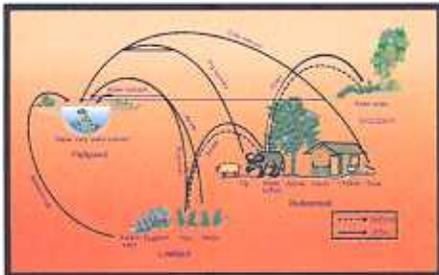


# ICLARM 1999 Operational Plan





International Center for Living Aquatic  
Resources Management

**Our Commitment** : to improve the well-being and livelihood of present and future generations of poor people in developing countries.

**A Way to Achieve This**: we achieve this by undertaking and encouraging scientific research to improve the production, management and conservation of aquatic resource such as fish.

We believe this work will be most successful when undertaken in partnership with national government and nongovernment institutions and with the participation of the users of the research results.

ICLARM is one of the 16 international research centers of the Consultative Group on International Agricultural Research (CGIAR) that has initiated the public awareness campaign, Future Harvest.



# **ICLARM 1999 OPERATIONAL PLAN**

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# ICLARM 1999 OPERATIONAL PLAN

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**Cover**  
**A representation of ICLARM's Nine Programs**

1. Biodiversity and Genetic Resources Program (BGRP)
2. Germplasm Enhancement and Breeding Program (GEBP)
3. Integrated Aquaculture-Agriculture Systems Program (IAASP)
4. Coastal Aquaculture and Stock Enhancement Program (CASEP)
5. Aquatic Environments Program (AEP)
6. Fisheries Resources Assessment and Management Program (FRAMP)
7. Policy Research and Impact Assessment Program (PRIAP)
8. Information and Training Program (ITP)
9. International Partnerships and Networks Program (IPNP)

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# FOREWORD

*ICLARM 1999 Operational Plan* is dedicated to our target beneficiaries - poor fishers, fish farmers, fish consumers and the officials and staff in government management agencies, nongovernment organizations and research institutes. Although our work is targeted to help these groups and individuals, some of whom are also our direct research partners, many of them will never know us by name.

ICLARM's current research activities are described in this, our fifth, annual Operational Plan. It describes the research work that we and our partners are doing to help reverse the overuse of natural living aquatic resources and the degradation of aquatic environments. We also undertake research to promote the sustainable and equitable development of aquaculture to reduce the potential gap between the supply and demand for fish.

ICLARM places great value on its research partnerships. Therefore, we were pleased to receive the Consultative Group on International Agricultural Research (CGIAR) Chairman's 1998 Award for Excellence in Scientific Partnerships, along with the Philippine Bureau of Fisheries and Aquatic Resources (BFAR), the Freshwater Aquaculture Center/Central Luzon State University (FAC/CLSU) and AKVAFORSK (Norway) for the work done under the project on the Genetic Improvement of Farmed Tilapias (GIFT). This project also involved broader partnerships including: the donors [the United Nations Development Programme (UNDP), the Asian Development Bank (ADB) and all ICLARM core donors]; the African and Asian countries that directly supplied fish for the project; the national institutions involved in the study on the Dissemination and Evaluation of Genetically Improved Tilapia in Asia (DEGITA); and the International Network on Genetics in Aquaculture (INGA).

This volume covers work in progress or to be initiated in 1999. However, this year will also see the publication of ICLARM's new Strategic Plan. The previous one developed in 1992<sup>1</sup> shaped ICLARM's research in the 1990s. Development of the new Plan commenced early in 1998 and has involved the ICLARM Board of Trustees, staff and key stakeholders. In early 1999, an advanced draft will be circulated widely for comment before the Plan is finalized and printed. ICLARM's research planning has been based on an analysis of selected aquatic resource systems. This approach has been refined and developed to set priorities for future research, by using the latest fisheries and demographic data to derive biophysical and socioeconomic descriptions for each resource system and geographic region.

The work program for 1999 builds on the work in 1998 as several large multicountry projects mature, especially the study on genetic improvement of carps in Asia, the assessment of Asian trawl fisheries, and the database and training work of the FishBase project. Fisheries co-management studies completed their first major phase in 1998 and a new phase of research in Africa and Asia is commencing, building on the lessons of the earlier phase. New assessments of the state of the world's coral reefs will concentrate on more detailed analyses of the Asian region, following the successful *Reefs at Risk* report<sup>2</sup> which concluded that the reefs in the southeast Asian region were most at risk of degradation. Research in the African region will focus on fish genetic studies and continue studies on the adoption, evolution and impact of small-scale aquaculture. Research on fish production in large lakes and reservoirs will commence in Lake Nasser, following the plans made at a workshop in 1998. In 1999, genetics research and networking at ICLARM enters a new phase. The technology created in the GIFT project will be transferred to Africa and INGA will expand to include 11 research institutes from industrialized countries as associate members along with the 13 developing member countries. ICLARM will also commence new studies on the conditions that make for successful small-scale aquaculture and its impact on food security.

<sup>1</sup> ICLARM. 1992. ICLARM's Strategy for international research on living aquatic resources management.

<sup>2</sup> Bryant, D., L. Burke, J. McManus and M. Spalding. 1998. *Reefs at risk: a map-based indicator of threats to the world's coral reefs*. World Resources Institute, International Center for Living Aquatic Resources Management, World Conservation Monitoring Center and United Nations Environment Programme. 56 p.

The External Program and Management Review of ICLARM will be completed in February 1999 by the panel appointed by the CGIAR. It will report its findings to the Technical Advisory Committee of the CGIAR in March and to the Group in May. ICLARM Board and Management will then begin to implement the approved recommendations of the Review. This will be integrated with the Center's future planning in which greater emphasis will be placed on the development of multidisciplinary projects. Key areas of research will be supply and demand studies for fish, wetland fisheries in the Mekong region, impacts of integrating aquaculture with agriculture, coastal zone management, sustainability of small island states' aquatic systems, and ecosystem management.

After a long search for a headquarters site, the ICLARM Board hopes to be in a position to decide on a site at its 15<sup>th</sup> meeting in February 1999. Following the decision, action will be taken to prepare ICLARM for the move to the new site, although this will occur in the year 2000 at the earliest.

**Meryl J. Williams**  
Director General  
ICLARM

# OVERVIEW

ICLARM's research covers both marine and fresh waters in important tropical ecosystems - coastal waters, coral reefs and inland waterbodies. The research is carried out and disseminated through the following nine programs.

<b>Programs</b>	<b>Focus</b>
1. Biodiversity and Genetic Resources Program	Monitoring and conservation of aquatic biodiversity.
2. Germplasm Enhancement and Breeding Program	Improving fish breeding techniques.
3. Integrated Aquaculture-Agriculture Systems Program	Improving productivity and sustainability of small farms.
4. Coastal Aquaculture and Stock Enhancement Program	Increasing marine harvests through farming and restocking valuable aquatic species.
5. Aquatic Environments Program	Improving ecosystem health and management.
6. Fisheries Resources Assessment and Management Program	Developing tools to improve assessment and management of fish stocks.
7. Policy Research and Impact Assessment Program	Improving policy decisions by evaluating the impact of management practices and socio-economic structures.
8. Information and Training Program	Disseminating ICLARM's research results and creating an awareness of the role of science in global fisheries issues.
9. International Partnerships and Networks Program	Strengthening collaborations through research and information networks.
<b>Activities and Services</b>	
10. System-wide Initiatives	Coordinating activities with other centers within the CGIAR.
11. Corporate Services Division	Providing the Center's management, staff and organizational units the needed support services to carry out programs and activities.
12. Office of the Deputy Director General - Africa and West Asia	Managing the Abbassa aquaculture facility and overseeing its operations as ICLARM's Regional Research Center for Africa and West Asia.

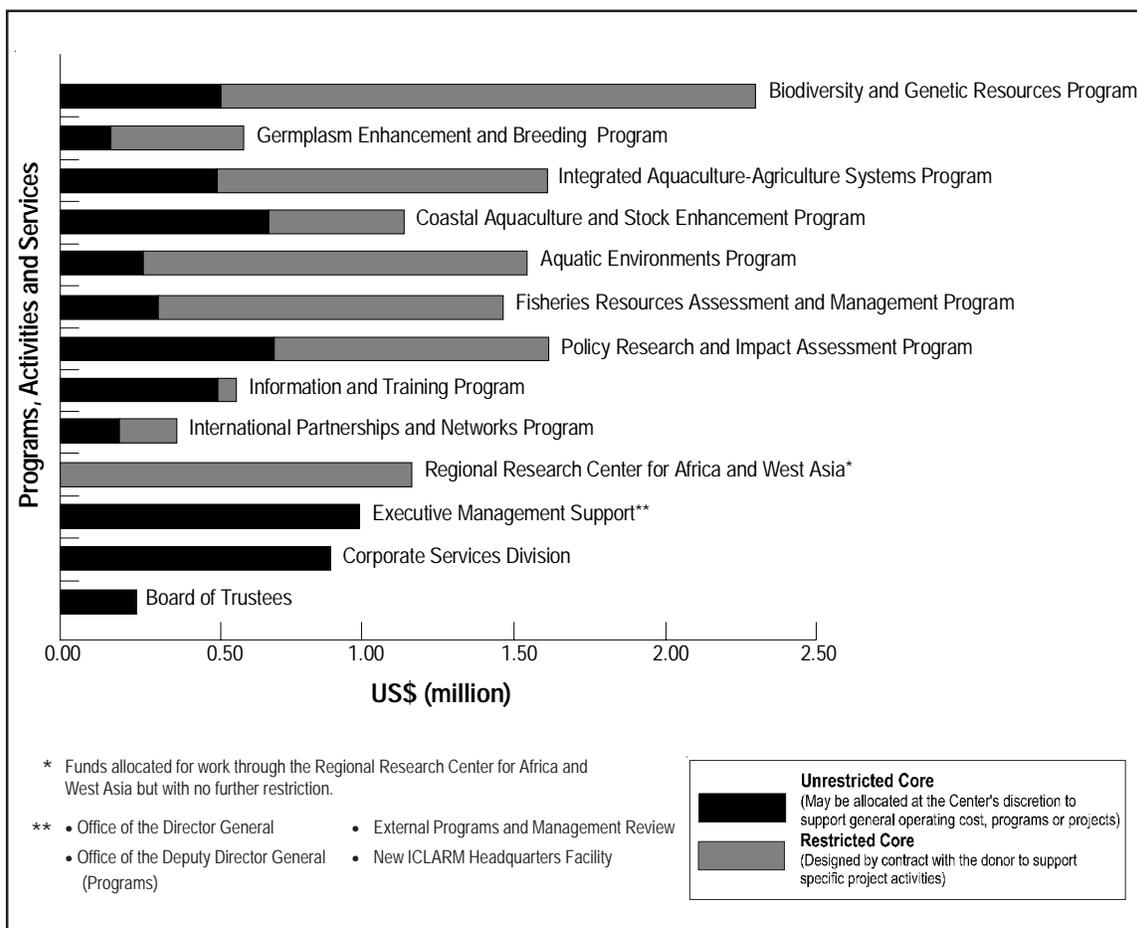
13. Office of the Deputy Director General - Programs

Assisting the Director General in planning, implementing, monitoring and reporting ICLARM's research and related programs.

14. Office of the Director General

Managing the Center, raising resources and ensuring proper implementation of Board-approved policies; acting as ICLARM's legal representative; and enhancing relationships with research organizations worldwide, and current and potential donors.

### Resource Allocation for 1999



# OUR GUIDING PRINCIPLES

In an effort to show how our program activities measure against the guiding principles, the leader of each activity has given a rating, either H = high, M = medium, L = low or n/a = not applicable.

The rating of the criteria for each project has been interpreted by each Program Leader in relation to his/her projects' requirements. In the longer term, the results of our studies on research impact emerge under the new Policy Research and Impact Assessment Program, we plan to be in a position to score activities in a more rigorous manner.

## THE DEFINITION OF EACH PRINCIPLE IS:

**Sustainability:** if successful, the result of the activity will lead to a more ecologically sustainable resource system and/or more economically sustainable system, taking a long-term perspective which respects the right of future generations.

**Equity:** the results of the activity will assist a more even distribution of benefits either by directly helping those who are presently disadvantaged or by allowing equal access to use of new information and technologies. Both producers and consumers are to be considered.

**Gender:** the extent to which the activity considers gender issues and seeks to ensure that women's and men's needs are met.

**Participation:** the extent to which the ultimate beneficiaries, our partners, and their views and needs are included in priority setting, planning and implementation of the activities.

**System Approach:** the extent to which the activity incorporates or takes into account the ecosystem, social and geopolitical context within which the activity is set.

**Anticipatory Research:** the extent to which the activity is designed to anticipate the consequences of its outcomes, takes steps to alleviate or minimize potential negative consequences, and overcomes obstacles to the adoption of its results.

## PROGRAMS

**1. Biodiversity and Genetic Resources Program (BGRP).** The Program pursues strategic research on fish biodiversity and genetic resources and the development of genetic resources research methods, in partnership with international, regional and national agencies and institutions, nongovernment organizations (NGOs), scientists, farmers and fishers.

The BGRP's largest activity is a project funded by the European Union (EU) that contributes to capacity building for fisheries and biodiversity management in the national programs of 55 African, Caribbean and Pacific (ACP) countries. The project emphasizes training for establishing national fish biodiversity databases (based upon the concepts in FishBase) and the forging of regional and intraregional partnerships through electronic networking. A feasibility study for a relational database on fish larvae, LarvalBase, was started in 1998 and is expected to lead to a substantial addition to FishBase information on fish larvae and their importance in fisheries and aquaculture.

The other research projects of the Program are aimed at demonstrating how to document aquatic genetic resources for their sustainable use and conservation. At present, two case studies are in progress: i) on tilapia *Sarotherodon melanotheron* in the coastal lagoons and estuaries of West Africa and ii) on Asian carp *Barbodes (Puntius) gonionotus* that is rapidly gaining popularity among resource poor fish farmers in South and Southeast Asia.

A conference entitled "Towards Policies for Conservation and Sustainable Use of Aquatic Genetic Resources," was held in Bellagio in 1998, in partnership with the Food and Agriculture Organization of the United Nations (FAO) and hosted by the Rockefeller Foundation. The proceedings of this conference will be published in 1999.

The BGRP contributes to the meetings of the Convention on Biological Diversity (CBD), including its Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), to the Global Biodiversity Fora (GBF) that are held in conjunction with CBD meetings, and to the Species 2000 Initiative. It also collaborates with international organizations concerned with the sustainable use and conservation of living aquatic resources, including FAO and the World Conservation Union (IUCN).

The Program provides ICLARM's contributions to the CGIAR's System-wide Genetic Resources Programme (SGRP) and its System-wide Information Network for Genetic Resources (SINGER). The SGRP is envisaged as a vehicle to move the CGIAR forward to meet the challenges posed by the CBD and Agenda 21. The SGRP's guiding principle is collaboration. It aims to consolidate the genetic resources efforts and to harness collective strengths of the Centers with the ultimate goal of creating a system-wide effort that is greater than the sum of its parts. Both *in situ* and *ex situ* conservation activities are included and the Program covers crops and their wild relatives, forage, forestry and agroforestry species, livestock and aquatic genetic resources. Collaborative activities within SGRP create synergy among the Centers and with partners, allowing for greater efficiency and effectiveness, and stimulating initiatives in new areas. Collaboration is focused on four thematic areas, each guided by a strategy developed in consultation with key partners: *ex situ* genetic resources conservation and research on strategies and technologies for conservation and use; *in situ* genetic resources management and research on strategies and methods; policy and socioeconomic issues in genetic resources conservation and use; and information and institution strengthening/training.

**2. Germplasm Enhancement and Breeding Program (GEBP).** This Program aims to develop techniques for improving breeds of fish, the dissemination of these techniques and the training of staff in their use. The Program focuses on carp and tilapia species that are important for aquaculture systems prevalent in developing countries.

The Program has fully implemented the two major components (socioeconomic and genetics) of a project sponsored by the ADB on genetic improvement of carp species in Asia. The project is a combined genetics and socioeconomic evaluation of the appropriate species, farming systems and breeding goals that will yield the highest potential impact on increased protein production, efficiency, equity, sustainability and environmental issues. The countries collaborating in this project are: Bangladesh, the People's Republic of China, India, Indonesia, Thailand and Vietnam. The combined production of these countries is more than 90% of the world's production of carp. Documentation of the status of carp genetic improvement programs in Asia and research work on carp genetics research in these countries was started in 1998. Expected outputs in 1999 include an *ex ante* assessment of potential impact of carp genetic research and a book including a report on the carp genetic resources of Asia.

For the tilapia, plans have been developed to transfer the lessons learned from the research in the Philippines to Africa and to establish similar genetic enhancement programs at ICLARM's Regional Research Center for Africa and West Asia in Egypt. *Oreochromis niloticus*, *O. aureus*, *Tilapia zilli* and *T. galilaeus* were compared for performance in aquaculture in Egypt. The performance of each species was substantially different during the three growth phases. This suggests that introgression should be evaluated to combine the various growth and spawning advantages of these tilapia species. Expected outputs in 1999 include technical reports on: genetic enhancement of tropical aquaculture species by combined selection, marker-assisted selection and QTL mapping; genetic enhancement of Nile tilapia and utilization of F<sub>1</sub> crossbred clones; and new proposal(s) for funding.

The Program also contributes to the activities of INGA.

**3. Integrated Aquaculture-Agriculture Systems Program (IAASP).** The activities of the Program have been focused on the improvement of small farm productivity through the introduction of multiuse waterbodies. The Program has examined the introduction of aquaculture into farming systems in: i) Bangladesh, a country with abundant rainfall and a great variety of waterbodies that can be used for aquaculture; ii) Malawi, a semi-arid country in southern Africa dependent upon seasonal rainfall; and iii) the Philippines, where the project seeks to combine aquaculture with forest buffer zone management in the highlands. Research at these sites is linked to the development of a software package called RESTORE (Research Tool for Natural Resource Management, Monitoring and Evaluation). At each site, the integration and uptake of aquaculture is supported by biological research and the adaptation of aquaculture systems to suit the conditions of these countries.

In 1998 the program developed a new strategic research plan for inland aquatic resource systems including those above the farm level. These systems include reservoirs, small lakes, flood plains and waste waters. A new project for increasing and sustaining the productivity of fish and rice in the floodplain ecosystems of South and Southeast Asia is in operation in Bangladesh and Vietnam. The objectives are to: analyze alternative resource management strategies in floodplain ecosystems; study participatory development and viable income generating options and their field validation; identify viable community-based mechanisms to secure target group access to waterbodies and adequate provision of inputs and access to markets.

This approach is similar to the development of aquaculture research projects at the farming community level. In 1999 the Program will prepare project designs and proposals in line with the new strategy.

**4. Coastal Aquaculture and Stock Enhancement Program (CASEP).** Projects on giant clams, pearl oysters and sea cucumbers will continue to be a major part of the Program in 1999. For giant clams and pearl oysters, there will be greater emphasis on the transfer of technology to the private

sector. The work on sea cucumbers will focus on documenting the knowledge gained on the larval rearing and juvenile ecology of sandfish and preparing a proposal to proceed to the next stage of the research, viz., developing optimum strategies for releasing cultured juveniles into the wild for the purposes of stock enhancement.

A five-year project to study the effects of logging on inshore marine ecosystems in the western Pacific (Vanuatu, Papua New Guinea and the Solomon Islands) commenced in October 1998. The project aims to provide information to coastal communities to assist them in making informed decisions about logging and reforestation.

A new project will be added to the Program in 1999 – the development of artisanal fisheries for coral reef fish based on the collection and culture of postlarvae. This project is expected to provide coastal villagers in the South Pacific and Southeast Asia with an additional, sustainable way of deriving income from their inshore marine resources.

**5. Aquatic Environments Program (AEP).** During 1999, the data-gathering, consolidation and dissemination activities of the AEP will be supplemented by increased efforts to analyze the data and address major concerns in coral reef management. The Population Interdependencies in the South China Sea Ecosystems (PISCES) genetic data will be analyzed to see if and how reefs in one country may depend on reefs in adjacent countries for propagules. ReefBase is a global database on coral reefs and their resources. Selected ecological variables within ReefBase, such as the ratio of dead to total coral, will be analyzed in terms of statistical distributions to determine norms and bounds relative to the evaluation of ecosystem health. The Rapid Assessment of Management Parameters (RAMP) data will be compared in multivariate analyses to ecological variables to determine the degrees to which sets of socioeconomic variables can predict reef health. Both the ecological health variables and their socioeconomic predictors will be used in a *Reefs at Risk* study for Southeast Asia that will use data records from many sources in a geographical information system (GIS) based analysis of coral reef status in the area. This study will provide a much better basis for reef management in the region and a protocol for similar studies in other regions. The AEP will increasingly act as a catalyst for interaction among a variety of coastal zone projects under the MacArthur Population, Consumption and Environment (PCE) Program. Principles elucidated under these projects will be incorporated into the training materials being developed as part of the United Nations Train-Sea-Coast network. Finally, projects will be designed to integrate PISCES, ReefBase, RAMP, Reefs at Risk and the Coastal Management Training Project along with other relevant projects to assist the United Nations Environment Programme (UNEP) Regional Seas Program in upgrading the management of coral reefs globally.

**6. Fisheries Resources Assessment and Management Program (FRAMP).** The Program has a strong track record of developing and supporting the use of fisheries assessment software for researchers in national research institutions, be it through the Compleat Elefan, FiSAT (FAO-ICLARM Stock Assessment Tools) or one of the many other software packages released as part of the fisheries assessment programs at ICLARM. In recent years the focus has been widened from the initial focus on tools for the analysis of fish stocks. The Ecopath work is the best example. It allows fisheries to be analyzed in the context of the ecosystems that support them and to design policies for ecosystem-based management of fisheries. Further, with the realization that fisheries are inherently difficult to manage through catch or effort regulations, attention has been drawn toward using protected areas (with fishing restricted or banned) as part of management schemes. To participate in this effort ICLARM is undertaking projects (in two island states in the Caribbean) aimed at better understanding how marine protected areas function and how they can be used to improve the management of tropical fisheries. This work is supported by the recent development of spatial modeling as part of the Ecopath with Ecosim system that opens the way for model-based studies of protected area design.

**7. Policy Research and Impact Assessment Program (PRIAP).** The aims of the Program are, firstly, to provide policy options to ensure that the benefits of improved aquatic resources management are equitably distributed and, secondly, to develop measures for assessing the impact of biophysical

research to provide directions for ICLARM's future research.

The research activities of the Program are divided into three thematic areas:

- (i) ecological economics for sustainable governance of aquatic resources;
- (ii) impact of aquatic resources research: methods and assessment; and
- (iii) policy analysis of the contribution of fisheries to food security.

PRIAP has contributed both in terms of research methodologies and scientific results on the institutional governance of fisheries. Since its inception in 1994, fisheries co-management research has generated a large body of knowledge and information on the institutional approaches that are potentially available to developing countries. Phase II of the project will continue to focus on fisheries while encompassing coastal ecosystems and coastal resource management. The resource systems studied will include fisheries, coasts, coral reefs, mangroves, seagrasses, lakes, rivers, floodplains, wetlands and inland waterbodies.

In Bangladesh, the project on community-based fisheries management training and capacity building activities through government organizations and NGOs will continue. This project has generated a wide range of outputs including the development of institutional mechanisms and policy instruments for the participation of resource users in inland fisheries. Documenting the results of the various surveys and monitoring activities and preparation for the second phase of the project will be the main focus of the work in Bangladesh in 1999.

In 1998, a comprehensive review of the legal and institutional policy framework for fisheries and coastal resources management, covering Bangladesh and some countries in Southeast Asia, was accomplished. This review is important for improving policies and assessing various institutional management options. Over the next three years, PRIAP will expand this research into a more focused project on the Legal and Institutional Framework and Economic Valuation of Resources and Environment in the Mekong River Region. The preparatory activities will cover the period October 1998 to March 1999.

Research projects dealing with the analysis of policies for sustainable food security have contributed a wide range of data and information that support policy improvements and technological options for low income producers. Projects on the strengthening of the institutional capacity for aquaculture development in the southern part of Vietnam and the assessment of the supply of milkfish (bangus) fry in the Philippines have been completed. Final reports for the two projects will be prepared in 1999. Work on the development of a database for the assessment of fisheries in developing countries will continue and ICLARM will work with International Food Policy Research Institute (IFPRI) and FAO to integrate fish into the World Food Models.

**8. Information and Training Program (ITP).** The Program has a major role in ensuring the success of ICLARM's mission through the dissemination of the results of its research and by raising public awareness of its mission and activities. Traditional sources of funding for ICLARM and the other CGIAR Centers have become more difficult to access. This emphasizes the need for a clear identification of the impact of our research and the people who benefit from it. More widespread dissemination of ICLARM's work will contribute to a greater impact from the research while the marketing of ICLARM's mandate will promote an understanding of the need for this research.

In 1999, ICLARM will continue to produce high quality technical publications and public awareness materials. In 1998, ICLARM produced 44 publications (scientific reports and public awareness and corporate outputs) and copyedited and cleared 63 contributions to international and regional scientific journals and internal and external publications.

In 1999, the Library and Information Services Unit (LISU) will continue to operate and update six databases, which had a total of 51,457 entries as of 31 December 1998. Other library activities are

expected to continue to increase in 1999. During 1998, 460 queries from 82 countries were answered, 71% of these being from developing countries. Seventy-six percent of all queries were answered free of charge. Information and reference services were also provided to 1,797 users. A new electronic service for external users was introduced by making available monthly a selected new acquisitions list on ICLARM's homepage in an effort to make the library resources accessible to as wide an audience as possible. The serial contents page service was revived. Demonstrations on the use of information databases, online searches, library orientation and technical advice on library and information systems and services were provided to 469 users/visitors. The Unit had an exchange agreement with 146 libraries and institutions. Services and inputs to other libraries and international databases were also provided.

1999 will see the Publications Unit (PU) further formalize the project management procedures, based on a team approach and QA processes. These processes introduced in 1997/1998 contributed towards major efficiency gains in the PU. Statistics collated in 1998 showed a significant reduction in the time taken to publish a scientific manuscript from years to months. The release dates of *Naga, the ICLARM Quarterly*, were brought back on track. This followed the clearing of five to six years backlog of scientific manuscripts.

Significant financial gains (more than \$25,000) were achieved in PU due to creative cost cutting methods being implemented in the printing and distribution areas. Also \$15,060 was earned (for the ICLARM budget) through providing publication services and \$9,079 through the sales of books.

For 1999, ITP will capitalize on technology for information services and dissemination following an enhancement in technical staffing of the Program. *Naga* will be further developed for content and presentation. Better ways to disseminate ICLARM's research results and stories will also be analyzed.

A formal PA strategy is expected to be finalized and implemented in 1999. Acquiring external funding for information dissemination projects will be further developed. The training policy is expected to be finalized and will be followed by a plan for implementation.

**9. International Partnerships and Networks Program (IPNP).** ICLARM's work in research and related activities (training/workshops/conferences/information dissemination) is carried out in partnership with national institutions and regional and international organizations. The role of this Program is to strengthen existing collaborations and to develop new partnerships with national aquatic research systems (NARS), NGOs, regional and international organizations, advanced scientific institutions and the private sector, in research and related activities.

In collaboration with the Asia-Pacific Association of Agricultural Research Institutions (APAARI), ICLARM organized a meeting of the fisheries research agencies in Asia Pacific countries in 1998. This led to the formation of the Group of Fisheries and Aquatic Research (GoFAR) under APAARI, for identifying and implementing regional priorities in research and capacity building and bringing regional aquatic resources management issue to the NARS-CGIAR global agriculture research forum. A number of memoranda of agreement have been signed with national/regional/international organizations for collaboration in research, training and publications. ICLARM was the recipient of the 1998 CGIAR Chairman's Science Award for Outstanding Scientific Partnership indicating the success of ICLARM's partnerships.

The Program also coordinates the research network INGA (International Network on Genetics in Aquaculture) and the information network NTAFP (Network of Tropical Aquaculture and Fisheries Professionals). An increasing recognition of the importance of the networking activities is exemplified by 11 Advanced Scientific Institutions and regional and international organizations from Europe, USA, Middle East and Asia joining INGA as Associate Members.

During 1999, the program will forge new partnerships, further strengthen existing partnerships and networks and assess the feasibility of initiating a Network of Coastal Resource Management Scientists in southern Africa.

## ACTIVITIES AND SERVICES

**10. System-wide Initiatives.** ICLARM is an active member of several CGIAR system-wide activities, including research program and research support initiatives. It participates in the: System-wide Genetic Resources Program; System-wide Initiative on Water Management; System-wide Initiative on Property Rights and Collective Action; system-wide public awareness activities; and the gender and diversity program. ICLARM will continue its contribution to these and any other relevant system-wide initiatives.

**11. Corporate Services Division (CSD).** The CSD provides the operational and logistical support to the Center's Programs and Units. The philosophy of the Division is to provide client-oriented and efficient services to donors, Board of Trustees (BOT), management and staff. It also assists the BOT and management in developing appropriate policies, procedures, systems and in regular reviews of the effectiveness and efficiency of the Division's services so as to indicate areas for improvement and the adaptation of these services to the constantly changing environment.

The CSD is undergoing a transformation with the objective of improving services and addressing client needs and requirements. The reorganization, which commenced in 1998, is progressing with key managerial positions now in place. The Division has been organized into the following functional units: Human Resources; Finance and Management Information; Administrative and Liaison; Information Technology (Computer Services); Financial and Administrative Systems Development; and Planning and Budgeting.

**12. Office of the Deputy Director General - Africa and West Asia (ODDG-AWA).** This office was established in January 1997 when ICLARM moved to open a regional center in Egypt. The regional research center was set up to develop and conduct a program of research and training to facilitate and encourage better management and use of living aquatic resources in the region. It will do this through a program of work at the Abbassa research center and in close cooperation with the national programs in the region as well as ICLARM's global Programs coordinated at its headquarters.

1998 was the first year of full operation. A complete compliment of national staff was recruited. The renovation of the facilities was advanced and all ponds and almost all research labs are ready for operation. The research and training program dealt mostly with nutrition of tilapia and catfish and the genetic enhancement of tilapia. Many national programs were visited during the year. An international conference on the Lake Nasser fisheries was held.

The major goals for 1999 will be to complete the renewal of the facilities and to continue to develop the plans and funding for a program of research for the region.

The work on the genetic enhancement of tilapia will increase. Several research and training efforts with Egyptian organizations are scheduled. A regional training program, developed in collaboration with FAO, will be conducted. An international conference is planned.

**13. Office of the Deputy Director General - Programs (ODDG-P).** This office was established in 1996 to oversee the planning, implementation, impact assessment and reporting of ICLARM's scientific programs. The office helps coordinate the planning activities including the development of ICLARM's rolling Medium-term Plans (MTP). A major activity in 1998 was the holding of a Strategic Planning Workshop and the coordination of the drafting of ICLARM's new Strategic Plan for 2000-2020, to be completed in 1999. The office convenes the internally commissioned external reviews of ICLARM's scientific programs. New project development is carried out with the Research Management Committee. New activities (especially with respect to the new initiative in Africa) will be promoted in conjunction with the Deputy Director General, Africa and West Asia and other Programs. In 1999, the office will focus on the development and implementation of research in line with the new Strategic Plan.

**14. Office of the Director General (ODG).** This office carries out the central executive management functions of ICLARM and is responsible for implementing Board policies and advising the Board on management and policy matters.

Major challenges in 1999 will be the final stages of ICLARM's quinquennial external program and management review. ICLARM expects to select a new headquarters site and commence the process of relocating to the site. Continued efforts will be made to define ICLARM's position in strategic research vis-à-vis other agencies and in relation to the research and development continuum. Internally, program synergy among all projects and ICLARM sites will be promoted strongly.

The ODG is also in charge of the Project Development Coordination Unit (PDCU) whose main function is to provide assistance to the scientific programs in proposal development and to assist the Director General of ICLARM in developing, maintaining and enhancing the Center's relationships with its donor stakeholders.

