1.1 Program Objective and Strategy

Objective: Advancement in fisheries management and resource utilization based on improved understanding of the coastal fisheries resource base, the social and economic structure of the fishing communities, and the interactions between these and other sectors.

Strategy: The Program builds on the experience of ongoing activities, combined with new projects, focusing on developing new methodologies which provide options for managers to improve aquatic resources management. New activities will be initiated with a state-of-the-art review and include a component for method/tool development, verified as appropriate through application at test sites.

Research activities at HQ will mainly deal with the development of methods (including software and databases), whereas research at outreach sites will mainly cover site-specific applications.

1.1.2 Program Thrusts and Core Activities

The activities of the CRSP will be implemented through three interlinked thrusts:

Thrust	Objectives
I. Dynamics of multispecies resources	To develop analytic tools, models and information databases on coastal fish resources and their supporting ecosystems upon which sustainable management systems can be based.
II. Socioeconomic dimension of coastal fisheries	To develop analytic tools for and models of coastal fisheries and their socioeconomic context upon which sustainable management systems can be based.
III. Integrated coastal fisheries management	To develop and test models and approaches for managing coastal fisheries in the context of the integrated development of coastal systems.

THRUST I DYNAMICS OF MULTISPECIES SYSTEMS

The activities to be conducted here are crucial in that they will provide the base for the other two thrusts in the CRSP, and for program interactions with the many NARS faced with the problem of how best to assess and manage their fisheries resources and who turn to ICLARM for support. This thrust will be implemented through three projects (or cluster of projects in case I.3).

Project I.1 Assessment of multispecies fisheries

Scope: Building on ICLARM's track record in this area, the project will continue the development and dissemination of tools for length-based assessment, notably FiSAT (FAO/ICLARM jointly developed stock assessment tool). As part of this work, support will be given to scientific activities in the Network of Tropical Fisheries Scientists.

Main emphasis of the project will, however, be on development of a new approach for management of multispecies fisheries. This tool is called multispecies virtual population analysis and is essentially designed to give advice on how to allocate fishing effort. The approach is to be adapted from methodologies now in use in temperate areas incorporating also major concepts from the FiSAT methodology.

Mode: Most software development to be done at headquarters, with interactions with one ASI and three selected NARS with expertise and interest in this area. Methods/software will be verified through joint application at selected sites then widely distributed.

Project I.2 Productivity of aquatic ecosystems

Scope: The project will continue the development of the software tool ECOPATH II which provides descriptions of energy flows in aquatic ecosystems, with special focus on studies of its ability to characterize productivity and sustainable use of especially coastal systems.

Related effort will be directed to analyzing data on production (realized and potential) of various coastal aquatic systems on a country and regional basis with the aim of drawing generalizations. The resulting products (including maps) will be made available to NARS and to cooperating international bodies, notably IARCs, to support their research and planning.

Mode: Development of software at ICLARM HQ and in interactions with individual scientists of a large number of NARS and ASIs. Close collaboration with IARCs and other ASIs with appropriate databases, and to Reefbase, a project of the CRRSP.

Project I.3 Global and country-specific databases

Scope: Documentation of global fish biodiversity, and of the fisheries resources of selected tropical countries.

Mode: FISHBASE, the global database on fish will be continued, while strengthening its linkages with various thrusts of other ICLARM programs, notably the Fish Productivity Thrust of the IARSP, the Reefbase Project within the CRRSP and its efforts to capture species-specific indigenous knowledge of fish, and the Human Resource Development Thrust of the NRSP. The capabilities of FISHBASE as a research support system will be enhanced, besides its ability to generate packaged information (e.g., species synopses, special country lists). Country-specific activities in support of coastal and especially artisanal fisheries management,

structured around Fisheries Data Acquisition Systems (FIDAS), as initially developed for Sierra Leone, will be transformed into a single interregional project, to enable rapid transfer of experience and software between countries, especially in West Africa.

THRUST II SOCIOECONOMIC DIMENSIONS OF COASTAL FISHERIES

This thrust is to mirror Thrust 1 in that it will deal with management of coastal fisheries resources. The thrust, however, focuses on the human factors that impact on the resources, especially how fishers use their "indigenous knowledge" to structure the application of their fishing effort in space and time so as to optimize their net incomes. The thrust includes two projects in which the first (II.1) will closely complement Thrust I activities and serve as an information source for the second project of this thrust (II.2).

Project II.1 Bioeconomic modeling

Scope: The Project consists of two elements, to be developed sequentially:

- adding an economic component to the multispecies analyses to be developed in Thrust I (Project (1), in the form of price and cost vectors, and enabling "costing" of various management options; and

- extending these analyses by developing simulation models of fisheries that include fishers' behavior as the key component, i.e., "biosocioeconomic modeling".

Mode: Headquarters development of appropriate methodology/software in cooperation with the CRRSP and verification/application in cooperation with selected NARS.

Project II.2 Socioeconomic analysis for coastal fisheries co-management

Scope: Analyze how traditional knowledge and social and economic relations at the community level affect management strategies for coastal fisheries. The research would assist in knowing to what extent co-management might serve as a management strategy. Co-management, the sharing of fishing management authority between the national government and the local community, offers the opportunity to allocate resource rights and benefits in a more sustainable manner (see Box 2). Co-management builds on the existing capacities and interests of the local community and is complemented by the ability of the national government to provide enabling legislation and institutions and provide assistance. Research methods would include rapid rural appraisal, socioeconomic surveys, gender and institutional analysis.

Mode: Headquarters development, jointly with the CRRSP; further development, testing and use of methodology and concepts emerging from this project will be done in close collaboration with NARS and NGOs involved in community studies.

THRUST III INTEGRATED COASTAL FISHERIES MANAGEMENT

Coastal fisheries management requires an approach which explicitly considers the linkages between the livelihoods and aspirations for economic advancement of coastal residents, the coastal ecosystems, including the fisheries, and activities which depend on coastal resources. This well-balanced perspective can best be achieved through a multifaceted, integrated approach which addresses the key factors that influence progress towards sustainable development. The coastal fisheries management approach employs an integrated, multisectoral approach to resolve multiple resource use conflicts. This thrust will build on work previously developed by ICLARM through its Coastal Area Management Program, and be implemented through three projects:

Project III.1 Valuation/evaluation of coastal resources

Scope: The project will build on previous ICLARM work on developing a methodology enabling non-market valuation in developing countries, emphasizing coastal fisheries resources. The "shadow" prices - one of the indicators of the value of nonmarketable resources - will be imputed/estimated in a user-friendly application software, designed for use in data-sparse situations.

Mode: Mainly headquarters development, complemented with collaborative projects with interested NARS.

Project III.2 Comparative analysis of coastal cross-sections

Scope: Coastal cross-section models, further developed from the transects used in agroecosystem analysis, will be used as tools to relate coastal fisheries to other coastal processes and sectors; identify classes of *similar fisheries and/or coastal cross-sections* and use these for "globalization" of site-specific knowledge; also identify typical development path of coastal fisheries and systems, and provide managers with costed options for management of entire coastal resource systems. Successful completion will enhance considerably the ability of the CRSP and of ICLARM as a whole to assist NARS and other agents of development in evaluating cost-efficiency and reliability of the many coastal development projects now being proposed worldwide.

Mode: Headquarters activity, with strong interactions with NARS and international institutions with coastal area management projects.

Project III.3 The policy and structural context of coastal fisheries management

Scope: An integrated, multisectoral policy approach will be taken to resolve multiple resource use conflicts and address key policy issues both within and in sectors complementary to the fisheries sector. The project will research - among other topics - the influence of nonfisheries sectors on fishing communities, the local effects of national resource policies, and the implications of such structural conditions as the relative importance of the fisheries sector in national economic

development priorities. The project will make use of policy, gender, institutional, and structural analysis.

Mode: This project will be implemented through collaborative arrangements with NARS and IARCs, notably IFPRI.

1.1.3 Complementary Activities

The program will respond to NARS requests for site-specific applications, or joint collaborative projects for further developments, in the areas covered by the thrusts described above, especially when they offer opportunity for wider testing, verification and dissemination of the numerous new concepts, methodologies and software to be developed during the MTP period.

1.1.4 Program Resource Requirements

The resource requirement of the CRSP 1994-98 by thrusts and projects are shown in Table 3.

1.1.5 Program Resource Allocation by CGIAR Activity

The planned resource allocation by CGIAR activity is shown in Table 4.

1.1.6 Program Logical Framework

The Program Logical Framework is presented on page 38.

Table 3

COASTAL RESOURCE SYSTEMS PROGRAM (CRSP)
Senior Staff Requirements 1994-98, by Thrust and Project
(In SSY)

Core Activities	1994	1995	1996	1997	1998
Program Management	0.5	0.5	0.5	0.5	0.5
THRUST I DYNAMICS OF MULTISPECIES SYSTEMS					
I.1 Assessment of multispecies fisheries	1.0	1.0	1.5	1.5	1.5
I.2 Productivity of aquatic ecosystems	1.0	1.0	1.0	1.0	1.0
I.3 Global and country-specific databases	1.0	1.0	1.0	1.0	1.0
THRUST II SOCIOECONOMIC DIMENSIONS OF COASTAL FISHERIES					
II.1 Bioeconomic modeling	0.5	1.0	1.0	1.0	1.0
II.2 Socioeconomic analysis for coastal fisheries co-management	0.5	0.75	1.0	1.0	1.0
THRUST III INTEGRATED COASTAL FISHERIES MANAGEMENT					
III.1 Valuation/evaluation of coastal resources	0.5	0.5	1.0	1.0	1.0
III.2 Comparative analysis of coastal cross-sections	1.0	1.0	1.0	2.0	2.0
III.3 Policy and structural context of coastal fisheries management	-	0.25	0.5	0.5	0.5
Subtotal, Core	**6.0**	**7.0**	**8.5**	**9.5**	**9.5**
Complementary Activities					
THRUST I DYNAMICS OF MULTISPECIES SYSTEMS					
I.4 Productivity of aquatic ecosystems	1.0	1.0	1.0	1.0	1.0
I.5 Country-specific databases	1.0	1.0	1.0	1.0	1.0
THRUST III INTEGRATED COASTAL FISHERIES MANAGEMENT					
III.4 Country-specific coastal cross-sections	-	-	1.0	1.0	1.0
Subtotal, Complementary	**2.0**	**2.0**	**3.0**	**3.0**	**3.0**
TOTAL PROGRAM	**8.0**	**9.0**	**11.5**	**12.5**	**12.5**

Table 4 COASTAL RESOURCE SYSTEMS PROGRAM (CRSP)
Senior Staff Requirements 1994-98, by CGIAR Activity
(In SSY)

Core Activities	1994	1995	1996	1997	1998
Program Management	0.5	0.5	0.5	0.5	0.5
1.1. Ecosystem conservation and management	2.5	2.5	3.5	4.5	4.5
1.2 Germplasm collection, conservation, characterization and evaluation	1.0	1.0	1.0	1.0	1.0
4.1 Economic and social analysis	2.0	2.75	3.0	3.0	3.0
4.2 Policy analysis	-	0.25	0.5	0.5	0.5
Subtotal, Core	6.0	7.0	8.5	9.5	9.5
Complementary Activities					
1.1. Ecosystem conservation and management	2.0	2.0	2.0	2.0	2.0
4.1 Economic and social analysis	-	-	1.0	1.0	1.0
Subtotal, Complementary	2.0	2.0	3.0	3.0	3.0
TOTAL PROGRAM	8.0	9.0	11.5	12.5	12.5