## 1. BIODIVERSITY AND GENETIC RESOURCES PROGRAM (BGRP)

### Project 1.1

Strengthening Fisheries and Biodiversity Management in African, Caribbean and Pacific (ACP) Developing Countries, with Further Development of a Biological Database on Fish (FishBase)

#### ICLARM Staff

Dr. Rainer Froese (Project Leader); Dr. Jan Michael Vakily; Dr. Maria Lourdes D. Palomares; Ms. Crispina B. Binohlan; Ms. Armi G. Torres; Ms. Pascualita T. Sa-a; Ms. Emily DC. Capuli; Mr. Rodolfo B. Reyes, Jr.; Ms. Rachel Atanacio; Ms. Alice Laborde; Ms. Cristina V. Garilao; Ms. Christine Marie V. Casal; Ms. Grace Tolentino-Pablico; Ms. Maria Teresa G. Cruz; Mr. John Falcon; Dr. Daniel Pauly (Scientific Adviser)

#### Collaborating Institutions

*International/Regional:* Caribbean Community (CARICOM) Fisheries Resources Assessment and Management Program; Food and Agriculture Organization of the United Nations (FAO); Secretariat of the Pacific Community (SPC); World Conservation Monitoring Centre (WCMC); World Conservation Union (IUCN)

*Belgium:* Musée Royal de l'Afrique Centrale

*Canada:* Ocean Voice International; University of British Columbia (UBC)

*France:* Museum National d'Histoire Naturelle

*Germany:* Institut für Meereskunde, Kiel (IFM-K)

*Namibia:* National Marine Information and Research Centre

*Sénégal:* Centre de Recherche Océanographique, Dakar-Thiaroye (CRODT)

*UK:* Natural History Museum; Species 2000 Project, University of Reading

*USA:* American Fisheries Society; California Academy of Sciences

*Others:* the national programs of 55 countries in the ACP regions; other institutions and individual researchers

**Donor** : EU

**Duration** : December 1996 - December 2000

#### Objectives

- Facilitate the sustainable use and conservation of fish biodiversity by making key scientific information readily accessible through a computerized encyclopedia.
- Build up the aquatic resource management and scientific capacity of ACP national institutions by providing managers, researchers, teachers and students with reliable and easy to use key information and state-of-the-art management tools, and by training them in the use of these tools.
- Promote an enabling environment for research which is relevant and critical to sustainable aquatic resources management in developing countries, by facilitating cooperation between national researchers and managers in individual countries, and by actively fostering regional and global cooperation.
- Improve further the quality, completeness and usefulness of FishBase, national biodiversity databases and other management tools.

#### Background and Justification

Researchers and managers in ACP countries are seeking to achieve sustainable management of their living aquatic resources and to increase awareness of the importance of conserving aquatic biodiversity. This requires resource management tools and broad-based training of NARS scientific and resource management staff. Accessibility of relevant information is crucial for success.

FishBase is a biological database developed by ICLARM in collaboration with FAO and many other partners. FishBase contains key information (nomenclature, morphology, trophic ecology, population dynamics, physiology, pictures, maps, etc.) for 20,000 of the estimated 25,000 known species of finfish. It acts as a host to other databases that are developed by collaborators, such as FAO Catches 1950-1996, FAO Aquaculture Production 1984-1994, IUCN Red List Data, Eschmeyer's Catalog of Fishes, Myers' database of recruitment time series, Houde's LARVDYN database, among many others.

FishBase forms the scientific backbone of ICLARM's EU-funded activities to strengthen fisheries and

biodiversity management in the ACP countries, by facilitating the creation of up-to-date national biodiversity databases for finfish. Part of this task is the repatriation of national biodiversity information currently held in the museums of developed countries. These data, once they are computerized, georeferenced, checked and completed with more recent data, will be used to analyze national biodiversity trends and patterns and to provide a scientific basis for national biodiversity policies in ACP and other countries.

### Scores Against Principles

Sustainability	H	Participation	M
Equity	H	Systems Approach	M
Gender	M	Anticipatory Research	H

### 1998 Results

FishBase 98 was released in September 1998. It covers information on 20,000 fishes drawn from over 12,000 references. The most significant improvement in this version is the addition of many graphs covering a wide range of analytical topics. For example, FishBase 98 contains graphs to analyze the sustainability of fish catches at the global, regional and country levels.

The Second Regional Training Course on Fisheries and Biodiversity Management was conducted in Port of Spain, Trinidad and Tobago, from 21 May to 3 June. The course was attended by 22 participants from 14 ACP countries in the region, as well as by eight observers from Trinidad and Tobago.

The Third Regional Training Course on Fisheries and Biodiversity Management was conducted in Swakopmund, Namibia, from 31 November to 11 December for participants from nine ACP countries in southern Africa.

The Project's Steering Committee met on 3-5 June in Port of Spain, approved progress so far and discussed plans for a project extension.

The Department of Biology, University of Addis Ababa, Ethiopia, and CRODT in Dakar, Sénégal, were selected as regional nodes for east Africa and west Africa, respectively. Both institutions were visited and Memoranda of Understanding (MOU) were prepared. The MOU with CRODT has been signed by both parties and this regional node is now operational.

The regional nodes were provided with the necessary computer hardware and software.

Two regional training coordinators were hired for the Caribbean region (based at the CARICOM Fisheries Resources Assessment and Management Program office, Belize); one coordinator was hired for the southern African node (Swakopmund, Namibia), and two coordinators were hired for the west African node (Dakar, Sénégal).

The two regional coordinators for the Caribbean each spent two weeks at ICLARM headquarters, to work directly with the FishBase team in preparation for remote data entry into FishBase by means of the Internet.

### Expected Outputs in 1999

The training node for east Africa will be made operational in terms of staff and equipment.

Two-week regional training courses will be organized for ACP countries in west Africa and in east Africa (24 participating countries).

A one-week Fish Taxonomy Training Course for the wider Caribbean area will be held in Belize in cooperation with FAO. This will lead to a substantial improvement of the fish species lists in the participating ACP countries.

Individual on-the-job training for regional training coordinators will be continued at ICLARM headquarters for a duration of two weeks each.

FishBase 99 is planned to be released in September 1999. It will cover 22,500 species, contain new biodiversity maps and will be linked to the Ecopath software. Major parts of FishBase will be made available on the world wide web.

## Project 1.2

### LarvalBase: A Global Information System on Fish Larvae

#### ICLARM Staff

Dr. Rainer Froese

#### Collaborating Institutions

*Germany:* Institut für Meereskunde, Kiel (IFM-K)

**Donor** : Bundesministerium für  
Wirtschaftliche Zusammenarbeit/  
Deutsche Gesellschaft für Technische  
Zusammenarbeit (BMZ/GTZ),  
Germany

## Objectives

- Provide fisheries and hatchery managers in developing countries with fast and easy access to all information relevant to the identification and rearing of fish larvae for aquaculture and stock enhancement and for the conservation and re-establishment of fish biodiversity.
- Gather key information on fish larvae, as relevant to their identification and rearing.
- Assemble this information and data in an information system, LarvalBase.
- Make LarvalBase widely available in developing countries.
- Provide training courses in the use of LarvalBase.

## Background and Justification

Critical habitats for the spawning and early life history stages of many fish species have been degraded or lost as a result of pollution, coastal development and other human activities. In addition, recruitment overfishing - the reduction of the spawning stock below a critical threshold - has prevented many populations from replenishing themselves to previous levels. Together, these produce circumstances where aquatic habitats do not support as many fish as they could. Consequently, numerous ways are being explored to augment the natural supply of fish, ranging from aquaculture to various fisheries enhancement methods.

Fisheries and hatchery managers in developing countries need easy access to relevant information on identifying and rearing of fish larvae for aquaculture, stock enhancement and re-establishment of fish biodiversity. To address this need, the idea to produce a global database containing biological information "at a user's fingertips" was conceived. FishBase, the ICLARM-managed database on finfish, is a well-established example of such an information system and provides an ideal vehicle to make information on fish larvae effectively and inexpensively available to a wide range of users. In a collaboration between ICLARM and the IFM-K, ICLARM will provide the FishBase format and IFM-K will provide its specialized knowledge on fish larvae. LarvalBase will be made available on CD-ROM and the Internet.

Possible future collaborators include: the Institut für Hydrobiologie und Fischereiwissenschaft, Hamburg, Germany; Alfred-Wegener Institut, Bremerhaven, Germany; Danish Institute for Fisheries Research, Charlottenlund, Denmark; the Marine Biological Laboratory in Helsingor, Denmark;

Instituto Oceanografico, Department of Fishery Research, Sao Paulo, Brazil; Universidade Federal Rural de Pernambuco, Departamento de Pesca, Recife, Brasil; the Brackishwater Aquaculture Development Center, Jepara, Indonesia; and the Australian Institute of Marine Science (AIMS), Townsville.

## Scores Against Principles

Sustainability	H	Participation	M
Equity	M	Systems Approach	H
Gender	L	Anticipatory Research	H

## 1998 Results

A one-year feasibility study to explore the needs and requirements of a database (LarvalBase) on the rearing of fish larvae was started in March 1998, in collaboration with the IFM-K, and supported by the BMZ. First results indicate a considerable demand for such information, and the suitability of FishBase for hosting LarvalBase.

## Expected Outputs in 1999

Full report on the 1998-1999 feasibility study.

Start-up of a full LarvalBase project, subject to available funds.

## Project 1.3

Fish Biodiversity in the Coastal Zone: a Case Study on the Genetic Diversity (Process of Speciation), Conservation and Sustainable Use in Aquaculture and Fisheries of the Black-chinned Tilapia (*Sarotherodon melanotheron*) in West African Coastal Lagoons and Watercourses

## ICLARM Staff

Dr. Roger S.V. Pullin; Ms. Christine Marie V. Casal

## Collaborating Institutions

*Germany:* Zoologisches Institut und Zoologisches Museum, Universität Hamburg (ZIM/UH)

*Ghana:* Water Research Institute

**Donor** : BMZ/GTZ

**Duration** : March 1997 - September 1999  
(Extension proposed to March 2002)

## Objectives

### OVERALL

- Assist in the conservation and sustainable use in aquaculture and fisheries of a brackishwater tilapia (*S. melanotheron*) that is widely exploited in the coastal zone of west Africa, thereby improving fish supply, providing livelihood opportunities for fishers and farmers, and demonstrating approaches that can be used in other regions and with other exploited and exploitable fishes.

### SPECIFIC

- Gather comprehensive information, including indigenous knowledge, on the biology, ecology and use of *S. melanotheron* in west Africa.
- Determine the conservation status and potential for sustainable use of *S. melanotheron*.
- Identify at least two localities in Ghana with a potential for community-based sustainable aquaculture and/or fisheries development, using *S. melanotheron*.
- Initiate a practical aquaculture development program for *S. melanotheron* at a locality in Ghana.

## Background and Justification

The black-chinned tilapia is a coastal zone species inhabiting brackishwater and freshwater lagoons and watercourses in west Africa, ranging from Sénégal to the Democratic Republic of Congo (formerly Zaïre). It is widely exploited by poor fishers using a variety of fishing gear and traditional methods of fisheries enhancement, the so-called 'brushparks'. It is also a promising species for aquaculture in brackishwater and freshwater and its development for this purpose would help to obviate the need for the importation of exotic species for aquaculture, which could have adverse environmental impacts.

*S. melanotheron* is a highly appropriate species for a case study on how to combine the conservation of the genetic resources of an exploited species with its sustainable and equitable use by humans. This is a question that needs to be answered for many exploited fishes. *S. melanotheron* has the following attributes that qualify it as a choice for such a case study:

- It is used by poor coastal dwellers for food and livelihood in capture fisheries and enhanced fisheries and has potential for aquaculture. Its sustainable use in all of these, including breeding programs for aquaculture, will depend largely

upon the characterization, evaluation and conservation of its genetic resources.

- Its populations have a high level of intraspecific variation in that five subspecies are recognized (*S.m. melanotheron*, *S.m. heudelotii*, *S.m. leonensis*, *S.m. paludinosus* and *S.m. nigripinnis*). It is, therefore, a good subject for further development of different methods, especially new biochemical techniques, to characterize and to evaluate fish genetic resources.
- Its populations are threatened by the human pressures that are responsible for the loss of fish genetic resources worldwide: overfishing, habitat degradation, pollution, impact of exotic species, etc.
- The indigenous knowledge and the traditional management practices that were established to conserve its populations for sustainable use are breaking down as population increases and natural resources and habitats are degraded.

## Scores Against Principles

Sustainability	H	Participation	M
Equity	H	Systems Approach	M
Gender	M	Anticipatory Research	H

## Results in 1998

Extensive data were obtained on the genetic diversity of *S. melanotheron* populations from the western portion of its range (Sénégal to Benin) and from Kouilou (DR Congo), based upon 432 samples from 18 sites, documenting variations in hemoglobins, allozymes, skeletal parvalbumins, and morphology. These data broadly confirm the existing subspecific classification of this species but there is no evidence for the existence of *S.m. paludinosus* in Sénégal or *S.m. leonensis* in Sierra Leone.

A pioneering demonstration of the use of globin chain characteristics as discriminatory characters in studies on the population genetics of teleost fish.

Data were gathered on the biology, ecology and use of *S. melanotheron* in west African coastal lagoons and watercourses.

Aquaculture trials, using genetically distinct *S. melanotheron* populations, were initiated at two localities in Ghana.

Standardization of allozyme data was initiated, by using allozymic variants of known molecular weights, representing 20 different alleles at seven polymorphic loci.

ICLARM, Water Research Institute, Accra, and ZIM/UH project staff participated in the Paradi Association and the Fisheries Society of Africa's International Conference on African Fish and Fisheries: Diversity and Utilization, on 13–19 September 1998, Grahamstown, South Africa, where they presented the project's progress.

A proposal was prepared for an extension of the project to March 2002.

### Expected Outputs in 1999

Further sampling and analyses of the genetic relationships of *S. melanotheron* populations in west Africa.

Further data gathering on the biology, ecology and use of *S. melanotheron* in west African coastal lagoons and watercourses.

Continuation of aquaculture trials in Ghana, using genetically distinct *S. melanotheron* populations.

Development of antisera-based methods for rapid, nonlethal identification of tilapia species and hybrids.

Convening an international workshop in Ghana in May 1999 to present the results obtained and methods developed to African scientists and to compare these results and methods with those of other groups.

Preparation of reports and publications relating to all of the above, before the project's closing date in September 1999 and preparing for the project's extension to March 2002, assuming that funding is approved.

## Project 1.4

Genetic Diversity of the Silver Barb  
*Barbodes (Puntius) gonionotus*  
(Bleeker) in Southeast Asia

### ICLARM Staff

Dr. Roger S.V. Pullin; Ms. Christine Marie V. Casal

### Collaborating Institution

UK: University of Wales, Swansea (UWS)

**Donor** : Department for International Development (DFID), UK

**Duration** : October 1997 - September 2000

### Objectives

- Identify the center(s) of genetic diversity of *B. (Puntius) gonionotus* across its natural range and make recommendations for the management of these genetic resources.
- Survey existing information, including indigenous knowledge on the distribution, transfer and introductions of this species in order to identify key sites where samples would be likely to represent important populations of the species.
- Gain experience in and develop methods for genetic diversity research that could be applied to other species.

### Background and Justification

*Barbodes (Puntius) gonionotus* (Bleeker), the silver barb, is an Asian carp that is popular as a food fish and is particularly suitable for low input pond aquaculture in poor communities in south and southeast Asia. It is reportedly native to Indonesia and the Mekong basin (Cambodia, Laos, Thailand and Vietnam), although it may have been originally introduced to the Mekong from Indonesia. The species has now been introduced throughout much of tropical and subtropical Asia, e.g., Bangladesh, China, India and Malaysia.

Knowledge of the genetic diversity and population structure of this species is vital to the future management of farmed and wild populations. A recent preliminary study on the selection of *B. gonionotus* stocks in Bangladesh has indicated growth differences between farmed strains of different origins. As the commercial importance of a species grows, so too does the value of its genetic diversity. Wild populations act as reservoirs of genetic variation available for exploitation. It is thus essential that the most important wild populations (i.e., those having the highest levels and most unique genetic variation) must be identified and given priority status in terms of conservation. They can then be used for the further domestication of the species. There is presently very little information available on the population genetics of *B. gonionotus*, a gap which this project will start to fill.

### Scores Against Principles

Sustainability	H	Participation	M
Equity	M	Systems Approach	L
Gender	L	Anticipatory Research	H

### Results in 1998

Samples were collected from wild populations in central, northern and southern Thailand and in central, east and west Java, Indonesia, and from wild and farmed populations in Vietnam.

MtDNA and microsatellite markers were further developed and optimized.

Initial results, from molecular genetic and meristic studies, indicate that *B. gonionotus* is a single species across its range. Samples collected for comparison included *B. altus*, *B. balleroides* and *B. schwanenfeldii*. Museum specimens of *B. gonionotus* from London, the University of Michigan and Washington, D.C. were examined.

Contacts were established in Lao PDR for future sampling of the species through the Research Development Committee and the Division of Agriculture and Forestry.

ICLARM staff discussed the project's results with representatives of FAO and the World Fisheries Trust at a meeting in Rome in November. An ICLARM staff visited the UWS laboratories to study the molecular methods being used in the project.

### Expected Outputs in 1999

Identification of additional microsatellite markers.

Surveys of variations in the mtDNA control region at microsatellite loci.

Sampling of *B. gonionotus* populations in Cambodia, Lao PDR and Indonesia.

Morphometric and meristic datasets.

### Project 1.5

Bellagio Conference: Towards Policies for Conservation and Sustainable Use of Aquatic Genetic Resources

#### ICLARM Staff

Dr. Roger S.V. Pullin; Ms. Christine Marie V. Casal; Dr. Rainer Froese, Dr. Modadugu V. Gupta; Ms. Cynthia Villaflor

#### Collaborating Institution

International/Regional: Food and Agriculture Organization of the United Nations (FAO)

**Donors** : FAO; Rockefeller Foundation

**Duration** : April 1998 – March 1999

### Objectives

#### OVERALL

- Contribute to the development of policies for the conservation and sustainable use of aquatic genetic resources, by reviewing critical policy issues and suggesting ways and means to address these.

#### SPECIFIC

- Review and comment upon the laws and protocols (local, national, regional and international) that apply to the conservation and use of aquatic genetic resources.
- Review institutional responsibilities and roles, present and future, that apply to the conservation and use of aquatic genetic resources.
- Devise strategies to inform and to educate those concerned with the conservation and sustainable use of aquatic genetic resources, especially those tasked with the framing and implementation of policies at the international, regional, national and local levels.
- Prepare flowcharts and plans for the development of tools to assist policymakers, e.g., databases and decision-support software.
- Publish and disseminate its findings in a comprehensive proceedings volume.

### Background and Justification

International, regional and national policies for the conservation and sustainable use of aquatic genetic resources are urgently needed. Without such policies, fisheries will continue to decline resulting in increasing conflicts over diminishing stocks, aquaculture will fail to realize its potential for growth in both developed and developing countries and much of the aquatic biodiversity, upon which the environmental health of the planet's waters depends, will be reduced or lost. The CBD requires the establishment of such policies for the conservation and use of aquatic ecosystems, organisms and genes.

Policymaking for aquatic biodiversity and genetic resources lags far behind that for exploited plant species and livestock. Previous consultations and mechanisms relating to aquatic genetic resources have been convened and established mainly by fish geneticists. This conference was focused on policy, emphasizing the human dimensions in conservation and use scenarios and the legal,

political, ethical and economic issues that must be faced.

Some of the policy issues for aquatic genetic resources are similar in scope to those for terrestrial plants and livestock, including legislation, institutional responsibilities and roles, ownership and access, intellectual property rights, farmers' and breeders' rights, users' perspectives (from indigenous peoples and from the public and private sectors), biosafety introductions in transfers of aquatic organisms, and the pros and cons of using genetically modified aquatic organisms. However, the connectivity of aquatic systems and the common property aspects of fisheries and some of the resources used for aquaculture mean that there are policy issues that have special characteristics and importance in the aquatic realm. Aquatic biota and habitats are extremely vulnerable to change from human interventions. Such changes are often irreversible and may have consequences beyond national and other boundaries. Equity issues, including intergenerational equity, have been little considered for aquatic genetic resources. This conference explored these issues and the possibilities for developing tools to assist policymakers.

#### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	M

#### 1998 Results

The Bellagio Conference titled "Towards Policies for Conservation and Sustainable Use of Aquatic Genetic Resources" was held 14-18 April 1998. Participants from 14 countries made contributions in a wide range of disciplines (aquatic biology, aquaculture, genetics, governance of natural resources, fisheries, public awareness, intellectual property rights, law, etc.).

The participants agreed upon a consensus statement - suggestions for action and areas of concern - and this statement was distributed at the Fourth Conference of Parties (COP IV) to the CBD, 4-15 May 1998, Bratislava, Slovakia.

A summary report of the results of the conference was submitted to the Rockefeller Foundation and the consensus statement of the conference was published in *Naga, the ICLARM Quarterly*.

#### Expected Outputs in 1999

Full edited proceedings of the conference will be published.

#### Project 1.6

#### Authoritative Nomenclature for Species Used in SINGER and the CGIAR

#### ICLARM Staff

Dr. Rainer Froese (Project leader); Ms. Catalina Rañola

#### Collaborating Institutions

*UK:* Species 2000 Project, University of Reading  
*Others:* All CGIAR Centres with research and information/publication activities that involve naming biological species; other international authoritative initiatives in taxonomy

**Donors** : SGRP; SINGER

**Duration** : 1 January - 31 December 1999

#### Objectives

- Ensure that nomenclature used by the CGIAR and SINGER for the species it handles in its various activities is correct and authoritative.
- Establish procedures for ensuring that this will continue in the future, as nomenclature changes.
- Put in place a taxonomy database at the end of the project under the responsibility of the International Plant Genetic Resources Institute (IPGRI).

#### Background and Justification

It was stressed in the SINGER meeting (Rome, 9-14 November) that data quality checking within the SINGER databases should be initiated. This is to ensure a homogeneous set of standards within the SINGER core set of data is taxonomy. The meeting endorsed ICLARM to carry out this activity in view of its expertise in this field. IPGRI has undertaken to continue this work after the end of this project and ensure its sustainability.

Authoritative taxonomy references to ensure better compatibility with existing and future partners of the network are needed in the very near future. This SGRP taxonomy list will provide an authoritative guidance to CGIAR information systems and

databases and guarantee their compatibility with other such information/database systems. The collaboration with “non-CGIAR” partners (e.g., Genetic Resources Information Network [GRIN], Nordic Genebank, Plant Breeding and Acclimatization Institute, Poland [IHAR]) and strong linkages to the Species 2000 initiative ensures that this authoritative list will provide a preliminary basis for the exchange of information. At the NARS level, it will guarantee a better flow of information and assistance using common standards.

**Scores Against Principles**

Sustainability	H	Participation	M
Equity	M	Systems Approach	H
Gender	L	Anticipatory Research	H

**Expected Outputs in 1999**

Nomenclature used by the CGIAR and SINGER for the species it handles in its various activities is correct and authoritative.

SINGER linked to authoritative global species databases that contain information on distribution, characterization, maps, pictures, references links, etc.

SINGER linked to relevant databases such as IUCN Red List, IUCN Environmental Law, museums, other genebanks, etc.

A taxonomy database at the end of the project under the responsibility of IPGRI.

## 2. GERMLASM ENHANCEMENT AND BREEDING PROGRAM (GEBP)

### Project 2.1

#### Genetic Improvement of Carp Species in Asia

#### ICLARM Staff

Dr. Rex A. Dunham (Program/Project Leader); Dr. Madan Mohan Dey (Project Leader); Dr. Modadugu V. Gupta; Mr. Gaspar B. Bimbao; Ms. Florabelle Gagalac; Ms. Perla M. Virly; Ms. Ma. Concesa Gayanilo

#### Collaborating Institutions

*Bangladesh:* Bangladesh Fisheries Research Institute (FRI); Department of Agricultural Finance, Bangladesh Agricultural University

*China:* Freshwater Fisheries Research Center; Shanghai Fisheries University

*India:* Central Institute of Freshwater Aquaculture (CIFA); National Bureau of Fish Genetic Resources

*Indonesia:* Research Institute for Freshwater Fisheries; Universitas Hasanuddin

*Thailand:* Asian Institute of Technology (AIT); National Aquaculture Genetics Research Institute (NAGRI)

*Vietnam:* Research Institute for Aquaculture (RIA) Nos. 1 & 2

**Donors** : ADB; ICLARM core funds

**Duration** : Phase I, 1997 - 1999

#### Objectives

- Document carp genetics resources in Asia.
- Document genetic improvement of carps in Asia.
- Conduct baseline surveys to understand the existing farming practices, marketing and consumption patterns.
- Identify constraints to carp productivity improvement in different ecological and socio-economic environments.
- Prioritize selection of carp species, choice of farming systems and selection of traits for research.
- Genetically improve carp for aquaculture.
- Transfer technology to collaborating country scientists and to farmers.

#### Background and Justification

Diverse species, farming systems and socio-economic scenarios prevail in various major Asian carp-producing countries. About 20 carp species are extensively cultured under diverse farming systems. All are natural inhabitants of Asian waters. There are a number of commercial traits that could be improved for each species, depending on the users' perspective. Carp genetics research will begin by choosing species, farming systems and breeding goals with the highest potential impact on increased protein production, efficiency, equity, sustainability and environmental issues.

The study is being implemented in Bangladesh, the People's Republic of China, India, Indonesia, Thailand and Vietnam. These countries contribute more than 90% of the world production of carps. Carps constitute about 50% of the total aquaculture production in these countries.

In analyzing priorities for carp genetic research, the following aspects are being considered: (i) assessment of how and to what extent existing carp species/strains are valued by different groups of society (farmers, consumers, agents, etc.); (ii) estimation of future demand for various carp species by income groups; (iii) analysis of present and future importance of various carp-based farming systems, including problems and opportunities for increasing production in these environments; (iv) assessment of the relative economic importance of various traits (for example, growth, disease resistance, resistance to abiotic stresses such as low dissolved oxygen, adverse soil and water conditions, etc.). The analyses are based on field surveys for carp producers, consumers and traders, and on secondary information available in the participating countries. This demand analysis will provide information on research areas which will focus on increasing biological efficiency (productivity), reducing production costs, and improving quality.

#### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	M
Gender	H	Anticipatory Research	H

## 1998 Results

*Species Prioritization Research:* Carp species prioritization research was initiated in Bangladesh, China and India. A draft report regarding this activity in Bangladesh and China was completed, and is currently being revised. In India, this research activity has been impeded due to problems in transfer of funds among collaborating institutions.

*Socioeconomic Surveys:* Bangladesh completed the socioeconomic survey of 480 fish farmers equally distributed in 8 thanas: Trishal, Chandina, Jhikargacha, Sadar, Ishawarganj, Burichong, Bagharpara and Sariakandi. A draft report on the results of the data analysis of this survey is undergoing revision. A survey of 720 consumers in the same thanas was completed. China's implementation of the survey of 400 fish producers was delayed due to prolonged flooding in China. The survey is expected to be completed by the end of January 1999. Data on 500 respondents have been generated for the survey of consumers. Implementation of all socioeconomic surveys in India was delayed due to problems in transfer of funds among collaborating institutions. Research collaborators are still in the process of recruiting personnel to undertake the surveys. Indonesia completed the socioeconomic surveys of fish farmers covering the districts of Sukabumi, Cianjur, Bandung and Subang. The survey of consumers in these districts is ongoing. Thailand completed the socioeconomic surveys of 280 fish farmers and 26 fish hatchery operators covering Chiangmai, Phetchabun, Khonkaen, Nakhon, Pathumtani, Chachoengsao and Suphanburi provinces. The first round of a quarterly survey of consumers was also completed with 734 respondents. The Bangkok area was covered in this survey in addition to the seven provinces covered in the socioeconomic survey of fish farmers. All the data collected are currently being encoded. Vietnam completed the socioeconomic survey of 160 fish farmers in four provinces: Hanoi, Hai Dung, Vinh Phuc and Thai Nguyen. This is the first round of a quarterly survey of fish farmers. The second round of this survey is ongoing. A preliminary analysis was undertaken of the socioeconomic survey of fish farmers.

*Genetic Enhancement:* Selection for increased body weight was conducted for two lines of rohu in India. Growth rate was improved by 13 and 30% in these two lines. The first generation of selection for increased body weight in silver barb in Bangladesh produced less dramatic results with a 7% increase

in body weight. Multiple generations of selection for increased body weight of bluntnose bream in China resulted in a 20% growth improvement. Correspondingly, one generation of inbreeding, brother-sister mating decreased growth rate to the same extent. This illustrated the importance of not only genetic enhancement in developing country aquaculture, but also the importance of maintaining genetic quality and utilizing proper brood-stock and hatchery management.

All female populations of silver barb had higher survival in ponds than mixed sex populations resulting in higher production for the all female population. For wild strains of silver barb it was more difficult to artificially spawn than domestic strains in Vietnam.

### Expected Outputs in 1999

Completion of baseline survey on farming practices, marketing and consumption patterns.

*Ex ante* assessment of the potential impact of carp genetics research.

Report on carp genetic resources in Asia.

Report on status of carp genetic improvement programs in Asia.

## Project 2.2

### Genetic Improvement of Tilapias

#### ICLARM Staff

Dr. Rex A. Dunham (Project Leader); Mr. Mahmoud Rezk; Mr. Abdel-Rahaman El-Gamal; Ms. Florabelle Galalac; Ms. Perla M. Virly

#### Collaborating Institutions

*Philippines:* Freshwater Aquaculture Center/Central Luzon State University (FAC/CLSU); GIFT Foundation International, Inc.

*UK:* University College of Swansea; University of Stirling

*USA:* Auburn University

**Donors** : DFID; ICLARM core funds; International Development Research Centre (IDRC); UNDP; United States Agency for International Development (USAID)

**Duration :** 5 - 10 years

**Objectives**

- Develop improved breeds of tilapia and provide these to national testing programs and hence to fish farmers.
- Develop breeding plans for tilapia genetic enhancement in Africa and Asia.

**Background and Justification**

Tilapia is a major aquaculture species in Asia, Africa and throughout the world. The characteristics of this fish should allow its utilization to increase protein production, profits and quality of life of poor fish farmers and consumers. Previous research indicates great potential for the genetic improvement of this species for aquaculture. Our aim is to develop additional programs of research and to secure funding to strengthen tilapia genetic improvement programs in Africa and Asia.

**Scores Against Principles**

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	H

**1998 Results**

*Tilapia Genetic Enhancement in Egypt:* *Oreochromis niloticus*, *O. aureus*, *Tilapia zilli* and *T. galilaeus* were compared for aquaculture performance in Egypt. *T. zilli* and *T. galilaeus* spawned earlier and at cooler temperatures. Fry from these two species were larger than those of *O. niloticus* and *O. aureus* at the initiation of a growth experiment because of the early spawning. However, *O. niloticus* and *O. aureus* rapidly grew to larger sizes than *T. zilli* and *T. galilaeus* despite the size advantage of the latter two.

Three strains of *O. niloticus* from Egypt were included in the comparison, and strain differences were evident. During warm weather, two strains of *O. niloticus* grew faster than *O. aureus*, but the third strain grew more slowly. This illustrates the importance of strain effects when attempting to draw conclusion about species differences. Once cold weather arrived, the growth rate of the *O. niloticus* strains slowed more so than the *O. aureus* and it appears that the *O. aureus* will reach a larger size by the conclusion of the experiment. Different species had advantages during the three different growth phases. This suggests that introgression should be evaluated to combine the various growth and spawning advantages of these tilapia species.

*New Funded Project:* Genetic Enhancement of Tropical Aquaculture Species by Combined Selection, Marker-assisted Selection and QTL Mapping. Donor: USAID. Collaborator: Auburn University.

*Concept Notes Accepted:* Genetic Enhancement of Nile Tilapia and Utilization of F<sub>1</sub> Crossbred Clones. Donor: DFID. Collaborators: University of Stirling; University College of Swansea; FAC/CLSU; GIFT Foundation International, Inc.

**Expected Outputs in 1999**

Develop breeding plans.

Develop reports on the status of the tilapia genetic improvement.

Submit proposals to donors.

Secure funding for tilapia genetics research for discrete continental foci in Africa and Asia.

### 3. INTEGRATED AQUACULTURE-AGRICULTURE SYSTEMS PROGRAM (IAASP)

#### Project 3.1

Reviews on Inland Aquatic Resource Systems

#### ICLARM Staff

To be determined

#### Collaborating Institution

UK: Imperial College, London

**Donors** : To be identified

**Duration** : 2000 - 2002

#### Objective

- Define strategic research agendas (and ICLARM's possible future contributions to these) for aquaculture and fisheries development in inland aquatic resource systems other than ponds and rice floodwaters. The systems to be reviewed include reservoirs, small lakes, floodplains and wastewaters.

#### Background and Justification

Given its limited budget, ICLARM chose, for the 1994-1998 MTP period, to focus the work of its Inland Aquatic Resource Systems Program on the resource system for which the most pressing needs and opportunities could be seen with respect to resource-poor farmers, i.e., ponds and rice floodwaters. This was based upon the priority setting done in ICLARM's strategic planning. However, other inland aquatic resource systems (reservoirs, small lakes, floodplains and wastewaters) have potential for fish production and livelihood, and strategic research agendas are needed for this, with ICLARM's possible roles clarified for future research. This can be done through commissioned reviews.

#### Scores Against Principles

Sustainability	H	Participation	L
Equity	H	Systems Approach	H
Gender	L	Anticipatory Research	H

#### 1998 Results

Discussions were held with a number of potential donors and contributors. A concept note and a proposal were prepared and submitted to donors.

#### Expected Outputs in 1999

Proposals for donors to fund commissioned reviews on one of the additional aquatic resource systems listed above. Reservoirs will be the priority.

#### Project 3.2

Integrated Resources Management (IRM) Group and Development of RESTORE Software

#### ICLARM Staff

Dr. Mark Prein (Project Leader); Ms. Mary Ann P. Bimbao; Ms. Teresita S. Lopez; Mr. Ferdinand Paraguas; Mr. Roberto T. Oficial

#### Collaborating Institutions

*Bangladesh*: national collaborators  
*Malati*: national collaborators

**Donors** : ICLARM core funds

**Duration** : 1991 - 1999

#### Objectives

- Improve the way farmers manage their land and water resources through integration of aquaculture and agriculture.
- Develop participatory research procedures for farmers to integrate aquaculture into their farming systems.
- Develop participatory research methods for enhancing farmers' natural resource management skills.
- Develop an analytical framework, including customized software, for monitoring the impact of integration on households, assessing the sustainability of integrated farming systems and providing direct feedback to farmers.

#### Background and Justification

Development of integrated aquaculture-agriculture (IAA) farming systems has progressed over the past decade. Much has been learned and development imperatives have changed. Exploring sustainable management of natural resources has taken precedence over the pursuit of maximum commodity yields. The concentration on systems developed at

research stations has given way to farmer participation in technology development.

Resource-poor farmers are the target beneficiaries and very few of them culture fish. Ways are needed to integrate fish farming on resource-poor farms, not solely to produce more fish, but as part of a strategy to develop sustainable farming systems.

A farmer participatory research protocol that brings farmers and scientists together to transform existing farming systems of resource-poor farmers into IAA farming systems is the aim of ICLARM's IRM approach. This transformation process is guided by a set of 'sustainability indicators' to ensure that the farming systems developed are ecologically and economically sustainable and that many resource-poor farmers can adopt them.

#### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	H

#### 1998 Results

A major revision of the RESTORE package was made and programming of the tool was undertaken. The design included the expansion of data collection and analysis in order to obtain standard economic criteria.

An in-house alpha test was initiated and the first results were fed back to improve the program design and performance.

#### Expected Outputs in 1999

Evaluation of RESTORE by an external reviewer.

Alpha-test in-house completion.

Release of RESTORE version 1.0, along with a revised User Manual and Field Guide.

Establish further working relationships with ongoing projects, to further test and evaluate the RESTORE process and software.

Publications on the potential applications of RESTORE and an information brochure on RESTORE.

### Project 3.3

#### Development of Sustainability Indicators for Integrated Agriculture-Aquaculture Farming Systems

##### ICLARM Staff

Dr. Mark Prein (Project Leader)

##### Collaborating Institutions

*Germany:* University of Kassel (GHK)

*Philippines:* national institutions

*Others:* national collaborators

**Donors** : BMZ/GTZ

**Duration** : October 1994 - June 1999

##### Objectives

- Develop and test a set of sustainability indicators for evaluating the performance of IAA on small farms.
- Formulate a range of simulation models of IAA systems at different levels of integration.
- Disseminate results through a workshop, ICLARM publications and peer reviewed journals.
- Train national and project staff at appropriate ICLARM work sites in the application of tools for participatory monitoring and evaluation (PME) of system integration.

##### Background and Justification

Farm activities can be integrated, in that some activities can provide nutrient inputs to or 'ecological services' for others. Such integration has the potential to improve income and nutrition of small farm households and to counteract the effects of environmental degradation. However, data on the economic, ecological and nutritional benefits of IAA are still scarce. Moreover, for determination of sustainability, clear definitions, criteria and quantitative indicators are lacking. If IAA systems are to be successfully developed and adopted in the future, tools for measurement of their sustainability must exist to enable control of the development process.

In collaboration with scientists from the GHK, indicators of sustainability on IAA smallholder farms

are being formulated and evaluated. Multivariate statistical analyses of farm datasets and indicators will identify key relationships and governing variables. Dynamic simulation models of representative farms will enable testing and characterization of the indicators in terms of sensitivity and precision.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	M	Systems Approach	H
Gender	L	Anticipatory Research	H

### 1998 Results

Existing information on sustainability indicators was further compiled from a range of sources, including grey literature and Email conferences. This body of knowledge is being explored for indicators for IAA smallholder farms.

A visit to Philippine worksites by the staff of GHK provided details of the decisionmaking criteria and options within a Philippine rice-fish culture system under subsistence level rice and fish production.

A dynamic simulation model of a Philippine rice-fish farming system was further refined and expanded within the STELLA modeling environment.

### Expected Outputs in 1999

A RESTORE training workshop will be conducted.

The RESTORE software will be finalized, manuals updated and the package released.

Indicators will be formulated, tested and characterized.

## Project 3.4

### Research for Development of Sustainable Aquaculture Practices

#### ICLARM Staff

Dr. Mark Prein (acting Project Leader)

#### Collaborating Institutions

*Bangladesh:* Bangladesh Fisheries Research Institute (FRI)

*Others:* various NGOs

**Donor** : USAID

**Duration** : June 1993 - December 1999

### Objective

- Develop sustainable, low-external input integrated agriculture-aquaculture practices that fit into farming systems of Bangladesh, in collaboration with NARS.

### Background and Justification

Fish is an important source of animal protein for the people of Bangladesh but is in short and diminishing supply. The country has vast water resources some of which are presently underutilized or unutilized. Available capital intensive aquaculture technologies are not suitable for adoption by resource-poor farmers. Hence, the project has been assisting the national research and development institutions and a number of NGOs in developing low external input, low cost, IAA practices that could be sustained by the rural poor, using mostly on-farm resources.

This requires: on-station research; farmer participatory research; dissemination of the technologies developed through training government and NGO extension workers; training of scientists in IAA research; assisting in preparation of trainers' training manuals; and conducting impact studies for feedback to research.

Dissemination of results is done through a technology transfer process in collaboration with NGOs, which provide feedback from different agroecological regions. The project also addresses gender issues through the involvement of women in pond aquaculture, through which they contribute to household income, resulting in their empowerment. This work is expected to benefit not only resource-poor rural households but also to contribute to increasing the availability of affordable fish in urban areas and indeed throughout the country.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	H	Anticipatory Research	H

### 1998 Results

Development of ecoregion specific technologies through on-farm, farmer participatory research is

in progress. Weed based carp polyculture has been found to be an appropriate system for high rainfall, flood free, medium highland ecoregion. Similarly, prawn-carp polyculture appears to be ecologically and economically sustainable in the low saline, coastal belt in the southwestern region of Bangladesh.

Technical and logistic support was provided to private hatcheries for spawning the rare, indigenous small and medium sized carps *Labeo gonius*, *Cirrhinus reba* and *Puntius sarana* for biodiversity conservation, increased production and meeting consumers' and farmers' demands. Studies on their growth and production performance in ponds, rice fields and beels are in progress. Earlier studies have shown that *C. reba* achieves the marketable size of 40 g in six months in seasonal and 80 g in a year in perennial ponds when cultured along with other carps.

A great emphasis was placed on improvement of seed quality of cultivable species and training workshops were organized for hatchery and nursery operators. Simple methods were suggested to avoid inbreeding and thereby control mortality of eggs and spawn in hatcheries.

New initiatives have been taken in pen/cage culture and deepwater rice-fish production.

Several NGOs were assisted to provide training to farmers in sustainable aquaculture technologies.

Under the auspices of the Gender Program of the CGIAR, the production of a video film and book on "Women in aquaculture in Bangladesh" were supported.

#### **Expected Outputs in 1999**

Development of sustainable low-cost, ecoregion specific, integrated agriculture-aquaculture technologies.

Studies and training to practitioners on appropriate broodstock management techniques for major aquaculture species, and advisory services in specific techniques for seed production and culture of rare and disappearing indigenous carps and catfishes.

Increased linkages with government organizations and establishment of a network of NGOs.

Training of national scientists in RESTORE.

Training of extension personnel of NGOs and Departments of Fisheries (DOF) and Agricultural Extension (DAE) for widespread technology transfer program targeting 10,000 farmers.

### **Project 3.5**

#### **Aquaculture Research and Development for Smallholder Farms in Southern Africa**

##### **ICLARM Staff**

Dr. Daniel Jamu (Project Leader); Dr. Randall E. Brummett; Mr. Foster Makuwa; Mr. Alim Montjeza; Mr. Issa Jaffali; Mr. Francis Kachala

##### **Collaborating Institutions**

*International/Regional:* Aquaculture for Local Community Development Programme (ALCOM), FAO *Malawi:* Fisheries Department; Ministry of Agriculture and Livestock Development; University of Malawi

**Donors** : Danish International Development Assistance (DANIDA); ICLARM core funds; others to be identified

**Duration** : 1996 - 2000 (proposed)

##### **Objectives**

- Study IAA technology adoption and dissemination, and measure impact on African smallholdings.
- Develop sustainable management practices for enhanced aquatic productivity within the context of rural subSaharan Africa.
- Strengthen national capacity to develop and disseminate sustainable aquaculture technology.
- Study the aquaculture development process and advise policymakers on how to maximize the impact of development efforts.

##### **Background and Justification**

The agricultural economy of the subSaharan Africa ecoregion is dominated by smallholding farmers who operate at very close to the subsistence level. With increasing population in the region, the productivity of these farming systems is increasingly unable to meet food security needs. At the same time, fertilizer and other subsidies to agriculture in

the region are being withdrawn as country after country adopts structural adjustment. With inadequate capital to purchase more expensive fertilizer, smallholding farmers must rely on IRM within the farming system itself in order to maximize the efficiency of use of what nutrients are available.

IRM's theoretical capability to improve productivity, increase sustainability and decrease waste has been recently accepted as a realistic approach to reducing rural poverty and food insecurity in sub-Saharan Africa. Proponents of this approach claim that integrated farming can improve productivity, sustainability and even rehabilitate degraded rural landscapes. Unfortunately, the farm level field data which support this enthusiasm are restricted to a few case studies involving a relatively small number of farmers.

IRM must be sustainably adopted by large numbers of smallholding farmers if its impact is to be widely felt. Current thinking is that the involvement of farmers from the beginning of the technology development process will help in overcoming problems of adoption. Evidence exists that the approach is probably useful, if it can be adapted to accommodate the wide diversity of smallholding farming systems.

ICLARM has been studying the potential of and problems associated with farmer participatory aquaculture based IRM (integrated aquaculture-agriculture or IAA for short) in Malawi and Ghana for 10 years with a view to establishing the criteria upon which a transition in African agriculture from destructive to sustainable can be made. Through dozens of on-farm research projects, a set of approaches to technology development, farmer participation and impact analysis has been identified. Collectively these components form a methodology which can now be tested for its effectiveness as a farmer participatory technology development and transmission mechanism.

**Scores Against Principles**

Sustainability	H	Participation	H
Equity	M	Systems Approach	H
Gender	M	Anticipatory Research	H

**1998 Results**

As financial resources for 1998 were barely sufficient to keep the Malawi office open, little more than baseline research was conducted. Most of this

was student work on tilapia biology, organic matter sedimentation rates and practical diets for aquaculture, carried out in collaboration with the University of Malawi. ICLARM-Malawi continued its provision of technical advisory services to the Malawi Fisheries Department and, with DANIDA support, conducted a feasibility assessment of the Mbowe Sustainable Agriculture Project.

*Pond Aquaculture:* Feed trials were conducted to compare several pelleted diets based on locally available agricultural by-products for the production of *Oreochromis shiranus*. These studies produced results indicating that a wider range of abundant, but previously unused, plant materials can be used to grow tilapia economically on small farms.

Growth was investigated in juvenile *O. shiranus* to test the assumption held by many fish farmers that holding juvenile tilapias causes them to lose their growth potential. Younger fry remained smaller than the older fish throughout the study and there was no evidence of compensatory growth.

*Mbowe Sustainable Agriculture Feasibility Assessment:* The Mbowe Sustainable Agriculture Project was conceived some five years ago as a way to address problems associated with unsustainable agricultural practices and rural poverty in Malawi's northern region.

In early 1998, DANIDA was approached to support the building in which training for local farmers could be conducted and provide other modest financial support. ICLARM-Malawi was requested by DANIDA to: (i) assess the technical and other viability of the project's agricultural and business management; (ii) design an impact monitoring and evaluation system; and (iii) provide technical expertise into integrated aquaculture-agriculture and identify other sources of expertise as necessary.

*Information Outreach:* The job of linking the National Aquaculture Centre (NAC) information center with other such facilities in the region continued. A library officer of the Fisheries Department has been receiving instruction in library management. This is being done in collaboration with the Icelandic International Development Agency (ICEIDA), FAO and the Fisheries Department. Modern information technology is being used to make aquaculture and fisheries literature more available

to the region's aquatic scientists. This work will continue in 1999.

### **New Activities in 1999**

*Technology Development and Transfer (TDT) Teams for IAA:* The training and visit system for transferring IAA technology onto smallholdings, although still widely used, has generally failed in subSaharan Africa. With external support from DANIDA and ICLARM attached to local funding from the Malati Fisheries Department, a new, evolutionary approach to TDT will be tested in Malati. This will involve a rationalization of existing extension resources to enable a higher level of activity at fewer centers. At each center, farmer-led research will be conducted following ICLARM's Farmer-Scientist Research Partnership Approach. Separate research and extension units will be dissolved to form a TDT unit which will conduct studies and participatory open days on the experiment stations, thus improving the relevance of research, upgrading the skills and operational budgets of existing extension staff and involving farmers as equal partners in the development process. The RESTORE database will be used to monitor impact among participating farmers. This will be the vehicle for the conduct of all new pond research at the NAC. Initially, two existing extension agents and two ICLARM staff will work out of the NAC under the supervision of the new Project Director, Dr. Daniel Jamu. Other centers will be added as the project expands.

*Integrated Watershed Management:* With support from DANIDA, ICLARM-Malati will take on the role of coordinating research for the development and execution of a comprehensive management plan for the Lake Chilwa Catchment. Research topics are to include:

- Water and land use planning (including irrigation);
- Integrated farming systems;
- Mapping and GIS;
- Environmental monitoring and economics;
- Fisheries and aquaculture;
- Invasive alien species and indigenous biodiversity.

The information gathered will be analyzed, synthesized and incorporated into a holistic approach to integrated watershed management. ICLARM's expertise in this area derives from past work with community management of rainfed *thamandas* in

southern Malati. This new work will lay the foundation for further involvement in watershed level research as described in the Research Plan for Managed Freshwater Aquaculture.

### **Project 3.6**

#### **Upland Integrated Aquaculture-Agriculture Systems in Forest Buffer Zone Management**

#### **ICLARM Staff**

Dr. Mark Prein (Project Leader); Mr. Roberto Oficial; Ms. Mary Ann P. Bimbao; Ms. Teresita S. Lopez

#### **Collaborating Institutions**

*Philippines:* Community Forestry Project-Quirino (CFPQ); Department of Environment and Natural Resources (DENR); Peoples Organizations (POs) of barangays Baguio Village and Don Mariano Perez

**Donors** : BMZ/GTZ; Philippine/Germany CFPQ

**Duration** : July 1996 to December 1999

#### **Objective**

- Conduct a rigorous assessment of the usefulness of farm ponds for aquaculture and the potential for integration of ponds and ricefields into existing farming systems within the forest border zone management efforts of CFPQ.

#### **Background and Justification**

The CFPQ is a development project of bilateral cooperation between the Philippines and Germany, executed by GTZ and Kreditanstalt für Wiederaufbau (KfW) in collaboration with the Provincial Government of Quirino and the DENR. Its aims are to contribute to the sustainable management of the natural resources (forest, land and water) within the project areas through community organization and self-help in order to conserve the watershed function of the areas and to safeguard the livelihood of the upland population. The project operates under the premise that small communities are able to independently conserve and manage their local resources and benefit from them. The project operates in five barangays in the municipalities of Diffun, Maddel and Nagtipunan. The project area covers 23,700 hectares, of which 19,300 are still thickly forested, with a population of 3,500 persons in 660 households.

In 1993 CFPQ promoted the establishment of small farm reservoirs above terraced ricefields, which was widely adopted. These reservoirs range in size from 50 to 2,000 m<sup>2</sup> and provide opportunities for aquaculture. Initial attempts at tilapia cultivation have been made and some households have established a reliance on this source of fish for their home consumption, with giveaways to neighbors. Few nutrients are added to ponds, and these are only in form of direct feed to the fish and in form of leaves or rice hulls.

Based on observations and suggestions by CFPQ staff and an initial visit of an ICLARM team to the CFPQ areas in Baguio Village and Don Mariano Perez in May 1996, it was concluded that greater potential exists for aquaculture as an added element of farm diversification in the areas. Existing operations can be improved for enhanced production from existing farm ponds (mini reservoirs), i.e., through better management and enhanced input of on-farm residues as nutrients. Additionally, considerable potential exists for rice-fish culture, as numerous irrigated rice terraces have been established, permitting two crops per year without the use of fertilizers or pesticides.

ICLARM will provide appropriate IAA technology to farmers and apply the RESTORE approach to establish measures and indicators of the economic and ecological benefit.

#### Scores Against Principles

Sustainability	H	Participation	H
Equity	M	Systems Approach	H
Gender	M	Anticipatory Research	H

#### 1998 Results

Monitoring of 30 farm households in two barangays was completed in its second year on the impact of IAA adoption through the RESTORE approach, which also produced map transects, calendars and bioresource flow diagrams. This information is compared with the pre-intervention situation, based on recall and secondary data.

Training workshops on IAA and follow-up visits were conducted with individuals and groups of farmers. Fingerlings of Nile tilapia and common, grass and silver carp were delivered to farmers through CFPQ based on their requests.

Initial impact workshop was conducted with farmers to discuss results. Farmers expressed desire to

continue with collaboration and requested continued support.

Data entry and analysis was conducted and preliminary results were presented at the Symposium of the Asian Fisheries Forum in Chiang Mai, Thailand, in November. A final report on the collaborative activity was submitted to CFPQ.

#### Expected Outputs in 1999

Analyses of IAA impact after two years of IAA trials completed and results to be presented to farmers and CFPQ staff in workshop.

ICLARM Technical Report and newsletter articles.

Decision whether or not to embark on greater involvement with a larger activity (which would involve designing a project and preparing a proposal).

### Project 3.7

#### Increasing and Sustaining the Productivity of Fish and Rice in the Flood Prone Ecosystem in South and Southeast Asia

#### ICLARM Staff

Dr. Madan Mohan Dey (Project Leader); Dr. Mark Prein; Mr. Ferdinand Paraguas

#### Collaborating Institutions

*International/Regional:* International Rice Research Institute (IRRI)

*Bangladesh:* Bangladesh Fisheries Research Institute (FRI); Bangladesh Rice Research Institute; Proshika Manobik Unnayan Kendra (MUK)

*Vietnam:* Research Institute for Aquaculture (RIA) Nos. 1 & 2; Vietnam Agricultural Science Institute

**Donors** : Ford Foundation; International Fund for Agricultural Development (IFAD)

**Duration** : June 1997 - May 2000

#### Objectives

##### OVERALL

- Develop a sustainable resource management system for the deepwater rice ecosystem, through action research. The aim is to integrate "indigenous" resource management techniques with semi-intensive rice-fish culture and management technologies that promise to increase the incomes of rice farmers.

## SPECIFIC

- Comparative analysis of alternative resource management strategies in flood prone ecosystems.
- Participatory development of viable income generating technical options and their field-testing and validation.
- Identification of viable community-based mechanisms and tenurial/institutional arrangements to secure target group access to waterbodies, adequate provision of fingerlings, and access to fish processing and marketing facilities.

### **Background and Justification**

Deepwater subsistence rice farmers are among the poorest socioeconomic groups in South and South-east Asia. The low yields of deepwater rice have made it increasingly difficult for farmers to make a living. While deepwater rice cultivation is one of the most sustainable of farming systems, at its present low yield levels, the flood prone ecosystem cannot supply adequate food to meet growing demand. As a result, farmers are compelled to look for every possible additional avenue for increasing the food supply. In so doing, some of their measures have adversely affected the environment. There is an urgent need to identify high yielding, yet sustainable, technological and resource management options for the flood prone ecosystem to improve the livelihood of people dependent on it.

Bangladesh and Vietnam are two countries which are heavily reliant on flood prone rice ecosystems. More than half of Bangladesh's 10.2 million ha of riceland and about 10% of Vietnam's 7 million ha of arable land are flooded to depths of 30-180 cm during the rainy season. Traditionally, in the rainy season, farmers grow deepwater rice and capture fish in the flood prone ecosystems.

The flood prone ecosystem (with floodwater depth of up to 180 cm) has considerable potential for increased food production through the integration of fish culture with deepwater rice farming. Preliminary research has shown that fish production of 1-2 t/ha/yr is possible with deepwater rice fields compared with 50-200 kg/ha/yr in irrigated fields. This is accounted for by higher stocking densities, the abundance of natural food, the better quality of water and the absence of pesticides and herbicides associated with cultivating high yielding rice varieties. These flood prone areas are seasonally

flooded during the monsoon and remain submerged for four to six months. The vast waterbodies and the rice canopies that result provide natural habitats for various aquatic resources including wild fishes and shrimps. The yearly silt deposition and organic matter decomposition favor the growth of naturally occurring flora and fauna. The abundance of natural organisms favors the cultivation of fish for four to five months in a deepwater rice environment.

During the dry season, land ownership is fixed according to tenure arrangements. At times of floods during the wet season and where land is not bounded, fish are a community property granting community members access to fish in all the communal areas. This, together with experience from other areas, makes it likely that poor communities may sustainably manage common property resources over which they have effective control. In the case of stocking of certain areas with fish fingerlings and necessary investment in fencing materials, this will be a crucial issue.

Resource management approaches, such as integrated resource management and ecosystem-based planning, are essential for the sustainable use of natural resources. Community-based management approaches have been successfully used to achieve both socioeconomic and ecological objectives through integrated conservation and development planning. Community-based management can also serve as a mechanism for economic development by promoting participation of resource users and the community in actively solving problems and addressing needs.

The considerations establish the basis for an interdisciplinary and integrative research project for increasing and sustaining the productivity of rice and fish in the seasonally flooded ecosystem of Bangladesh and Vietnam.

### **Scores Against Principles**

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	H	Anticipatory Research	H

### **1998 Results**

In Bangladesh, implementation of project activities was somewhat delayed due to the time taken by the participating institutes and the Government of Bangladesh to process the relevant documents. Project personnel were not available at the project

sites to implement the project activities. Furthermore, the exceptional floods in 1998 affected the project's operation to some extent. In spite of these difficulties, experiments were conducted in all the three selected areas representing various major floodplains (Meghna, Brahmaputra and Ganges floodplains), mainly with the help from the staff of our NGO partner, Proshika MUK.

Rice-fish experiments have been conducted in all the sites. In spite of the unprecedented flood (in some areas, fences had to be raised up to a height of 16 feet to keep the fish from escaping), the participating farmers were able to control the fishes. Though the recovery was low, the fish culture in the flood prone area in the rainy season, both concurrent with rice as well as without rice, proved profitable.

Institutional arrangements (group formation, input and output sharing arrangements) for community-based rice-fish culture for all the three project sites were designed and tested. The groups contain both the land owning farmers and landless families and fishers who obtained common property fishing benefits in the area prior to the initiation of experiment. The institutional arrangements worked well, and there were no social conflicts.

In Vietnam, experiments have been conducted in two sites in the Red River delta, and in one site in the Mekong delta. In the Red River delta, the fish yield (cultured concurrent with rice) was about 600 kg/ha in one site and about 1,150 kg/ha in another site, and the profit obtained from rice-fish culture

was double compared to that of single rice culture. In the Mekong delta, fish yield, cultured in between two rice crops, was low (about 200 kg/ha), but the profitability was still high. Institutional arrangements worked well in all the sites.

The interim review meeting of the Project was held in Bangladesh during 6-7 July 1998. Scientists from the participating institutes in Bangladesh and Vietnam as well as from ICLARM and IRRI attended the review meeting.

### **Expected Outputs in 1999**

Completion of baseline surveys in Bangladesh.

Preliminary analysis of survey data.

Implementation of experiments on rice-fish in Bangladesh and Vietnam.

Preliminary analysis of experimental data.

Conduct of baseline institutional and organization analysis in Bangladesh and Vietnam.

Identification of institutional arrangements in Bangladesh and Vietnam.

Training on common property and community-based management in Vietnam.

Conduct of review workshop in Bangladesh and Vietnam.

Organization of exchange visits for the collaborating scientists from Bangladesh and Vietnam.

## 4. COASTAL AQUACULTURE AND STOCK ENHANCEMENT PROGRAM (CASEP)

### Project 4.1

#### Village Farming and Restocking of Giant Clams

##### ICLARM Staff

Dr. J. Bell (Project Leader); Mr. R. Pitt; Mr. I. Lane; Mr. C. Oengpepa; Mr. H. Tafea; Mr. F. Lasi; Ms. A. Grice; Ms. L. Kumar; Mr. T. Barcelona

##### Collaborating Institutions

*Australia:* James Cook University

*Fiji:* University of the South Pacific

*Solomon Islands:* Ministry of Agriculture and Fisheries (MAF)

**Donors** : Currently: US Peace Corps. Previously: Australian Centre for International Agricultural Research (ACIAR); Economic and Social Commission for Asia and the Pacific (ESCAP); EU; FAO South Pacific Aquaculture Development Programme

**Duration** : Operational since 1987. Current phase, mid-1995 – December 1999

##### Objectives

- Train village farmers and key regional fisheries personnel in the efficient and profitable culture of giant clams.
- Develop markets for giant clams in the seafood trade and aquarium industry.
- Maintain genetically diverse  $F_1$  broodstock of several species of giant clams as the basis for future hatcheries throughout Asia-Pacific.
- Supply giant clam larvae and training in the rearing of giant clams to countries in the Asia-Pacific region where giant clams have been overfished or extinguished.
- Transfer methods for propagating and growing giant clams to the private sector in the Pacific.
- Develop cost-effective methods for restocking giant clams.

##### Background and Justification

Coastal communities adjacent to coral reefs in developing countries have few opportunities to de-

velop low cost industries capable of generating income and food on a sustainable basis. The farming of giant clams is one option. Past research by the Micronesian Mariculture Development Center, James Cook University, the University of the Philippines (UP) and ICLARM's Coastal Aquaculture Centre (CAC) in Solomon Islands, resulted in the development of reliable methods for the spawning and land-based larval rearing of giant clams. More recently, research by ICLARM identified the average rate of growth and survival of five species of giant clams across a broad range of village sites in Solomon Islands and demonstrated that growout of these species by coastal villagers for the marine aquarium market was profitable. The CAC is now completing the international research effort on farming and restocking giant clams by developing methods to reduce the cost of producing seed clams in hatcheries, adding value to cultured products, improving the survival of clams during growout and developing cost-effective ways for linking the restocking of giant clams to the farming industry.

This project will provide a firm basis for a sustainable increase in the productivity of giant clams. It will also yield robust information on the commercial viability of small-scale "village" farms for these large "autotrophic" bivalves. At the conclusion of the project, ICLARM will be in a position to provide advice to national agencies on the nature of markets for giant clams as well as the costs and benefits associated with farming and restocking. The maintenance of adequate broodstock and the delivery of larvae and growout technology to a variety of countries will facilitate the continuation and expansion of giant clam farming and the re-establishment of wild stocks throughout the Asia-Pacific region.

Giant clam farming is particularly suitable to villagers living near coral reefs because there is virtually no impact on the coral reef environment, the procedures tend to enhance rather than diminish genetic diversity, and the farms can be designed to be economically viable at the village level. In addition, the farms have been shown to be particularly successful when run by family units, and there are a variety of markets for giant clams, e.g., aquaria, food and shellcraft.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	H

### 1998 Results

Production from the CAC's nursery resulted in the distribution of 10,500 giant clam "seed" of *Tridacna squamosa* to coastal villagers in 1998. In addition, 10,000 *T. derasa* have been produced by Paruru Aquaculture. This private business produces seed clams for the giant clam farmers in Marau Sound and is gradually assuming the role that ICLARM has been playing in developing the giant clam industry in Solomon Islands. ICLARM encouraged US Peace Corps to allocate a volunteer to assist Paruru Aquaculture to assess the factors needed to operate a profitable business involving village based giant clam farmers (outgrowers). The volunteer assisted the business throughout 1998.

A series of eight growout experiments involving *T. maxima* and *T. crocea* was submitted for publication in 1998.

In 1998, ICLARM continued to coordinate sales to the aquarium market on behalf of village farmers. A total of 19,000 clams were sold. Sales of clams and the distribution of seed were fewer than previous years because ICLARM is in the process of transferring responsibility for this to the private sector, and the sole private enterprise (Paruru Aquaculture) is having "teething" troubles as it enters the industry.

The project continued to explore the opportunities to market *T. derasa* as a live seafood product to those outlets identified in the report commissioned by the ESCAP entitled *The marketing of farmed giant clams to the live seafood markets in Asia*. Sales to Hong Kong in 1998 were prevented by the occurrence of toxic red algae that deterred consumption of live seafood and the economic downturn in Asia. Trial shipments were well received by one restaurant in Singapore and the prospects for regular sales to this business look good once the economic situation improves.

Efforts to reduce the cost of restocking giant clams, by linking restocking with the small-scale farming of giant clams, continued in 1998. This initiative was promoted through presentations at regional meetings of fisheries personnel conducted by FAO

and SPC and submission of an article to the journal *Coral Reefs*.

### Expected Outputs in 1999

Publications documenting the methods used by ICLARM to reduce the cost of producing giant clam seed.

Presentation of a paper at the World Aquaculture Society Conference on the requirements for development of village-based farming and restocking of giant clams.

Continuation of restocking experiments in collaboration with local villages at several sites in Solomon Islands.

Continued promotion of live giant clams to seafood markets in Asia.

Continued support of the first private sector giant clam hatchery in the Solomon Islands.

Preparation of proposals to major donors to achieve the transfer of technology to the private sector and to test ICLARM's model for linking the restocking of giant clams to the farming industry.

### Project 4.2

#### Development of Village Farms for Blacklip Pearl Oysters in Solomon Islands

### ICLARM Staff

Dr. J. Bell (Project Leader); Mr. I. Lane; Mr. K. Friedman; Mr. J.P. Thonney

### Collaborating Institutions

*Australia*: James Cook University

*Fiji*: Fisheries Department

*Solomon Islands*: Ministry of Agriculture and Fisheries (MAF)

**Donors** : ACIAR; CUSO, Canada

**Duration** : Operational since 1993. Current phase, early 1998 - December 2001

### Objectives

- Produce blacklip pearl oysters in ICLARM's hatchery in Solomon Islands.

- Develop systems for collecting spat of the blacklip pearl oysters suitable for use in the western Pacific.
- Compare the growth and survival of cultured and wild spat.
- Develop methods for maximizing the survival of oysters in the juvenile growout phase.
- Transfer methods for collection of spat and growout of juvenile oysters to Fiji.
- Maintain a small-scale pearl farm using oysters derived from wild spat.
- Produce the biological data needed to make a thorough economic analysis of potential returns to village farmers from farming black pearls in the Solomon Islands.

### Background and Justification

The culture of pearls from blacklip pearl oysters has brought substantial economic benefits to coastal communities in French Polynesia and the Cook Islands. Despite intensive fishing of the species throughout the Pacific earlier this century, these countries managed to establish pearl farming industries due to the nature of their “closed” coral atoll lagoons. Spat from the remnant populations trapped within the lagoons were collected and used for pearl farming operations.

The blacklip pearl oyster also occurs throughout the more open coral reef habitats of the western Pacific. This project builds on the results of research funded by ACIAR to assess the potential for establishing village farms for blacklip pearl oysters based on the collection of wild spat. The emphasis will be on transferring the methods developed to other countries in the region, encouraging the commercial sector to apply the technology, and assessing the practicalities of using hatchery-reared spat to culture pearls.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	M
Gender	M	Anticipatory Research	H

### 1998 Results

The major activity of the project in 1998 was the maintenance of seeded oysters at the demonstration blacklip pearl oyster farm at the CAC’s field station at Nusa Tupe in the Western Province of Solomon Islands. The results of this initial trial are expected to yield data on the effects of mantle color (orange vs. black) and husbandry regime (different frequencies of cleaning) on pearl quality. The rou-

tine husbandry work was done by two US Peace Corps volunteers. The first crop of pearls is due to be harvested in April 1999.

Other work in 1998 focused on: (i) continuation of the collection of long-term data on the seasonal availability of spat of the blacklip pearl oyster; (ii) experiments to quantify the levels of predation of spat; and (iii) the rearing of larvae of blacklip pearl oysters in the hatchery at the CAC.

Methods for the collection of wild spat were given to the Fisheries Department in Fiji in November 1998. Project staff also trained a group in the Shortland Islands, Solomon Islands, in the maintenance of adult pearl oysters. The group has established the first village based farm for pearl oysters in Solomon Islands.

Donors in Canada and Australia were approached for support to continue the operation of the demonstration pearl farm at the Nusa Tupe field station and to promote the dissemination of the results of our research on pearl oysters to governments, investors and local communities.

### Expected Outputs in 1999

Assessments of the potential for using hatchery-reared spat to culture pearls in the Solomon Islands.

Harvest, marketing and sale of the first batch of cultured pearls from Solomon Islands, and reseed-ing/seedling of 3,000 oysters.