	Description	Verifiable Indicators	Means of Verification	Important and Critical Assumptions
Program Objective	Advancement in fisheries management and resource utilization	Research methods and tools developed by ICLARM adopted by NARS and applied in research work serving fisheries resources management purposes; ICLARM contributions to global knowledge	- Global/regional survey of research work undertaken by NARS and the impact hereof - ICLARM Staff articles in peer-reviewed journals, ICLARM publications; citations	
Thrust Objectives	Thrust 1: Development of analytic tools, models and information databases on coastal fish resources and their supporting ecosystems Thrust 2: Development of analytic tools for and models of coastal fisheries and their socioeconomic context Thrust 3: Development and test of models and approaches for managing coastal fisheries in the context of integrated development of coastal systems	- Tools, models and databases on coastal fish resources and supporting ecosystems developed - Socioeconomic tools and models for coastal fisheries management developed - Models and approaches for integrated development of coastal systems developed and tested	- Software and documentation available -User manuals and other training materials available - Guidelines for management systems and institutional changes available - Model descriptions and test reports available	Role of NARS recognized by national governments and sufficient research resources provided for
Outputs	Thrust 1 - Multispecies VPA-Tool for giving advice on how to allocate fishing effort (software and training materials) - Improved versions of tools for length-based fish stock assessment (software and training materials) - Improved models for description of energy flows - Maps on production potentials of various coastal aquatic systems - Documentation (databases) of global fish diversity and of the fishery resources of selected tropical countries (FISHBASE, FiDAS) Thrust 2 - Bioeconomic component of multispecies VPA tool - Simulation models (software) of fisheries including fisher's behavior - Identification of balance between centralized and community-management schemes for various types of resources/fisheries/communities Thrust 3 - Approaches for valuation of nonmarketable resources important to coastal fisheries - Coastal cross-section models (analytical tools)	- MSVPA tool inclusive of bioeconomic component developed - New version of FiSAT developed - ECOPATH II further developed - Contents of FISHBASE and FiDAS further expanded - Simulation models (bio-socioeconomic) developed - Management options for various resources, fisheries, communities analyzed/described - Valuation techniques developed - Coastal transect models developed - Maps on production potentials worked out	- MSVPA software and manuals - Software and documentation for new versions of FiSAT and ECOPATH II available including training material - FISHBASE, ACCESSIBLE (CD-ROM available) - FiDAS software and documentation - Publication on management options (articles, books, manuals) - Valuation techniques documented - Demonstration of the use of transect models; analytical results from use of transects for typologization/comparison of coastal sites - Maps on production potentials	Contributions from collaborators provided as planned - Collaborative arrangement with ASIs and NARS established and implemented - FiDAS: Interregional West Africa project established
Activities	- Analytical work and software development at HQ and at collaborating ASIs (MSVPA, ECOPATH, FiSAT, etc.); verification of models and tools at selected sites in collaboration with NARS - Training of NARS scientists in the use of and application of methods and software - Database feeding at HQ and collaborating IARCs, ASIs and NARS; training in database use - Socioeconomic and bioeconomic research at HQ and selected outreach sites - Valuation method development and testing - Institutional and community research on-site using farming system methodologies and RRA techniques adopted to coastal communities; analytical works at HQ; test of methods and concepts in collaboration with NARS	- Collaborative arrangements with ASIs and NARS - Primary data collected/analyzed - Development and testing of concepts and models performed	ICLARM Annual Report	
Inputs	Senior Staff Years (SSY)	94 95 96 97 98		
	Core Program	6.0 7.0 8.5 9.5 9.5		
	Complementary Program	2.0 2.0 3.0 3.0 3.0		
	Total	8.0 9.0 11.5 12.5 12.5		

1.2.THE CORAL REEF RESOURCE SYSTEMS PROGRAM (CRRSP)

1.2.1 Program Objective and Strategy

Objective: To sustain or improve the productivity of coral reef resource systems by improving the management of these complex ecosystems and their exploited resources, and by increasing the productivity of selected stocks by the development of aquaculture and fisheries enhancement systems.

Strategy: The focus of the Program will be on the activities of fishing communities in coralline regions, on their utilization and management of coral reef resources, on the prospects for enhancing those resources by the supplementation of natural recruitment with hatchery-reared stocks and on the development of appropriate biotechnical systems for village-based aquaculture.

Recruitment, the periodic addition of juvenile fish to exploited stocks, has emerged as the single most important variable in fishery science. Natural rates of recruitment are largely uncontrollable and are also highly sensitive to environmental degradation and to the depletion of spawning stocks. There is much evidence that populations of coral reef fish and invertebrates are usually recruitment limited. For this reason, the development of modern hatchery technology offers the opportunity for enhancing or stabilizing natural rates of recruitment, for re-establishing stocks which have been extinguished by over-exploitation, and for developing village-based aquaculture systems.

Social and economic aspects of fisheries management and aquaculture development have an overriding influence on whether or not fishing communities benefit from the results of biotechnical research. Indigenous knowledge, community organization, customary laws, rules and beliefs, and their legal and economic settings need to be understood and evaluated. New technologies must be integrated with the social and economic needs of coastal communities in order to draw upon the strengths of community-based organization and management systems.

The focus of research on aquaculture and fisheries enhancement will be ICLARM's Coastal Aquaculture Centre in the Solomon Islands, which is set in a typical equatorial coral reef environment, close to the centre of biodiversity of the Indo-West Pacific region. Consequently, there is a very high degree of applicability of results throughout the Asia-Pacific region. The target of all these activities will continue to be the coastal villager and the successfully established mode of participatory research in the development of aquaculture and fisheries management systems will be expanded.

A set of complementary projects is planned, including country-specific studies of indigenous knowledge of reef resources, the coordination of a consortium of institutions which will oversee the re-establishment of stocks of giant clams in countries where they have become extinct, research on the transfer of farming systems for bivalves to various countries and the development of culture systems for various species of coral reef fish and invertebrates which have favorable attributes for cultivation or fisheries enhancement programs.

There are overlapping themes, particularly in the social sciences, which link the projects. Likewise there are common objectives, needs and methodologies which will link the Program closely with the CRSP and also with the IARSP. Co-management and community-based management, issues of equity and gender, legal and institutional constraints, bioeconomic modeling and the valuation of reef resource systems are themes to be addressed in joint projects or by shared staff.

The bulk of the world's coral reef systems lies in the Indian and Pacific Oceans (70%) and the focus of the Program will therefore be on the Asia-Pacific region, but with activities in East Africa and the Caribbean roughly in proportion to the relative extent of the coral reefs in of those areas (10% and 15%, respectively). The transferability of results and concepts between these regions will be an important factor.

1.2.2 Program Thrusts and Core Activities

The Program will be carried out through two interlinked thrusts:

Thrust	Objectives
I. Improving resource management	To improve the management of coral reef resources by increasing our knowledge and understanding of the characteristics of fishing communities and fisheries resources.
II. Biotechnical systems for improving productivity	To improve income-earning opportunities and availability of foods for coastal villagers through the development of village-based aquaculture and fisheries enhancement systems in coral reef environments.

The thrusts and activities, together with their interactions, are described in Fig. 3.

Project I.1 Reefbase - global and national database for coral reef fisheries

Scope: Development of a global database of coral reef systems commenced in late 1992. It will include all categorical and numerical data available on all of the reef systems of the world, including fisheries data. It will also be linked into GIS systems and will be capable of yielding information which is of use to both fisheries and conservation agencies.

A second component of this project will be to develop a generic data acquisition system for use in models for the assessment and management of small-scale, multispecies, multigear fisheries, as exemplified by those in coral reef systems.

Mode: Reefbase will be developed on a collaborative basis with many agencies and there will be close collaborative links with agencies in developing countries and with ASIs, including the World Conservation Monitoring Centre, UK. Activities will

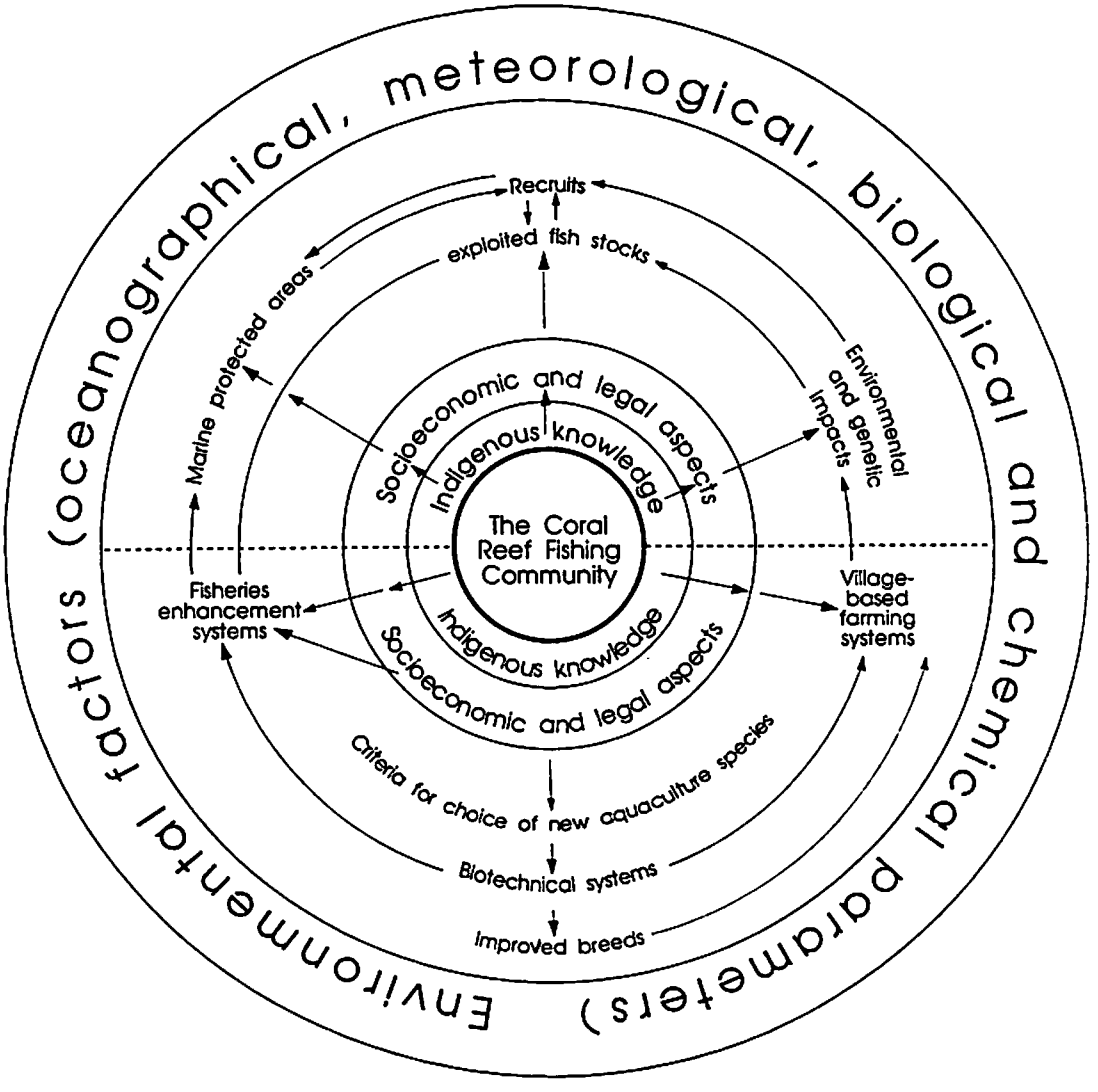

Fig. 3. The fishing community, with its social, economic and legal framework, both customary and modern, is central to all developments in fisheries management and aquaculture in coral reef resource systems. The community is the repository of a large body of indigenous knowledge of the resources, their biology and behavior and their environment. Biotechnical systems for the culture of carefully chosen species can lead to the development of farming systems or to fisheries enhancement systems designed to supplement the natural recruitment of young fish to exploited stocks. Marine protected areas are emerging as a vital fisheries management tool, particularly as an adjunct to fisheries enhancement systems. Selective breeding can lead to the development of improved breeds for aquaculture but care must be taken to avoid negative effects on the environment and on genetic resources.

Coral reefs differ from other aquatic resource systems in terms of their greater biodiversity, productivity and ecological fragility; promising both greater challenges and greater rewards for resource systems approach.

include development of an agreed system for classification of reef systems, the design and development of the database and inputting and updating data. ICLARM has extensive experience in the development of such databases and global linkages which will facilitate the acquisition and input of data.

Typically, catch and effort data for coral reef fisheries are very sparse and routine collection of landings data is not cost-effective because of the complexity of the fisheries. The data acquisition system will be based on inventories of fishing communities, their gear and methods and numerous social and economic parameters, coupled with information on catch rates and on the size composition of catches of selected species.

The methodology will include field testing of the proposed data acquisition system in collaboration with NARs in selected coral reef fisheries and evaluation of results for cost-effectiveness. Some, but not all, of the FIDAS data acquisition methodology developed by ICLARM in West Africa will be applicable and there will be strong linkages between this project and Project I.3 of the CRSP.

Project I.2 **Socioeconomic analysis for coastal and coral reef fisheries co-management. Joint project with CRSP. See CRSP Project II.2.**

Project I.3 **New strategies for management of coral reef fisheries**

Scope: Biotechnical and socioeconomic evaluation of active, community-based, management strategies for coral reef fisheries. These strategies include fisheries enhancement, control of top predators, protection of spawning aggregations, selective fishing, establishment of closed areas and the use of feeding stations. These strategies may be applied individually or in combination.

The project will also examine the biological, social and economic basis for the selection, development and management of marine protected areas (MPAs) in coral reef systems. It will have a large component of field work to examine the effectiveness of MPAs in enhancing various stocks (using recently-developed sampling strategies), the migration of fishes into and out of exploited areas, comparative fecundities and rates of recruitment in protected and unprotected stocks, the importance of spawning aggregations, and will develop models to examine the comparative responses of various species to MPAs. The methods for valuation of coastal resources developed under the CRSP Project III.1 will be applied to MPAs.

Mode: Undertaken in collaboration with NARS, NGOs and coral reef fishing communities in representative tropical Indo-Pacific and Caribbean countries, including some with established systems of marine tenure.

Project II.1 **Cultivation of bivalve molluscs**

Scope: Coral reef resource systems harbor many species of bivalves which are of great value as producers of food and of income. The most important groups in the Indo-Pacific region are giant clams and pearl oysters but there are other groups

which are heavily exploited at a subsistence level. They appear to offer much potential for cultivation and thus, opportunities to improve incomes and food availability for coastal villages.

The relatively simple hatchery and nursery technologies which have been developed for giant clams can be extended to other genera and species, and ICLARM's participatory research approach to adoption of giant clam cultivation by villagers can be likewise adapted.