Publications on improved methods for collecting spat of the blacklip pearl oyster and rearing spat in nursery systems.

Appointment of staff to assist the uptake of technology and the establishment of pearl farms in the Solomon Islands.

Training of staff from the Fisheries Department in Fiji in the husbandry of juvenile oysters derived from wild spat.

Training of the Assistant Manager at the CAC in the larval rearing of blacklip pearl oysters.

Presentation of a paper on the culture of pearl oysters using wild spat at the World Aquaculture Society Conference.

**Project 4.3**  
**Development of Methods for the Mass Rearing of Tropical Sea Cucumbers for the Purpose of Enhancing Wild Stocks**

**ICLARM Staff**

Dr. J. Bell (Project Leader); Dr. S. Battaglene; Dr. A. Mercier; Dr. J.-F. Hamel; Ms. E. Seymour; Mr. C. Ramofafia

**Collaborating Institutions**

*Australia:* Advisory Panel from Advanced Scientific Institutions in Australia, ACIAR; University of Sydney

*Solomon Islands:* Ministry of Agriculture and Fisheries (MAF)

**Donors** : ACIAR; Canadian International Development Agency (CIDA)

**Duration** : Operational since 1993. Current phase, January 1995 - December 1999

**Objectives**

- Develop reliable methods for inducing tropical species of sea cucumbers to spawn.
- Develop repeatable, cost effective methods for rearing the larvae and juveniles of tropical sea cucumbers to the stage where they are robust enough for release into coral reef habitats.
- Understand the ecology of juvenile sea cucumbers in the wild as the basis for designing field experiments to identify methods to optimize the release of hatchery-reared juveniles into the wild.

**Background and Justification**

Bêche-de-mer (processed sea cucumber) is a valuable source of income for communities in remote areas of the Asia-Pacific region because it can be processed (boiled and dried) on site, it has a long shelf life without refrigeration and it fetches a high price in Asian markets. There is a particularly strong demand for bêche-de-mer in China. This demand has pushed up the price of the favored species and created a market for a wider variety of species. There is now widespread concern that recent levels of catch throughout tropical Asia-Pacific may not be sustainable.

The ability to rebuild populations of sea cucumbers through restocking would be a valuable tool

for managers. There are several reasons why sea cucumbers appear to be well suited to restocking: (i) most species are restricted to particular inshore habitats; (ii) sea cucumbers are low on the food chain, so impact on other species is unlikely to be a major limiting factor; and (iii) sea cucumbers are conspicuous and slow moving and therefore easy to harvest.

The potential of restocking for managing sea cucumber fisheries in the Asia-Pacific region cannot be assessed until four pieces of research have been completed. These are: i) development of cost effective methods for producing larvae *en masse*; ii) description of the ecology of wild juvenile sea cucumbers; iii) identification of strategies for maximizing the survival of released juveniles; and iv) evaluation of the profitability of large-scale release of juveniles to existing fisheries. ICLARM is currently addressing the first task with funds from ACIAR, and the second one with support from CIDA.

**Scores Against Principles**

Sustainability	H	Participation	H
Equity	Variable	Systems Approach	M
Gender	M	Anticipatory Research	H

**1998 Results**

Research was concentrated on sandfish (*Holothuria scabra*), although smaller experiments were undertaken with white teatfish (*H. fuscogilva*) and surf redfish (*Actinopyga mauritiana*). Spawning induction trials were made with wild-caught broodstock to test the use of dried algae as a spawning induction agent. All four attempts to rear larvae of *H. scabra* in 1998 were successful, resulting in the production of 50,000 juveniles. Overall, research on the larval rearing of *H. scabra* showed that newly settled juveniles can be reared in tanks using simple technology, with little or no added feeds, at low cost.

**Expected Outputs in 1999**

Documentation of reproductive cycles of wild broodstock.

Analysis of samples of seagrass leaves to identify species of sea cucumbers that settle to this habitat.

Publication of scientific papers documenting the behavior and burrowing cycle of juvenile sandfish, the survival and growth of juveniles reared in land based tanks, the activity and spatial patterns of

*A. mauritiana*, and the settlement preferences of *H. scabra* larvae.

Participation on an Advisory Panel to evaluate the status of research and to develop strategies for management and conservation of sea cucumbers, at an international conference in Malaysia on the conservation, taxonomy, ecology and trade of sea cucumbers.

Presentation of a paper on the culture of tropical sea cucumbers at the World Aquaculture Society Conference.

Submission of final report to ACIAR on the first five-year phase of the project.

Submission of proposal to ACIAR for development of the second phase of the project, i.e., optimal release strategies for cultured sandfish.

#### **Project 4.4**

#### **Development of New Artisanal Fisheries Based on the Capture and Culture of Postlarval Coral Reef Fish**

##### **ICLARM Staff**

Dr. J. Bell (Project Leader); Ms. C. Hair; Mr. I. Lane; Mr. R. Pitt; Ms. S. Sadler

##### **Collaborating Institutions**

*Australia*: Australian Institute of Marine Science (AIMS); Queensland Department of Primary Industry

*Solomon Islands*: Ministry of Agriculture and Fisheries (MAF)

**Donors** : ACIAR; CUSO, Canada

**Duration** : January 1999 - January 2002

##### **Objectives**

- Investigate temporal variation in availability of postlarval reef fish near Gizo in the Western Province of the Solomon Islands.
- Compare the species composition of catches of postlarval fish made using light traps and crest nets and determine the effectiveness of the two techniques in providing juveniles fit for aquaculture.
- Develop methods for village based growout of selected species of postlarval reef fish.

#### **Background and Justification**

In the past decade, there has been rapid expansion of two fisheries associated with coral reefs: the collection of tropical marine fish for the aquarium trade and the harvesting of groupers (Serranidae), snappers (Lutjanidae) and the napolean wrasse (*Cheilinus undulatus*) for the live reef fish trade.

The markets for tropical marine aquarium fish and live reef fish are of major interest to coastal communities in the South Pacific and Southeast Asia. Villagers have easy access to the resource, prices are high, and networks for sale and distribution are in place. In some countries, however, the high demand for coral reef fish has led to overexploitation and the use of destructive fishing methods.

Several NGOs are now playing an important role in the sustainable management of groupers and snappers by assisting countries in Southeast Asia to provide a regular supply of juveniles through intensive aquaculture. However, it is clear that large-scale production through intensive aquaculture, as an alternative to wild harvest, will depend on solving problems with larval rearing and nutrition of juveniles.

This project seeks to develop an additional way of supplying coral reef fish for the marine aquarium and live reef fish trades by assessing the potential for capturing a sustainable proportion of the postlarvae as they settle from the plankton and then rearing them to marketable size.

Provided the cost of catching and rearing the postlarvae can be kept down, villagers in the South Pacific and Southeast Asia will have at least three options to derive income from the capture and culture of postlarval fish. They can sell species of high value to the aquarium market through local dealers, export juvenile groupers to growers of live reef fish in Asia, or sell juvenile groupers to local growers who have access to a supply of fishmeal or trash fish. Juvenile fish that have been "nursed" through a "survival gate" could also be released onto protected reefs, e.g., those under customary marine tenure in the South Pacific, to enhance natural spawning stocks for subsequent harvest.

#### **Scores Against Principles**

Sustainability	H	Participation	H
Equity	Variable	Systems Approach	M
Gender	M	Anticipatory Research	H

### **Expected Outputs in 1999**

Documentation of temporal variability of postlarval coral reef fishes from a representative area of Solomon Islands.

Evaluation of the best method (light traps vs. crest nets) for capturing fish for culture.

Identification of species amenable to culture.

Presentation of a paper outlining the project at the World Aquaculture Society Conference.

Training of a fisheries officer from Solomon Islands MAF in the use of light traps and crest nets, and the culture of juvenile fish.

### **Project 4.5**

#### **Effects of Alternative Logging Operations on Inshore Marine Ecosystems in the Tropical Western Pacific**

#### **ICLARM Staff**

Dr. J. Bell (Project Leader); Dr. D. Morrissey; Dr. M. Lincoln Smith; Mr. R. Pitt; Mr. I. Lane; Mr. P. Clarke

#### **Collaborating Institutions**

*New Zealand:* National Institute of Water and Atmospheric Research

*Solomon Islands:* Kolombangara Forest Products Limited (KFPL); Ministry of Agriculture and Fisheries (MAF); Ministry of Forests, Environment and Conservation

**Donors** : Government of New Zealand

**Duration** : October 1998 - October 2003

#### **Objectives**

- Work with coastal communities, governments and industry to collect data on the effects of logging on aquatic habitats and biota.
- Quantify the effects of logging on aquatic habitats and biota by comparing previously logged, actively logged and unlogged areas.
- Compare the effects of logging, as outlined above, on virgin forests and on mature plantations.

- Transfer information on the effects of different types of logging on aquatic habitats and biota to coastal communities so that they can make informed decisions about logging operations in virgin forests, and the reforestation of areas logged previously.
- Disseminate the findings of the research to countries in the South Pacific region.

#### **Background and Justification**

The export of whole round logs from virgin tropical rainforests has been a major source of foreign earnings for developing island nations in the western Pacific, particularly Vanuatu, Papua New Guinea and Solomon Islands. However, the economic benefits that stem from exploitation of this natural resource are tempered by risks to the catchments, inshore receiving waters and the well-being of coastal communities.

The risks associated with logging in the western Pacific arise because of the steep, volcanic nature of the islands. If too much vegetation is removed carelessly, heavy rains during the wet season increase the erosion of topsoil and transport sediment to inshore marine habitats via freshwater streams. The effects attributed to excessive removal of trees and destruction of undergrowth by machinery include: reduced biodiversity of forest plants and associated fauna; destruction of areas suitable for production of food by gardening; loss of pools and riffle habitats in freshwater streams due to sedimentation; deterioration in the quality of water used for drinking; and reduced productivity of inshore fisheries. The latter effect is attributed to loss of, or damage to, coral reefs due to smothering by sediments and reduced light penetration resulting from increased turbidity. Such effects limit the ability of coastal people to obtain a balanced diet, maintain hygienic living conditions and earn the income needed to improve their lifestyles.

A solution to these problems is to equip the resource owners with knowledge about the consequences of different forms of logging. They can then decide what type of logging they will approve on their land and determine whether it is being carried out within the specified guidelines.

This project is designed to determine the effects of two types of logging operations on freshwater, inshore and coral reef habitats in areas of

the Solomon Islands that are typical of the forested volcanic islands of the western Pacific. The two types of operations are the rapid removal of trees from virgin forest and the controlled harvesting of logs from a plantation.

This project is expected to contribute to lasting improvements in the well-being of coastal communities in the western Pacific by empowering them to decide whether proposals to harvest their forests are compatible with the protection of freshwater streams and coral reefs, and the maintenance of fisheries supported by these habitats. For each type of operation, the effects of logging will be determined by comparing the diversity and abundance of fauna associated with freshwater, inshore and coral reef habitats for three types of catchments – those where logging has been completed, those where logging is still underway and those where logging has not occurred.

**Scores Against Principles**

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	H	Anticipatory Research	H

**1998 Results**

The project commenced in November with selection of the study sites. The island of Kolombangara, where the KFPL operates a large plantation, was chosen for assessing the effects of controlled harvesting of trees and Vangunu Island was chosen

for the investigation of the effects of removal of trees from virgin forests. Both islands are in the Western Province of the Solomon Islands. On each island, it was possible to find two “replicate” catchments in each of the three categories described above. Thus, the project involves the receiving waters from a total of 12 catchments.

Sites were selected in consultation with the Ministry of Forests, Environment and Conservation, the Government of the Western Province, the KFPL and the land and reef owners. In all cases, the communities with customary ownership of the catchments and reefs have given permission for sampling of the fauna and are interested in participating in the project.

**Expected Outputs in 1999**

A pilot study to determine the optimal sampling design. This will involve replicated sampling of freshwater fishes, marine infauna, corals and marine fishes at the scales of sites within catchments, and catchments within logging treatments, and refining standard sampling methods (e.g., transect length and quadrat size) to obtain acceptable precision under the conditions that exist in the study areas.

A report to the donor describing the outcome of site selection and pilot study and a description of the sampling design that maximizes the power of the project to identify differences due to logging operations.

## 5. AQUATIC ENVIRONMENTS PROGRAM (AEP)

### Project 5.1 ReefBase

#### ICLARM Staff

Dr. John W. McManus; Ms. Sheila G. Vergara; Mr. Lambert A.B. Meñez; Mr. Emmanuel Cayabyab; Ms. Kathleen K. Reyes; Ms. Aileen del Rosario; Ms. Audrey Marie B. Serrano; Ms. Rosenne Funk and Ms. Cindy Cabote

#### Collaborating Institutions

*International/Regional:* Global Coral Reef Monitoring Network (GCRMN); World Conservation Monitoring Centre (WCMC)

*China:* Reef Check Program, Hong Kong University of Science and Technology

*USA:* Earth Observations Program, NASA-Johnson Space Center; National Center for Atmospheric Research (NCAR); University of Rhode Island (URI); World Resources Institute (WRI)

*Others:* Institutions and individuals who contribute data and pictures to the database

**Donors** : ICLARM core funds; Swedish International Development Agency (SIDA); USAID

**Duration** : January 1999 – March 2001

#### Objectives

- Develop a relational database for structured information on coral reefs and their resources that will serve as a computerized encyclopedia and analytical tool for use in reef management, conservation and research.
- Collaborate with other national, regional and international databases and GIS facilities relating to reefs and provide a means of comparing and interpreting information at the global level.
- Develop and distribute analytical routines for ReefBase that will make full use of the information and ensure appropriate interpretation and synthesis.
- Serve as the central repository for GCRMN data.
- Define criteria for reef health and use those criteria to refine procedures for coral reef assessments and to determine coral reef status at the regional and global levels.

- Determine the relationships among coral reef health, fishery production and the quality of life of reef people dependent on reefs.

#### Background and Justification

A great part of the coral reef resources in the world are in danger of destruction due to overexploitation, degradation of the habitat and, possibly, changes in global climate conditions. A survey by the IUCN concluded that coral reefs in 93 countries have been damaged or destroyed. In the Philippines alone, fisheries' loss due to reef degradation amounts to millions of dollars a year, directly affecting thousands of jobs and indirectly affecting family members dependent on them. On a global scale, the loss in fisheries income may reach billions of dollars a year and affect millions of people.

Few figures are available to indicate the sustainable yields that might be extracted for different reef types, current and potential yields of different reef species, how yields are affected by declining reef health and loss of productive capacity, and the value of nonextractive uses of reefs such as tourism. Sophisticated methods to quantify the deterioration of coral reefs have been initiated in some areas, while hardly any assessment or monitoring activities exist in others. Information from these activities is usually published in primary scientific literature and may not be readily understood by a nontechnical reader. A larger body of information has been compiled in technical reports, which are generally for limited distribution. This makes it extremely difficult for the people tasked with managing coral reefs to obtain the information needed for good management even when comprehensive information exists.

Several initiatives are underway to monitor the status of and threats to reefs at the global, regional and national levels, but little progress has been made in database systems that will ensure broad dissemination of data and interpretation and comparison of results. The need for such a tool is becoming increasingly urgent if appropriate management is to be introduced worldwide to halt the decline in the health and productivity of reef systems.

ReefBase is an effort to gather the available knowledge about coral reefs into one information repository. The information in ReefBase is intended to arrive at assessments and summaries about coral reefs worldwide and to facilitate informed decisions regarding coral reef use and management. After two and a half years of development with support from the European Commission (EC), the Government of the Netherlands and USAID, ReefBase 1.0 was officially released in June 1996. ReefBase 2.0 followed in June 1997, with information on over 7,000 coral reefs. ReefBase served as the major source of information for the "State of the Reefs Report", the primary background document for the International Coral Reef Initiative (ICRI) Workshop. ReefBase is the official database of the GCRMN and directly addresses priority actions of the ICRI, now endorsed by 75 governments.

In order that the range of survey contributions to the database is expanded, the ReefBase Aquanaut Survey Method for coral reefs was developed by ICLARM. It allows quick and efficient monitoring of a broad geographical area. For many volunteers, this will be the primary method by which divers can contribute to existing knowledge about coral reefs. Volunteer organizations and scientists using other monitoring methods may find the ReefBase Aquanaut Survey Method useful as a supplemental source of information for broad comparisons or standard baseline information. The new method is designed to produce data which can be compared in broad categories with that gathered using the standard method of the GCRMN.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	n/a	Anticipatory Research	H

### 1998 Results

Over 700 ReefBase 2.0 CD-ROMs have been distributed worldwide to coral reef managers and scientists, NARS, libraries and others.

ReefBase has provided data for the *Reefs at Risk Report* released this year by WRI, ICLARM and WCMC. This report was based on a model of potential threats to coral reefs around the world, validated against empirical data in ReefBase. The report generated coverage by major news media, including CNN, and will be a focus of an article in a future National Geographic Magazine.

A model of ReefBase data was used in an upcoming article on the environmental conditions necessary for coral reef growth. Those results were important in a recent official statement of concern over the effects of climate change on coral reefs issued by a working group of prominent coral reef scientists.

ReefBase 3.0 was released at the International Tropical Marine Ecosystems Management Symposium (ITMEMS) in Australia in November 1998.

The ReefBase Aquanaut Reef Monitoring Method has been adopted by the *Aggressor* fleet as its monitoring method.

ReefBase trained a programmer from India to provide a framework for database setup in the South Asian region in coordination with the GCRMN.

ReefBase and other AEP projects were subjected to the internally commissioned external review (ICER) and received favorable remarks.

Collaboration with organizations working on reef related databases were established, such as ReefCheck and Caribbean Coastal Marine Productivity Program (CARICOMP).

### Expected Outputs in 1999

The information in ReefBase is gathered from published literature as well as conference proceedings, technical reports, news articles, thesis and manuscripts contributed by institutions and other research groups involved in the study of coral reefs.

In 1999, ReefBase will continue as one of the components of the project entitled "Improving Policies for Sustainable Management of Coral Reefs" with the following major project components and activities:

- Data entry focusing on identified critical coral reef areas.
- Reference search for:
  - published works of coral reef scientists and managers
  - library holdings on coral reef resources data and management information
  - internet links and relevant Web sites
  - best practice mechanisms on coral reef and coastal area management
  - trends in the coral reef related tourism industry

- harvesting, mariculture, and traditional forms of reef related exploitation
- coral reef fisheries statistics.
- Networking with:
  - coral reef researchers, their institutions and coral reef managers and advocates on establishing collaborations
  - regional nodes of the GCRMN
  - other reef monitoring programs (ReefCheck, Jean Michel Cousteau Society and the *Aggressor* fleet)
  - other reef-related databases.
- Training on:
  - the Aquanaut training course
  - ReefBase structure, development and data entry procedures.

Database expansion will include the addition of a major database as developed by the AIMS. CoralBase will be appended to ReefBase during 1999 and appropriate links will be established.

Modifications will possibly include a shift in the program to facilitate the availability of the whole database on the internet. Further refinements on graphs and charts are expected.

The utility of the database will be demonstrated when Component 2 of the project Valuation and Policy Analysis of Coral Reefs generates valuation, policy analysis and strategic coral reef policy recommendations. The database will also serve as a tool in the forthcoming Regional Reefs at Risk Project in collaboration with the WRI.

**Project 5.2**  
 Application of Rapid Assessment of Management Parameters (RAMP) in ReefBase

**ICLARM Staff**

Ms. Rosenne Z. Funk; Ms. Audrey Marie B. Serrano

**Collaborating Institution**

USA: University of Rhode Island (URI)

**Donors** : USAID; CIDA

**Duration** : November 1997 – January 1999

**Objectives**

- Increase the number of reefs in ReefBase which have associated RAMP data so as to make crucial management information widely available for summary analysis and for use in management implementation.
- Determine interrelationships between the coral reef related human variables included in RAMP and ReefBase and selected indicators of coral reef status (e.g., percent live coral cover as well as density, abundance and average size of fish within a reef).
- Further demonstrate the feasibility of quantitative analysis of ReefBase data.

**Background and Justification**

ReefBase is a worldwide database on coral reefs which includes benthic components of reef areas, associated fish communities, human and natural stresses, coastal tourism, amounts of fish harvested by reef, associated mariculture activities and management information. RAMP is a data set associated with each reef in ReefBase. It includes a select set of indicators directed at providing information on coral reef related human activities as well as political, socioeconomic and cultural variables which can be used to assess, predict and potentially manage these activities.

Much of the existing literature does not include information on all variables included in RAMP, and information provided may be at different levels of measurement (e.g., metric, ordinal and nominal). RAMP was developed in a manner that information could be provided either by primary fieldwork, fieldwork and literature review or only literature review, and that information of various levels of measurement could be used. This facilitates accumulation of sufficient cases for statistical analysis of relationships between selected human and reef variables. At the present time, however, very little information has been entered in the RAMP component of ReefBase and only preliminary analyses have been conducted on relating human and reef variables.

The research is significant for several reasons: (i) the additional data entered into ReefBase/RAMP will be useful for analysis by coral reef scientists worldwide; (ii) the analysis conducted as a part of the research will provide a model and questions

for further research using ReefBase/RAMP; (iii) the analysis will provide an indicator of the usefulness of ReefBase/RAMP and serve to justify further funding to continue data entry into this important database; and iv) the analysis will provide information concerning link between coral reef status indicators and coral reef related human activities as well as political, socioeconomic and cultural variables which can be used to assess, predict and potentially manage these activities.

### Scores Against Principles

Sustainability	H	Participation	n/a
Equity	H	Systems Approach	H
Gender	n/a	Anticipatory Research	H

### 1998 Results

Site selection for the sampling was made.

Human variables from ReefBase and RAMP were collected for the selected sites.

### Expected Outputs in 1999

Increase RAMP data in ReefBase and deliver a report in February demonstrating further the analytical capacities of RAMP and ReefBase data.

## Project 5.3

### Population Interdependencies in the South China Sea Ecosystems (PISCES)

#### ICLARM Staff

Dr. John W. McManus; Ms. Ma. Carmen Ablan-Lagman; Ms. Teresa R. Catubig

#### Collaborating Institutions

*Indonesia:* Environment Study Center, Universitas Pattimura Ambon

*Malaysia:* Universiti Malaya

*Solomon Islands:* Coastal Aquaculture Centre (CAC)

*Taiwan:* Institute of Zoology, Academia Sinica (IZAS)

*Vietnam:* Institute of Oceanography, Department of Marine Living Resources

**Donors :** John D. and Catherine T. MacArthur Foundation, World Environment and Resources Program

**Duration :** January 1997 - December 1999

### Objectives

- Study the genetic variation of several organisms at selected reefs in six countries in the South China Sea (SCS).
- Model the degree of interdependencies between reefs, based on the genetic markers.
- Quantify the exchange of organisms between reefs, based on the species in the study.
- Facilitate the development of improved management strategies by providing information on the interconnections among reef populations.
- Initiate/strengthen collaboration among scientists in the SCS and adjacent areas.

### Background and Justification

PISCES is an initiative to investigate the degree of connectivity among selected reefs in each of these six countries by evaluating genetic variation based on isozyme and DNA markers. Much of the work on stock identification in both capture and culture species is done using genetic markers. This project is an attempt to apply the theory and technology of genetic markers to the evaluation of interconnection among coral reef resources in the region.

This study was prompted by the need for a knowledge base for managing reefs. On the average, more than 60% of the larvae from organisms in coral reefs remain in the pelagic phase for at least 21 days before they recruit into an existing population. Given the magnitude and direction of the surface current patterns, this period may allow for transport of juveniles across country boundaries. The extent and direction of movement are not very clear. Any information on the dynamics of larvae transport is very important.

The model of reef interdependencies from this project will be based on genetic variation displayed by populations of three species of reef fish *Heniochus acuminatus*, *Thalassoma hardwicki* and *Dascyllus trimaculatus* and the starfish *Linckia laevigata*. These species were chosen based on their common occurrence and abundance in the area covered by the study.

A modest laboratory capable of doing investigations using genetic markers has been established at ICLARM headquarters. DNA work is in progress at the Academia Sinica in Taiwan, under the leadership of Dr. Kwang Tsao-Shao.

The project also provides an opportunity for the participating institutions to relate their current research on these reefs (e.g., investigations on recruitment, pollution activities and environment gradients) with the results from PISCES. The project is also a venue for training research staff in techniques for work with genetic markers. Though very limited in its scope and participation, the project is a major step towards regional cooperation on management of coral reef resources.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	n/a	Anticipatory Research	H

### 1998 Results

Data gathering was the main focus of the PISCES project this year. Samples from collaborators arrived in batches. The sites and number of samples available for analysis are listed in Table 1. Substantial data were obtained from isozyme analyses of *D. trimaculatus* and *L. laevigata*.

Electrophoretic analyses of *D. trimaculatus* and *L. laevigata* samples were completed. Routine analysis of the other species and samples will continue as the samples arrive. Results suggest that factors other than larval duration have a greater influence on the dispersal of reef species.

A disparity in the protein patterns between small and large sized *D. trimaculatus* from different areas was observed. This may be because of: natural population substructuring, the allozyme expression in this species changing with age or cryptic speciation. An initial study to investigate the reason for the discrepancy in pattern using the RAPD method and seven universal primers was completed this year.

Sequencing the DNA of the D-loop control region of the mitochondria for *D. trimaculatus* was completed at the IZAS. Primer sets of the most variable region at the 5'-end of D-loop for this species were redesigned for analysis and 10 samples from each of the sites were analyzed this year.

### Expected Outputs in 1999

Completion of sampling and DNA and allozyme analyses of populations of the other selected species is the main project priority for the first quarter of 1999. The satellite study that investigates the apparent differences in the expression of allozyme patterns in large and small *D. trimaculatus* is expected to be completed in the first half of 1999.

A project workshop will be held at IZAS in May 1999. The model of reef interdependencies, based on the results from the laboratory analyses, will be finalized for discussion at the workshop. This

Table 1. Samples collected for the PISCES Project in 1998.

	<i>D. trimaculatus</i>	<i>H. acuminatus</i>	<i>T. hardwickii</i>	<i>L. laevigata</i>
Philippines				
Zambales	40	44	6	-
Cebu	80	15	-	12
Quezon	40	-	-	11
Batangas	40	14	-	6
Malaysia				
Pulau Tiga	40	-	-	33
Pulau Mengalum	40	-	-	40
Semporna	40	-	-	40
Solomon Islands				
Gela	40	-	33	38
Marou	40	-	23	23
West Solomon	40	-	38	35
Vietnam				
Nhatrang	29	13	7	10
Qui Nhon	32	-	3	28
Ca Na Bay	15	-	19	-
Taiwan	-	-	-	-
Indonesia	-	-	-	-

workshop will discuss the project results, devise strategies for disseminating the results for maximum impact among the target beneficiaries, and determine the directions for further collaboration.

## **Project 5.4** Coastal Management Training Program

### **ICLARM Staff**

Ms. Sheila G. Vergara; Ms. Audrey Marie B. Serrano

### **Organizing Committee**

DENR; ICLARM; DA-BFAR; Haribon Foundation; IIRR; PCAMRD

### **Collaborating Institutions**

*Indonesia:* Pusat Kajian Sumberdaya Pesisir dan Lautan, Institut Pertanian Bogor (PKSPL-IPB)  
*Philippines:* Local Government Academy (LGA)  
*Vietnam:* Cantho University (CTU)

**Donor** : Rockefeller Brothers Fund

**Duration** : Five years from 1997

### **Objectives**

- Initiate collaboration and networking activities in South and Southeast Asia in the context of coastal management.
- Develop a pool of coastal managers who will champion Integrated Coastal Management (ICM) in the Asian region, starting in Vietnam, Malaysia, Indonesia and Sri Lanka.
- Adapt the National Course on Integrated Coastal Management (NCICM) and experience acquired from it for the development of national integrated coastal management courses in other Asian countries.
- Adapt the NCICM to fit the needs of local government units in the Philippines.

### **Background and Justification**

Developing nations in Southeast Asia are experiencing similar problems with their nearshore coastal resources. Issues common to these countries are the lack of comprehensive information on their coastal zones, increasing populations, limited ability to ensure a sustainable level of resource use (e.g., deforestation, coastal erosion, destructive harvesting practices), urbanization, lack of investment on environmental management, and lack of a management plan, among others.

Several international institutions are providing assistance in the form of policy development, technical assistance, preparation of master plans, provision of environmental quality criteria, coastal erosion abatement, etc. These assistance packages are based on externally commissioned reviews and needs assessment.

To benefit from this assistance, in-country awareness, participation, commitment and expertise have to be developed. National expertise has to be enhanced so that such programs are implemented in harmony with political directions, existing institutions and support systems, cultural factors and socioeconomic conditions. It is, therefore, necessary to train a pool of coastal managers.

### **Scores Against Principles**

Sustainability	H	Participation	H
Equity	?	Systems Approach	H
Gender	H	Anticipatory Research	H

### **1998 Results**

The last (9<sup>th</sup>) NCICM Training Program was conducted in Zamboanga for Regions 9 and ARMM (Autonomous Region for Moslem Mindanao) in the Philippines. Twenty-seven government and non-government personnel were trained in the principles of ICM.

Towards the end of the year a convention of managers was held in Davao. Successful graduates of the NCICM course were invited to:

- formalize networks of communication, information and experience sharing among ICM managers in the country
- assess the impact of the NCICM course in terms of the site specific ICM activities
- update them on new materials and evolving ICM paradigms
- formulate plans for future ICM developments.

Delegates from Indonesia, Vietnam, Malaysia and Sri Lanka were invited to share their experiences in coastal management and to contribute their insights to a proposal for regionalizing the training package.

Quarterly training bulletins were distributed nationwide to share successful coastal management experiences and to keep the trainees and trainers in touch.

### **Expected Outputs in 1999**

*Country-based Training Needs Analysis:* Gaps in the extant in-country skills, knowledge and attitudes required for ICM will be assessed through training needs assessment.

*Curriculum Development:* Based on the recommendations from the training needs analysis (TNA), a framework for the country specific curriculum will be developed. Consultation with national experts and stakeholders will continue, through government organizations, NGOs and the private sector, for preparing the ICM training design. External reviews will be made solicited to ensure relevance and maintain standards.

### **Project 5.5** Population, Consumption and Environment Coordination

#### **ICLARM Staff**

Dr. John W. McManus; Ms. Rosenne Z. Funk

#### **Collaborating Institutions**

*International/Regional:* Programme for Integrated Development of Artisanal Fisheries in West Africa (IDAF)

*Congo:* Conseil National de Recherche Scientifique et Technique (CNRST)

*Ecuador:* Fundacion Natura; World Wildlife Fund

*El Salvador:* Center for Environmental and Social Studies on Sustainable Development (CEASDES)

*Ghana:* Institute of African Studies, University of Ghana

*Honduras:* Committee for the Defense and Development of the Flora and Fauna in the Gulf of Fonseca (CODDEFFAGOLF)

*India:* National Institute of Oceanography; Tata Energy Research Institute (TERI)

*Madagascar:* Madagascar University Museum

*Micronesia:* Kosrae Department of Agriculture and Land

*Norway:* Christian Michelsen Institute (CMI)

*Philippines:* University of the Philippines (UP)

*USA:* Institute for International Studies, Stanford University; Institute of Pacific Islands Forestry, Honolulu; International Center for Research on Women (ICRW); The Nature Conservancy (TNC); Office of Population Research, Princeton University; University of Connecticut; University of Rhode Island

(URI); World Wildlife Fund

*Zimbabwe:* Center for Applied Social Sciences (CASS), University of Zimbabwe

**Donors** : John D. and Catherine T. MacArthur Foundation; ICLARM core funds

**Duration** : January 1998 - December 2000

#### **Objectives**

The interactions between population and the environment are key to understanding how population changes influence and are influenced by the environment. There are seven research grants by the MacArthur Foundation under its PCE Program. ICLARM will coordinate the collaboration among research groups to consolidate and synthesize the separate studies into one cohesive set of results. To this end ICLARM will:

- conduct an inaugural PCE program workshop to improve the comparative and complementary aspects of the studies and, where possible, standardize data collection
- assist the advisory group and the leaders of the PCE program studies to further develop and adapt plans to fit the overall research framework
- assist communication among the studies and the Foundation
- develop links between the PCE Program and ongoing ICLARM projects, as appropriate
- assist in the publication of the synthesized results of the studies and the overall program.

#### **Background and Justification**

This project represents a novel approach to optimizing ICLARM's role in global strategic research as a catalyst and coordinator. Coordination at critical points of inception, implementation and analysis will maximize the benefit from the seven projects under the MacArthur Foundation's PCE Program for research into coastal resources management.

ICLARM has 20 years of experience in tropical fisheries, aquaculture, coastal resources and aquatic conservation research. It specializes in research to benefit low income people in developing countries, and works with a range of partners from other research institutes, government and nongovernmental agencies. In addition, ICLARM has a well established publishing program with several publication series, including conference proceedings, technical reports and manuals of research methods.

ICLARM scientists also publish widely in mainstream scientific literature. The Director General of ICLARM, Dr. Meryl J. Williams, is a member of the advisory committee for the PCE Program and is familiar with the goals of the Foundation.

**Scores Against Principles**

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	H	Anticipatory Research	H

**1998 Results**

The first of a series of three PCE workshops was held in April 1998 in Chicago at the MacArthur Foundation headquarters. The seven grantees and collaborators agreed that collaboration is possible between the different studies, on the relationship between migration and the environment.

A research framework integrating the different studies was proposed by Dr. Lutz, one of the PCE Advisory Committee members. It was presented to the network members during the workshop.

A mechanism for collaboration among the different studies was developed. Research groups agreed to collect data on a set of common demographic variables (age, gender, education, migration and time) and perceptions above the environment during the rapid assessment survey. Research goals, purpose, methods and outcomes as well as research designs on migration and the environment were compared for the different studies.

For effective and efficient communications among the network collaborators through electronic mail, a number of PCE collaborators, researchers and institutions have been identified. A bibliography related to PCE has been established from the list of relevant references submitted by the collaborators for circulation to the network.

A second set of research grantees under the PCE Program of MacArthur Foundation has been identified. These were selected in September 1998 by the Foundation and the PCE Advisory Committee.

**Expected Outputs in 1999**

The second of a series of three workshops to be conducted over a three-year period with the researchers and the members of PCE's Advisory Committee will be held in March 1999. The workshop will be held in Palawan, Philippines, where the PCE Program is currently conducting studies on the coastal community. This will also be the first joint meeting between the first set (1997) and the second set (1998) of research grantees under the PCE Program.

The framework developed during the first workshop for investigating population influences on coastal and marine resources will be further improved as results of the different studies are presented and collated at the workshop.

## 6. FISHERIES RESOURCES ASSESSMENT AND MANAGEMENT PROGRAM (FRAMP)

### Project 6.1

#### Tropical Fish Stock Assessment

##### ICLARM Staff

Dr. Villy Christensen (Project Leader); Mr. Felimon C. Gayanilo, Jr.; Mr. Geronimo T. Silvestre; Mr. Francisco S.B. Torres, Jr.

##### Collaborating Institutions

Predominantly in-house, with informal linkages with various research institutions

**Donor** : ICLARM core funds

**Duration** : Indefinite

##### Objectives

- Increase our understanding of the dynamics of exploited tropical/subtropical fish communities.
- Develop stock assessment methods which are straightforward and readily applicable to tropical and subtropical stocks.
- Implement and disseminate these methods in the form of widely usable software for research and training.

##### Background and Justification

Stock assessment methods used in the temperate north were traditionally based on age structured information. Such information is difficult and expensive to obtain. ICLARM has developed length-frequency based methods and made them available to tropical developing nations. ICLARM's prominent role is stock assessment of tropical fisheries based on collaborations with fisheries scientists dating back to 1978.

Since its inception, this project has supplied NARS with conceptual and methodological advances to understand and manage fisheries resources systems. New approaches and techniques developed were distributed through computer program routines. These are now widely used by fisheries researchers in developing countries and increasingly in developed countries as well. One such product is the ELEFAN software.

In 1989, it was decided that a single software be developed that merges the routines in the ELEFAN and Length-Frequency Stock Assessment (LFSA) package. This would become the basic training tool for future FAO and ICLARM courses in stock assessment. The product was named FiSAT (FAO-ICLARM Stock Assessment Tools). The package is being distributed since 1996.

As a corollary to the efforts to improve FiSAT, ICLARM is developing new models appropriate to tropical situations. For example, for cases where length-weight data pairs are lacking, a new model was developed to estimate the coefficients (a,b) of the length-weight relationship from length frequencies and sample weights only. This is incorporated in the software product ABee.

To further facilitate the use of different software applications and databases developed at ICLARM, an interface will be developed which will integrate (crosslink) these different products and the corresponding files, and guide the interpretation of the outputs. An important component of this product will be the management and detailed analysis of files resulting from scientific trawl survey data, that tend to be underutilized although they are extremely expensive to obtain (see report on "Regional Technical Assistance Toward Strategies and Action Plans for Sustainable Utilization of Coastal Fish Stocks in Tropical Asia" below).

##### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	H

##### 1998 Results

The reference manual of FiSAT has been printed by FAO and is being distributed by FAO and ICLARM. The manual presents key concepts and methods useful for assessing fish stocks and approaches based on the detailed analysis of length frequency data. An update of the FiSAT routines and the ABee software is also available.

An updated version of the yield/recruit and AUXIMS software modules were incorporated in

the FishBase 98 CD with its documentation. A new version of the ABee software incorporating routines to estimate length-weight coefficients from length-weight data or from length frequencies has been tested in the FishBase training courses.

A B:RUN folder has been published containing the disk and reprints of the papers published in *Naga*, *the ICLARM Quarterly*, documenting the system and its application.

### Expected Outputs in 1999

Distribution of the FiSAT package (software, user's guide and reference manual) will continue. Some of the modules incorporated in FiSAT will be translated to work with the FiRST (Fisheries Resources Information System and Tools) package (see ADB Regional Technical Assistance [RETA] Project below) which is based on Microsoft Windows 98 and will be distributed through that system and through the ICLARM web pages.

New updates of the yield/recruit, AUXIMS and ABee software will be developed to accommodate the required changes for the modules to work properly with Microsoft Windows 98.

The concluding part of the B:RUN documentation will be published in the early part of the year.

## Project 6.2

### Modeling of Multispecies Fisheries

#### ICLARM Staff

Dr. Villy Christensen (Project Leader); Mr. Felimon C. Gayanilo, Jr.

#### Collaborating Institutions

*Canada:* Fisheries Centre, University of British Columbia (UBC)

*Denmark:* North Sea Centre (NSC)

**Donors** : DANIDA; ICLARM core funds

**Duration** : Continuing since February 1990

#### Objectives

- Develop modeling approaches for management of ecosystems and of multispecies fisheries incorporating biological interaction.
- Make the methods available to and develop them further in cooperation with scientists in national institutions.

### Background and Justification

A method for ecosystem analysis has been developed at ICLARM over the last few years based on an approach originally conceived by a US scientist, Dr. J.J. Polovina. This had led to the Ecopath software system which is now widely distributed (1,450+ registered users in 94+ countries) and has been used for description of more than 100 ecosystems, for regular course work at universities, theses work, etc. Interest is now growing in its potential for ecosystem management.

A new methodology, Ecosim, for describing ecosystem dynamics has been developed by Prof. Carl Walters, UBC, Vancouver, and integrated in Ecopath with Ecosim. Ecosim makes it possible to simulate the impact of changes in fishing pressure on ecosystems.

There are no comparable methodologies for ecosystem analysis and biological management of multispecies fisheries accessible to scientists working with tropical fisheries.

### Scores Against Principles

Sustainability	H	Participation	M
Equity	n/a	Systems Approach	H
Gender	n/a	Anticipatory Research	H

### 1998 Results

A test version of Ecopath with Ecosim was developed in 1998 and made available for testing through the internet ([www.ecopath.org](http://www.ecopath.org)). More than 450 users downloaded and registered through the internet during the year. The website had more than 6,000 virtual visitors since it was created on 15 April 1998.

A spatial model, Ecospace, was developed by Prof. Carl J. Walters, Fisheries Centre, UBC. Ecospace can be used to predict biomass and exploitation distribution over two-dimensional space and includes facilities for definition of habitats including nonfished protected areas. The model was incorporated as a module in the Ecopath with Ecosim software.

Seven international training courses/workshops were conducted on the use of Ecopath with Ecosim (Canada, Costa Rica, France, Denmark, Alaska, Thailand and Brazil).

New publications that place fisheries in the context of their ecosystems.

Ecopath was presented at a number of international conferences, notably the Oceanic Food Web and Economic Productivity conference of the EU held as part of the Year of the Ocean exposition in Lisbon in July 1998.

The Beta version of the Ecopath with Ecosim was not released as planned during 1998 due to lack of programming resources.

### Expected Outputs in 1999

A Beta version of the Ecopath with Ecosim software system. Continued user support of its application.

A research focus on ecosystem effect of fisheries, including studies of the properties of ecosystem indicators.

## Project 6.3

Caribbean Marine Protected Areas  
Project: The Role of Marine Protected Areas in Fisheries Management and Biodiversity Conservation in Coral Reef Ecosystems

### ICLARM Staff

Dr. John L. Munro (Project Leader); Dr. Marguerite Watson; Mr. A. Roberts

### Collaborating Institutions

*British Virgin Islands (BVI):* Conservation and Fisheries Department

*Jamaica:* Centre for Marine Sciences, University of the West Indies (CMS-UWI)

**Donors** : DFID (BVI component); Inter-American Development Bank (IDB) (Jamaica component)

**Duration** : January 1996 - June 1999

### Objectives

- Develop scientifically validated criteria for the establishment of marine protected areas (MPA).
- Establish methods for identifying optimal locations for MPA and for the implementation of management strategies based on sound social, economic and ecological evaluations.

### Background and Justification

MPAs or marine fishery reserves (MFR) have been established in many countries for marine conservation and to conserve stocks of exploited fish and invertebrates. In the tropics, such areas very often encompass coral reefs.

It has been established that increases in average size of individuals, stock abundance and the diversity of marine organisms occur as a result of the creation of a MPA. Outmigrations from MPAs also enhance fisheries in adjacent areas though such migrations depend on the size and location of the MPA. MPA can have a role in ecotourism and thus have additional economic benefits. On the other hand, fishing area is lost by closure and protection of fishing grounds. The economic and social benefits of MPA are difficult to evaluate, particularly in multispecies, multigear tropical fisheries and must be evaluated on the basis of a knowledge of existing fisheries, of potential gains from outmigrations, increased recruitment and ecotourism.

The current project encompasses a limited range of investigations designed to provide baseline data at a few selected sites.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	H	Anticipatory Research	H

### 1998 Results

The monitoring programs for juvenile coral reef fish in the BVI and Jamaica continued throughout the year, using a standardized array of ½" mesh mini traps.

The light trapping program in BVI terminated at the end of October and in Jamaica at the end of August.

The mark-and-release program in the Discovery Bay Fishery Reserve, started in December 1996 with trials of various tags and marking, terminated on 5 May 1998. By that date a total of 6,949 fish (of 44 species) had been marked and released. The recapture program has continued and by the end of 1998 a total of over 6,000 recaptures (including multiple recaptures of the same individuals) of 26 species had been recorded, mostly in the project's traps in the MPA. However, 286 tagged fish have

been returned by fishers. The longest verified distance moved was 28 km, by a parrotfish, *Sparisoma chrysopterum*. In the final months of the year, returns of marked fish by fishers ceased and very few marked fish were being recaptured within the Discovery Bay Fishery Reserve.

The data on settlement and recruitment in Jamaica were compared with the results of similar studies conducted concurrently around Tortola in the lightly exploited waters of the BVI. The data show that in almost every case the light trap and fish trap catch rates are one to three orders of magnitude greater in BVI than in Jamaica. It is likely, but difficult to prove, that the differences between Tortola and Discovery Bay can be ascribed to recruitment overfishing.

### **Expected Outputs in 1999**

The Project has sufficient funds only up to June 1999.

A study of the economics of the BVI commercial fishing and pelagic sport fishing industries will be undertaken by a consultant from January to March, 1999 and a report focusing on the value of the industry to the territory will be prepared.

In BVI, January and February 1999 will be spent on the analysis of data, the preparation of the final report on the work of the first phase of the DFID funded component of the Project, and on the completion of several scientific papers. The final scientific report of this phase of the Project is expected to be completed in March 1999.

## **Project 6.4**

### **Regional Technical Assistance Toward Sustainable Management of Coastal Fish Stocks in Asia**

#### **ICLARM Staff**

Mr. Geronimo T. Silvestre (Project Leader); Dr. Daniel Pauly; Dr. Mahfuzuddin Ahmed; Dr. Villy Christensen; Dr. John McManus; Mr. Felimon C. Gayanilo, Jr.; Mr. Len R. Garces; Ms. Lualhati Lachica-Aliño; Ms. Emily Christi A. Cabegin; Mr. Fredelito C. Valdez; Mr. Francisco S.B. Torres, Jr.; Ms. Kristine F. Santos

#### **Collaborating Institutions**

*Bangladesh:* Bangladesh Fisheries Research Institute (FRI); Department of Fisheries (DOF); University of Chittagong

*India:* Central Marine Fisheries Research Institute; Indian Council for Agricultural Research (ICAR)

*Indonesia:* Central Research Institute for Fisheries (CRIFI); Directorate of Fisheries Resource Management

*Malaysia:* Department of Fisheries (DOF); Fisheries Research Institute

*Philippines:* Bureau of Fisheries and Aquatic Resources (BFAR); University of the Philippines in the Visayas (UPV)

*Sri Lanka:* Ministry of Fisheries and Aquatic Resources Development

*Thailand:* Department of Fisheries (DOF); Southern Marine Fisheries Development Center

*Vietnam:* Ministry of Fisheries; Research Institute for Marine Products

**Donor** : ADB

**Duration** : 1998 - 2000

### **Objectives**

#### **OVERALL**

- Provide selected developing countries with tools and strategies to improve management and sustainable utilization of their coastal fisheries and related ecological systems.

#### **SPECIFIC**

- Develop a fisheries resource information system that relates environmental and socioeconomic factors to resource management needs of participating countries.
- Develop appropriate strategies and action plans to assist these countries in rehabilitating their coastal stocks and sustaining the benefits.
- Strengthen the capabilities of selected institutions in coastal fisheries assessment and management.

### **Background and Justification**

The ADB RETA No. 5651 (Sustainable Exploitation of Tropical Coastal Fish Stocks in Asia) identified the issues impacting coastal fisheries in the region that require action on a broad front. Success in dealing with these issues will depend on the institutional capabilities and resource mobilization in these countries. Regional collaboration can be focused on key elements that will assist them to deal successfully with these issues.

Regional cooperation will be cost effective in addressing common issues in the management of coastal fish stocks in the participating countries. It

will contribute to scientific advances in stock assessment and development of fisheries resource databases which can be applied extensively for improved management and sustainable utilization of coastal fisheries resources.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	M	Systems Approach	M
Gender	M	Anticipatory Research	H

### 1998 Results

The project commenced on 15 March 1998. Start-up activities have been completed and a Project Inception meeting was conducted on 7-9 July 1998. Activities undertaken include formation of project teams, finalization of work programs, preparation and signing of Memoranda of Agreement (MOA), and submission of a Project Inception Report to ADB.

Design and programming of the FiRST and revision of the initial database prototype developed under RETA 5651 were initiated. The database system (1998 release) was presented at the regional training/workshop in October 1998. Data compilation and inputting have also been initiated.

The following workshops were conducted: Regional Training/Workshop on Fisheries Information Systems and Tools (20-24 October 1998, Penang, Malaysia); Regional Workshop on Methods of Analysis of Fisheries Resources (27 October - 6 November 1998, Hat Yai, Thailand); and Regional Workshop on Fisheries Socioeconomics and Management (24 November 1998, Hat Yai, Thailand). Scientists from eight countries attended the workshops.

The project has also initiated a webpage on the Internet. This will facilitate communication and information exchange among the participating countries, ICLARM and ADB, and make project implementation and progress monitoring more effective.

### Expected Outputs in 1999

Continuation of data and policy analyses.

Continuation of the development of FiRST and release of the 1999 version and documentation.

Preparation and submission of draft technical reports.

Conduct of national/regional fisheries resource management strategic planning workshops.

Commence the formulation of national strategies and action plans.

### Project 6.5

Testing the Use of Marine Protected Areas to Manage Fisheries for Tropical Coral Reef Invertebrates – Arnavon Islands

#### ICLARM Staff

Dr. Johann Bell (Project Leader); Mr. Marcus Lincoln-Smith (Consultant); Mr. Peter Ramohia; Mr. Rayner Pitt; Mr. Idris Lane

#### Collaborating Institutions

*Australia:* Great Barrier Reef Marine Park Authority (GBRMPPA)

*Solomon Islands:* Ministry of Agriculture and Fisheries (MAF); Ministry of Forests, Environment and Conservation

*USA:* The Nature Conservancy (TNC)

**Donor** : ACIAR

**Duration** : October 1994 - September 1999

#### Objective

- Test the hypothesis that abundance of commercial tropical invertebrates will increase on coral reefs closed to fishing relative to reefs that remain open to fishing, and that the average sizes of individuals in reserves will be greater than those in fished areas.

#### Background and Justification

Fisheries managers in developing countries are looking for affordable alternative ways of achieving sustainable harvests. One such method is to use MPA, also known as marine refugia, to protect a proportion of the stock. A well designed system of reserves, in conjunction with appropriate levels of fishing effort, has the potential to sustain catches.

Firstly, the prevention of fishing allows fish to accumulate and grow in size. The protected fish then produce a far greater number of eggs because there is an exponential increase in fecundity with increasing body size. Secondly, the eggs and larvae of most marine species have an extended pelagic (floating)

stage, during which they are likely to be dispersed outside the reserve. At the end of this process, the larvae “settle” as juveniles in areas open to fishing. Provided reserves are located in places where larvae are distributed to areas open to fishing, populations in the refuge should contribute an increased number of juveniles to the fishery.

ICLARM is testing the first of these ideas in conjunction with the declaration of a marine conservation area (MCA) of 83 km<sup>2</sup> at the Arnavon Islands, Solomon Islands. TNC has negotiated a three-year closure to fishing in the MCA for trochus, sea cucumbers and giant clams with the traditional users. GBRMPA has provided assistance with the statistical design of a monitoring program to assess the effect of the closure. This monitoring program is based on a ‘before vs. after, impact vs. control’ design. In this particular case, abundance of all species is to be estimated from six transects at each of four sites at two islands within three ‘external reference’ areas and within the MCA. Such estimates were made three times prior to dedication of the MCA (in August 1995, once each in 1996 and in 1997) and will be done on three occasions between late 1998 and early 1999.

ICLARM regularly attends meetings of the Management Committee established by TNC to oversee the establishment and surveillance of the MCA. A major impact of ICLARM’s initiative to monitor the effects of the MCA has been the raised awareness, both among traditional users of the area and in the Fisheries Division, of the potential value of MPA in the management of coral reef fisheries.

**Scores Against Principles**

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	n/a	Anticipatory Research	H

**1998 Results**

The first of the three surveys to be conducted three years after declaration of the MCA was completed in September 1998. The results of this survey indicate that:

- there has been some increase in the abundance of trochus in the MCA relative to the reference sites. These increases have not been as great as expected and there is concern that poaching of trochus (reported by staff from TNC) is limiting the recovery of this species.

- the response of trochus within the MCA is site specific, suggesting that not all (apparently similar) sites are suitable for trochus.
- there has been a very limited increase in the abundance of sea cucumbers and giant clams in the MCA after three years, indicating that far longer periods are needed for recovery of stocks.

**Expected Outputs in 1999**

Surveys of invertebrate populations in the MCA and at the external reference sites during February and April to complete the three surveys.

Analysis of the data and submission of the final report to the donor.

Meetings with the Management Committee for the MCA to assess the need to continue the monitoring for a longer period.

Attachment of a scientific officer from Solomon Islands MAF for training in the analysis and write-up of data from the first three years of the project.

**Project 6.6**

Caribbean Marine Protected Areas Project: The Role of Marine Protected Areas in Fisheries Management and Biodiversity Conservation in Coral Reef Ecosystems (Phase Two)

**ICLARM Staff**

Dr. John L. Munro; Dr. Marguerite Watson

**Collaborating Institutions**

*British Virgin Islands:* Conservation and Fisheries Department; H. Lavity Stout Community College  
*Jamaica:* Centre for Marine Sciences, University of the West Indies (CMS-UWI)

**Donor** : DFID

**Duration** : January 1999 - December 2001

**Objectives**

- Develop scientifically validated criteria for the establishment of marine protected areas as fishery reserves through large-scale experimental

studies of lightly fished reefs (BVI) and heavily exploited reefs (Jamaica). Specifically, to establish criteria for identifying optimal locations for marine protected areas and to provide a basis for the implementation of management strategies based on sound social, economic and ecological evaluations.

- Develop trophic interaction models of pristine and heavily impacted coral reef resource systems in order to develop management strategies for fisheries in such ecosystems, with particular reference to the design and management of marine protected areas as fishery reserves.
- Understand the recruitment patterns of commercially important coral reef fish in relatively pristine areas in comparison with heavily exploited areas within the Caribbean Large Marine Ecosystem.
- Determine expected rates of recruitment into newly established marine fishery reserves and develop technologically simple sustainable methods for rearing selected reef fish post-larvae for stock enhancement in depleted marine fisheries.
- To explore strategies for management and rehabilitation of Caribbean reef fish stocks.

**Background and Justification**

Reef fisheries are in a state of decline in most parts of the Caribbean, either because of overfishing or because of environmental degradation. Large apex predators such as groupers and snappers have become virtually extinct in many fisheries and the composition of the catch has shifted steadily towards a larger proportion of herbivorous species.

In the north coast of Jamaica, massive algal overgrowth of coral reefs has resulted in severe loss of biodiversity and disruption of the ecosystem. This appears to have been triggered by the Caribbean

wide die-off of the herbivorous long-spined sea urchin (*Diadema antillarum*) in 1984. The biomass of herbivorous fishes in Jamaica were too low to control the algae. There is some evidence that stocks of *D. antillarum* are starting to recover at various locations in the Caribbean, including Jamaica. This might lead to a recovery, at least in part, of the coral reefs in Jamaica. However, data collected in Jamaica during the past few years show drastic declines in biodiversity of the fish community. This is attributed to the collapse in recruitment of some species and the current lack of habitat for others. Without active management, any recovery could take an extremely long time.

**Scores Against Principles**

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	H	Anticipatory Research	H

**Expected Outputs in 1999**

During 1999, work will focus on mapping the sites for the Ecopath studies in BVI and making preliminary estimates of the biomass of the principal components. In Jamaica, where the whole of Discovery Bay is adequately mapped, work will focus on biomass estimation in representative habitats.

Information on trophic interaction will build on published works by examining stomach contents of fish captured by commercial spear and line fishers and in the project's traps.

Biometric data will be gathered for trap-caught fishes and preliminary analyses made of the effect of escape gaps on trap catch rates and size selectivity. Investigations will also be made of the effects of trap size and design on catch rates.

## 7. POLICY RESEARCH AND IMPACT ASSESSMENT PROGRAM (PRIAP)

### ECOLOGICAL ECONOMICS FOR SUSTAINABLE USE OF AQUATIC RESOURCES

#### Project 7.1

Coastal Resource Co-Management Project: A Worldwide Collaborative Research Project (Phase II)

#### ICLARM Staff

Dr. Mahfuzuddin Ahmed; Dr. K. Kuperan Viswanathan (Project Leader); Ms. Brenda Katon; Mr. Emmanuel Genio; Ms. Anjanette Trinidad-Juan; Ms. Maricel Gamo-Magtalas

#### Collaborating Institutions

*International/Regional:* CARICOM Fisheries Resource Assessment and Management Program; Programme for Integrated Development of Artisanal Fisheries in West Africa (IDAF); Southeast Asian Fisheries Development Center-Aquaculture Department (SEAFDEC-AQD); Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)

*Denmark:* Institute of Fisheries Management and Coastal Community Development (IFM); North Sea Centre (NSC)

*Indonesia:* Directorate General of Fisheries; Indonesian Fisheries Socioeconomic Research Network; Research Institute for Marine Fisheries (RIMF); Universitas Pattimura Ambon; Yayasan Hualopu

*Malawi:* Chancellor College; Fisheries Department

*Malaysia:* Universiti Pertanian Malaysia

*Mozambique:* Institute for Development of Small-scale Fisheries

*Philippines:* College of Public Administration, University of the Philippines (UP); Department of Environment and Natural Resources (DENR); Haribon Foundation; Palawan Council for Sustainable Development; Tambuyog Development Center; University of the Philippines in the Visayas (UPV)

*South Africa:* Sea Fisheries Research Institute; University of Cape Town

*Thailand:* Department of Fisheries (DOF); Kasetsart University; Prince of Songkla University

*Vietnam:* Cantho University (CTU); Ministry of Fisheries; National Center for Social Sciences

*Zambia:* Department of Fisheries (DOF)

*Zimbabwe:* Center for Applied Social Sciences, University of Zimbabwe; Lake Kariba Fisheries Research Institute

**Donor** : DANIDA

**Duration** : January 1999 – December 2003

#### Objectives

- Gain practical knowledge and experience in coastal resources co-management.
- Analyze and demonstrate the applicability of co-management as a sustainable, efficient and equitable resource management strategy.
- Contribute to the global development objective of sustainable, efficient and equitable management of fisheries and coastal resources in developing countries to ensure food security and improve the economic and environmental conditions of poor people.

#### Background and Justification

During 1994-1998, Phase I of the Coastal Resources Co-management Project conducted research in selected coastal, coral reef, lake, river, floodplain, and inland waterbody systems in several countries of Asia and Africa in order to determine if co-management is a viable management strategy under varying conditions (political, social, cultural, economic, biophysical, technological). This has resulted in a large body of knowledge concerning the approaches, methods, process and impacts of the co-management of fisheries. Phase II of the project will continue to focus activities on fisheries while encompassing coastal ecosystem and coastal resources management. This broader focus illustrates the increased attention co-management is receiving from resource managers in other coastal resource systems. The resource systems to be studied will now include fisheries, coastal, coral reefs, mangroves, seagrasses, lakes, rivers, floodplains, wetlands, and inland waterbodies. "Coastal" will be defined to include not just the marine coast but the coast of lakes and inland waterbodies.

The project will not advocate or promote co-management, but systematically and comparatively document and evaluate the processes and feasibility of co-management implementation at the government and community levels and their performance and impacts. General conditions and factors that facilitate the successful implementation of co-management strategies will be identified. The research will have a strong applied policy focus aimed at strengthening national policies, laws and programs for co-management.

The research activities in Phase II will be conducted through eight components:

- case studies
- hypothesis testing
- studies of issues related to process and management systems
- legal, policy and institutional analysis
- national policy development
- technical assistance to co-management initiatives
- synthesis of research results
- networking/capacity building.

#### **Scores Against Principles**

Sustainability	H	Participation	M
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	H

#### **1998 Results (Phase I)**

##### PUBLICATION OF SCIENTIFIC JOURNAL ARTICLES

Katon, B.M., R.S. Pomeroy, A. Salamanca and L. Garces. 1998. Fisheries management of San Salvador Island: A shared responsibility (accepted for publication, *Society and Natural Resources Journal*).

Katon, B.M., R.S. Pomeroy, M. Ring and L. Garces. 1998. Rehabilitating the mangrove resources of Cogtong Bay, Philippines: a co-management perspective (under review by the *Coastal Management Journal*).

Brown, D.N. and R.S. Pomeroy. 1998. Co-management of Caribbean Community (CARICOM) fisheries (accepted for publication, *Marine Policy Journal*).

#### COMPLETION OF CO-MANAGEMENT CASE STUDIES IN ASIA

Case studies of community-based coastal resources Management in Vietnam. 1998. P.T. Hong Van and P.G. Hai.

Mangrove Rehabilitation and Coastal Resource Management Project of Mabini-Candijay: a case study of fisheries co-management arrangements in Cogtong Bay, Philippines. 1998. B.M. Katon, R.S. Pomeroy, M.W. Ring and L. Garces.

Community-based fisheries management in Orion, Bataan. 1998. L. Van Mulekom.

An analysis of fisheries co-management arrangements: a case of fishing community in Southern Thailand. 1998. A. Masae.

Case study of the institutional arrangements in the fisheries co-management on Malalison Island, Culasi, Antique. 1998. D.B. Baticados and R.F. Agbayani.

Fisheries co-management study in the Oxbow Lakes of Bangladesh. 1998. M.S. Khan and N.A. Apu.

Community-based management of Hamil Beel: a case study of fisheries co-management in Bangladesh. 1998. P. Thompson, S.M. Nazmul Alam, M. Hossain and A.B. Shelly.

#### OTHERS

Training Seminar on Institutional Analysis, Theory and Methods in Mozambique.

Asia National Partners Meeting in Chiang Mai, Thailand.

Completion of final project report on Fisheries Co-management in Asia: Lessons from Experience.

#### **Expected Outputs in 1999**

International workshop of research partners to be held in Malaysia.

Revisit of African case studies.

Initiation of new case studies in Thailand, Vietnam, Laos and Indonesia.

Initiation of study on institutional legitimacy.

## **Project 7.2**

## Community-based Fisheries Management (CBFM) Policy Research on User-based Management: The Case of Inland Openwater Fisheries of Bangladesh

### ICLARM Staff

Dr. Paul Thompson (Project Leader); Mr. Nurul Islam; Mr. Manjur Kadir; Dr. Mahfuzuddin Ahmed

### Collaborating Institutions

*Bangladesh:* Banchte Shekha; Bangladesh Rural Advancement Committee (BRAC); Caritas; Center for Resource and Environment Development (CRED); Department of Fisheries (DOF); Proshika Manobik Unnayan Kendra (MUK)

**Donor** : Ford Foundation

**Duration** : July 1995 - June 1999

### Objectives

#### OVERALL

- Develop a framework for user-based fisheries management that would promote equitable distribution of benefits to the poorer sections of the community and ecologically sustainable use of Bangladesh's openwater and floodplain fisheries.

#### SPECIFIC

- Develop an integrated systems view of the relationship between people and fisheries resources.
- Understand the role of local institutions, traditional practices and ecological knowledge in access to and patterns of exploitation of the fisheries.
- Test alternative models of government organization-NGO-fisher collaboration and examine the extent to which the models contribute towards encouraging community participation, reducing pressure on the fisheries and building locally sustainable institutions.
- Generate and disseminate relevant information to foster informed debate and the necessary policy changes.

### Background and Justification

Since the 1970s, DOF of Bangladesh has argued for managing the country's natural waterbodies with the objectives of sustainable increases in fish production and promoting the welfare of fishing

communities. In 1986, the government decided to pursue a New Fisheries Management Policy for the management of openwater fisheries along the lines suggested by DOF. Following this new initiative, about 300 waterbodies were placed under the administration of DOF.

The Ford Foundation supported DOF to work creatively with organized fisher groups in a project entitled "Improved Management of Openwater Fisheries" (IMOF) which focused on strengthening the licensing management by DOF through active participation of four leading NGOs (BRAC, Caritas, Proshika MUK and Friends in Village Development of Bangladesh [FIVDB]) with technical assistance from ICLARM.

An external evaluation of the IMOF Project noted that the Bangladesh experience with government organization-NGO-fisher relationships is valuable and applicable to co-management systems in many other fisheries. The report noted that increasing the participation of local fishers in resource management is required. The Bangladesh Project and the ICLARM Global Research Project on Fisheries Co-management are mutually strengthened through collaboration and networking, with the Co-management Project providing methodological inputs and the Bangladesh Project providing detailed case studies of a range of NGO led initiatives.

This project has been extended to mid-1999 and has been combined with part of the grant for Institutional Capacity Building for CBFM in Bangladesh that was earmarked for the transition phase of this activity. The expected outputs in 1999 are joint for the two grants.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	H	Anticipatory Research	H

### 1998 Results

Monitoring of fish catches, fish markets, fish consumption and impacts of CBFM and NGO activities continued through the year. Analysis of the 1997 surveys provides a baseline for assessing improvements in fisheries management. The surveys provide data on catches and fish consumption as well as levels of effort and catches in community initiated closed seasons in some waterbodies.

Action plans for developing community-based fisheries management were prepared and are being followed in ten project waterbodies. Follow-up visits were made under the institutional strengthening project. Local management committees have been established for all waterbodies, although those for rivers are at an early stage of development. ICLARM, DOF and NGO have provided training to the members of these committees.

Technical guidance was provided to six students studying for a Master's degree at Dhaka University. They were assisted in biological studies on indigenous fishes in project waterbodies. These are expected to be completed by the end of the year. The PhD student of Bangladesh Agricultural University who was researching the impacts of stocking carp on indigenous fish in Oxbow Lakes completed his fieldwork.

A workshop was held in June 1998 to bring together field-based staff and fisher representatives. The DOF-NGO teams working at each site reported on their progress and problems, linkages and activities under the project.

ICLARM continued to facilitate networking between NGO and the government by producing a quarterly project newsletter, a calendar and displays at the annual fish fair.

A panel on CBFM in Bangladesh was organized at the International Association for the Study of Common Property (IASCP) Conference in Vancouver in June 1998, comprising of four presentations plus a poster display.

Four poster papers (two by ICLARM) covering interim findings were presented at the Fifth Asian Fisheries Forum, Chiang Mai, Thailand, in November 1998.

A paper on the NGO-ICLARM partnership experience in the CBFM Project was presented at a Workshop on NGO Research Partnerships held at the International Institute of Rural Reconstruction in October 1998.

One case study of a CBFM waterbody following the co-management institutional analysis framework has been completed; 14 shorter case studies are in preparation. Editing of a workshop proceedings and a technical paper was completed.

### **Expected Outputs in 1999**

Outputs due by the completion of the current phase (during a six-month bridging period in 1999) are listed below. It is expected that the second phase will be finalized with new donor funding to start in mid-1999.