In connection with giant clams, further work is proposed on the use of the farming systems approach to evaluate the framework of activities of participating villagers, within which aquacultural work must be undertaken. Additionally, the comparative economics of various cultivation systems will be evaluated on a regional basis, to examine likely country or location-specific effects on the economic viability of the systems. Market analyses for various products will be undertaken.

Work will continue on the improvement of biotechnical systems and a program of selective breeding of giant clams will be undertaken as a long-term, low-level activity. Continued investigations are planned on the unique nutrition of giant clams. The development of genetic markers and characterization of different stocks will be an important subcomponent, executed in collaboration with the Australian Institute of Marine Science.

For pearl oysters, work will focus on testing the practicality of deployment of spat (seed) collectors in a variety of situations and depths and on the development of simplified hatchery techniques, both aimed at the production of spat for ongrowing in villages. At a later stage work could be integrated into the farming systems work on giant clams, using complementary county-specific funding.

Mode: The project will be executed by:

- collaborative research undertaken with NARS and ASIs in Southeast Asia and the Pacific which are currently participating in the Giant Clam Research Group coordinated by ICLARM; and

- collaborative research at the Coastal Aquaculture Centre, mostly done in conjunction with the Solomon Islands Fisheries Division.

Project II.2 New species for aquaculture and resource enhancement

Scope: Criteria will be developed to assess the potential for aquaculture and enhanced fisheries of the wide variety of coral reef fishes and invertebrates which have desirable attributes in terms of growth rates, feeding habits, nutritional qualities and value. Because of their attributes, wild stocks of the most desirable species have been drastically depleted in many fisheries.

Tropical sea cucumbers are a very promising group which appear to offer particular opportunities for stock enhancement in the Indo-Pacific region and this will be the first group to be investigated. A global review of the status of wild stocks, with

particular reference to their capacity to recover from overexploitation and the economics of "beche-de-mer" production will precede hatchery work on selected species.

The potentials of other species of fish and invertebrates will also be examined and these investigations are expected to lead to the development of complementary projects.

Mode: Basic research conducted at the Coastal Aquaculture Centre in the Solomon Islands, supplemented by research in conjunction with participating NARS elsewhere in the Indo-Pacific and with the JICA/FAO South Pacific Aquaculture Development Project.

1.2.3 Complementary Activities 1994-98

A number of complementary activities are planned or currently in progress which will run concurrently with core activities during the planning period and which will occupy some staff time for supervisory purposes.

Project I.4 (Thrust I) Indigenous knowledge and management systems for coral reef resources

Scope: A vast repository of indigenous knowledge concerning fisheries resources and their management is being lost as a result of the adoption of modern fishing technology and other societal changes. Prompt action, systematically coordinated, has the potential to document much of this knowledge for posterity.

Mode: A project will be developed to accelerate and consolidate the collection of such information. It is envisaged as a medium-term undertaking, in which a standardized cooperative approach is taken to gathering indigenous knowledge in collaboration with NARS.

Project II.3 (Thrust II) Re-establishment of stocks of giant clams

Scope: This is proposed as a collaborative project in which stocks of giant clams are re-established in countries where they have become extinct or reduced to non-viable levels. Where the remnants of local stocks exist their genetic identities must be preserved. As aquaculture systems develop and transfers of genetic materials are effected between and within areas of genetic distinctness, there is a danger that valuable genetic resources will be swamped. Recent work has shown significant genetic structuring of giant clam stocks within the Pacific. The most effective way to monitor survival of transfers and to characterize stocks recruitment is by the use of DNA markers.

Mode: Breeding programs will be undertaken on a planned basis in countries which have active hatcheries, such as the Solomon Islands, Marshall Islands, Palau, Fiji, Tonga and Australia. The aim will be to maximize the genetic diversity of early spat which are to be exported to countries such as Philippines, Indonesia, Fiji, Federated States of Micronesia, Northern Marianas, Tonga, Western Samoa, American Samoa,

Vanuatu and New Caledonia, where one or more of the larger species (*Tridacna gigas*, *T. derasa* or *Hippopus hippopus*) are extinct, or nearly so. Spat would be reared under quarantine conditions at receiving institutions and later transferred to marine protected areas, ideally under community control, for rearing to maturity and subsequent use in breeding programs. Information on interaction between genotypes and environments would be collated.

A centralized database to record transfers of genetic material will be developed and maintained at ICLARM. Compatible databases and records systems would be developed and records kept in other facilities in the region.

Project II.4 (Thrust II) Bivalve farming systems

Scope: This project will be initiated in the latter part of the planning period and will be concerned with the transfer of farming systems for bivalves to selected countries in the Indo-Pacific region and their adaptation to local social, economic and ecological conditions.

Mode: Executed in a collaborative basis with NARS by ICLARM's Farming systems specialists with technical support from biologists of the Coastal Aquaculture Centre.

Project II.5 (Thrust II) Culture systems for coral reef fish and invertebrates

Scope: Following the development of selection criteria for promising species and a review of the prospects for stock enhancement (Project II.2) in coral reef systems, research efforts will be directed toward the development of culture systems for selected species of reef fish and invertebrates, leading to farming on fisheries enhancement systems of wide applicability in coralline regions.

Mode: Research conducted at the Coastal Aquaculture Centre in collaboration with NARS and ASIs working in coordinated research groups.

1.2.4 Program Resource Requirements

The resource requirements of the CRRSP 1994-1998 by thrusts and by projects are shown in Table 5.

1.2.5 Program Resource Allocation by CGIAR Activity

The planned resource allocation by CGIAR activity and region is shown in Table 6.

1.2.6 Program Logical Framework

The Program Logical Framework is presented on page 48.

Table 5

CORAL REEF RESOURCE SYSTEMS PROGRAM (CRRSP)
Senior Staff Requirements 1994-98, by Thrust and Project
(In SSY)

Core Activities	1994	1995	1996	1997	1998
Program Management	0.5	0.5	0.5	0.5	0.5
THRUST I IMPROVING RESOURCE MANAGEMENT					
I.1 Reefbase - Global and national database for coral reef fisheries	1.0	1.0	1.5	2.0	2.0
I.2 Socioeconomic analysis for coastal and coral reef fisheries co-management	0.5	0.5	0.5	0.5	0.5
I.3 New strategies for management of coral reef fisheries	0.5	1.0	2.0	3.0	3.0
THRUST II BIOTECHNICAL SYSTEMS FOR IMPROVING PRODUCTIVITY					
II.1 Cultivation of bivalve molluscs	1.0	1.0	1.0	-	-
II.2 New species for aquaculture and resource enhancement	1.0	1.5	1.5	1.75	1.75
Subtotal, Core	4.5	5.5	7.0	7.75	7.75
Complementary Activities					
THRUST I IMPROVING RESOURCE MANAGEMENT					
I.4 Indigenous knowledge and management systems for coral reef resources	1.0	1.0	0.5	-	-
THRUST II BIOTECHNICAL SYSTEMS FOR IMPROVING PRODUCTIVITY					
II.3 Re-establishment of stocks of giant clams	0.5	0.5	0.5	0.5	0.5
II.4 Bivalve farming systems	-	-	1.0	1.0	1.0
II.5 Culture systems for coral reef fish and invertebrates	-	-	0.5	2.0	2.5
Subtotal, Complementary	1.5	1.5	2.5	3.5	4.0
TOTAL PROGRAM	6.0	7.0	9.5	11.25	11.75

Table 6 CORAL REEF RESOURCE SYSTEMS PROGRAM (CRRSP)
Senior Staff Requirements 1994-98, by CGIAR Activity
(In SSY)

Core Activities	1994	1995	1996	1997	1998
Program Management	0.5	0.5	0.5	0.5	0.5
1.1 Ecosystem conservation and management	1.5	2.0	2.5	3.25	3.25
3.4 Production systems development and management	1.5	1.5	1.5	1.25	1.25
4.1 Economic and social analysis	1.0	1.5	2.5	2.75	2.75
Subtotal, Core	4.5	5.5	7.0	7.75	7.75
Complementary Activities					
1.1 Ecosystem conservation and management	0.75	0.75	0.25	-	-
2.4 Germplasm enhancement and breeding	0.5	0.5	0.5	0.5	0.5
3.4 Production systems development and management	-	-	0.5	2.0	2.5
4.1 Economic and social analysis	0.25	0.25	1.25	1.0	1.0
Subtotal, Complementary	1.5	1.5	2.5	3.5	4.0
TOTAL PROGRAM	6.0	7.0	9.5	11.25	11.75

PROGRAM: CRRSP **LOGICAL FRAMEWORK**

	Description	Verifiable Indicators	Means of Verification	Important and Critical Assumptions
Program Objective	Sustained or improved productivity of coral reef resource systems	Stabilized or increased catches per unit of fishing effort; increase in coral reef aquaculture production	Review reports on local/regional/ global reef fisheries and aquaculture; research publications	
Thrust Objectives	Thrust 1: Improved management of coral reef resources Thrust 2: Improved income opportunities and food availability for coastal villages through village-based aquaculture and fisheries enhancement	- Increases in village aquaculture production - Increase in amounts of targeted species/sizes in catch composition - Increase in catch per unit of effort - Household incomes increased - Increase in supply of fish for local consumption	- Project monitoring reports (site-specific) - Peer-reviewed research publications - Local/regional/national statistics - Project evaluation reports - Household surveys	- Active community support for management of coral reef resources - Government support for improvements in reef resource management
Outputs	Core Program: - Test and social acceptability and practicability of new active-community-based management strategies - Scientific guidelines for selection, development and management of marine-protected areas (MPAs) - Global database on coral reef systems (REEFBASE) and data acquisition system for small-scale, multispecies, multigear coral reef fisheries - Evaluation of integrating bivalve molluscs aquaculture with other village activities - Improved biotechnical systems for cultivation of bivalve molluscs - Selection criteria and review of potential species for aquaculture and resource enhancement - Research results from biotechnical work with new species Complementary Program: - Information base on indigenous knowledge of fishery resources and management - Re-establishment of giant clam stocks in selected sites - Transfer and adaptation of bivalve farming systems to other regions	- Articles, reports, books, etc. on research results published - Database established (REEFBASE) - Data acquisition system developed and tested - Technical manuals drawn up - Review reports drawn up - Information base on indigenous knowledge established - Stock assessment data provided - Bivalve farming systems adapted in pilot sites - Stocks of giant clams re-established in various countries	- Articles, reports, book, etc. - Database accessible (CD-ROM available) - Data-acquisition system documentation - Technical manuals - Review reports - Information base on indigenous knowledge - Stock assessment - Project monitoring reports - Database on transfers of genetic material (giant clams)	Contribution from collaborators provided as planned
Activities	Core Program: - Field tests of technical and socioeconomic feasibility of applying new management measures - Database establishment (REEFBASE); data acquisition - Adaptation of FIDAS methodology to coral reef systems; development and test of data acquisition system - Field tests of effectiveness of MPAs and guidelines - Comparative analysis of bivalve molluscs cultivation systems - Basic biotechnical on-station research on new species - Research reviews (new species) and establishment of criteria for choice Complementary Program: - Surveys for collection of indigenous knowledge - Collaborative breeding activities for giant clams	- Test results recorded and reported - FIDAS methodology adapted and documented; data acquisition system established - REEFBASE established and data fed in - Biotechnical research recorded and reported - Review reports written - Survey data recorded and results reported - Test reports written - Shipments and survival of giant clams spat or larvae recorded	ICLARM Annual Report	Collaborative arrangements with ASIs, NARS and NGOs established

Inputs		94	95	96	97	98
	Senior Staff Years (SSY)					
	Core Program	4.5	5.5	7.0	7.75	7.75
	Complementary Program	1.5	1.5	2.5	3.5	4.0
	Total	6.0	7.0	9.5	11.25	11.75

1.3. THE INLAND AQUATIC RESOURCE SYSTEMS PROGRAM (IARSP)

1.3.1 Program Objective and Strategy

Objective: To foster the adoption of sustainable inland aquaculture by resource-poor farmers, raising their incomes and nutritional status and increasing the supply of fish.

Strategy: The focus will be on the development of socially and environmentally acceptable methods for farming fish that can be raised on low-cost feeds and fertilizers. This will involve the development of new tilapia and carp breeds, to be farmed in ponds and rice floodwaters.

This research will be done with the participation of farmers who are representative of the many potential adopters of inland aquaculture as a means towards integrated resources management and as a profitable smallholder enterprise. These are here termed "new entrants", meaning new to fish farming, new to integrated resources management or both. In some cases, landless persons are also targeted. Pond aquaculture will be evaluated as an enterprise to be undertaken also by women.

Environmental costs and benefits will receive particular attention, building upon the experience gained through the Center's 1990 Bellagio Conference on Environment and Aquaculture in Developing Countries and through interactions with the international, regional, and national bodies that lead environmental conservation efforts, e.g., IUCN, the Asian Wetland Bureau and NARS.

Amongst the many collaborators to be involved, it is noteworthy that there will be close linkages with other IARCs, because inland waters are a key resource for the entire CGIAR agenda, especially for the evolution of ecoregional mechanisms.