A national workshop on CBFM to present the findings of the current phase and discuss future activities.

A study will be undertaken by an NGO partner on the impacts of its CBFM activities in rivers and the scope to enhance them in adjacent floodplains.

Publication of workshop proceedings and technical report.

Finalization of case study reports on all waterbodies under the current phase, as well as a consolidated report on the results of monitoring over two years and lessons for models of community management.

Finalization of detailed study of fish consumption covering two years and four waterbodies.

Continued production of the project newsletter, calendar and publicity activities. Present papers at international conferences to disseminate findings.

### **Project 7.3** **Institutional Capacity Building** **for Community-based Fisheries** **Management in Bangladesh**

#### **ICLARM Staff**

Dr. Mahfuzuddin Ahmed; Dr. Paul Thompson (Project Leader)

#### **Collaborating Institutions**

*Bangladesh:* Banchte Shekha; Bangladesh Rural Advancement Committee (BRAC); Caritas; Center for Natural Resource Studies (CNRS); Center for Resource and Environment Development (CRED); Department of Fisheries (DOF); Proshika Manobik Unnayan Kendra (MUK)

*Philippines:* Tambuyog Development Center

**Donor** : Ford Foundation

**Duration :** 1 January 1997 - 31 December 1999

### **Objectives**

- Provide training for government (national and local) and NGO personnel consistent with the needs of CBFM activities in Bangladesh.
- Contribute to the establishment of linkages between the Bangladesh government, NGO institutions and Southeast Asian institutions involved in CBFM activities to strengthen overall fisheries resources management.
- Contribute to the establishment of collaborative research and development activities in CBFM in Asia to improve overall fisheries management and policy.

### **Background and Justification**

This project will complement the practical development and action research work being undertaken by the DOF and NGO in Bangladesh in collaboration with ICLARM. The overall goal of the project is institutional capacity building for CBFM in Bangladesh and training of government and NGO personnel to meet their development and research needs.

CBFM in Bangladesh is focused on inland openwaters (rivers, beels/lakes and floodplains). The DOF and NGO are working as partners to enable local communities, particularly people who depend on fishing for their livelihood, to manage fisheries in more sustainable ways. This includes developing alternative and enhanced sources of income for the lean seasons and protecting access to fisheries of the many poor households who catch small fish for their own consumption. Training is needed to enhance the capacity of institutions and local communities to assess and analyze existing management systems, to undertake participatory rapid appraisal and participatory planning of community-based initiatives (for example for fish conservation), to analyze survey results to assess the sustainability and equity implications of fisheries management, and to learn from the experience of CBFM in other countries.

The training and study program will include: i) custom-designed CBFM training and programs to strengthen the capabilities of government and non-government personnel involved in CBFM at specific waterbodies covered by existing projects; and ii) training programs for policymakers.

### **Scores Against Principles**

Sustainability	H	Participation	H
Equity	M	Systems Approach	H
Gender	H	Anticipatory Research	H

### **1998 Results**

Follow-up visit to Bangladesh for evaluation of training and review of case studies.

Exchange visits by three Bangladeshis and two Filipinos to visit community-based fishery and coastal resource management sites and exchange experiences.

### **Expected Outputs in 1999**

Preparation of a manual/report on the CBFM training modules.

Final report on the training and exchanges and their impacts.

Support to the bridging period of CBFM activities in Bangladesh.

## **Project 7.4**

### **Valuation and Policy Analysis for Sustainable Management of Coral Reefs**

#### **ICLARM Staff**

Dr. Mahfuzuddin Ahmed (Project Leader); Ms. Gloria Magnayon-Umali; Ms. Sheila Vergara; additional staff to be identified by 1<sup>st</sup> quarter 1999

#### **Collaborating Institutions**

*Philippines:* Marine Science Institute, University of the Philippines (UPMSI); University of the Philippines in the Visayas (UPV)

**Donors :** ICLARM core funds; SIDA

**Duration :** October 1998 – December 2000

#### **Objectives**

- Review and assess valuation techniques that are potentially applicable to valuing coral reef systems under varying degrees of exploitation.
- Compile related valuation studies and collect information on values estimated through non-market valuation techniques.

- Identify goods and services provided by the coral reefs and classify them according to the type of benefit they provide (e.g., use/nonuse, market/nonmarket).
- Estimate values for coral reef systems through demand estimation using nonmarket valuation techniques and/or benefit transfer analysis.
- Analyze alternative management and policy scenarios based on the full range of benefits provided by the coral reef system.
- Enhance the scope of ReefBase by incorporating nonmarket values into the existing database.

### Background and Justification

Economic valuation has emerged as a recognized tool for resource allocation that promotes sustainable resource management. While values of market goods and services are more easily measured in monetary terms, nonmarket valuation techniques are used to estimate the value of benefits such as habitat protection and resource conservation.

Many human activities cause coral reef degradation. Destruction of coral reefs due to sediment and nutrient pollution, destructive fishing methods, coral mining and other human activities has continued unabated in many parts of the world. Open access to the resource and the lack of collective responsibility among common users invariably result in resource overexploitation and environmental degradation.

A collaborative case study with the UPV carried out in 1988 documents the market and nonmarket benefits provided by the coral reefs of Taklong Island National Marine Reserve (TINMAR). The outputs from this project will be a technical report and a journal article to be completed in 1999. This case study is a learning experience and a preliminary step that feeds into the broader valuation exercise.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	H

### Expected Outputs in 1999

Matrix of nonmarket values estimated elsewhere.

Review of valuation techniques.

Technical report on the application of nonmarket valuation techniques and benefit transfer analysis in the estimation of benefits from coral reef sys-

tems including results of UPV-ICLARM collaboration in TINMAR.

## Project 7.5

### Legal and Institutional Frameworks and Economic Valuation of Resources and Environment in the Mekong River Region - A Wetlands Approach

#### ICLARM Staff

Dr. Mahfuzuddin Ahmed; Dr. Magnus Torell (Project Leader); Mr. Albert Salamanca; Ms. Gloria Magnayon-Umali; Ms. Rowena Andrea V. Santos; Mr. Maximin Luna

#### Collaborating Institutions

*International/Regional:* Mekong River Commission (MRC)

*Sweden:* Lunds Institutions University; University of Gothenburg

*Thailand:* Asian Institute of Technology

*Others:* National institutions (to be identified)

**Donor** : SIDA

**Duration** : Preparatory phase, October 1998 - March 1999  
Implementation phase, April 1999 - March 2001

#### Objectives

PREPARATORY PHASE:

- Develop a project framework and workplan for submission to SIDA by the 1<sup>st</sup> quarter of 1999.
- Define specific objectives for the implementation phase.

IMPLEMENTATION PHASE:

- Contribute to ecologically and economically sound decisions on the use, exploitation, conservation and management of wetlands and wetlands-related resources throughout the Mekong river region and to contribute to the development of workable legal, institutional and policy structures.

#### Background and Justification

Jurisdiction and authority over forests, fisheries and other natural resources including lakes, rivers, coastal zones and other wetlands tend to be fragmented and overlapping. The authorities lack the capacity to monitor resource use or to enforce regulations.

The actual availability and value of fish and other aquatic products (such as frogs, eels, snails, crabs, etc.) that are found in commons like wetlands, floodplains, etc., is grossly underestimated and not well documented. These resources are crucial throughout the Mekong river basin, especially so for the rural poor and those with limited access to (productive) land. These resources are threatened by increasing encroachment, overexploitation, destructive practices, pollution and environmental degradation. Because of lack of information, environmental and social impact assessments are based on false assumptions.

The project will focus on the analysis and dissemination of information on legal and institutional aspects, as well as on economic values of aquatic resources in the wetlands of the Mekong river region through links with concerned national, regional and international agencies.

#### Scores Against Principles

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	H

#### 1998 Results

Initial contacts established with the University of Gothenburg, Sweden, to establish international cooperation and network.

#### Expected Outputs in 1999

Consultative workshop with partners in Thailand, Cambodia, Laos and Vietnam.

Development of a full project document.

Establishment of links and framework of collaboration with MRC, AIT, riparian countries and institution(s) in Sweden.

Review of literature on laws and institutions, and analysis of economic information relevant to sustainable management of wetlands in the Mekong river region.

### Project 7.6

#### Socioeconomic and Bioeconomic Analysis of Coastal Fish Stocks in Asia

#### ICLARM Staff

Dr. Mahfuzuddin Ahmed; Ms. Emily Christi A. Cabegin; Ms. Mylene H. Lorica; FRAMP staff

#### Collaborating Institutions

*Bangladesh:* University of Chittagong

*India:* Central Marine Fisheries Research Institute

*Indonesia:* Directorate General of Fisheries

*Malaysia:* Department of Fisheries (DOF)

*Philippines:* University of the Philippines in the Visayas (UPV)

*Sri Lanka:* Ministry of Fisheries and Aquatic Resources Development

*Thailand:* Department of Fisheries (DOF); Southern Marine Fisheries Development Center

*Vietnam:* Research Institute for Marine Products

**Donors** : ADB; others to be identified

**Duration** : 1998 – 2000

#### Objectives

- Provide socioeconomic information for developing strategies and action plans for sustainable utilization of coastal fish stocks in Asia.
- Present an overview of the socioeconomic status of coastal fisheries and analyze the importance of the fisheries sector to the national economy.
- Analyze the socioeconomic condition of the small-scale fishery sector and recommend policies for economic advancement.
- Analyze the productivity, cost efficiency and economic viability of both small-scale fisheries and commercial fisheries, and indicate a more optimal composition of the fleet in relation to available fishery resources.
- Analyze the relationship between catch and fishing effort (or revenue and costs).
- Identify a set of socioeconomic variables for integration into the database to be developed under the Project on Sustainable Management of Coastal Fish Stocks in Asia (refer to p. 39 of this operational plan).

#### Background and Justification

This project is part of the ADB RETA (No. 5766) Project on Sustainable Management of Coastal Fish Stocks in Asia in which several components on bio-physical analysis of coastal fish stocks are conducted by FRAMP. The project covers Bangladesh, Indonesia, India, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam.

An adequate information base on the economics of the fishing industry is as crucial as information on ecological processes and biological characteristics of fish populations. It is necessary to analyze

the interaction between the fish stock and the fishery industry as the management of fisheries is primarily a management of the industry rather than of the fish stock itself. This will lead to management decisions that are not only biologically sustainable but also economically efficient.

### Scores Against Principles

Sustainability	H	Participation	H
Gender	M	Systems Approach	M
Equity	H	Anticipatory Research	H

### 1998 Results

Provided inputs into the proceedings of the Project Inception Meeting conducted on 7-9 July 1998 and prepared the report for the socioeconomic component.

Formed the socioeconomic team in the countries covered by the Project.

Organized and conducted the Regional Workshop on Fisheries Socioeconomics and Management held in Hat Yai, Songkhla, Thailand, 24 November – 1 December 1998.

### Expected Outputs in 1999

Prepare the report of the proceedings of the Regional workshop for the socioeconomic component.

Supervise data collection and analysis.

Monitor the progress of research studies.

Provide technical assistance and conduct regional visits.

Prepare draft technical reports on the Socioeconomic and Bioeconomic Analysis of Coastal Fish Stocks in Asia in collaboration with the participating countries.

Provide technical inputs to the socioeconomic component of the FiRST.

Provide technical support to the conduct of national and regional fisheries resources management and planning workshops and formulation of national development strategies and action plans.

## IMPACT OF AQUATIC RESOURCES RESEARCH: METHODS AND ASSESSMENT

### Project 7.7

#### Impact of Giant Clam Productivity Enhancement Research

### ICLARM Staff

Dr. Mahfuzuddin Ahmed

### Collaborating Institutions

*Australia:* Department of Agricultural and Resource Economics, University of New England (UNE)

**Donor** : ICLARM core funds

**Duration** : 1997 - 1999

### Objectives

#### GENERAL

- Assess the impact of research and technology development for giant clam mariculture in the Indo-Pacific region.

#### SPECIFIC

- Estimate the effects of giant clam breeding and stock enhancement research on income and output stabilization; productivity of marine and coral reef systems; and risks to a stable supply of food and income for coastal communities.
- Provide a framework for monitoring farming trials of *Tridacna derasa*, determine its potential for adoption and provide *ex ante* assessment (e.g., productivity, income and market).
- Develop a biological model which captures the relationships inherent in the marine production system for cultured giant clams.
- Develop a bioeconomic model which links the biological model to market conditions.
- Identify and demonstrate the possible applications of the bioeconomic model, such as evaluation of the:
  - optimal management strategy for the village farmer facing three different markets
  - effects of marketing, extension and biological research on the profitability of the village farm
  - possible losses to the village farm due to externalities caused by the third party activities.
- Investigate the factors affecting the rate of adoption of giant clam mariculture by village farmers.

### Background and Justification

Giant clams were listed under the Convention on International Trade in Endangered Species in 1983, prohibiting international trade in giant clam products obtained from wild stocks. ICLARM has devoted significant resources over the last decade to developing breeding and farming technologies for enhancement of production of giant clams in the South Pacific region. Initially, the objective of the research was to develop aquaculture techniques to restock reefs where giant clams had become extinct, thereby providing coastal communities with giant clam stocks sufficient for their subsistence needs. However, the interest in and prospects for commercial giant clam aquaculture were greater than for subsistence aquaculture. The objective has expanded to include the development of commercially viable giant clam aquaculture industries. However, despite favorable research results, commercial giant clam aquaculture has not yet been well adopted by village farmers. There is a need to assess the impact of this research and development investment to determine the research benefits as well as to provide guidelines for future research and development initiatives on giant clams.

### Scores Against Principles

Sustainability	H	Participation	M
Equity	H	Systems Approach	M
Gender	H	Anticipatory Research	M

### 1998 Results

A seminar entitled “Bioeconomic Research and Policy Applications” was presented by Dr. O. Cacho and Ms. R. Hean in May 1998.

Development of a biological model of individual giant clam growth is ongoing. The model was originally developed for the species *Tridacna gigas* and has recently been extended to four other species, namely, *T. crocea*, *T. derasa*, *T. squamosa* and *Hippopus hippopus*, all of which are farmed by coastal villagers as part of ICLARM’s giant clam mariculture project in the Solomon Islands. The model is used to produce frontier production functions for the growth of giant clams under ideal conditions. These can be used to analyze the effects of alternative management strategies on clam farm output and farmer profits. Preliminary analysis of this type is underway and will form the basis of a paper entitled “Management strategies for giant clam mariculture in the Solomon Islands”, to be presented by Ms. Hean and Dr. Cacho at the An-

nual Conference of the Australian Agricultural and Resource Economics Society in Christchurch, New Zealand, in January 1999.

### Expected Outputs in 1999

Collaboration with UNE researchers to finalize research results.

Completion of a technical report.

### Project 7.8

Developing an Appropriate Fishery Extension System for Transfer of Technology Based on Evaluation of Existing Alternative Extension Approaches

### ICLARM Staff

Dr. Paul Thompson (Project Leader); Dr. Mahfuzuddin Ahmed

### Collaborating Institution

Bangladesh: Department of Fisheries (DOF)

Donor : IFAD

Duration : October 1997 - September 1999

### Objectives

- Evaluate the sustainability of fish culture based on technology transfer and extension efforts.
- Make a comparative study of the efficacy of extension services with and without credit availability. This is expected to cover the Mymensingh Aquaculture Extension Project that has a higher input approach to promotion of aquaculture and the original control areas in Sreepur to provide a comparison with the standard DOF extension programs.
- Compare the above with the extension approaches and impacts of other pond fish culture programs in Bangladesh where the standard DOF extension programs are in operation through the trickle down approach of Fish Culture Extension at Thana Level, and where enhanced extension systems have been tried through intensive training under the Northwest Aquaculture Development Project.
- Make recommendations on extension methods based on these comparisons. Recommendations for extension assessment methodologies will also

be developed for the DOF and others involved in fish culture projects.

- Make a whole farm analysis of fish culture input-output relationships. This will expand existing models and involve detailed farm household surveys and monitoring of inputs and outputs, nutritional changes, and employment and income of men and women.

### Background and Justification

In collaboration with Government of Bangladesh agencies, ICLARM carried out a project on Socio-economic Impact of Fish Culture Extension Program on the Farming Systems of Bangladesh in Gazipur district of Bangladesh during 1990–1994.

A project control methodology was adopted, with Kapasia Thana forming the target area and Sreepur Thana the control area. A benchmark survey was carried out at the start of the extension project and an impact survey near the end, to measure relative changes with and without the extension program. The impact survey showed a substantial increase in production of carp and tilapia in the 215 ponds where the technology was adopted. It also indicated a return on investment (ratio of net income to total cost) for disease free carp polyculture of 500%.

The project successfully extended low cost fish culture technology. However, the true test of such a program is the sustainability of increases in production and incomes when there are no project interventions and no intensive extension efforts. This study will assess the long-term sustainability of the technologies introduced and the extension approach adopted three years after the intensive extension effort ended. Whole farm models including aquaculture will be refined and the impacts of the previous project compared with other ongoing programs to promote and support pond fish culture. This will help to guide future fish culture extension programs in Bangladesh.

### Scores Against Principles

Sustainability	H	Participation	M
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	M

### 1998 Results

The sample design and participants' experience were reviewed through six focus group discussions with previous contact farmers.

Interviews with 200 fish farmers in the original project area of Kapasia and control area of Sreepur were completed and the data are being analyzed.

Pond operation, farm systems and fish consumption are being monitored in 69 households that took up aquaculture during the earlier project and have continued cultivating fish with stocking in 1998.

Limited sample surveys in the Mymensingh Aquaculture Project have been designed following field visits and consultations with the staff of that project, and studies of demonstration pond impacts under the Thana Extension Project are being designed with DOF.

### Expected Outputs in 1999

Completion of all surveys and monitoring, including comparative studies in Mymensingh, north-west region and of DOF demonstrations.

Analysis of all surveys, including comparative assessment with findings of the earlier ICLARM project.

Report on surveys in Kapasia area.

A national workshop to present findings and discuss fish culture extension approaches for ponds, especially those of the rural poor.

## POLICY ANALYSIS OF THE CONTRIBUTION OF FISHERIES TO FOOD SECURITY

### Project 7.9

Database for the Assessment of Developing Country Fisheries

### ICLARM Staff

Dr. Mahfuzuddin Ahmed (Project Leader); Ms. Rowena Andrea V. Santos; Ms. Mylene Lorica; Ms. Emily Christi Cabegin; Mr. Maximin Luna

### Collaborating Institutions

*International/Regional:* Food and Agriculture Organization of the United Nations (FAO); INFOFISH;

Network of Aquaculture Centres in Asia-Pacific (NACA)

*Others:* to be identified

**Donor** : ICLARM core funds

**Duration** : 1997 - 2000

### Objectives

#### GENERAL

- Establish and maintain a database for policy analysis, analyses of technological developments, market movements and institutional changes in developing country fisheries.

#### SPECIFIC

- Develop and adapt databases for impact assessment and research priority setting.
- Create, maintain and update a secondary database combining biophysical and socioeconomic information on world fisheries with special reference to developing country fisheries.
- Make projections of and forecast trends in the sector to formulate research and development priorities.

### Background and Justification

Impact assessment and policy analysis will require a wide range of historical and comparative data. Data are needed for assessment of developing country fisheries to guide policy measures, technological development and institutional changes.

### Scores Against Principles

Sustainability	H	Participation	L
Equity	L	Systems Approach	H
Gender	L	Anticipatory Research	H

### 1998 Results

A project proposal entitled "Assessment and Monitoring of Supply and Demand for Fish and Seafood Products in Asia" was submitted to ADB in May 1998.

Compilation of fishery statistics data from FAO's *State of the world fisheries and aquaculture, review of world aquaculture, fishery statistics (landings and commodities)* and other related literature and the generation of technical information for a strategic planning document.

### Expected Outputs in 1999

Create a secondary database for data storage and analysis.

Continue compilation of fishery statistics data from existing literature.

Collaborate with IFPRI, FAO and INFOFISH on the development of joint proposals to integrate fish into the World Food Models.

Finalize project proposal on the Assessment and Monitoring of Supply and Demand for Fish and Seafood Products in Asia.

### Project 7.10

Assessment of the Contribution of Aquatic Resources in the Mekong River Basin to Food and Nutritional Security of the Fishing and Farming Population

### ICLARM Staff

Dr. Mahfuzuddin Ahmed (Project Leader); Ms. Gloria Magnayon-Umali; Ms. Rowena Andrea V. Santos

### Collaborating Institutions

*International/Regional:* International Institute of Rural Reconstruction (IIRR)

*USA:* Institute for Development Anthropology (IDA)

*Vietnam:* Cantho University (CTU)

**Donor** : Oxfam America

**Duration** : May 1998 - October 1999

### Objectives

#### GENERAL

- Provide baseline data on the current state of fisheries resources and their role in household food security for assessing and monitoring effects of local, national and transnational intervention on fisheries in the Mekong Basin and the consequent impact on people/communities that are dependent on these resources.

#### SPECIFIC

- Assess the value of aquatic resources in ecological, social and economic terms.
- Provide extensive and in-depth baseline information on the contribution of aquatic resources to food security and livelihood of the farming and fishing population.
- Estimate household benefits and consumption patterns of fish and other aquatic resources.

- Build national and regional capacity to assess and monitor the economic, social and ecological value of resources through on-the-job training.

### Background and Justification

As the largest freshwater source in the region, the Mekong river provides food, water and economic sustenance to more than 50 million people. Infrastructure development and planning has emphasized the construction projects without assessment of their impact on livelihoods, community life and the environment. For example, the Mekong Basin Development Plan Insight Workshop in April 1996, focused on the technical aspects of plans with little consideration of the social and environmental impacts. There is evidence of the deleterious impact of development on fish production and farming.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	M	Systems Approach	H
Gender	H	Anticipatory Research	H

### 1998 Results

The Letter of Agreement among CTU, IIRR, IDA and ICLARM was signed on 20 May 1998.

Initial collaborative meeting was held in May 1998 at CTU. The workplan and activities of the project were discussed. The project sites identified were Loi Du B, Can Tho, representing the irrigated ricefield and Binh An Thanh Loi, An Giang province, representing the flooded area.

An in-house training conducted by ICLARM staff on Agroecosystem Mapping and Analysis was held in July 1998 at CTU. Application of the methodologies for Agroecosystem Mapping was done in the two project sites. Key informant interviews were conducted for institutional and management systems, and marketing attributes survey.

Pretesting of household questionnaires was done in September 1998. Household surveys were conducted in Loi Du B in November 1998 and in Binh An Thanh Loi in December 1998.

### Expected Outputs in 1999

Completion of data gathering and monitoring.  
Completion of data processing and database management.

Training and workshop on research methods and field data gathering and analysis.

Report preparation and recommendations.

## SYSTEM-WIDE INITIATIVES

### Project 7.11

#### CGIAR System-wide Initiative on Property Rights and Collective Action

#### ICLARM Staff

Dr. Mahfuzuddin Ahmed; Ms. Brenda M. Katon; Ms. Anjanette Trinidad-Juan; Mr. Emmanuel Genio

#### Collaborating Institutions

*International/Regional:* International Food Policy Research Institute (IFPRI)

*Germany:* German Foundation for International Development/Food and Agriculture Development Centre (DSE/ZEL)

**Donor** : DSE/ZEL

**Duration** : October 1998 - July 1999

#### Objective

- Liaise with IFPRI, DSE/ZEL and other participating groups on planning and hosting an international policy conference on collective action, property rights and devolution.

#### Background and Justification

Property rights and collective action play an important role in how people use natural resources, which in turn shapes the outcomes of production systems. This system-wide initiative examines the formation and effectiveness of community-based organizations and the performance of institutions involved in natural resource management. The overall goal of this initiative is to contribute to policies and practices that alleviate rural poverty by analyzing and disseminating knowledge on the ways that property rights and collective action institutions influence the efficiency, equity and sustainability of natural resource use.

The issues of property rights and collective action are of special concern to the CGIAR because of their effect on technology adoption, natural resource

management and poverty alleviation. To address these complex issues requires an interdisciplinary approach, with insights and methodologies from a range of social as well as technical scientists. Through collaboration among CGIAR centers, national research institutions and NGO, the system-wide initiative is able to achieve the necessary complement of researchers to examine the environmental impact of institutional change.

As part of the activities of the system-wide initiative in 1999, a five-day International Policy Conference on Property Rights, Collective Action and Devolution of Natural Resources Management will be held in the Philippines from 21 to 25 June 1999. The conference has four guiding objectives: i) identify the factors that facilitate collective action for resource management; ii) discuss issues and problems that have emerged in the course of implementing devolution policies; iii) pinpoint priorities for further research; and iv) draw up policy recommendations that will hasten effective, sustainable and equitable devolution of natural resource man-

agement. The conference will bring together 40-50 policymakers, practitioners and research collaborators from various countries to actively share and exchange insights on these important areas.

**Scores Against Principles**

Sustainability	H	Participation	H
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	H

**1998 Results**

Initial meeting and planning the Policy Conference.

Formulation of draft conceptual framework.

Circulation and review of draft MOU among ICLARM, IFPRI and DSE/ZEL.

**Expected Outputs in 1999**

Hosting and management of the conference.

Press releases and public awareness activities on the conference.

## 8. INFORMATION AND TRAINING PROGRAM (ITP)

### Project 8.1 Program Office

#### ICLARM Staff

Ms. Joanna Kane-Potaka (Program Leader); Ms. Riza Castañeda

**Donor** : ICLARM core funds

**Duration** : Continuous

#### Objectives

- Actively initiate and participate in the dissemination of ICLARM's research outputs, through the use of the skills of the program.
- Initiate the marketing of ICLARM as a corporate entity with a clearly defined mission.
- Develop the structure and skills within ITP and, where relevant, within ICLARM, to achieve these objectives.
- Overall management responsibility for the Units and activities under the Program: Publications Unit (PU); Library and Information Services Unit (LISU); Public Awareness Unit (PAU); and Training Unit (TU).

#### Background and Justification

Dissemination of research results and the marketing of ICLARM is critical for its continued existence and success in its mission. The increased demand by donors for identification and assessment of the impact of its research further emphasizes this requirement.

#### Scores Against Principles

Sustainability	n/a	Participation	H
Equity	H	Systems Approach	n/a
Gender	n/a	Anticipatory Research	H

#### 1998 Results

Annual update of ITP plan prepared and presented.

Achievements are listed under the individual units. Additional outputs of the overall program are:

Development of ITP staff's skills and involvement in broader ITP activities and in adopting a team-

style of operations. Numerous meetings, discussions, joint work and teambuilding workshop were conducted. Continued direction and input on the implementation of project management in publications.

Provided advice on the development of dissemination strategies as part of the proposal preparation stage.

Funding for a concept note on information dissemination was actively sought. The concept was further developed as a result and follow-up made.

Contributed to Center activities through provision of advice and suggestions; panel member on internal committees; presentations and reports to numerous visitors and others, e.g., Review Team on behalf of the program; and involvement in the Mid-term meeting.

Directed and assisted the strategizing for promoting ICLARM publications. Initiatives were acted on by the program and some further ideas put in place.

Director/associate editor for *Newsplash*, *Naga*, *the ICLARM Quarterly*, *Annual Report*, *Operational Plan* and numerous brochures and flyers.

Initial direction for reviewing the implementation of electronic (CD) publishing.

Direction for development and updating of ICLARM's distribution database.

Managed ITP budgets, giving feedback and suggestions.

Minor restructuring proposed within ITP for library position to be converted into a technical specialist position. This is a strategic approach to make significant developments in the future to capitalize on technology developments in better reaching out to potential beneficiaries.

Direction and monitoring of ICLARM's homepage.

### Expected Outputs in 1999

Major review and update of the Program Plan.

Further develop capitalization of technology in fulfilling ITP goals.

Continued search of and lobbying for funding for information and training activities.

Continue management and direction for ITP units.

Continue center-level and system-wide involvement.

### Project 8.2

#### Publications Unit (PU)

#### ICLARM Staff

Ms. Marie Sol Sadorra-Colocado (Manager); Ms. Rita Kapadia; Ms. Sheila Siar; Ms. Ma. Graciela Balleras; Ms. Alma Canuto; Mr. Rodel Resurreccion; Mr. Miguel Migallos; Mr. Albert Contemprate; Mr. Alan Siegrid Esquillon

#### Collaborating Institutions

Various external authors contributing manuscripts; a few authors on commission; external reviewers

**Donor** : Mainly ICLARM core funds

**Duration** : Continuous

#### Objectives

##### GENERAL

- Publish effectively and disseminate efficiently information on ICLARM research and related matters.

##### SPECIFIC FOR 1998-99

- Restructure the unit.
- Clear backlog of publications.
- Introduce team-style management.
- Streamline procedures.
- Upgrade computer system.
- Reduce time taken to produce a publication.
- Coordinate translations.
- Release *Naga, the ICLARM Quarterly* on time.

#### Background and Justification

The main tool for documenting and disseminating ICLARM's research and development activities are

its publications. These take several forms, including *Naga, the ICLARM Quarterly*, Technical Reports, Conference Proceedings, Software Manuals, Education Series, Bibliographies, Studies and Reviews, Training Manuals, brochures and flyers. This is to ensure that ICLARM's work reaches the donors, scientific community, fisheries managers, extension workers and, most importantly, the intended beneficiaries and user groups.

#### Scores Against Principles

Sustainability	n/a	Participation	H
Equity	H	Systems Approach	n/a
Gender	n/a	Anticipatory Research	n/a

#### 1998 Results

##### UNIT MANAGEMENT AND OPERATIONS

*Management:* Training of staff in team-style responsibilities and accountabilities was undertaken. Roles and functions of staff for each team were clearly delineated with an emphasis on communication, efficiency and timely outputs. This was further developed through regular meetings run by different staff members.

*Workflow Charts:* were developed for the various jobs in the Unit, including the *Naga*, technical publications, PA activities and distribution. It is the first time such workflow charts have been developed. They are currently being refined.

*Procedures, Feedbacks and Comments:* on the many publication projects were documented for reference and guidance in the future.

*Work Approval Forms:* for the services provided by PU were developed and are currently being implemented. The information on the forms is used for the prioritization and conceptualization (as needed) of the job request, and for keeping track of the timing and workflow.

*Facilitate the Clearance Process:* a list of publications requiring the DC's approval and the expected dates to be given to her is prepared every two months.

*Technology Upgrading:* Over the years, the Unit has been experiencing many problems with its computer system. These seriously affected the operations, resulting in production delays, redoing pieces of work and working overtime to catch up.

In early 1998, the CSU was requested to make a diagnostic study of the problems and the hardware and software requirements of ITP. This study was completed in August 1998 and made recommendations on the upgrading required. However, no budget was available. PU used the savings that it had generated in its printing and mailing budget to purchase equipment and software amounting to US\$25,000. Most of the new hardware was installed in December.

*The Impacts:* of all the above project management and computer improvement activities were reflected in that:

- the average production period in processing a publication was shortened by at least three months; continuous improvements were made in the production and clearance process; and the number of layout versions and blueprints was reduced
- the publication of *Naga* was brought back on track with the release of the January-March 1999 issue on 24 December 1998
- more open communication among staff, with the regular meetings providing a venue for this
- evidence-based forecasting of workload and setting of realistic timetables and deadline
- proactive involvement of PU staff with scientists and research staff
- enhanced cooperation between the unit and the Center's programs and projects in facilitating publications – from conceptualizing of the publication or activity to distribution of the finished products.

These improvements were made along with the restructuring, new hiring, reorientation of new appointees and the added functions of the Unit such as coordination of translation activities and preparation of public awareness materials for many exhibits and events during the year.

*An Audit Program for PU:* was undertaken from August to September 1998 by an outside firm. The audit aimed to: i) assess the operational efficiency of publication activities, including pricing, procurement, printing contracts, publication rounds, storage, editing and other in-house activities; ii) assess the operational efficiency of the distribution of publications, mailing and cost recovery of publication activities; and iii) identify opportunities for improving the operational aspect of publication activities. The report of the audit has been received and feedback to it has been sent by PU.

## PUBLICATIONS

*Forty-four (44) Publications were Completed:* compared to 31 in 1997 and 34 in 1996. These include:

- ICLARM 1998 Operational Plan
- ICLARM Annual Report 1997
- six issues of *Naga, the ICLARM Quarterly*, one of which was a special, double issue
- 13 issues of *ICLARM Newsplash*, including a special Centennial issue
- two Technical Reports (TR 54 and 55)
- three Conference Proceedings (CP 55, 56 and 57)
- one CD-ROM user's manual/guide (ReefBase vers. 3.0)
- six brochures and a folder (new ICLARM brochure with folder, FishBase [French and English], Ecopath with Ecosim, ReefBase and TrawlBase)
- seven flyers (on ReefBase 3.0, TR 54, TR 55, CP 55 and CP 57, "New and recent publications from ICLARM" and "You are invited to publish in the *Naga*")
- three booklets (Research Highlights - taken from ICLARM Annual Report 1997; available in English, French and Arabic versions).

*Development of the Naga:* Timely release of the *Naga* was achieved through close collaboration between section editors and PU staff. A campaign on publishing and advertising in the *Naga* was initiated.

## CONTRIBUTION SERIES

*Sixty-three Contributions were Edited:* (technical and/or copyedited) and cleared for submission to international and regional refereed journals, internal and external publications (such as conference proceedings, technical reports, studies and reviews, magazines and newsletters, web pages) and for presentation at various conferences and workshops.

## DISTRIBUTION AND PROMOTION

*34,464 Copies of ICLARM Publications Distributed:* This figure includes sales, library exchange and free list, the *Naga*, and technical and nontechnical series. *Naga* recipients now total about 5,100 per issue (with an increase of 170 from 1997). Income from publication sales from mail and internet orders and walk-in buyers totaled US\$9,033.

*Distribution and Cost:* The Unit researched and started using TNT Mailfast in mailing *Naga* and other publications in bulk. This new mode resulted in shorter transit time (only 1.75 months compared

with 3–6 months via Philippine surface mail); is cost-efficient (some US\$500 saved in every *Naga* mailing); and less labor intensive (sticking on of postage stamps is done by TNT). More discounts are being negotiated.

*Inventory and Sorting of Publications:* in the warehouse were made. Many copies of old publications were packed and sent as donations to libraries in the Philippines and in Africa. Several new shelves were purchased for keeping the books, wrapped in plastic instead of paper for easy locating.

*An Improved Way of Announcing New Releases/Publications:* was introduced. A brief description on the release and an image of its cover are electronically sent to all ICLARM staff at HQ and other sites. Flyers on or photocopies of covers of the new releases are also displayed on the bulletin boards at HQ.

*Promotion of New Publications:* was invigorated through attractive flyers. Programs and projects were strongly encouraged to budget for and produce these. They are distributed with *Naga* (selected recipients) and in relevant conferences and workshops. In 1998, four publications were accompanied with flyers.

*ICLARM Publications Promoted:* at six local and seven international conferences/exhibits. These included: March – Workshop on New Directions for Integrated Coastal Zone Management and Board of Trustees Meeting; May – Albassa, Cebu, Bookfair and CGIAR Mid-term Meeting; June – ICLARM Strategic Planning and Priority Setting Workshop and Philippine Women's Centennial Day; August – Japan International Cooperation Day; September – Philippine Bookfair '98 and ICLARM External Panel Management Review; October – International Centers' Week; November – ReefBase Launching in Australia; Fifth Asian Fisheries Forum; and Second Ghana International Bookfair.

Around 1,700 responses were received for the *Naga* survey on readership and subscriber profile. The results of the survey will be compiled, analyzed and published in the *Naga* and *Newsplash*.

#### HOME PAGE, TRANSLATION AND OTHER ACTIVITIES

*Updating of Sections of the ICLARM Homepage:* was regularized with a rate of two to three uploadings per month. New sections/homepages

have been added, e.g., the Serial Holdings List (a guide to the serial resources of LISU), Selected New Acquisitions (a list of new titles added to LISU each month), the ADB-RETA 5766 Project and the Asian Fisheries Society homepage. The homepage is also being used more to promote new publications.

*The Translation Projects Coordinated by the Unit were:* the French version of the FishBase brochure; the French and Arabic versions of the introduction sections of the ICLARM Annual Report 1996; and of the Research Highlights section of the ICLARM Annual Report 1997. Translations of inquiries and reply letters were made through free translation services on the internet. A pool of commissioned translators is being developed.

*Electronic Publishing:* is being studied as an additional method of publishing and information dissemination. Some publications have been put on hold due to lack of funds for production, printing and distribution. The Unit is studying the possibilities of electronic publishing and funding for it.

*Powerpoint Presentations were Prepared:* for internal and external presentations of various Center staff in addition to posters, overhead transparencies, slides and folders. Business cards, conference/workshop invitations, certificates and handouts were also prepared. Photography, videography and other audiovisual requirements were handled.

#### TRAINING

The Unit provided practicum training in graphical design and layout, and database handling to two students from the German School Manila.

The Assistant Editor and the Publications Assistant attended the annual meeting of the Book Development Association of the Philippines (BDAP). The editors and artists visited the office of Scanatronics, a commercial company specializing in color separation, to familiarize themselves with the process.

#### Expected Outputs in 1999

##### UNIT MANAGEMENT AND OPERATIONS

*Management:* Team-style management will be further refined through internal training and regular Unit meetings. The workflow charts will be cleared and finalized, and posted for immediate reference of the staff. Use of the work approval forms will be implemented more strictly to better monitor types and volume of requests received.

The results of the project management activities will be further analyzed, updated and improved for better results.

Some of the recommendations of the PU audit program will be implemented.

With the installation of the new computer hardware and software, it is expected that efficiency will be greatly increased.

*Publications and Other Services:* The Unit will produce the following publications:

- ICLARM 1999 Operational Plan
- ICLARM Annual Report 1998
- four issues of *Naga, the ICLARM Quarterly*
- 12 issues of *ICLARM Newsplash*
- one Studies and Reviews
- one CD-ROM user's manual
- three Conference Proceedings
- four Technical Reports;
- several flyers on the new publications
- several project brochures
- Season's greetings card, etc.

*Naga* will be released on schedule, that is, in the early part of the first month of the issue. During the ITP teambuilding workshop held in November 1998, many suggestions in improving the already good image of *Naga* were generated. These will be tried, starting with a survey on the magazine and its readership. The campaign on "publishing and advertising in *Naga*" will be bolstered. Advertising exchanges will be studied and, when found feasible, will be carried out.

The Unit will continue to draft figures and graphics; prepare posters, slides, overheads and Powerpoint presentations; assist in encoding (although this will be kept to a minimum) and in proofing corrections to manuscripts and layouts.

*Contribution Series:* The Unit will continue to edit and clear contributions.

*Distribution and Promotion:* will continue to be made more dynamic. Flyers to promote new publications will be produced. The internet will be used more to feature publications and software, their contents and attractive covers. Sale of publications via the internet will be studied.

The two-tiered pricing system, which was introduced in mid-1997 for strategic marketing, will be imple-

mented further for old and forthcoming publications. New publications since mid-1997 have been priced using the new system. The new prices will be included in the forthcoming new publications catalogue.

The Unit's mailing list will be updated. The objectives of this project are to: i) eliminate redundancy or duplication of names of individuals, their position/affiliation, and names of institutions, etc.; ii) identify key people and institutions; iii) make the mailing list accessible to ICLARM staff (read-only); iv) design a faster and more efficient customer-entry system; and v) create a set of criteria for reviewing and updating the list.

More effective and reasonably priced mailing modes will be sought, as well as negotiating for more discounts.

The inventory of publications in the warehouse and in other stockrooms in the headquarters will be systematized. Stock inventory cards will be used and inventory forms will be developed to monitor the movement of the products. Another batch of donations of old publications will be sent to other libraries.

The Distribution Section of the Unit will continue to perform a more proactive role in promoting publications and software, locally, regionally and internationally.

*Homepage:* A plan for further improving the ICLARM homepage has been made. Some of the proposed new features of the homepage are:

- statement of purpose – to include specific objectives, target audience and information needs analysis vis-à-vis current sections of the homepage
- calendar of events – training, workshops and symposia, national and international, organized or co-organized by ICLARM
- abstracts of *Naga* articles
- order form – customized form which users can just fill out and send directly
- press releases (under Newsbits section)
- outreach sites – brief background and contact information
- photo gallery – interesting photos taken in the field, with interesting captions
- Aquafacts – information about marine life, resources, etc.
- new design – to make it more user-friendly.

To determine the effectiveness of the homepage, it is proposed to add:

- a counter to monitor the number of visitors
- a feedback section where visitors can send their comments and suggestions
- an electronic survey every third quarter of the year. The survey will run for two months, and results compiled and analyzed before the end of the fourth quarter.

*Training:* The PU is seeking budget allocation for training of the PU Manager and staff.

Plans for reviving the IRRI-IIRR-ICLARM Communication Workshop are underway after the postponement of the 1997 meeting due to time constraints. Two meetings are planned. These meetings are expected to contribute a lot to the professional development of the staff, who will share their expertise and experiences and learn from their colleagues.

ICLARM participation (through PU staff) in the meetings of the BDAP will continue.

*Translation and Other Activities:* Coordination of translation activities (for the 1998 Highlights brochures, Annual Report and other inquiry and reply letters) and of some public awareness activities (workshops, bookfairs and CGIAR events) will continue. The pool of commissioned translations will be further developed.

*Electronic Publishing:* The request for necessary hardware and software to pursue this type of publishing is underway. The progress of the EMT approval of the concept note and possible donor funding will be monitored. If approved, processing the publications that have been put on hold due to lack of funds will be timetabled.

### **Project 8.3**

Library and Information Services Unit (LISU)

#### **ICLARM Staff**

Ms. Rosalinda M. Temprosa (Manager); Ms. Norma I. Jhocson; Ms. Erlinda B. Gonzalez; Ms. Adelina P. Mendoza; Ms. Rosario T. Yabut; Mr. Reynaldo A. Damalerio

**Donor** : ICLARM core funds

**Duration** : Continuous

#### **Objective**

- Promote and effectively provide information services including, but not limited to, identifying, collecting, processing, storing, analyzing and disseminating scientific information to ICLARM management and staff and partners (including donors, researchers, collaborators and other users of the information) worldwide.

#### **Background and Justification**

In September 1978, the ICLARM Library (re-named the Ian R. Smith Memorial Library and Documentation Center in May 1990) was set up as a nucleus of information resources. It aims to help and implement the Center's goal in providing the technical and scientific information required to strengthen research on tropical aquatic resources for the benefit of developing countries.

It has grown rapidly in pace with the proliferation of literature on fisheries and aquatic resources both from the developing countries served by ICLARM and from the developed countries where much of the relevant literature is published/printed. Its growth enables the Center to provide more specialized information services.

#### **Scores Against Principles**

Sustainability	n/a	Participation	H
Equity	H	Systems Approach	n/a
Gender	n/a	Anticipatory Research	n/a

#### **1998 Results**

##### **COLLECTIONS**

The library collections include a wide variety of materials in many formats: books and monographs; reprints; theses; serials; maps; video recordings; slides; photos; CD-ROMs, software; newspaper clippings; pamphlets; microforms; posters; and other materials. As of December 1998, the collection comprised 14,569 volumes of books and monographs; 7,574 titles of reprints; 232 items of nonbook materials; 297 slides; and 4,515 photos. There were 869 currently received serial titles from a total holdings of 1,332 serials. About 1,242 (93%) titles were received as gifts or exchange items and only 90 (7%) titles were on subscription.

The acquisition of additional library materials has again been greatly affected by the centerwide budget cuts and the increasing costs of books and

serial subscriptions. As a result, the Executives, Program/Project Leaders and Unit Heads were requested to accommodate the subscription cost of the remaining journals which the Library could not afford to purchase. Forty-four titles were covered.

Addressing a need for quick and easy access to the growing slide and photo resources, a new bibliographic database called IMAGE and a slide code and classification system were developed in March. The image database is keyword searchable.

For the Retrospective Conversion Project, an additional 130 paper-based catalog records of monographs were converted into machine readable format and added to LIBRI database as they became available.

Access to the information sources available is provided through six bibliographic databases serving as catalogs and indexes to the collections. The library's databases and their total number of entries as of December 1998 are:

LIBRI	13,273
SERIE	1,332
NAGA	17,677
PRESS	778
CAD	18,250
IMAGE	147

The following were compiled from these databases:

*Twelve "New Acquisitions" Lists:* (with 669 bibliographic entries). Announcements of newly added titles and the lists are sent monthly via electronic mail to headquarters staff and outreach offices.

*A Selected List of New Acquisitions:* submitted for ICLARM's homepage every month, beginning January 1998.

*Bibliography of Recent Publications:* available at the Library printed in 4 issues of the *Naga* (1,200 entries).

A new subscription to a commercial database Fish and Fisheries Worldwide CD-ROM [network version, 2-10 simultaneous users] with data/info beginning 1971 to August 1998 was made available to headquarters staff through the LAN. ICLARM's subscription was made possible through the FishBase project. LISU was also able to acquire and offer the ARIEL Document Delivery System for users of

the Internet and an upgrade to LISU's ILL and Document Delivery Service to clients. The ICLARM ARIEL ILL System/Network operation started in November 1998.

## SERVICES

The library continued to provide information and reference services to 1,797 users, mostly university students from Metro Manila, growers, volunteers, academic/library personnel, government workers, consultants, administrators and policymakers. Of the 15,357 library materials being used, serials (45%) were most frequently used, followed by books and monographs (42%) and reprints and other types of documents (13%). The five most important/used serial titles were: *Aquaculture*, *Journal of Experimental Marine Biology and Ecology*, *Nature*, *Hydrobiologia* and *Science*. Demonstrations on the use of information databases, online searching and library orientations were provided to 469 users/visitors.

LISU continued to support the research needs of the outreach staff by ensuring that they had access to the current information available in the most efficient and convenient ways. The New Acquisitions lists were sent by electronic mail to outpost officers and outreach sites in Abbassa, Solomon Islands, Bangladesh, Caribbean/Eastern Pacific and Malati. A total of 211 titles/4,712 photocopied pages were requested from the list. During the year, 1,574 pages of table of contents from 1,087 volumes/issues of different journals and 743 titles (5,686 pages) of photocopied journal articles were sent to Abbassa, Solomon Islands, Bangladesh and Malati as part of the Serial Contents Page Service to outreach sites. LISU also facilitated the acquisition requirement for books, reprints and serial subscriptions for all the outreach sites. In August, 290 volumes of books and 39 titles/717 issues of journals were sent to ICLARM's Regional Research Center for Africa and West Asia.

Beginning January, the Serial Contents Page Service was revived at the HQ. This has resulted in a significant increase in the number of requests received and photocopies of articles delivered. A total of 904 serial contents pages of table of contents (1,306) and 622 titles (6,247) photocopied were provided to HQ staff during the year.

Under the Selective Fisheries Information Service (SFIS), 460 queries from 82 countries were responded to during the year. Three hundred forty-

eight (348) queries were answered free; 27 were charged; 14 offered on exchange; and 71 referred to others. Developing countries (71% of queries) continued to be the largest users of SFIS.

#### LINKAGES AND COOPERATION

In its fourth year of participation as an international inputting center to the Aquatic Sciences and Fisheries Information System (ASFIS), the library has contributed a total of 889 ICLARM publication citations since November 1995. Entries of all ICLARM publications to the *Aquatic Sciences and Fisheries Abstracts* (ASFA) database are fully up-to-date.

The library continued to send ICLARM press clippings to CGIAR Secretariat for inclusion in the *CGIAR Media Digest*. A total of 29 ICLARM press clippings were sent as of December.

The library continued to strengthen its ties with libraries and institutions worldwide through increased cooperation and assistance. An exchange of publications with five additional institutions - Centro Interdisciplinario de Ciencias Marinas, Mexico; Public Committee of Technogenic Safety, Russia; Center for Coastal and Marine Studies, Indonesia; Global Fishing Chimes Privated Limited, India; Pond Dynamics/Aquaculture Title XII Collaborative Research Support Program, USA - has also been established. Through the Duplicate Exchange Program of the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC), requests from 10 foreign libraries were filled in exchange for two volumes of books and 18 titles of journals.

As of December 1998, LISU has exchange agreements with libraries/institutions in 89 developing and 57 developed countries.

LISU also continued to provide a Document Delivery Service to the Regional Co-operation in Scientific Information Exchange in Western Indian Ocean Region (RECOSCIX-WIO) Project of the IOC based in Mombasa, Kenya. A total of 45 titles/342 photocopied pages of articles and five ICLARM publications were sent during the year.

In March, LISU prepared and submitted ICLARM's entry for the CGIAR listings of Major Awards to CG Scientists from External Sources for the CG Annual Report. ICLARM's input for the first version of the CGIAR Training Database for SSA was

submitted in March to the International Livestock Research Institute (ILRI), Ethiopia.

In November, LISU donated library duplicates such as 18 volumes of books, 49 titles/120 issues of journals and reprints to the SEAFDEC-AQD Library, Iloilo, Philippines.

#### INFORMATION PROJECT

Work started on a project to update and complete the ICLARM Contributions Series file. A new project titled "Usage Study of ICLARM's Subscriptions" to assess the extent of usage of serials on subscription covering five and a half years (1993 to June 1998) started in July.

During the year, LISU's project "Union Catalog of Fisheries Serial Holdings in Asia" was discontinued because of budget constraints and lack of staff due to resignation of one library assistant. LISU had to make some changes in work priorities and adjustments in its operations to devote resources to higher priority activities that are necessary to maintain services at acceptable levels.

#### TRAINING/CONSULTANCY/ ADVISORY SERVICES

LISU provided summer internships for three students from the UP College of Mass Communication, Diliman, Quezon City.

Demonstrations on the use of information databases, online search, briefings and technical advice on library and information services were provided to 469 users/visitors and to new ICLARM staff during the year.

In April, technical advice on the management of fisheries and aquatic information system was provided to two technical staff of the PCAMRD. Technical advice on library computerization for the visiting professor of Mindanao State University (MSU), Tawi-Tawi College of Technology and Oceanography was given in October.

#### WORKSHOPS, CONFERENCES AND SEMINARS CONDUCTED

LISU organized a visit to ICLARM of Elsevier Science representative who gave a demonstration on their latest product, ScienceDirect, in July. ScienceDirect is a web page database for scientific research that contains the full text of Elsevier Science journals. As a result, ICLARM was given a

free trial access to ScienceDirect from 5 August to 20 September 1998.

In November, a Timesheet Workshop was conducted by the LISU Manager for LISU staff.

### Expected Outputs in 1999

Continue to adopt and use current information systems and technology in the efficient delivery of information services and for more efficient operational activities, including:

- library holdings made accessible via the Internet;
- a monthly selected list of new acquisitions made available on ICLARM's homepage

Further promote and develop SFIS worldwide.

Continue the provision of information services to outreach sites and improve services where practical opportunities are identified.

Keep up-to-date input of ICLARM publications to ASFIS.

Continue citation tracing of ICLARM documents to find out the extent to which the Center's publications/contributions have been used by other researchers in various countries.

Continue to work on the retrospective conversion of the library's catalog records into machine readable format.

Continue cooperation and resource sharing with other fisheries and aquatic libraries worldwide.

Continue to monitor and assess the usage of and demands for ICLARM subscriptions to determine a priority listing.

## Project 8.4 Public Awareness Unit (PAU)

### ICLARM Staff

Ms. Joanna Kane-Potaka; All ITP Staff

**Donor** : Mainly ICLARM core funds

**Duration** : Continuous since 1995

### Objectives

- Coordinate PA of ICLARM at a corporate level. The priority target audience is the current and potential development assistance community.
- Encourage building of PA into scientific research projects as a component of the dissemination strategy for the research outputs.

### Background and Justification

Traditional sources of funding for ICLARM and other CGIAR Centers have tightened and become more competitive to access. The Centers need to justify their work, its impact and purpose much more clearly and emphatically for continued support. PA has a large role to play in this and, hence, can influence and support ICLARM's future existence.

Recognition of the importance of dissemination has increased with the need to show the impact of scientific research. PA is one component or dissemination tool that can be important for this purpose, but is currently underutilized. PA, therefore, needs to be built into projects and funded as an integral part of a project.

### Scores Against Principles

Sustainability	n/a	Participation	H
Equity	H	Systems Approach	n/a
Gender	n/a	Anticipatory Research	H

### 1998 Results

ICLARM conducted a wide variety of PA activities in 1998. Some of the highlights were:

*Science Display at EPCOT, Disney's Science and Technology Theme Park in USA:* The concept of integrated agriculture-aquaculture was presented with a 3D display and four 15-minute presentations every day for six weeks (totalling 320 presentations) by an ICLARM scientist. More than 27,000 people visited the display and presentation. The involvement in EPCOT was important to private donor networking, exposure and further professionalizing our experience in displays. Costs were subsidized by PARC (CGIAR's Public Awareness and Resource Committee).

*Integrated Aquaculture on Display through Europe:* ICLARM and three other CGIAR centers were chosen to feature 3D displays at International Fund

for Agricultural Development's 20<sup>th</sup> Anniversary exhibition which were translated into all major European languages and taken to a number of different locations in Europe.

*Initiated "Focus for Research" Flyer Series:* An information handout was trialed at the MTM, using the theme "Integrated Coastal Zone Management" (ICZM). This was supported by two displays using the theme — the ICLARM publications display and the Center's contribution to the CGIAR display in Brazil's public agriculture exhibition. The response to this handout led to the development of a Focus for Research flyer series for trial at the 1998 International Centers Week (ICW). Each flyer had a theme and was targeted at informing donors to encourage strategic research and unrestricted core funding. Two such flyers have been produced, one each on global climate change and ICZM.

*Video and Monograph on ICLARM's Work with Women in Bangladesh:* The CGIAR Gender Program funded a monograph to be written using ICLARM's research in Bangladesh to create a story showing that empowering women requires appropriate technology and support services and leads to an improvement in the livelihood opportunities for women and their families. For a small additional cost, ICLARM funded the writers to produce a video. These complementary products were released at ICW 1998 and have been very well received.

*Development of a PA Strategy for ICLARM Continued:* Information was researched. Two PA brainstorming workshops on 'consciously developing ICLARM's identity' were conducted with ITP staff, the BOT, and some ICLARM executives and program leaders. A donor survey was prepared and distributed.

*The Theme for 1998 PA was "Faces":* Materials, displays and presentations portrayed the people whose lives ICLARM is trying to impact. Where relevant, images of the "faces" of ICLARM's beneficiaries were used for visuals.

*Hosted International Journalists and Coordinated Interviews:* Edward Carr, Business Editor of *The Economist* and Claire Wallerstein and Adam Easton, Foreign Correspondents of *The Guardian*, visited ICLARM in Manila and were taken to ICLARM's projects in the Philippines.

*ICLARM Brochure:* Designed, written and printed a new brochure.

*Participation in the Philippine Centennial Activities with a Parade Float Promoting Women in Fisheries Science:* This was done in collaboration with the Asian Fisheries Society (AFS) and the UPV. Pictures of ICLARM women staff conducting fisheries-related activities were also displayed at the Philippine Women's University, including ICLARM scientist Belen Acosta, who was featured as one of the Filipino women achievers in fisheries for her significant contributions to tilapia research, specifically in the GIFT Project.

*Articles Submitted:* to i) *CGIAR News* titled "As you sow, so shall you reap". The article was written by ITP for ICLARM Annual Report 1997 (based on "Fishing down marine food webs" by D. Pauly, V. Christensen, J. Dalsgaard, R. Froese and F. Torres, Jr.; and ii) South Pacific Commission.

ICLARM's Research Highlights were published as a booklet in three languages.

*Aquavision Conference Presentation:* Prepared a speech for the DG to present in The Netherlands in May to the private sector on their role in assisting with development work.

*Resource Mobilization (Donor) Strategy:* Actively participated as a team member in the development of the strategy.

*Participation in Exhibitions and Bookfairs:* Internationally - MTM, Embrapa, Brazil; International Cooperation Day, Japan; Ghana Bookfair; Asian Fisheries Society Conference; and ICW. National level in the Philippines - Workshop on New Directions for ICZM; Albassa Bookfair; Women's Centennial Day; and Philippine Bookfair.

*Further Strengthening of Coordination with CGIAR's System-wide PA:* through participation in MTM displays and meetings, involvement in electronic discussions, participation in system-wide activities, submission of stories for the Future Harvest conflict studies and the CGIAR for media requests. In support of Future Harvest, logo and text are being included in all the center's current publications as well as on business cards, complimentary cards, posters, homepage and other PA materials.

### Expected Outputs in 1999

*Corporate PA Strategy:* will be developed for ICLARM.

*PA Activities and Outputs:* will continue to be created and undertaken.

*Speakers' Kit:* will be completed for ICLARM Board, management and staff.

*System-wide PA:* involvement will continue to be increased through participation in strategy development and related activities.

## Project 8.5 Training Unit (TU)

### ICLARM Staff

Ms. Joanna Kane-Potaka (Program Leader); All ITP Staff

**Donor** : ICLARM core funds

**Duration** : Continuous from 1996

### Objective

- Institutionalize training activities provided or assisted by ICLARM.

### Background and Justification

ICLARM has a long history of training activities. Most of the training is a component of individual projects as well as capacity building of visiting specialists and students. The need for a more formal and strategic approach to training was identified a few years ago and a partnerships strategy initiated in 1996. However, as a formal training strategy was still thought to be crucial for ICLARM's projects to sustain a long-term impact, the training responsibility was given to ITP in 1996. Without a budget allocation in 1997, discussions on and formulation of a draft training strategy were initiated.

### Scores Against Principles

Sustainability	n/a	Participation	H
Equity	H	Systems Approach	n/a
Gender	H	Anticipatory Research	H

### Results

A training strategy for ICLARM was drafted and presented to the Board in January 1998. A formal Training Policy was then presented to the Board in September 1998.

### Expected Outputs in 1999

The Training Policy is to be refined (incorporating comments from the Board) and finalized. Further activities will be dependent on human and financial resources.

## 9. INTERNATIONAL PARTNERSHIPS AND NETWORKS PROGRAM (IPNP)

### Project 9.1

#### International Partnerships

#### ICLARM Staff

Dr. Modadugu V. Gupta; Ms. Belen O. Acosta; Ms. Natalie Macawaris-Ele; Ms. Edna Tuico

#### Collaborating Institutions

National, regional and international research institutions

**Donor** : ICLARM core funds

**Duration** : Continuous since 1996

#### Objectives

- Strengthen existing collaborations and develop new partnerships with NARS in developing countries and with regional and international organizations, in research and related activities, through collaborative programs and networking.

#### Background

The need for strong national research systems, better utilization of scarce resources, quicker gains from strategic research and matching of complementary skills of agencies, underscores the importance of ICLARM working in partnership with national systems (government and nongovernment organizations), advanced scientific institutions, individual scientists, the private sector and farmers/fishers.

ICLARM almost invariably works with and through national programs, even where it has its own research facilities, as is the case in the Solomon Islands. In a broad sense, all its activities are serving to strengthen NARS. This means forming productive partnerships for collaborative research on aquatic resources with national research institutions, the private sector and development assistance agencies as well as undertaking related activities such as workshops, training and advisory services at the national, regional and global levels.

#### Scores Against Principles

Sustainability	M	Participation	H
Equity	H	Systems Approach	H
Gender	M	Anticipatory Research	H

#### 1998 Results

##### NARS CAPACITY BUILDING

*Genetics Training:* A three-week intensive training course on Quantitative Genetics and its Application to Aquaculture was organized in collaboration with the Norwegian Institute of Aquaculture Research (AKVAFORSK). Twenty-two scientists from 13 developing countries participated.

*Training Young Scientists from Developing Countries:* To help foster the development of young scientists from ICLARM partner countries, the Management has allocated US\$10,000 from unrestricted core funds and all Programs have been invited to submit proposals. In addition, all Programs are being encouraged to build into project proposals positions for partner scientists in the categories approved by the Board last year, i.e., Visiting Scientist, Project Scientist and Research Fellow.

*ADB-Japan Scholarship Program:* As part of ICLARM's mandate on strengthening NARS research capacity through human resources development, discussions were held with the Coordinator of the Japan Special Fund (JSF) at the ADB to request that ICLARM be included as a designated institution in the ADB-Japan Scholarship Program to facilitate ICLARM's role in training scientists pursuing their graduate studies in aquatic resources. ICLARM was advised that due to budget constraints, JSF would not be able to accede to the request at this time, but will consider it in the future.

*Academic Collaborations with Universities:* A MOA for Joint Teaching and Research Undertakings has been signed with the CLSU in the Philippines and a similar MOA with the UPV is being finalized.

##### NARS COLLABORATION

Requests for possible collaborations in research and related activities have been received from various institutions in developing and developed countries:

*India:* the National Bureau of Fish Genetics Resources, Indian Council of Agricultural Research (ICAR) proposed to include ICLARM in a project on post-production research.

*Philippines:* (1) UPV requested research collaboration in mariculture of sea cucumber and evaluation of the effects of protective management on reef fish. Presently, ICLARM is collaborating with UPV in two research areas: i) valuation of coral reefs, and ii) coastal stock assessment. The increased interest in research collaboration between the two institutions was a result of the workshop organized by ICLARM-PCAMRD in November 1996, proposing research areas for collaboration with various Philippine institutions. (2) Mindanao State University at Naawan requested training assistance in sea cucumber mariculture and research collaboration in coastal resources management.

*Venezuela:* an NGO in Venezuela sought closer relations with ICLARM especially for obtaining technical advice on integrated fish farming.

*Germany:* the Institute of Freshwater Ecology and Inland Fisheries requested developing a joint proposal on the characterization of wild and cultured common carp in Asia and Europe for submission to German donors.

*USA:* scientists from the University of Arizona and Purdue University have indicated interest in working with ICLARM on the feasibility of using salt tolerant crops as biofilters to remove nutrients from saline aquaculture effluents, and in aquaculture genetics.

*Ukraine:* scientists from the Institute of Hydrobiology have indicated interest in collaborating with ICLARM in genetics research.

*Africa:* contacts have been made with the President of the African Fisheries Society.

#### REGIONAL COLLABORATION

Meetings were held with the following regional institutions leading to identification of areas for research collaboration.

The SEAFDEC-AQD requested the collaboration of ICLARM in organizing regional workshops on Mangrove Friendly Aquaculture and Towards Sus-

tainable and Responsible Aquaculture Development in Southeast Asia in 1999. The proposed workshops will discuss regulatory concerns, ecological limits and environmental considerations for sustainable aquaculture development and come up with action plans to be implemented by SEAFDEC member countries. In this connection, discussions, held with SEAFDEC-AQD, indicated ICLARM's interest in these workshops as a part of the Coastal Zone Resource Management Research thrust.

The Asia-Pacific Association of Agricultural Research Institutes (APAARI) and ICLARM, with funding support from AusAID and ACIAR, organized a meeting in Korea in October 1998. It was attended by fisheries/aquatic resources managers from 13 countries (Australia, China, India, Indonesia, Korea, Malaysia, Nepal, New Zealand, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam) and regional (SEAFDEC) and international organizations (FAO). The Group on Fisheries and Aquatic Research (GoFAR) was established under APAARI. GoFAR will take the lead in the regional coordination of efforts in identifying regional research priorities; formulating collaborative programs based on identified priorities; promoting interests in aquatic resources research; and providing means to interlink with other sectors such as agriculture, livestock and forestry. ICLARM was identified as the focal point of GoFAR in APAARI. The meeting also identified regional priorities in research and capacity building.

#### INTERNATIONAL COLLABORATION

*FAO:* A MOA has been signed with FAO- Regional Office for Asia and the Pacific (RAP), Bangkok, for the joint publication of a manual on integrated farming systems.

*Strategy for International Fisheries and Aquatic Research (SIFAR):* Discussions were held with Dr. Tim Bostock, Deputy Executive Secretary, who expressed keen interest in collaborating with ICLARM. It was agreed to formulate a joint proposal to organize a Southern Africa Coastal Resources Management Research Network that could be subsequently expanded to cover the rest of Africa. This is in response to requests received from African social science researchers. A proposal to donors will be jointly developed by SIFAR and ICLARM. A draft MOU to establish formal linkage between the two institutions for collaboration was developed and sent to SIFAR for review.

*Winrock International:* Discussions for collaboration were held with Dr. Avtar Kaul, Director for Forestry and Natural Resources Division of Winrock International. Winrock International is a private, nonprofit organization funded by grants, contracts and contributions from the public and private sector. The Institute is recognized as a private voluntary organization by USAID. It was agreed that ICLARM would collaborate with Winrock in areas of its work programs.

#### ICLARM PARTNER DATABASE:

An information database on current ICLARM research partners was developed and is now available through the network server at ICLARM HQ. The database includes information on partner institutions and individuals involved in ICLARM's research projects.

#### **Expected Outputs in 1999**

Joint publication of manual on integrated farming systems with FAO.

Annual meeting of APAARI/GoFAR.

Continue strengthening/developing research partnerships with institutions in Asia and Africa.

## **INTERNATIONAL RESEARCH NETWORKS**

### **Project 9.2**

International Network on Genetics in Aquaculture (INGA)

#### **ICLARM Staff**

Dr. Modadugu V. Gupta; Ms. Belen O. Acosta

#### **Collaborating Institutions**

*Bangladesh:* Bangladesh Fisheries Research Institute (FRI)

*China:* Shanghai Fisheries University

*Côte d'Ivoire:* Centre National de Recherche Agronomique (CNRA)

*Egypt:* Central Laboratory for Aquaculture Research (CLAR)

*Fiji:* Ministry of Agriculture, Fisheries and Forestry

*Ghana:* Water Research Institute

*India:* Central Institute of Freshwater Aquaculture (CIFA)

*Indonesia:* Research Institute for Freshwater Fisheries (RIFF)

*Malawi:* University of Malawi

*Malaysia:* Universiti Malaya

*Philippines:* Bureau of Fisheries and Aquatic Resources (BFAR)

*Thailand:* National Aquaculture Genetics Research Institute (NAGRI)

*Vietnam:* Research Institute for Aquaculture (RIA)  
No. 1

**Donors** : Government of Norway; ICLARM core funds; IDRC

**Duration** : Continuous since August 1993

#### **Objectives**

- Contribute to the domestication and sustainable performance of tropical finfish species farmed in developing countries.
- Demonstrate the potential for increasing production through application of genetics and selective breeding.
- Evaluate culture performance of promising lines of tilapias and carps.
- Develop national capabilities through training, exchange of germplasm and methodologies.
- Provide a forum for exchange of information, methods and germplasm.
- Strive for conservation of biodiversity.