Research at HQ will comprise mainly data processing, modeling, development of analytical frameworks and software. When ICLARM's new HQ is operational in, say 1996, these activities will be extended to include fish breeding and biological research in ICLARM's ponds and tanks and *ex situ* germplasm conservation as cryopreserved sperm and live fish collections. Interim arrangements for breeding and pond trophic dynamics research, before the new HQ facilities are available, are described by project below.

Core activities will be those in which ICLARM is setting novel directions in strategic aquaculture research emphasizing: 1. selective breeding of tropical fish; 2. elucidation of the trophic dynamics of fishponds; and 3. integrating water management and inland aquaculture within whole farm resource systems, to promote new synergisms among enterprises and sustainability.

Complementary activities will increase the spread of this core research among more diverse sites so as to strengthen regional and global findings.

1.3.2 Program Thrusts and Core Activities

The Program research will be carried out in two thrusts, normally combining their activities at or near the same work site:

Thrust	Objectives
I. **Fish productivity**	To develop new tilapia and carp breeds to be farmed in ponds and rice floodwaters by resource-poor farmers; and to understand pond foodchains for optional resource management.
II. **Integrated resources management**	To develop sustainable integrated agriculture-aquaculture farming systems for resource-poor farmers.

THRUST I FISH PRODUCTIVITY

ICLARM's strategic research will assist national programs in biodiversity conservation and fish breeding. The Center's recent work, using Nile tilapia as a model species, (it is farmed or under experimentation for farming in over 60 countries) has indicated that evaluation of wild genetic resources and simple selective breeding programs can yield rapid genetic gain: a 20% response to selection for better growth performance has been achieved in one generation. How to establish and sustain such breeding programs and how to choose among and use new genetic management techniques (biotechnology) safely and equitably are the major challenges.

The new fish breeds and breeding methods to be developed through this thrust will be for resource-poor farmers using waters that receive low-cost inputs. These environments must therefore be well understood. Hence, the genetics research will be interactive with research on the trophic dynamics of fishponds and rice floodwaters and on user perspectives and likely impact, so that the efficiency and profitability of conversion of low-cost feeds and fertilizers into fish can be maximized.

Project I.1 Genetic improvement of farmed fish

Scope: Characterization, collection and evaluation of strategically important tilapia and carp genetic resources in Asia and subSaharan Africa; germplasm enhancement and breeding for low-cost input pond aquaculture with *in situ* and *ex situ* conservation of biodiversity (cryopreserved sperm and live fish collections); catalyzing self-sustaining national fish breeding programs; assessing user perspectives on new fish breeds and potential social and economic impacts; environmental safeguards and biodiversity conservation.

Mode: Activities include expansion of the ongoing Genetic Improvement of Farmed Tilapias (GIFT) project (currently led by ICLARM, with Philippine institutions and the Institute of Aquaculture Research of Norway as collaborators) of research on

tilapias and carps, with development of an international network involving about six Asian and four African NARS as long-term collaborative research partners, and with interactions and exchanges with a wider range of NARS, ASIs, IARCs (including collaboration with biotechnology researchers) and international agencies (e.g., IUCN and FAO). Genetic resources (biodiversity) research results and summary data on farmed fish breeds will be lodged in FISHBASE. Germplasm enhancement and breeding and research on user perspectives will be done entirely in the facilities of collaborating NARS and ASIs up to the completion of ICLARM's new HQ. Thereafter, breeding research on a few species of circumtropical importance (mainly tilapias) and banking of their germplasm will also be conducted at HQ; the potential environmental, social and economic effects of new fish breeds will be assessed through the international network and through special consultations and workshops.

Project I.2 Trophic dynamics of fishponds

Scope: Studies on foodchains in ponds and rice floodwaters that receive low-cost feeds (principally agricultural residues) and fertilizers (e.g., TSP, urea and organics); focusing on trophic dynamics (particularly C, N, P and energy fluxes) of bacteria, detritus, fish, meiofauna, phytoplankton and other aquatic life.

Mode: Decentralized on-station and farmer participatory research, in collaboration with AIT as the major ASI partner, the USAID Pond Dynamics/Aquaculture Collaborative Research Support Program, other ASIs, IARCs and NARS; radiotracer and other trophic dynamics methods will be used; data analysis will be linked to the CRSP work on ECOPATH and integrated resource systems models (see Thrust II).

THRUST II INTEGRATED RESOURCES MANAGEMENT

Inland integrated aquaculture-agriculture farming has moved slowly (from research to application) because farmers had little participation in the research and the crop-fish, livestock-fish systems developed on-station did not suit their circumstances. This thrust *relies* on farmer participation in research towards integration of all their available resources, rather than just one or two farm enterprises as in past efforts. Such an integrated resource systems approach requires social scientists and biologists to work interactively in three areas: 1. evolving participatory strategies for transforming farming systems to integrated agriculture-aquaculture; 2. modeling the ecological and bioeconomic consequences of system transformation; and 3. evaluating the social, economic and institutional factors that may affect the adoption and retention of such systems by new entrants.

This demands a large measure of decentralized research at regional sites that represent a range of agroecosystems and social structures. Such research will lead to regionally and globally applicable findings. An "Integrated Resource Systems Group" within the program will be established to ensure close interaction among projects and among staff based at outreach sites and HQ.

Project II.1 Integrated agriculture-aquaculture systems

Scope: This project comprises research that will develop procedures for farm households to integrate aquaculture into their farm systems and to recognize and develop their resource management options and skills. An analytical framework for monitoring and assessing changes in households and natural resource systems will be developed. The research will include the development of farmer participatory methods for integrated resources management. Integrated agriculture-aquaculture work sites will include ricefields and ponds. Biological research will address optimization of aquatic productivity and choice of fish species. Socioeconomic research will address how decisions on integrated resources management are made at household and community levels.

Mode: The research will be carried out at ecoregional and global levels. Ecoregional outreach sites will be selected to represent: 1. the 7 million ha of dambo areas of subSaharan Africa; 2. the 68 million ha of ricelands in Southeast Asia; and 3. the 20 million ha of floodplain farming areas of South Asia. At each site, partnerships will be established with farmers, NGOs and governmental research and extension institutions. Natural resource systems will be assessed and categorized through maps and transects, and by modeling bioresource flows. Farmer participatory experiments in agriculture-aquaculture integration techniques will follow. Thereafter the impact of integration will be measured through performance indicators such as enterprise diversity, recycling, biological productivity, economic efficiency, equity and stability. Biotechnical, socioeconomic and environmental questions arising will be addressed through collaborative research with NARS and ASIs. Sharing research findings with farmers will close the cycle of research and ensure its continuity.

HQ staff will synthesize ecoregional findings and extract global generalizations for methods and new knowledge on integrated aquaculture-agriculture farming systems. User perspectives of the methods will be obtained through collaborative agreements with IARCs, NARS and ASIs operating in a wider array of sites in Asia and subSaharan Africa. Such testing could start by mid-plan period. Where user tests are successful, interested scientific associations, networks and projects could then be given the results to apply more widely.

Project II.2 Bioeconomic and ecological modeling

Scope: Modeling will be undertaken in bioeconomics and ecology to assess impact and to make simulations and projections of integrated resource systems performance over time and space. Assessment criteria will include input-output balances, recycling, diversity, stability, equity (including gender), productivity and economic efficiency. An array of analytical techniques including budgeting, linear and dynamic programming will be employed. Multivariate analysis will be used to develop systems typologies. Ecological processes will be modeled using steady-state (ECOPATH) and dynamic modeling programs. The models will predict performance of integrated resource systems and allow independent regional testing across different agroecosystems, with different property management regimes and user groups.

Mode: The models, at ecoregional and global levels, will be developed at HQ from primary data gathered at the outreach sites and appropriate secondary data (where available) and tested at the outreach sites. If testing proves successful, the models will be shared with IARCs, NARS and ASIs, as in Project II.1.

Project II.3 New entrants

Scope: Socioeconomic profiles of new entrants will be made at household and community levels. Factors that predispose for successful adoption and retention of integrated resources management will be analyzed. The impact of adoption on women and children, income distribution and resource access will be evaluated. Based on these findings, changes in policies and institutional arrangements (e.g. technical support, extension services, credit, subsidies) will be suggested.

Mode: This research will be carried out among farming communities in the outreach sites identified in Project II.1. Primary and secondary data will be collected and analyzed using quantitative and qualitative techniques (including participant observation and case studies of community resource management). For institutional and policy analysis, advice will be sought from IFPRI, other IARCs, NARS and ASIs.

1.3.3 Complementary Activities 1994-98

With inland aquaculture and integrated resources management at present underdeveloped in all subSaharan Africa and most of tropical Asia, and with a wide diversity of potential species and systems and of different perspectives among potential adopters, it is important that general principles and location-specific factors are clarified. Thus, the development of guidelines and models must include recognition of their limitations and applicability across sites. This applies to fish breeding (collaborative research by genetics network members on a variety of tilapia and carp species), to trophic dynamics (research at AIT and with other collaborators using low-cost inputs in different pond and rice floodwater ecosystems) and particularly to integrated resources management research, which is decentralized among different ecoregional sites.

The complementary activities proposed here will facilitate a balanced effort between work at sites in South and Southeast Asia (including some complementary activities at ICLARM's HQ) and in subSaharan Africa. For the latter, the extent of activities in the various subregions (Eastern-Central-Southern and West) will depend upon available resources. Priority will be given to building upon ICLARM's strengths. The Center's staff have worked continuously in Southern Africa since 1986, and activities can now be expanded to involve collaboration in Eastern and Central Africa.

1.3.4 Program Resource Requirements

The resource needs of the IARSP 1994-98 by thrusts and projects are shown in Table 7.

1.3.5 Program-Resource Allocation by CGIAR Activity

The planned resource allocation by activity is shown in Table 8.

1.3.6 Program Logical Framework

The Program Logical Framework is presented on page 56.

Table 7 INLAND AQUATIC RESOURCE SYSTEMS PROGRAM (IARSP)
Senior Staff Requirements 1994-98, by Thrust and Project
(In SSY)

Core Activities	1994	1995	1996	1997	1998
Program Management	0.75	0.75	0.75	1.0	1.0
THRUST 1 FISH PRODUCTIVITY					
I.1 Genetic improvement of farmed fish	2.0	2.25	2.5	2.5	2.5
I.2 Trophic dynamics of fishponds	-	0.25	0.25	0.5	1.5
THRUST II INTEGRATED RESOURCES MANAGEMENT					
II.1 Integrated agriculture-aquaculture systems	1.5	2.0	2.5	2.5	2.5
II.2 Bioeconomic and ecological modeling	1.0	1.0	1.5	1.5	1.5
II.3 New entrants	1.0	1.0	1.5	1.5	1.5
Subtotal, Core	**6.25**	**7.25**	**9.0**	**9.5**	**10.5**
Complementary Activities					
THRUST 1 FISH PRODUCTIVITY					
I.3 Trophic dynamics	-	1.0	1.0	1.0	1.0
I.4 Regional outreach (Genetics-breeding programs in Asia and Africa)	0.25	0.25	0.5	0.5	1.0
THRUST II INTEGRATED RESOURCES MANAGEMENT					
II.4 Regional outreach (Integrated resources management)					
Adoption studies	2.0	2.0	2.0	2.0	2.0
Ecology, IAA (HQ)	0.5	0.5	1.0	1.0	1.0
IndoChina-initiative	1.0	1.0	1.0	1.0	1.0
Biology for IAA system	2.0	2.5	2.5	2.5	3.0
West Africa-initiative	-	-	0.5	1.0	2.0
Subtotal, Complementary	**5.75**	**7.25**	**8.5**	**9.0**	**11.0**
TOTAL PROGRAM	**12.0**	**14.5**	**17.5**	**18.5**	**21.5**

Table 8 INLAND AQUATIC RESOURCE SYSTEMS PROGRAM (IARSP)
Senior Staff Requirements 1994-98, by CGIAR Activity
(In SSY)

	Core Activities	1994	1995	1996	1997	1998
	Program Management	0.75	0.75	0.75	1.0	1.0
1.2	Germplasm collection, conservation, characterization, and evaluation	1.0	1.0	1.0	1.0	1.0
2.4	Germplasm enhancement and breeding	1.0	1.25	1.5	1.5	1.5
3.4	Production systems development and management	2.5	3.25	4.25	4.5	5.5
4.1	Economic and social analysis	1.0	1.0	1.5	1.5	1.5
	Subtotal, Core	6.25	7.25	9.0	9.5	10.5
	Complementary Activities					
2.4	Germplasm enhancement and breeding	0.25	0.25	0.5	0.5	1.0
3.4	Production systems development and management	4.0	5.0	5.5	5.5	6.0
4.1	Economic and social analysis	1.5	2.0	2.5	3.0	4.0
	Subtotal, Complementary	5.75	7.25	8.5	9.0	11.0
	TOTAL PROGRAM	12.0	14.5	17.5	18.5	21.5

PROGRAM: IARSP

LOGICAL FRAMEWORK

	Description	Verifiable Indicators	Means of Verification	Important and Critical Assumptions
Program Objective	Adoption of sustainable inland aquaculture by resource-poor farmers and increasing the supply of fish	New fish breeds and integrated resources management adopted by new entrant farmers	- Program review reports - Research literature (peer-reviewed books and articles)	
Thrust Objectives	Thrust 1 : Improving performance in low-cost input pond systems by selection for growth, feed conversion, disease resistance and other commercial traits; understanding pond foodchains for optional management of resources Thrust 2 : Development of sustainable, equitable and environmentally sound integrated agriculture-aquaculture systems with models to elucidate their limitations and further research needs; understanding attitudes and decision-making of adopters; identification of policy and institutional factors that encourage or constrain adoption of inland aquaculture.	- Genetic characterization of farmed fish; in situ and ex-situ germplasm conservation; genetic gain; use of germplasm by NARS; increased conversion efficiency of low-cost inputs to fishponds - Increased whole farm performance (from new linkages and ecological changes, not just fish yields) in terms of income; aquaculture enterprises for women; fish in IPM; increased fertility; water availability and risk reduction; adaptation of research agenda to farmers' knowledge, attitudes and needs; common aspects of policy and institutional arrangements that have encouraged or constrained inland aquaculture investigated; guidelines for farmers' integrated resource use by NARS and NGOs	- Genetic resources (biodiversity) research - Test reports on new fish breeds - Feedback from an international network - Test reports on new feed/fertilizer management strategies; - Analyses of economic, social and environmental consequences of new breeds and pond management methods in research - Research publications - Software and models - Feedback from end-users - Feedback from NARS, NGO and IARC collaborators - Donor assessment of inland aquaculture development projects	- Contributions from collaborators provided as planned - Trophic dynamics research, mainly undertaken at AIT
Outputs	- Documentation of the biodiversity of farmed tilapias and carps - New tilapia and carp breeds - New fish breeding methods - Initiation of national fish breeding programs by network members - New knowledge on foodchains in ponds with low cost-inputs - Guidelines for integrated resources management by farmers - Bioeconomic and ecological models and software - Profiles of new entrant farm households and communities adopting aquaculture for integrated resources management - Identification of critical policy and institutional factors affecting inland aquaculture - Commissioned reviews on inland aquaculture systems research - Fish genetics research network	- FISHBASE entries - Research results on genetic gains reported - Research results on new breeding reported - Breeding programs initiated - Research results on pond dynamics reported - Research tools for NARS, NGOs prepared - Models built; software written and documented - Research results on the adoption of new integrated resource management practices reported - Publications - Reviews published - Genetics network established	- Peer-reviewed research publications (books, articles, etc.) - Guidelines for integrated resource management - Training material - Software packages (programs and manuals) - Models documented in publications - Review reports published - Genetics network by-laws, list of members	
Activities	Core Program: - Strategic research with collaborators on fish breeding, pond trophic dynamics and integrated farming systems, combining new breeds, new systems and new entrants (farmer cooperators) - Initiation of international fish genetics research network - Software development and database loading Complementary Program: - Additional research and outreach sites to supplement core research - Commissioned reviews (inland aquatic systems research frameworks; stress in farmed fish)	Core Program: - Research activities (inclusive of software development and testing and database loading) recorded - Network planning and implementation undertaken Complementary Program: - Research activities recorded - Reviews undertaken	ICLARM Annual Report	- Collaborative arrangements with ASIs, NARS and NGOs established - In-house research undertaken at ICLARM's new HQ from 1996/97.

Inputs

Senior Staff Years (SSY)	94	95	96	97	98
Core Program	6.25	7.25	9.0	9.5	10.5
Complementary Program	5.75	7.25	8.5	10.0	11.0
Total	11.75	14.5	17.5	19.5	21.5

1.4. THE NATIONAL RESEARCH SUPPORT PROGRAM (NRSP)

1.4.1 Program Objective and Strategy

Objective: To strengthen the institutional capabilities of NARS to undertake effective planning, implementation and management of national fisheries research, and to provide feedback to the Center on the effectiveness of its research.

Strategy: The program will build up the professional skills of national scientists through short-term, in-service training courses for researchers; organized opportunities for postgraduate students, post-doctorates and senior scientists to participate in the center's research and related activities, and through professional networks.

The program will seek to strengthen national competence in adopting new approaches and methodologies in fisheries research planning and management in response to changes of the fisheries sector and the aquatic environment. The program will collaborate with ISNAR using methodologies developed and applied by ISNAR. ICLARM will supply technical expertise in fisheries for priority setting, design and management of national/institutional research programs.

Realizing that networking is an efficient way to multiply research impact, the program will support and promote information exchange and research collaboration by organizing and coordinating institutional networks in areas where ICLARM has a comparative advantage.

The program will collaborate closely with SIFR secretariat in providing support services to NARS in terms of information on donor agencies, educational institutions, availability of training opportunities and fellowships.

The program will promote interaction to ensure that the center's programs and the application of research findings respond to the priorities and concerns of NARS. Mechanisms of feedback and impact assessment are discussed in Chapter 1.5.

1.4.2 Program Thrusts and Core Activities

The NRSP will be implemented through two interactive thrusts:

Thrust	Objectives
I. Human resource development	To strengthen the professional skills of fisheries scientists (and research support personnel) in applying and adapting new research approaches, methodologies and tools in national programs.
II. Strengthening of national institutions	To develop and test models and approaches in implementing and managing effective national fisheries research programs.

THRUST I HUMAN RESOURCE DEVELOPMENT

The focus of this thrust is on training which will complement regional and national training programs.

Project I.1 In-service training in fisheries management

Scope: Short-term (normally 2-4 weeks) regular training courses for NARS scientists, trainers and others with the aim of transferring new knowledge, methodologies and tools generated by the ICLARM research programs. Courses could be conducted at ICLARM HQ or elsewhere.

The training courses planned for the period 1994-98 are based on the following themes:

- *Advances in fisheries stock assessment and management.* A yearly training course on the application of advanced tools for fish stock assessment and fisheries management.

- *Tropical fish genetics and breeding.* Two regional training courses on applied fish breeding and quantitative genetics (Asia, Africa) in 1994/95 followed by a yearly international training course on advances in tropical fish genetics and breeding.

- *Integrated farming systems.* An annual training course on each of the following: integrated rice-fish farming in collaboration with IRRI; participatory research in collaboration with the International Institute for Rural Reconstruction (IIRR) beginning 1995.

- *Aquaculture and the environment.* Two training courses emphasizing aquaculture development planning within the context of environmental compatibility will be organized in 1995 and 1997 in collaboration with various international and regional agencies.

- *Integrated fisheries management.* An annual training course emphasizing the integrative approach to fisheries management will begin in 1995.

- *Management of coral reef ecosystems and fisheries.* An annual training course for fisheries managers and scientists on the management of coral reef ecosystems and fisheries will start in 1996. Training courses on the application of Reefbase will be conducted when the software is ready for dissemination.

- *Research and information management.* An annual training course for fisheries managers and researchers on the development of research programs at individual, institutional and national levels; preparation of proposals for funding support and information management; scheduled to begin in 1995.

Mode: The NRSP, through the Training Unit, will organize the courses, provide logistic support, monitor and evaluate the training, and channel feedback to the research programs. The research programs will provide trainers and prepare training materials. Other trainers from IARCs, ASIs and NARS will be invited whenever necessary. The NRSP will develop in-house capability to conduct regular training courses which have been well established.

Detailed curricula for each training course will be developed in collaboration with the research programs. A course advisory committee, consisting of relevant experts and the NRSP training coordinator, will be formed for each training course to ensure balance in terms of scope and coverage, appropriateness and duration.

Project I.2 Preparation of training materials, including manuals, audiovisuals and self-learning materials

Scope: This project is closely linked to project I.1. Training and self-learning materials of four categories will be prepared: fish stock assessment methods, integrated farming systems, tilapia genetics and integrated fisheries management. The target users are NARS scientists, trainers and managers.

Videos on fish production and management techniques/technologies developed by ICLARM will be prepared, e.g., giant clam cultivation and genetic improvement of farmed tilapias.

Mode: Training materials will be prepared by staff of the research programs in collaboration with NRSP staff. The NRSP will provide guidance and assistance in refining and transforming these into appropriate teaching/training manuals or self-learning materials.

Some of the materials/manuals will be developed in collaboration with FAO and other agencies. As far as possible, the advisory committee for the training courses will also be responsible in overseeing the preparation of the materials.

Project I.3 Research fellowship scheme for NARS scientists

Scope: This project provides opportunity for a limited number (about 10 per year) of researchers from NARS to undertake fellowships at ICLARM HQ or outreach stations in collaboration with the center's research programs. ICLARM research fellowships will be available to graduate students (preferably Ph.D. level) preparing theses under the joint supervision of the center and the university's faculty and to scientists doing postdoctoral research.

Mode: Fellowships will be awarded by the ICLARM's Research Committee. The NRSP will establish coordinating mechanisms for the research fellows and provide logistic support needed throughout their stay.

THRUST II STRENGTHENING OF NATIONAL INSTITUTIONS

The thrust will focus on developing case studies to improve the research capability of NARS by transferring the appropriate approaches and methodologies which have been used successfully in agriculture research. The program will assist participating NARS to identify research needs, prioritize national/institutional research agendas and effectively implement research programs.

Project II.1 Planning and management of fisheries research programs

Scope: The project will assist a small number of interested countries/NARS in:

a) undertaking a diagnostic review of the national fisheries research system, focusing on research program design and policies, institutional structure, as well as allocation and management of manpower and financial resources;

b) identifying and prioritizing national/institutional research programs for sustainable development and management of fisheries resources; and identifying and, if possible, alleviating constraints to research to improve efficiency of the system;

c) planning for the strengthening of the research infrastructure and the implementation of its agenda, and for the improvement and management of the institutional organization; and

d) establishing databases for research planning and management, including the installation of software developed by ICLARM (e.g., FISHBASE) and ISNAR (management software).

Mode: The project will involve four NARS (subprojects) during the period 1994-98. It will be undertaken in an experimental mode in collaboration with ISNAR. Each subproject will cover the activities described above (a-d). Preference will be given to NARS already collaborating with ICLARM.

Project II.2 Asian Fisheries Social Science Research Network

Scope: This ongoing network involving social scientists initially from the Southeast Asian region will be expanded to include other Asian and Pacific nations. The network focuses on developing the professional capacities of its members, promoting information exchange and undertaking collaborative research on policy analysis, integrated management of coastal fisheries, common property management, resource valuation and socioeconomic analysis of integrated farming systems.

Mode: The network will continue to be coordinated by ICLARM which provides the services of a network coordinator. Team leaders of the network will meet frequently to decide on network activities and to set priorities and direction.

1.4.3 Complementary Activities 1994-98

Training courses will in a limited scale, be duplicated at national or regional levels, depending on demand and availability of complementary funding. Requests to help NARS to improve research planning and management are expected also from countries which do not yet have institutions involved in research collaboration with ICLARM. Such requests may be met, where ICLARM is seen to have a comparative advantage, by establishing counseling/supervisory supervisory projects through complementary funding mechanism.

Three additional categories of complementary activities have been identified:

Project I.4 Regional or national training courses

Special national/regional training courses may be organized during the MTP period in response to special human resource development needs of the national governments and donors. Ten regional training courses on the use of FISHBASE in Africa, the Pacific and the Caribbean will be conducted. Six national training workshops will be conducted for fish farmer cooperators on the genetic improvement of tilapia. The number of additional training courses to be organized each year will depend on the needs of NARS and the areas where ICLARM has a comparative advantage.

Project II.3 Workshops on research policies and management

Two ICLARM/ISNAR workshops will be organized in 1996 and 1998 to disseminate the experience and results of the case studies on research planning and management undertaken under thrust 2. The target workshop participants are research directors and senior researchers of NARS. The workshop will evaluate the methodologies used and assess their application to other NARS.

Project II.4 Technical assistance to NARS for research planning and management

Depending on the success of thrust 2 activities on research planning and management, there may be request from national governments or NARS for technical assistance in undertaking diagnostic studies to improve institutional research planning and management. There will not be more than one such project to be undertaken each year, preferably to begin after the first two case studies have been completed.

Project II.5 A feasibility study on fisheries networking in Africa

Institutional networks operating in the same mode as the AFSSRN may also work effectively in Africa. Before the initiation of such networks, a feasibility study will be undertaken to assess the needs for their establishment; their terms of reference; the scope of activities; organizational structure and coordinating mechanism; and to identify the potential institution members.

1.4.4 Program Resource Requirements

Program resource requirements 1994-1998 by thrust and projects are shown in Table 9.

1.4.5 Program Resource Allocation by Activity

The planned resource allocation by CGIAR activity is shown in Table 10.

1.4.6 Program Logical Framework

The Program Logical Framework is presented on page 64.

Table 9 NATIONAL RESEARCH SUPPORT PROGRAM (NRSP)
Senior Staff Requirements 1994-98, by Thrust and Project
(In SSY)

Core Activities	1994	1995	1996	1997	1998
Program Management	0.5	0.5	0.5	0.5	0.5
THRUST I HUMAN RESOURCE DEVELOPMENT					
I.1 In-service training in fisheries management	1.0	1.0	1.0	1.0	1.0
I.2 Preparation of training materials, including manuals, audiovisuals and self-learning materials	-	-	-	0.5	1.0
I.3 Research fellowship scheme for NARS scientists	-	-	-	-	-
THRUST II STRENGTHENING OF NATIONAL INSTITUTIONS					
II.1 Planning and management of fisheries research programs	0.5	1.0	1.0	1.0	1.0
II.2 Asian Fisheries Social Science Research Network	0.5	0.5	0.5	0.5	0.5
Subtotal, Core	**2.5**	**3.0**	**3.0**	**3.5**	**4.0**
Complementary Activities					
THRUST I HUMAN RESOURCE DEVELOPMENT					
I.4 Regional or national training courses	1.0	1.0	1.0	1.0	1.0
THRUST II STRENGTHENING OF NATIONAL INSTITUTIONS					
II.3 Workshops on research policies and management	-	-	-	-	-
II.4 Technical assistance to NARS for research planning and management	0.5	0.5	1.0	1.0	1.0
II.5 A feasibility study on fisheries networking in Africa	-	-	1.0	1.0	1.0
Subtotal, Complementary	**1.5**	**1.5**	**3.0**	**3.0**	**3.0**
TOTAL PROGRAM	**4.0**	**4.5**	**6.0**	**6.5**	**7.0**

Table 10 NATIONAL RESEARCH SUPPORT PROGRAM
Senior Staff Requirements 1994-98, by CGIAR Activity
(In SSY)

Core Activities	1994	1995	1996	1997	1998
Program Management	0.5	0.5	0.5	0.5	0.5
5.1 Training and conferences	1.0	1.0	1.0	1.5	2.0
5.3 Organization and management counselling	0.5	1.0	1.0	1.0	1.0
5.4 Networks	0.5	0.5	0.5	0.5	0.5
Subtotal, Core	**2.5**	**3.0**	**3.0**	**3.5**	**4.0**
Complementary Activities					
5.1 Training and conferences	1.0	1.0	1.0	1.0	1.0
5.3 Organization and management counselling	0.5	0.5	1.0	1.0	1.0
5.4 Networks	-	-	1.0	1.0	1.0
Subtotal, Complementary	**1.5**	**1.5**	**3.0**	**3.0**	**3.0**
PROGRAM TOTAL	**4.0**	**4.5**	**6.0**	**6.5**	**7.0**

PROGRAM: NRSP

LOGICAL FRAMEWORK

	Description	Verifiable Indicators	Means of Verification	Important and Critical Assumptions
Program Objective	Strengthened the institutional capabilities of NARS to undertake effective planning, implementation and management of national fisheries research programs.	- National research programs formulated inclusive of plans for their effective implementation - Research concepts, methodologies and tools developed by ICLARM (and collaborators) adopted and applied by NARS	- NRSP program monitoring and evaluation - National programs and implementation plans - Literature references made by NARS scientists to ICLARM developed ideas and methods (citation analysis)	
Thrust Objectives	Thrust 1 (Human Resource Development): Strengthening professional skills of NARS Scientists in applying and adapting new research approaches, methodologies and tools in national programs Thrust 2 (Strengthening of National Institutions): Development and test of new effective approaches in implementing and managing national fisheries research programs	- NARS scientists making use of research concepts, methodologies and tools developed by ICLARM (and collaborators) - Research agendas addressing the critical issues for resource systems management formulated and implemented by NARS	- Program monitoring and evaluation - Citation analysis - Feedback from NARS scientists (correspondence) - NARS research programs and implementation plans	Recognition by government of the need for research-based resource management schemes and of the role of NARS
Outputs	Core Program: - About 500 NARS scientists trained in the use of research concepts, methodologies and tools developed by ICLARM (and collaborators) - Minimum 5 training manuals/teaching materials and 2 video tapes covering different subjects/research themes - Minimum 10 postgraduates/post docs trained in fellowship program - 4 National fisheries research programs worked out in collaboration with NARS inclusive of implementation plans - AFSSRN collaborative research initiated and coached and network extended Complementary Program: - Additional 200 scientists trained - 2 workshops on research policy and management organized and attended by research directors and senior researchers - Additional 2 national research programs and implementation plans formulated - Feasibility of establishment of institutional networks(s) in Africa studied and 1-2 networks established and coordinated (if feasible)	Core Program: - Training courses and fellowships given - Training manuals, self-learning materials and videos prepared and distributed - National research programs formulated in operational plans and strategies -AFSSRN activity program formulated and implemented Complementary Program: - Additional training courses given - Additional national research programs formulated - Workshops given - Network feasibility study undertaken and network(s) implemented	Core Program: - Training course programs and list of participants - List of research fellows - Training manuals/videos - NARS research plans - AFSSRN news in *Naga* - AFSSRN activity program and list of participants Complementary Program: - Network feasibility study report (Africa) - Training course and workshop programs - Lists of participants in courses and workshops - National research plans	- Incentives in place for NARS scientists to improve their skills - Long-term governmental commitment to fund research Collaborative arrangements with ISNAR and NARS established and implemented
Activities	Core Program: - Planning and implementation of about 20 in-service training courses for NARS scientists - Preparation and publication of training manuals and videos - Planning and implementation of fellowship programs for postgraduates/post docs - Planning and implementation of NARS research programs in collaboration with ISNAR - Coordination of AFSSRN Complementary Program: - Planning and implementation of additional in-service training (e.g., national/regional training) - Additional support to formulation of national programs - Planning and implementation of research workshops - Studying of feasibility of institutional network(s) in Africa and initiating and coordinating network(s) (if feasible)	Core Program: - Training courses planned and given - Training manuals and videos prepared - Fellowships awarded - NARS research programs planned and implemented - AFSSRN activities planned and implemented Complementary Program: - Additional training courses planned and given - Network feasibility study undertaken, network(s) initiated - Additional research planning projects planned and implemented - Research workshops planned and implemented	ICLARM Annual Report	

Inputs	Senior Staff Years (SSY)	94	95	96	97	98
	Core Program	2.5	3.0	3.5	4.0	4.0
	Complementary Program	1.5	2.0	3.0	3.0	3.0
	Total	4.0	5.0	6.5	7.0	7.0

Appendix 2. Alternative Funding Scenarios

The alternative funding scenarios for which program implications have been considered include a 75% scenario (i.e., 75% of the MTP funding proposal) and a 45% scenario (conforming to the TAC Base Resource Envelope of $4.8 million). The latter has, on request from the TAC Secretariat, been further specified in 40% and 50% scenarios (corresponding to the Base Resource Envelope ± 10%).

Tables 1-4 (attached) show the 1998 resource allocations by cost center, CGIAR-activities and regions in the alternative funding scenarios.

2.1. Alternative 1. The 75% Scenario

There would be a proportional reduction across all programs in research and research-related activities. In view of the synergistic connections between the four programs, some sacrifices in depth, scope and rate of progress would be made to maintain the integrity of the program structure.

The major overall result would be: the Center's inability to respond to the urgent tone of the recent international declarations on environment and the need for sustainable natural resources management; delay in providing management tools sorely needed to improve aquatic resource management in developing countries; weakening of collaboration with NARS, NGOs and other IARCs; and severe reduction in assistance to NARS. Specifics follow.

With regard to core activities:

- First, there would be significant delay in developing and testing analytical tools for coastal resources management (CRSP, Thrust III). The opportunity costs may be very high, given the international concern for coastal area management and the present lack of such tools.

- Second, bioeconomic modeling of coastal fisheries (CRSP, Thrust II), a research area in which ICLARM is assumed to take leadership within the developing world, would be cut by 50%. This is particularly unfortunate since the adding of an economic dimension to the biological (and ecological) resource models has made the latter become increasingly appreciated by policymakers and fisheries administrators. This reduction has Center-wide implications, since this is a "cross-cutting" theme.

- Third, new strategies for managing coral reef fisheries, which would provide a basis for enhancing reef fisheries catches, would be curtailed (CRSP, Thrust I). Some of the potential for increased reef productivity (estimated at 2-3 times present levels) would thus remain unexplored.

- Fourth, the research leading to optimal management schemes for farm ponds (IARSP, Thrust I) would be delayed at least until the next MTP

period. Without such (collaborative) research, which is not on the agenda of any other group, resource-poor farmers will not receive knowledge on maximizing resource use and minimizing adverse environmental impact through integration of aquculture on their farms.

- Fifth, the impact of the surviving research would be considerably reduced because the preparation of some training materials from the results, including self-learning manuals and videos, would be deferred at least until the next MTP period (NRSP, Thrust I). NARS would be delayed in building their capacity to take over research on natural resources management. Collaboration with ISNAR on institutional assistance to NARS would be reduced.

- Sixth, planned efforts in impact assessments, which would benefit all IARCs, would be deferred (Information Division, NRSP). Also, a planned Project Development Officer position, found very valuable in some other centers, would not be filled.

On a regional basis, the assessment of multispecies coastal fisheries in subSaharan African and South Asian test/application sites (CRSP, Thrust I) would probably be omitted, thus considerably delaying the introduction of alternative management schemes at those sites. No other institution is developing the tools for such assessments. The deferment of trophic dynamics research (IARSP, Thrust I) would weaken the Center's efforts in integrated resources management (IARSP Thrust II) in IndoChina and subSaharan Africa, and the associated ecological research collaboration with other IARCs, especially IRRI, IITA and WARDA.

Planned complementary activities would be affected also due to delays and contraction of core work: country-specific applications of the tools for coastal resource management (CRSP) would be deferred; development of culture systems for promising coral reef species (CRRSP) would be reduced by 40% in effort; all inland research in West Africa (IARSP) would be deferred, including proposed interactions with IARCs, NARS, and NGOs in the region; and assistance to NARS in preparing national fisheries programs would be severely curtailed.

2.2. Alternative 2. The 45% TAC Base Envelope Scenario (± 10%)

This scenario depicts an ICLARM with 1998 core funding 25% below the Center's actual (1993) funding level.

The Center's program structure could not remain unchanged. In order for ICLARM to build up a minimum critical mass in those areas of research which would contribute most to the fulfillment of the Center's goal it would be necessary to concentrate available resources on two programs only. Even so, these programs would be narrowed in scope.

The programs that would "survive" in this scenario would be the CRSP and IARSP. The CRRSP would be integrated with the CRSP and remain at present staffing levels (2.25 SSY), only undertaking narrowly focused biotechnical and related coral

reef research. The National Research Support Program would also cease to exist as a separate program but would become a training unit within the center's divisional structure. The responsibilities of this program related to the conveyance of ICLARM's research results to NARS would instead rest with the individual research programs as in the past.

The major impacts on ICLARM of applying the TAC envelope (±10%) are:

- Failure to address some of the major constraints, discussed in the Strategy, facing development and management of aquatic resources in developing countries.

- Failure to reach an effective size in order to provide the supporting and catalytic role to regional and national aquatic research required by SIFR.

- Failure to assist NARS to improve their research capacity and policy towards national, natural resource management and production systems development goals.

- Total loss of proposed collaborations with other IARCs, including ISNAR, IRRI, IFPRI, IITA and WARDA.

Specific Consequences for CRSP:

- First, research on analytical tools for coastal resources management (CRSP, Thrust III) would be reduced to the same extent as in the 75% scenario, but with the additional loss of policy-related research, leaving the activity only "half-done" and thus unusable by NARS. Also, work would continue but at much reduced levels, on the stock assessment tools (CRSP, Thrust I), delaying (further) their development. As mentioned, the tools are badly needed by tropical NARS. (In the -10% version, this work would probably have to be abandoned).

- Second, the work on bioeconomic models - increasingly appreciated by fisheries managers - would be abandoned altogether (CRSP, Thrust II). Also to suffer would be the related valuation of coastal resources (CRSP, Thrust III), a major ingredient of coastal resource management, and a leading research area in which ICLARM has comparative advantage. This work would be halved in effort to 50% of one scientist's time. (In the +10% version, this effort would, however, be restored).

- Third, improved resource management research for coral reef systems (CRRSP, Thrust I) would disappear, except for development at HQ of the database Reefbase for two years. The Coastal Aquaculture Center would survive through complementary projects, staffed by one core scientist and supported by the HQ scientist, with 0.25 SSY available for economic analyses of new species for aquaculture and fisheries enhancement (CRRSP, Thrust II). (In the +10% version, an additional 0.25 SSY of economic analyses becomes available, while it is lost altogether in the -10% version).

Without economic analyses, the new methodologies could not be confidently applied.

Specific Consequences for IARSP:

- First, trophic dynamics research, (IARSP, Thrust I), the results of which were to help farmers to make optimal use of scarce farm resources through integration of aquaculture, would be totally abandoned, with consequent long-term loss also of collaboration in ecological research planned with IRRI, IITA and WARDA, as well as regional NGOs and NARS.

- Second, as with the 75% scenario, integrated resource management work would be weakened, but in this case there are serious implications also for the proposed work to benefit new entrants (IARSP, Thrust II) and for genetics research (IARSP, Thrust I). In these cases, the reduced team would be unable to gather and handle sufficient data to generate required global syntheses. Thus, the Center's highly recognized work on developing new fish breeds and the effort on helping farmers include a fish crop would be severely contracted.

- Third, most of the supporting modeling research, (IARSP, Thrust II) and all of its socioeconomic component, would be lost leaving major gaps in assessing farming system performance and optimizing integrated resources management on farms.

Other consequences:

- NRSP and its thrusts would disappear and only a training unit would remain. Training materials only directly usable in regular courses would be prepared. No staff expertise would be available to design the materials and external assistance would be sought. (In the +10% version, an in-house professional would be possible; in the -10% version, there would be no resources to secure assistance at all).

- The public awareness, translation and impact assessment activities would all be abandoned. Also, the positions of DDG and a Project Development Officer would not be filled.

- ICLARM would still be in need of a new (donor- funded) headquarters facility. The ongoing site-selection and planning activities would therefore be maintained and the time schedule for occupancy of the facilities kept unaltered.

Table 1a

Program and Activity Requirements 1998, By Cost Center in Alternative Funding Scenarios (in SSY and US $ '000)

Core Program	Main Budget 1998		Alt. 1 1998[a]		Alt. 2 1998[b]		Alt. 3 1998[c]		Alt. 4 1998[d]	
	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000
A. RESEARCH PROGRAMS										
1. CRSP	9.5	2,164	7.5	1,623	5.5	1,654	6.0	1,834	5.0	1,451
2. CRRSP	7.75	1,875	6.0	1,406	2.25		2.5		2.0	
3. IARSP	10.5	2,719	8.0	2,038	6.5	1,387	7.0	1,511	6.0	1,244
Subtotal, Research	27.75	6,758	21.5	5,067	14.25	3,041	15.5	3,345	13.0	2,695
B. RESEARCH SUPPORT										
1. Office of the DDG	1.0	226	1.0	190	-	-	-	-	-	-
2. Research Divisions	0.5	290	0.5	195	0.5	135	0.5	150	0.5	120
3. Computer Services	1.0	165	1.0	126	-	80	-	90	-	70
4. Coastal Aquaculture Center	-	200	-	150	-	50	-	50		50
Subtotal, Research Support	2.5	881	2.5	661	0.5	265	0.5	290	0.5	240
C. TRAINING/COMMUNICATION/LIBRARY										
1. NRSP	4.0	1,104	3.0	827	1.25	804	1.5	855.0	1.0	690
2. Information Division	3.0	966	2.0	725	1.0		1.0		1.0	
Subtotal, NRSP/INFO	7.0	2,070	5.0	1,552	2.25	804	2.5	855	2.0	690
D. ADMINISTRATION/OPERATIONS										
1. Office of the DG	2.0	420	1.0	240	1.0	275	1.0	290	1.0	275
2. Board of Trustees	-	135	-	135	-	135	-	135	-	135
3. Management Services Division	1.0	520	1.0	513	1.0	420	1.0	460	1.0	420
4. Operations	-	980	-	653	-	420	-	500	-	380
Subtotal, Administration/Operations	3.0	2,055	2.0	1,541	2.0	1,250	2.0	1,385	2.0	1,210
E. ADDITIONAL OPERATING FUNDS	-	200	-	150	-	50	-	50	-	40
TOTAL OPERATING REQUIREMENTS	40.25	11,964	31.0	8,971	19.0	5,410	20.5	5,925	17.5	4,875
Less: Center Incomes	-	1,245	-	934	-	610	-	665	-	555
TOTAL OPERATING FUNDS REQUIRED	40.25	10,719	31.0	8,037	19.0	4,800	20.5	5,260	17.5	4,320
CAPITAL PROGRAM	-	10	-	-	-	-	-	-	-	-
TOTAL FUNDING REQUIREMENTS	40.25	10,729	31.0	8,037	19.0	4,800	20.5	5,260	17.5	4,320

[a] ICLARM total core funding requirements 1998 8.0 mio $
[b] ICLARM total core funding requirements 1998 4.8 mio $ (TAC Envelope)
[c] ICLARM total core funding requirements 1998 5.3 mio $ (TAC Envelope + 10%)
[d] ICLARM total core funding requirements 1998 4.3 mio $ (TAC Envelope - 10%)

Table 1b

Program and Activity Requirements 1998, By Cost Center
in Alternative Funding Scenarios
(in SSY and US $ '000)

Complementary Program	Main Budget 1998		Alt. 1 1998[a]		Alt. 2 1998[b]		Alt. 3 1998[c]		Alt. 4 1998[d]	
	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000
A. RESEARCH PROGRAMS										
1. CRSP	3.0	750	2.0	500	2.0	1,175	2.0	1,310	2.0	1,175
2. CRRSP	4.0	1,080	3.0	810	2.5		3.0		2.5	
3. IARSP	11.0	2,750	8.0	2,000	6.5	1,625	7.0	1,750	6.0	1,500
Subtotal, Research	18.0	4,580	13.0	3,310	11.0	2,800	12.0	3,060	10.5	2,675
B. RESEARCH SUPPORT										
1. Office of the DDG	-	-	-	-	-	-	-	-	-	-
2. Research Divisions	-	-	-	-	-	-	-	-	-	-
3. Computer Services	-	-	-	-	-	-	-	-	-	-
4. Coastal Aquaculture Center	-	-	-	-	-	-	-	-	-	-
Subtotal, Research Support	-	-	-	-	-	-	-	-	-	-
C. TRAINING/COMMUNICATION/LIBRARY										
1. NRSP	3.0	1,215	2.5	1,015	0.75	300	0.5	200	-	-
2. Information Division	-	-	-	-	-	-	-	-	-	-
Subtotal, NRSP/INFO	3.0	1,215	2.5	1,015	0.75	300	0.5	200	-	-
D. ADMINISTRATION/OPERATIONS										
1. Office of the DG	-	-	-	-	-	-	-	-	-	-
2. Board of Trustees	-	-	-	-	-	-	-	-	-	-
3. Management Services Division	-	290	-	230	-	165	-	185	-	165
4. Operations	-	-	-	-	-	-	-	-	-	-
Subtotal, Administration/Operations	-	290	-	230	-	165	-	185	-	165
E. ADDITIONAL OPERATING FUNDS	-	-	-	-	-	-	-	-	-	-
TOTAL OPERATING FUNDS REQUIRED	21.0	6,085	15.5	4,555	11.75	3,265	12.5	3,445	10.5	2,840
Less: Center Income	-	-	-	-	-	-	-	-	-	-
TOTAL OPERATING FUNDS REQUIRED	21.0	6,085	15.5	4,555	11.75	3,265	12.5	3,445	10.5	2,840
CAPITAL PROGRAM	-	30	-	20	-	15	-	15	-	10
TOTAL FUNDING REQUIREMENTS	21.0	6,115	15.5	4,575	11.75	3,280	12.5	3,460	10.5	2,850

[a] ICLARM total core funding requirements 1998 8.0 mio $
[b] ICLARM total core funding requirements 1998 4.8 mio $ (TAC Envelope)
[c] ICLARM total core funding requirements 1998 5.3 mio $ (TAC Envelope + 10%)
[d] ICLARM total core funding requirements 1998 4.3 mio $ (TAC Envelope - 10%)

Table 2a

Program and Activity Requirements 1998
in Alternative Funding Scenarios
(in SSY and US $'000)

Core Program	Main Budget 1998		Alt. 1 1998[a]		Alt. 2 1998[b]		Alt. 3 1998[c]		Alt. 4 1998[d]	
	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000
I. OPERATIONS PROGRAM										
A. RESEARCH ACTIVITIES										
1. Conservation & Management of Natural Resources										
1.1 Ecosystem Conservation and Management	8.0	2,033	6.0	1,483	4.0	885	4.0	892	3.5	755
1.2 Germplasm Collection, Conservation, Characterization and Evaluation	2.5	598	2.0	494	2.0	442	2.0	446	2.0	431
Total Activity 1	10.5	2,631	8.0	1,977	6.0	1,327	6.0	1,338	5.5	1,186
2. Germplasm Enhancement and Breeding										
2.4 Fish	2.0	486	1.5	371	1.5	332	1.5	335	1.5	323
3. Production Systems Development and Management										
3.4 Aquatic Systems	7.0	1,674	5.0	1,236	3.5	774	4.0	892	3.0	647
4. Socioeconomic, Public Policy & Public Management Research										
4.1 Economic and Social Analysis	7.25	1,734	5.5	1,359	2.75	608	3.5	780	2.5	539
4.2 Policy Analysis	1.0	234	0.5	124	-	-	-	-	-	-
Total Activity 4	8.25	1,968	6.0	1,483	2.75	608	3.5	780	2.5	539
TOTAL RESEARCH ACTIVITIES	27.75	6,759	20.5	5,067	13.75	3,041	15.0	3,345	12.5	2,695
B. RESEARCH SUPPORT	2.5	881	2.5	661	0.5	265	0.5	290	0.5	240
C. INSTITUTION BUILDING										
5.1 Training and Conferences	2.0	591	1.5	466	1.25	365	1.5	443	1.0	276
5.2 Documentation, Publication and Dissemination of Information	3.0	887	2.0	621	1.0	292	1.0	295	1.0	276
5.3 Organization and Management Counselling	1.5	444	1.0	310	-	-	-	-	-	-
5.4 Networks	0.5	148	1.5	155	0.5	147	0.5	147	0.5	138
TOTAL INSTITUTION BUILDING	7.0	2,070	6.0	1,552	2.75	804	3.0	885	2.5	690
D. ADMINISTRATION/OPERATIONS										
1. Administration	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-
2. General Operations	2.0	-	1.0	-	1.0	-	1.0	-	1.0	-
3. Depreciation	-		-	-	-	-	-	-	-	-
TOTAL ADMINISTRATION/OPERATIONS	3.0	2,055	2.0	1,541	2.0	1,250	2.0	1,375	2.0	1,210
A-D SUBTOTAL OPERATIONS PROGRAM	40.25	11,765	31.0	8,821	19.0	5,360	20.5	5,895	17.5	4,835
E. PRICE INCREASE	-	-	-	-	-	-	-	-	-	-
TOTAL OPERATIONS PROGRAM	40.25	11,765	31.0	8,821	19.0	5,360	20.5	5,895	17.5	4,835
II. ADDITIONAL OPERATING REQUIREMENTS	-	200	-	150	-	50	-	50	-	40
TOTAL OPERATING REQUIREMENTS	40.25	11,965	31.0	8,971	19.0	5,410	20.5	5,945	17.5	4,875
III. Less: Center Income	-	1,245	-	934	-	610	-	665	-	555
TOTAL OPERATING FUNDS REQUIRED	40.25	10,720	31.0	8,037	19.0	4,800	20.5	5,280	17.5	4,320
IV. CAPITAL PROGRAM	-	10.0	-	-	-	-	-	-	-	-
TOTAL FUNDING REQUIRED	40.25	10,730	31.0	8,037	19.0	4,800	20.5	5,280	17.5	4,320

[a] ICLARM total core funding requirements 1998 8.0 mio $
[b] ICLARM total core funding requirements 1998 4.8 mio $ (TAC Envelope)
[c] ICLARM total core funding requirements 5.3 mio $ (TAC Envelope + 10%)
[d] ICLARM total core funding requirements 1998 4.3 mio $ (TAC Envelope - 10%)

Table 2b

Program and Activity Requirements 1998
in Alternative Funding Scenarios
(in SSY and US $'000)

Complementary Program	Main Budget 1998		Alt. 1 1998[a]		Alt. 2 1998[b]		Alt. 3 1998[c]		Alt. 4 1998[d]	
	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000	SSY	$'000
I. OPERATIONS PROGRAM										
A. RESEARCH ACTIVITIES										
1. Conservation & Management of Natural Resources										
1.1 Ecosystem Conservation and Management	2.0	495	1.5	382	1.5	368	1.5	383	1.5	382
1.2 Germplasm Collection, Conservation, Characterization and Evaluation	0.5	124	0.5	127	-	-	-	-	-	-
Total Activity 1	2.5	619	2.0	509	1.5	368	1.5	383	1.5	382
2. Germplasm Enhancement and Breeding										
2.4 Fish	1.0	248	1.0	255	-	-	0.5	128	-	-
3. Production Systems Development and Management										
3.4 Aquatic Systems	9.0	2,228	6.5	1,655	6.5	1,505	7.0	1,785	6.0	1,528
4. Socioeconomic, Public Policy & Public Management Research										
4.1 Economic and Social Analysis	6.0	1,485	3.5	891	3.0	736	3.0	765	3.0	765
4.2 Policy Analysis	-	-	-	-	-	-	-	-	-	-
Total Activity 4	6.0	1,485	3.5	891	3.0	736	3.0	765	3.0	765
TOTAL RESEARCH ACTIVITIES	18.5	4,580	13.0	3,310	11.0	2,609	12.0	3,061	10.5	2,675
B. RESEARCH SUPPORT	-	-	-	-	-	-	-	-	-	-
C. INSTITUTION BUILDING										
5.1 Training and Conferences	1.0	405	1.0	406	0.75	300	0.5	200	-	-
5.2 Documentation, Publication and Dissemination of Information	-	-	-	-	-	-	-	-	-	-
5.3 Organization and Management Counselling	1.0	405	0.5	203	-	-	-	-	-	-
5.4 Networks	1.0	405	1.0	406	-	-	-	-	-	-
TOTAL INSTITUTION BUILDING	3.0	1,215	2.5	1,015	0.75	300	0.5	200	-	-
D. ADMINISTRATION/OPERATIONS										
1. Administration										
2. General Operations										
3. Depreciation										
TOTAL ADMINISTRATION/OPERATIONS		290		230		165		185		165
A-D SUBTOTAL OPERATIONS PROGRAM	21.0	6,085	15.5	4,555	11.75	3,074	12.5	3,446	10.5	2,840
E. PRICE INCREASE	-	-	-	-	-	-	-	-	-	-
TOTAL OPERATIONS PROGRAM	21.0	6,085	15.5	4,555	11.75	3,074	12.5	3,446	10.5	2,840
II. ADDITIONAL OPERATING REQUIREMENTS	-	-	-	-	-	-	-	-	-	-
TOTAL OPERATING REQUIREMENTS	21.0	6,085	15.5	4,555	11.75	3,074	12.5	3,446	10.5	2,840
III. Less: Center Income	-	-	-	-	-	-	-	-	-	-
TOTAL OPERATING FUNDS REQUIRED	21.0	6,085	15.5	4,555	11.75	3,074	12.5	3,446	10.5	2,840
IV. CAPITAL PROGRAM	-	30	-	20	-	15	-	15	-	10
TOTAL FUNDING REQUIRED	21.0	6,115	15.5	4,575	11.75	3,089	12.5	3,461	10.5	2,850

[a] ICLARM total core funding requirements 1998 8.0 mio $
[b] ICLARM total core funding requirements 1998 4.8 mio $ (TAC Envelope)
[c] ICLARM total core funding requirements 5.3 mio $ (TAC Envelope + 10%)
[d] ICLARM total core funding requirements 1998 4.3 mio $ (TAC Envelope - 10%)

Table 3a

Research and Research-related Activity Requirements 1998
in Alternative Funding Scenarios
(in US $ '000 and % 1/)

Core Program	Main Budget 1998		Alt. 1 1998[a]		Alt. 2 1998[b]		Alt. 3 1998[c]		Alt. 4 1998[d]	
	$'000	%	$'000	%	$'000	%	$'000	%	$'000	%
1. Conservation and Management of Natural Resources										
1.1 Ecosystem Conservation and Management	2,823	80%	2,024	74%	1,293	67%	1,303	67%	1,114	64%
1.2 Germplasm Collection, Conservation, Characterization and Evaluation	706	20%	711	26%	637	33%	642	33%	627	36%
Total Activity 1	3,529	30%	2,735	31%	1,930	36%	1,945	33%	1,741	36%
2. Germplasm Enhancement and Breeding										
2.4 Fish	706	6%	529	6%	482	9%	472	8%	484	10%
3. Production Systems Development and Management										
3.4 Aquatic Systems	2,235	19%	369	19%	1,126	21%	1,297	22%	967	20%
4. Socioeconomic, Public Policy and Public Management Research										
4.1 Economic and Social Analysis	2,329	90%	1,747	90%	911	100%	1,179	100%	822	100%
4.2 Policy Analysis	259	10%	194	10%	-	-	-	-	-	-
Total Activity 4	2,588	22%	1,941	22%	911	17%	1,179	20%	822	17%
5. Institution Building										
5.1 Training and Conferences	676	25%	524	27%	428	47%	471	47%	337	41%
5.2 Documentation, Publication and Dissemination of Information	1,082	40%	699	36%	319	35%	351	35%	337	41%
5.3 Organization and Management Counselling	487	18%	349	18%	-	-	-	-	-	-
5.4 Networks	460	17%	367	19%	164	18%	1,061	18%	148	18%
Total Activity 5	2,705	23%	1,941	22%	911	17%	1,002	17%	822	17%
TOTAL CORE/OPERATIONS PROGRAM	11,763	100%	8,821	100%	5,360	100%	5,895	100%	4,835	100%

[1] Percentage distribution: sub-activities as % of activity, activities as % of total
[a] ICLARM total funding requirements 1998 8,037 mio $
[b] ICLARM total funding requirements 1998 4.8 mio $ (TAC Envelope)
[c] ICLARM total funding requirements 1998 5.3 mio $ (TAC Envelope + 10%)
[d] ICLARM total funding requirements 1998 4.3 mio $ (TAC Envelope - 10%)

Table 3b

Research and Research-related Activity Requirements 1998
in Alternative Funding Scenarios
(in US $ '000 and %[1])

Complementary Program	Main Budget 1998		Alt. 1 1998[a]		Alt. 2 1998[b]		Alt. 3 1998[c]		Alt. 4 1998[d]	
	$'000	%	$'000	%	$'000	%	$'000	%	$'000	%
1. Conservation and Management of Natural Resources										
1.1 Ecosystem Conservation and Management	549	82%	456	77%	411	100%	413	100%	426	100%
1.2 Germplasm Collection, Conservation, Characterization and Evaluation	120	18%	136	23%	-	-	-	-	-	-
Total Activity 1	669	11%	592	13%	411	13%	413	12%	426	15%
2. Germplasm Enhancement and Breeding										
2.4 Fish	304	5%	319	7%	-	-	138	4%	-	-
3. Production Systems Development and Management										
3.4 Aquatic Systems	2,556	42%	1,913	42%	1,741	55%	1,929	56%	1,619	57%
4. Socioeconomic, Public Policy and Public Management Research										
4.1 Economic and Social Analysis	1,643	100%		100%	823	100%	827	100%	795	100%
4.2 Policy Analysis	-	-	-	-	-	-	-	-	-	-
Total Activity 4	1,643	27%	1,048	23%	823	26%	827	24%	795	28%
5. Institution Building										
5.1 Training and Conferences	301	33%	273	40%	190	100%	138	100%	-	-
5.2 Documentation, Publication and Dissemination of Information	-	-	-	-	-	-	-	-	-	-
5.3 Organization and Management	301	33%	137	20%	-	-	-	-	-	-
5.4 Networks	310	34%	273	40%	-	-	-	-	-	-
Total Activity 5	913	15%	683	15%	190	6%	138	4%	-	-
TOTAL COMPLEMENTARY OPERATIONS PROGRAM	6,085	100%	4,555	100%	3,165	100%	3,445	100%	2,840	100%

[1] Percentage distribution: sub-activities as % of activity, activities as % of total
[a] ICLARM total funding requirements 1998 8,037 mio $
[b] ICLARM total funding requirements 1998 4.8 mio $ (TAC Envelope)
[c] ICLARM total funding requirements 1998 5.3 mio $ (TAC Envelope + 10%)
[d] ICLARM total funding requirements 1998 4.3 mio $ (TAC Envelope - 10%)

Table 4a

Research and Research-related Activity Requirements 1998, by Region in Alternative Funding Scenarios (in US $ '000 and %)

Core Program	Region	Main Budget 1998		Alt.[a] 1998		Alt. 2 1998[b]	
		$ '000	%	$ '000	%	$ '000	%
1. Conservation and Management of Natural Resources							
1.1 Ecosystem Conservation and Management	SSA	706	25%	507	25%	257	20%
	WANA	-	-	-	-	-	-
	LAC	141	5%	-	-	-	-
	ASIA	1,976	70%	1,522	75%	1,029	80%
	Total	2,823	24%	2,029	23%	1,286	24%
1.2 Germplasm Collection, Conservation, Characterization and Evaluation	SSA	141	20%	141	20%	129	20%
	WANA	35	5%	35	5%	-	-
	LAC	35	5%	35	5%	-	-
	ASIA	494	70%	494	70%	515	80%
	Total	706	6%	706	8%	643	12%
Total Activity 1		3,529	30%	2,735	31%	1,930	36%
2. Germplasm Enhancement and Breeding							
2.4 Fish	SSA	147	25%	132	25%	96	20%
	WANA	29	5%	26	5%	24	5%
	LAC	-	-	-	-	-	-
	ASIA	412	70%	370	70%	362	75%
	Total	588	5%	529	6%	482	9%
3. Production Systems Development and Management							
3.4 Aquatic Systems	SSA	588	25%	335	20%	169	15%
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	1,764	75%	1,341	80%	957	85%
	Total	2,353	20%	1,676	19%	1,126	21%
4. Socioeconomic, Public Policy & Public Management Research							
4.1 Economic and Social Analysis	SSA	471	20%	353	20%	182	20%
	WANA	-	-	-	-	-	-
	LAC	118	5%	-	-	-	-
	ASIA	1,764	75%	1,411	80%	729	80%
	Total	2,353	20%	1,764	20%	911	17%
4.2 Policy Analysis	SSA	47	20%	35	20%	-	-
	WANA	-	-	-	-	-	-
	LAC	12	5%	-	-	-	-
	ASIA	176	75%	141	80%	-	-
	Total	235	2%	176	2%	-	-
Total Activity 4		2,588	22%	1,941	22%	911	17%
5. Institution Building							
5.1 Training and Conferences	SSA	176	25%	106	20%	64	15%
	WANA	35	5%	26	5%	21	5%
	LAC	71	10%	26	5%	21	5%
	ASIA	423	60%	-	-	322	75%
	Total	706	6%	529	6%	429	8%
5.2 Documentation, Publication and Dissemination of Information	SSA	265	25%	141	20%	48	15%
	WANA	53	5%	35	5%	16	5%
	LAC	106	10%	35	5%	16	5%
	ASIA	635	60%	494	70%	241	75%
	Total	1,059	9%	706	8%	322	6%
5.3 Organization and Management Counselling	SSA	235	50%	88	25%	-	-
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	235	50%	265	75%	-	-
	Total	471	4%	353	4%	-	-
5.4 Networks	SSA	94	20%	53	15%	24	15%
	WANA	24	5%	18	5%	8	5%
	LAC	24	5%	18	5%	8	5%
	ASIA	329	70%	265	75%	121	75%
	Total	471	4%	353	4%	161	3%
Total Activity 5		2,705	23%	1,941	22%	911	17%
TOTAL RESEARCH & RESEARCH-RELATED ACTIVITIES	SSA	2,588	22%	1,764	20%	965	18%
	WANA	353	3%	176	2%	54	1%
	LAC	588	5%	265	3%	54	1%
	ASIA	8,234	70%	6,616	75%	4,288	80%
	Total	11,763	100%	8,821	100%	5,360	100%

[a] ICLARM total core funding requirements 1998 8.0 mio $
[b] ICLARM total core funding requirements 1998 4.8 mio $ (TAC Envelope)

Table 4b

Research and Research-related Activity Requirements 1998, by Region in Alternative Funding Scenarios (in US $ '000 and %)

Complementary Program	Region	Main Budget 1998		Alt. 1 1998[a]		Alt. 2 1998[b]	
		$ '000	%	$ '000	%	$ '000	%
1. Conservation and Management of Natural Resources							
1.1 Ecosystem Conservation and Management	SSA	138	25%	114	25%	84	20%
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	413	75%	343	75%	336	80%
	Total	550	9%	458	10%	420	13%
1.2 Germplasm Collection, Conservation, Characterization and Evaluation	SSA	24	20%	27	20%	-	-
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	98	80%	110	80%	-	-
	Total	122	2%	137	3%	-	-
Total Activity 1		673	11%	595	13%	420	13%
2. Germplasm Enhancement and Breeding							
2.4 Fish	SSA	61	20%	64	20%	-	-
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	245	80%	256	80%	-	-
	Total	306	5%	320	7%	-	-
3. Production Systems Development and Management							
3.4 Aquatic Systems	SSA	642	25%	384	20%	175	10%
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	1,926	75%	1,537	80%	1,574	90%
	Total	2,568	42%	1,922	42%	1,749	55%
4. Socioeconomic, Public Policy & Public Management Research							
4.1 Economic and Social Analysis	SSA	330	20%	210	20%	124	15%
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	1,321	80%	842	80%	703	85%
	Total	1,651	27%	1,052	23%	827	26%
4.2 Policy Analysis	SSA	-	-	-	-	-	-
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Total Activity 4		1,651	27%	1,052	23%	827	26%
5. Institution Building							
5.1 Training and Conferences	SSA	61	20%	55	20%	29	15%
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	245	80%	220	80%	162	85%
	Total	306	5%	275	6%	191	6%
5.2 Documentation, Publication and Dissemination of Information	SSA	-	-	-	-	-	-
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	-	-	-	-	-	-
	Total	-	-	-	-	-	-
5.3 Organization and Management Counselling	SSA	153	50%	34	25%	-	-
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	153	50%	103	75%	-	-
	Total	306	5%	137	3%	-	-
5.4 Networks	SSA	76	25%	69	25%	-	-
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	229	75%	206	75%	-	-
	Total	306	5%	275	6%	-	-
Total Activity 5		917	15%	686	15%	191	6%
TOTAL RESEARCH & RESEARCH-RELATED ACTIVITIES a)	SSA	1,345	22%	915	20%	477	15%
	WANA	-	-	-	-	-	-
	LAC	-	-	-	-	-	-
	ASIA	4,770	78%	3,660	80%	2,703	85%
	Total	6,115	100%	4,575	100%	3,180	100%

[a] ICLARM total core funding requirements 1998 8.0 mio $
[b] ICLARM total core funding requirements 1998 4.8 mio $ (TAC Envelope)
[c] CAPITAL requirements included