#### **Background**

The aquaculture sector, which is expected to contribute significantly to world food production, has made only modest gains from genetic research, particularly in tropical developing countries. Recent studies in Norway and the Philippines have clearly demonstrated the potential for achieving substantial gains in aquaculture production through application of genetics and breeding.

Networking is a well tested and proven mechanism to foster international cooperation in seeking solutions to problems of common interests that cut across political boundaries. The inherent advantages of the networks are that they accelerate exchange of information, experience, methods and materials; boost research efficiency; reduce research costs; and combat scientific isolation. This approach has been chosen for genetic improvement of freshwater cultured fish, targeted to the aquaculture systems in developing countries.

## Strategies

- Exchange of methodologies and materials.
- Research planning meetings and workshops.
- Formulation and implementation of collaborative research projects.
- Training.
- Joint site visits.
- Information dissemination.
- Involvement of national systems in planning and governance.

## Scores Against Principles

Sustainability	M	Participation	H
Equity	H	Systems Approach	M
Gender	n/a	Anticipatory Research	H

## 1998 Results

*Collaborative Regional Research:* The initial phase of the collaborative research on conservation of fish genetic resources and increasing fish production through genetic enhancement of local tilapia strains is in progress through the IDRC-funded project Collaborative Research and Training for Documentation and Characterization of Tilapia Genetic Resources for Aquaculture in Africa. Côte d'Ivoire, Egypt, Ghana and Malati are participating in this project. In Egypt, wild population of Nile tilapia were collected from the Ismailia Canal, Manzola Lake and Lake Nasser, in addition to the domesticated strain from Maryout. These strains have been bred, and studies are in progress to assess the performance of different strains under low temperatures. In Ghana, Nile tilapia stocks from three major ecological zones in the Volta System were collected, bred and the progeny tested for growth performance. Studies are in progress. In Malati, *O. shiranus* and *T. rendalli* were collected from four lakes and three rivers, and the progeny is being evaluated for growth performance. The agricultural research system in Côte d'Ivoire is being reorganized and the progress is slow.

*INGA Membership Expanded:* For synergy in research being undertaken in aquaculture genetics by member countries of INGA, invitations were extended to advanced scientific institutions to join INGA. The following 11 institutions joined the Network as Associate Members:

- AKVAFORSK (Norway)
- Auburn University (USA)
- FAO (Rome)
- Fish Culture Research Institute (Hungary)
- Queensland University of Technology (Australia)

- National Research Institute of Aquaculture (Japan)
- SEAFDEC/AQD
- UWS (UK)
- Wageningen Agricultural University (Netherlands)
- Agricultural Research Organization (Israel)
- University of Stirling (UK)

*National Systems:* As part of the agenda for better coordination among national institutions in genetics research, two national networks have been formally institutionalized during the year - the Malaysian Fish Genetics Network (February 1998) and the Philippine National Genetics Network (March 1998). These are in addition to the national networks formed earlier in India, Indonesia and Malati.

*National Workshop:* In collaboration with the University of Malaya, a National Genetics Workshop was organized in February 1998 which was attended by national fish geneticists and fish breeders/producers from public and private institutions.

In collaboration with BFAR and FAC/CLSU, a national workshop was organized in March to review progress in the Philippines and identify priorities for genetics research. The workshop was attended by 39 participants from various national and regional institutions and ICLARM.

*Germplasm Exchange:* At the request of the Government of Thailand, 2,000 fingerlings of the 7<sup>th</sup> generation genetically improved farmed tilapia (GIFT) from the Gift Foundation International, Inc. (GFII) were sent to initiate the national breeding program in Thailand. GFII also sent 3,000 GIFT fingerlings of the 7<sup>th</sup> generation to the CIFA, Bhubaneswar, India.

A total of 2,000 fingerlings each of Nile tilapia (*Oreochromis niloticus*) and blue tilapia (*O. aureus*) were shipped to Shanghai Fisheries University, Shanghai, China, by the CLAR, Abbassa, Egypt, in August.

About 1,000 fingerlings of generation 1 improved rohu (*Labeo rohita*) strain from CIFA, India, were transported to the NAGRI, Thailand, in September.

Fingerlings of improved common carp were transported from the Research Institute of Aquaculture No. 1, Hanoi, Vietnam, to the University of Agricultural Sciences, Bangladesh.

*Study Tours:* In response to the training needs of scientists from INGA member countries in Africa, the INGA Secretariat organized a two-week study tour of three senior scientists from Côte d'Ivoire, Egypt and Malawi to Thailand and India in July to familiarize them with the progress in aquaculture and aquaculture genetics research in the two countries. The study tour was part of the activities of the INGA coordinated regional collaborative project on Characterization and Documentation of Tilapia Genetic Resources in Africa, funded by the IDRC of Canada.

A scientist from FAC/CLSU undertook study tour to Thailand to familiarize himself with genetics research being undertaken at NAGRI.

*Information Dissemination:* Four issues of *INGA News* were published in *Naga*, the *ICLARM Quarterly* featuring genetics research profile of the member countries and news items related to the network.

A database has been designed for the directory of aquaculture geneticists that includes information on their fields of interest, geographic areas of study and list of publications.

### **Expected Outputs in 1999**

Further exchange of genetic materials.

Organization of the Fifth Steering Committee meeting on 3-5 March 1999 in Kuala Lumpur, Malaysia.

Development of INGA web page on the Internet.

Development of national breeding programs.

Continuation of regional research project in Côte d'Ivoire, Egypt, Ghana and Malawi.

Publication of the *Directory of Aquaculture Geneticists in INGA member countries*.

### **Project 9.3**

Asian Fisheries Social Science Research Network (AFSSRN)

#### **ICLARM Staff**

Dr. K. Kuperan Viswanathan; Ms. Anjanette Trinidad-Juan

### **Collaborating Institutions**

*International/Regional:* Economics Section, Research Division, Southeast Asian Fisheries Development Center-Aquaculture Department (SEAFDEC-AQD)

*Indonesia:* Central Research Institute for Fisheries (CRIFI); Faculty of Economics, Universitas Diponegoro (UNDIP); Research Institute for Marine Fisheries (RMF)

*Malaysia:* Faculty of Economics and Administration, Universiti Malaya; Natural Resource Economics Department, Universiti Pertanian Malaysia (UPM)

*Philippines:* Bureau of Fisheries and Aquatic Resources (BFAR); Department of Agricultural Economics, College of Economics and Management, University of the Philippines at Los Baños (UPLB); Faculty of Arts and Sciences, University of the Philippines in the Visayas (UPV); Freshwater Aquaculture Center/Central Luzon State University (FAC/CLSU)

*Thailand:* Coastal Resources Institute, Prince of Songkla University; Department of Agricultural and Resource Economics, Faculty of Economics and Business Administration, Kasetsart University (KU); Fisheries Economics Research Subdivision, Department of Fisheries (DOF)

*Vietnam:* Cantho University (CTU); Ministry of Fisheries

**Donors** : Asian Fisheries Society; ICLARM core funds

**Duration** : Continuous

### **Objectives**

- Promote effective interaction and cooperation among scientists involved in socioeconomic research on the fisheries sector.
- Promote investigation and advance knowledge of socioeconomic aspects of fisheries.
- Focus attention on socioeconomic problems by disseminating information on all aspects of living aquatic resources management.
- Disseminate social sciences research methodologies and results in the region.

### **Background and Justification**

The AFSSRN was established in 1983 to address the need to enhance research capabilities in socio-economic research relating to capture fisheries, coastal resources management and aquaculture in Asia. The aims are even more relevant today due to the increasing recognition of social and political factors in achieving sustainable aquatic resources development. The AFSSRN is currently composed

of 15 research teams, totaling more than 80 researchers at universities, research institutions and government fisheries agencies in Indonesia, Malaysia, Thailand, the Philippines and Vietnam. As the founding member institution of the AFSSRN, ICLARM has a lead role to play in its future. Under the new AFSSRN constitution, an ICLARM staff member shall serve as vice-chairman of the executive committee. ICLARM staff will continue to provide technical guidance to the AFSSRN.

### Scores Against Principles

Sustainability	H	Participation	H
Equity	M	Systems Approach	H
Gender	M	Anticipatory Research	H

### 1998 Results

An AFSSRN meeting was held in Chiang Mai, Thailand, in November. Brief reports from country representatives were presented and plans for attracting donor support for research and training activities were discussed. There was a special session of the AFSSRN on socioeconomic issues in fisheries in Asia at the Asian Fisheries Forum in Chiang Mai, Thailand, in November. The *AFSSRN News* was published in *Naga*.

### Expected Outputs in 1999

The AFSSRN executive committee will meet. A meeting of members will be held in late 1999. A regional training course will be conducted on a topic of importance to scientists in the region.

## INTERNATIONAL INFORMATION NETWORKS

### Project 9.4

Network of Tropical Aquaculture and Fisheries Professionals (NTAFP)

#### ICLARM Staff

Dr. Modadugu V. Gupta; Dr. Villy Christensen; Mr. Geronimo Silvestre; Ms. Natalie Macawaris-Ele

**Donors** : ICLARM core funds; FAO

**Duration** : Continuous

### Objectives

- Enhance communication among fisheries professionals working on the assessment, conservation and management of tropical stocks and among aquaculture scientists engaged in research in the tropics, especially in genetics, integrated agriculture-aquaculture farming systems and coastal aquaculture.
- Enhance the output by these professionals by assisting them in information and database searches, research, distributing manuals and other literature and methods, data analysis and interpretation, and by publishing some of the research findings of members in the *Fishbyte* (fisheries) and *Aquabyte* (aquaculture) sections of *Naga*, the *ICLARM Quarterly*.

### Background

After functioning as separate entities for more than a decade, the ICLARM-coordinated information networks, the Network of Tropical Fisheries Scientists (NTFS) and the Network of Tropical Aquaculture Scientists (NTAS) were merged in 1998 to form the NTAFP. The merger was designed to consolidate efforts and resources in the management of the networks by ICLARM and to expand its membership by including professionals from the private sector and NGO working in tropical aquaculture and fisheries. With the increasing involvement of the private individuals and NGO working on aquaculture and fishery development, be it for sustainable management of resources or for income-generating activities, it is recognized that professionals from these sectors can contribute significantly to information exchange among the members of the network. NTAFP will continue to fulfill the main purpose of NTAS and NTFS which is to create links among scientists and professionals working in the tropics, especially for those who work in isolation and have difficulty in accessing relevant information.

### Scores Against Principles

Sustainability	n/a	Participation	M
Equity	H	Systems Approach	n/a
Gender	H	Anticipatory Research	n/a

### 1998 Results

The networks' objectives and activities in the past decade were reviewed and a recommendation was made to combine the two networks and to extend

membership to the private sector and NGO who are also engaged in aquaculture and fisheries related activities.

Network members' re-registration and survey forms were distributed to over 2,000 members for updating records. To date, 803 responses have been received. A new database to contain all updated information on members is being developed.

Four issues of the *Aquabyte* and *Fishbyte* have been published in the *Naga, the ICLARM Quarterly* featuring 30 technical papers on aquaculture, biotechnology and fisheries stock assessment and management authored by 72 individuals from 26 countries in Asia, Australia and Oceania, the Caribbean,

Central and South America, North America, Europe, Middle East and Africa.

**Expected Outputs in 1999**

Four issues of the *Aquabyte* and *Fishbyte* sections of *Naga, the ICLARM Quarterly* with articles, news items, letters, photoessays, and thesis abstracts sent in by members.

Free computerized literature searches, supply of published materials unobtainable from reprint requests and providing communication links among research scientists.

Explore the possibility of using modern information technology to facilitate information dissemination.

## 10. CGIAR SYSTEM-WIDE ACTIVITIES

ICLARM is an active member in several CGIAR system-wide activities, including research programs and initiatives and research support activities.

### RESEARCH

#### **Project 10.1** System-wide Genetic Resources Program (SGRP)

All of the CGIAR Centers participate in this program. Most contribute through *ex situ* genebanks, germplasm distribution and research on *in situ* conservation. ICLARM has a lead role for some database activities in the SGRP's project that is enhancing access to genetic resources data held by CGIAR, through a System-wide Information Network on Genetic Resources (SINGER). In 1998, the majority of all data held by the various Centers was made available for searching through a common user interface on the SINGER CD-ROM.

#### **Project 10.2** System-wide Initiative on Property Rights and Collective Action

This initiative examines the formation and effectiveness of community-based organizations and how property rights issues affect their impact on technology adoption, natural resources management, poverty alleviation and the environment. Property rights and collective action are important determinants of how natural resources are used. ICLARM is assisting in planning and hosting an International Policy Conference on Property Rights, Collective Action and Devolution of Natural Resources Management in June 1999.

#### **Project 10.3** System-wide Initiative on Water Management

This initiative has the overall objective of enhancing the productivity of water in agriculture in an environment of growing scarcity and competition and provides an umbrella for several projects executed jointly by multidisciplinary partners.

ICLARM, through its Integrated Aquaculture-Agriculture Systems Program, collaborates with one project within this umbrella, entitled Valuing the Multiple Uses of Irrigated Areas, which is administered jointly by the International Water Management Institute and the International Food Policy Research Institute. The purpose of this project is to generate knowledge and understanding of the choices of users, and the determinants, value and consequences of multiple uses of water in irrigated areas (i.e., domestic water supply, livestock, home gardens, aquaculture and other rural enterprises, including human and environmental health issues).

### RESEARCH RELATED

#### **Project 10.4** System-wide Public Awareness Activities

The public awareness activities of the CGIAR are designed to inform the public, donors, scientists and academics about the need for and the results and impacts of the research activities that the centers undertake to enhance production and improve the management of agricultural and aquatic resources. ICLARM participates in these activities through meetings, displays, printed materials and other information dissemination activities at various international fora with other CGIAR centers.

#### **Project 10.5** Gender and Diversity Program

Following the successful gender staffing initiatives of the early 1990s, the CGIAR decided to launch a Program on Gender and Diversity in 1999. This program will provide the Centers with advice on gender and diversity in the workplace, and design training and programs to assist Centers and their staff to benefit from the opportunities of a diverse and multicultural workforce. The Program will be guided by the Gender and Diversity Program Advisory Board, reporting to the Committee of Center Directors. The Director General of ICLARM will chair the Advisory Board. The Program Leader, to be appointed in 1999, will be hosted at ICRAF in Nairobi.

## 11. CORPORATE SERVICES DIVISION (CSD)

### Project 11.1

Office of the Associate  
Director General (ADG)

#### ICLARM Staff

Mr. Edward N. Sayegh; Ms. Rachel Josue

**Donors** : ICLARM core funds

**Duration** : 1999 (12 months)

#### Background and Justification

The Corporate Services Division (CSD) provides operational and logistical support to the Center's Programs and Units. The philosophy of the Division is to provide client oriented and efficient services to donors, Board of Trustees, management and staff. It also assists the Board and management in developing appropriate policies, procedures, systems and in regular reviews of the effectiveness and efficiency of the Division's services so as to indicate areas for improvement and the adaption of these services to the constantly changing environment.

The CSD is undergoing a transformation with the main objective of improving services and better addressing client needs and requirements. The reorganization commenced in 1998 and key managerial positions are now in place. The reorganization is geared towards creating high commitment work practices to enhance organizational performance.

The CSD has used a priority setting process to analyze and prioritize the activities of the units within the Division. The objective of the priority setting framework is to focus the process on clients, service concepts, operating strategy and service delivery systems. The analytical framework is an essential tool for providing a systematic approach to the priority setting process. The method was a zero-based process, that is, prioritizing activities from a zero-base (fresh approach) regardless of past experience and history. The priority setting process requires responses to a set of precise questions and provision of analytical information on the overall organizational requirements.

The development of a service vision and service strategy was used as the launching pad for the process and to guide its direction and motivate the staff.

#### CSD SERVICE VISION

Creating and managing a client-oriented culture dedicated to developing seamless and high value service quality.

#### CSD SERVICE STRATEGY

To support CSD vision, the Division is committed to an operating strategy that is built on:

*Operational Excellence:* smoothness, speed, quality, accuracy, consistency and reliability in execution and delivery.

*Client Needs:* carefully targeted services to meet the broad range of internal and external client needs.

*Cost Consciousness:* delivery of services at costs comparable to or less than the market.

*Superior Human Resources:* strive to attract and maintain excellent human resources that share the vision, strategy and corporate values.

*Flexible Delivery Systems:* systems and processes responsive to the changing environment and rapidly adapting to constantly changing needs.

#### STRUCTURE

The CSD has been reorganized into six functions:

*Human Resources:* In consultation with clients, develop, implement and administer approved human resources systems, programs and activities designed to attract, motivate and retain efficient and effective human resources.

*Finance and Management Information:* Ensure the financial viability and stability of the Center through proper financial management and provide client oriented financial support services.

*Administrative Services and Liaison:* Provide client oriented administrative and support services, effectively and efficiently at cost equal or lower than the service providers in the open market.

*Computer Services:* Provide an environment for improved quality and efficiency of data processing and ensure the productive use of computers, applications and systems. Provide clients with speedy and easy access to information resources. Improve sharing and dissemination of information through the internet and the intranet.

*Planning and Budgeting:* Assist in the formulation, development and management of the Center budget including the establishment of databases, systems, procedures and guidelines. Assist in the development of the medium-term plans, financing plans and project proposals to donors. Provide assistance in financial and administrative services to the Board, Management, Programs and Units to reduce transaction costs.

*Financial and Administrative Systems Development:* Develop and maintain state of the art computerized and integrated financial and administrative systems to serve the institutional and client requirements effectively and efficiently. Modernize and update the computerized systems to respond to constantly changing internal and external client needs.

The Board Secretariat is managed by the ADG/CS (who is the Board Secretary) and his Personal Assistant. It has four major functions:

- maintaining Board records and files
- serving as a source of information regarding the Board to the staff of the Center and regarding the Center to the Board
- responsible for certain segments of corporate information, i.e., updating the ICLARM Constitution and maintaining Board approved policy decisions
- overseeing and coordinating the various arrangements necessary for each Board meeting.

The ADG/CS has been providing support to the Director General and the Board HQ Site Committee and playing a key role in the identification, assessment and negotiation for headquarters site locations in the Philippines and the region. The high priority process will continue in 1999.

## **Project 11.2**

### **Human Resources Unit (HRU)**

#### **ICLARM Staff**

Mr. Edward N. Sayegh; Mr. Arnt Tore Valsvik; Ms. Isabelle Ma. Ambat; Ms. Angelica Dayapan-David

**Donor** : ICLARM core funds

**Duration** : Ongoing

#### **Objectives**

- *Human Resources Information System:* Design and implement a reliable and efficient HRIS for providing management and staff with reliable, up-to-date and relevant HR information.
- *Competency-Based Human Resources Management:* Develop a concept for Competency-Based HR Management as a basis for future HR services in ICLARM.
- *Staff Performance Management Program (PMP):* Develop a PMP that yields fair and accurate assessment of performance and provides a tool for staff development.
- *IRS Classification System and Salary Structure:* Clearly describe and differentiate all IRS positions based on competencies; ensure that the IRS salary structure and pay ranges are internally equitable and externally competitive.
- *Administrative/Technical Classification System:* Clearly describe and differentiate all administrative and technical positions based on competencies.
- *Staff Training and Development:* Identify training needs within the Center and develop a set of training and development activities for a formal staff development program.

#### **Background and Justification**

In 1998, HRU underwent a comprehensive operational review and reorganization based on the priority setting process. The review resulted in minor organizational and structural changes. The Unit has been revitalized to ensure that proactive, responsive and efficient services are delivered to the clients. The reorganization is still ongoing and is focusing now on the delivery systems. Due to its small size, the unit has a flat structure focusing on the activities rather than a formal unit/section structure. The main functions of the unit are:

- planning and system design
- recruitment and selection
- development and evaluation
- compensation
- employee relations and assessment.

The Unit's staff are assigned to specific functions and activities, but each staff is expected to be able to cover all functional areas of the Unit.

## **1998 Results**

Guidelines for IRS Search Committees prepared.

A recruitment database developed and implemented.

The staff attitude survey for 1998 conducted; a new database for analysis/presentation implemented and a summary of the results prepared.

Outreach site personnel policy manuals developed/ revised for Board approval in 1999.

A new and more comprehensive Philippine nationally recruited staff (NRS) medical benefit package negotiated.

A comprehensive reference manual for NRS classification systems and salary structures prepared.

A staff award program developed and implemented.

A staff directory prepared.

New ID systems implemented.

An improving performance guide prepared.

## **Expected Outputs in 1999**

*Human Resources Information System:* Implementation of an approved system.

*Competency-Based Human Resources Management:* A concept paper describing a competency-based HR system for ICLARM has been approved by the EMT; review of the PMP, IRS classification system and salary structure, administration and technical classification system and salary structure based on the competency framework.

*Staff Performance Management Program (PMP):* A revised staff PMP.

*IRS Classification System and Salary Structure:* A revised IRS salary structure and corresponding pay ranges and IRS position classification system.

*Administrative/Technical Classification System:* A revised classification system.

*Staff Training and Development:* A training needs analysis will be conducted for ICLARM staff and a formal staff development program will be implemented.

*Other HR Related Matters:* A proposal on future structure of personnel policy manuals; staff attitude survey 1999; PMP 1998 review and merit increases; full implementation of the reorganization in line with CSD reorganization.

## **Project 11.3**

### **Finance and Management Information Unit (FMIU)**

#### **ICLARM Staff**

Mr. Edward N. Sayegh; Ms. Loriza E. Dagdag; Ms. Arlene Balane; Ms. Maruja Ventura; Ms. Grace Batario; Ms. Editha Artates; Ms. Elizabeth Jacildo; Ms. Ronabeth Icabandi; Ms. Merlie Beringuel; Mr. Napoleon Bulaquiño; Ms. Mildred Pepito; Ms. Rainelda Ampil; Mr. Samuel Adalia

**Donors** : ICLARM core funds

**Duration** : Ongoing

#### **Objectives**

- *Reorganization of FMIU:* Restructure the Unit to improve efficiency and effectiveness of procedures and make it more responsive to the needs of its clients, i.e., the donors, Board, management, research groups and staff.
- *Design and Implementation of Phase Two of Financial Management System (FMS):* Assist in the design and implementation of phase two FMS (Platinum) with emphasis on simplicity of operations, controls, full integration with phase one and the on-line accessibility of the system to users.
- *Center's Financial Position, Operating Reserves, and Liquidity Position:* Improve the Center's financial position and operating reserves.
- *Financial Management System for Regional Operations:* Design and implement a uniform financial/accounting system which is compatible with the Headquarters' accounting system.
- *Review and Audit of the Center Overhead:* Recover the fair share of the overhead costs from projects financed by restricted and special funding. Price services to maximize the utilization of general operational funds.
- *Financial Reporting Structure:* Improve the quality, accuracy and timeliness of financial reporting to internal and external clients which will have a positive impact on the Center's cash position and management of budget and resources.

## **Background and Justification**

The FMIU is primarily a support team. The Unit manages the Center's financial resources and generates financial information to enable management to make informed and timely decisions. Related functions include the maintenance of adequate operating reserves and accounting and internal control systems. It has the responsibility to safeguard and maximize the Center's assets and resources, and ensure the accuracy and reliability of financial information provided. The Unit will undergo a major restructuring in 1999 for improving its performance and responsiveness to internal and external clients.

## **1998 Results**

*Design and Implementation of Phase Two of Financial Management System (FMS):* Compiled reports and forms needed to be integrated into the system; attended user training for the Accounts Payable/Purchase Order (AP/PO) system and documented current workflow and changes to be incorporated in the design of phase two of the system.

*Center's Financial Position, Operating Reserves and Liquidity Position:* Close monitoring of cash and overall financial position; close monitoring of expenses and the effect of currency fluctuation enabled management to periodically review and revise the 1998 budget; unrestricted core acquisitions of new equipment were carefully scrutinized and the use of existing ones maximized; additional reserve for IRS repatriation was provided based on estimates and recorded in the books based on a three-year plan; and 1996 grant and half of the 1997 grant from a major donor were collected during 1998.

*Financial Management System for Regional Operations:* A PC based package was identified and used in one location. The outreach system was delayed pending the finalization of the Platinum FMS at HQ. A suitable package for outreach sites was identified to fully integrate them into the system at HQ.

*Review and Audit of the Center Overhead:* The external audit firm performing an internal audit has been reviewing overheads and the report will contain two methods of overhead recovery: i) the indirect cost method; and ii) the full cost recovery method. Management has examined the indirect cost pool for determining such costs. Those judged

to be direct costs will be included in the project proposals and current unit budgets as direct charges.

## **Expected Outputs in 1999**

*Reorganization of FMIU:* A new financial management structure to include systems, procedures and processes.

*Design and Implementation of Phase Two of Financial Management System (FMS):* Continue to assist FAST with the setting of parameters and control features for the new AP/PO system which will address institutional and client needs; document the new system, policies and procedures brought about by the new AP/PO system; and monitor the parallel run of the system, its performance and reliability.

*Center's Financial Position, Operating Reserves, and Liquidity Position:* Continue to improve on internal reporting to enable project leaders/unit heads to closely monitor their expenses against budget, specially those from unrestricted funds; improve the timeliness and accuracy of reporting to donors; improve the monitoring and collection of receivables from donors, staff and other parties; enhance cash reserves to improve the Center's financial liquidity; improve the Center's operating reserve and gradually build it up to meet the minimum requirement of the CGIAR; and improve overhead recoveries by introduction of a new rate and methodology for such recoveries.

*Financial Management System for Regional Operations:* A uniform chart of accounts will be used for HQ and outreach operations; options will be assessed on whether larger operations will perform the full independent accounting function and then consolidate with HQ accounts; implement external audit for all outreach operations.

*Review and Audit of the Center Overhead:* Finalize the internal audit report on overhead recovery addressing the two methods; implement the results of the indirect cost pool review and bundle similar costs into direct charges; and determine cost of services to be charged as direct costs rather than institutional cost, e.g., motor pool, drivers, maintenance, etc.

*Financial Reporting Structure:* In consultation with clients, produce a financial reporting structure utilizing the capabilities of Platinum and ensuring its

relevance to internal and external clients. The structure should address the quality, contents, relevance and timelines of the financial reports.

### **Project 11.4** **Administrative and Liaison Unit (ALU)**

#### **ICLARM Staff**

Mr. Edward N. Sayegh; Mr. Paulino V. Manese; Ms. Esperanza M. Sadiua; Mr. Cirilo O. Federigan, Jr.; Ms. Ma. Gemma Calderon; Ms. Belen Dagmil; Ms. Ma. Clotilde Alcantara; Mr. Benjamin M. Bayron, Mr. Norberto E. Cabrera; Mr. Pedrosino F. Catubig; Mr. Dominador V. Gomez; Mr. Hermenegildo A. Magsino; Mr. Florentino D. Paulino; Mr. Emmanuel P. San Juan; Ms. Hazel Grace V. Tardo; Ms. Remedios Ugalde; FMIU Staff; FAST Staff; Legal Counsel

**Donor** : ICLARM core funds

**Duration** : Ongoing

#### **Objectives**

- *Internal Documentation and Communication:* Improve documentation, coordination and communication with ICLARM staff and stakeholders on procedures and workflow for the delivery of administrative and liaison support services; have a readily available reference manual for ICLARM staff on administrative services.
- *Maximization of ICLARM's Privileges under the Host Country Agreement:* Ongoing.
- *Operation Enhancement:* Continue the implementation of the reorganization within CSD in general and the Administrative and Liaison Unit in particular; be more transparent and accountable in discharging its support services; be result-oriented with the delivery of services on a timely and accurate manner; continue the delivery of support services in a cost effective manner.
- *Safety and Security on ICLARM Premises:* Continue improvements.

#### **Background and Justification**

The ALU has undergone an extensive operational review and reorganization. The Unit now has three functional areas, namely: Administrative, General Operations and Liaison. The Administrative area includes mail and communication, travel, materials management (purchasing, receiving, storage and shipping), safety and security, and the centralized filing system of Administrative contracts, Center's

MOU's and MOA's. The General Operations area covers the physical plant (housekeeping/maintenance/fixed assets monitoring, warehouse and insurance) and transport (driving, maintenance and registration). The liaison function includes coordination with visitors, government offices and embassies and lawyers to insure ICLARM's visibility in the Philippines and to secure the privileges granted under the HQ agreement.

The administrative and liaison functions will be further streamlined in 1999 to ensure the efficiency and effectiveness of services. Procedures, systems and processes will be revamped and computerized to enhance operations and rationalize staff requirements.

#### **1998 Results**

*Maximization of ICLARM's Privileges Under the Host Country Agreement:* Representation made to the Department of Foreign Affairs and the Bureau of Immigration, with the assistance of our legal counsel, for the upgrading of visas of IRS and their legal dependents, from the 47-a(2) working visa to the 9-E diplomatic visa; all ICLARM vehicles now carry diplomatic (blue) plates; selected ICLARM senior staff now have access to the Ninoy Aquino International Airport (NAIA) to receive overseas visitors.

*Operation Enhancement:* A workshop was arranged with Thomas Cook Travel Agency regarding visa and documentation requirements of foreign embassies in the Philippines, and a summary document was prepared and submitted to all secretaries; an inventory of fixed assets at HQ was completed during the third quarter of 1998; a logbook system was implemented in November 1998 for better control and monitoring of mileage and trips of pool cars; an inventory of existing administrative contracts and leases was completed for easy monitoring, reference and retrieval. Timely reminders to staff can be made prior to contract/lease expiration.

*Safety and Security on ICLARM Premises:* The safety and security manual was updated and distributed to all IRS; services of a towing company that offers 24 hour service for emergency engine trouble shooting and towing have been secured; additional monitoring put in place wherein ICLARM guards check and log all staff and visitors in the premises after office hours and during weekends.

### **Expected Outputs in 1999**

*Internal Documentation and Communication:* Preparation, approval by Senior Management and implementation of a new Administrative Services Procedures Manual.

*Maximization of ICLARM's Privileges under the Host Country Agreement:* Inclusion of ICLARM's name in the yearly publication of DFA, the "Blue Book" or the consular list, and the list of international organizations; posting of ICLARM's name at the international desk of the NAIA.

*Operation Enhancement:* Creation, approval by Senior Management and implementation of a bids and awards system by a committee; implementation of the computerized PO system; more transparent, accountable and proactive administrative and liaison staff; and review, analysis and accreditation of ICLARM's various service providers.

*Safety and Security on ICLARM Premises:* A risk consultant conducted a premise site analysis at the HQ in December 1998 and recommendations will be evaluated by Senior Management and implemented; fire, earthquake and other drills for emergencies will be organized.

### **Project 11.5**

#### **Computer Services Unit (CSU)**

#### **ICLARM Staff**

Ms. Cristina Carpio; Mr. Allan Sesbreño; Mr. Romeo Oite; Mr. Paulino Manese; Mr. Cirilo Federigan, Jr.; Ms. Loriza Dagdag

#### **Other Staff**

Mr. Kenneth Kovak; Mr. Jim Estes; Mr. Steven Ross; Mr. David Lincoln; Ms. Karin Cornils; Ms. Abby Byrnes; Mr. Steve Lee; Mr. Ned Balzer; Ms. Kris Kerrigan

**Donor** : ICLARM core funds

**Duration** : Ongoing

#### **Objectives**

- *Standardization of the IT Environment:* Ensure compliance with the agreed standards and compatibility of equipment and software; have PC systems that have long-term value, i.e., systems

that will not be obsolete in a few months, and reduce the complexity and diversity of systems.

- *Migration to Exchange:* Improve usability of the Email client and its features; an improved and less expensive remote mail access; an organized and secured method of sharing documents and other information through public folders; improve productivity with applications using electronic forms.
- *Internet Support:* Enable more PCs to gain access to the internet; provide technical support in developing and maintaining internet and intranet pages; be able to leverage the internet in developing systems and applications.
- *Year 2000 Problem Support:* Develop a strategy in handling the Year 2000 (Y2K) problem and provide support regarding this problem within the Center and its outreach offices.
- *Communications Support:* Provide the facility to improve the quality and efficiency of data processing and continuously search for better ways to disseminate information.

### **Background and Justification**

CSU operates ICLARM's central computer system and its local and wide area networks. The Unit provides technical services, help-desk support and user training. It is responsible for the development and maintenance of an information technology (IT) infrastructure that adequately supports research and administration within the Center and in NARS.

The Unit aims to have a level of support that not only reacts to problems, but actively initiates improvements by capitalizing on modern technologies for greater effectiveness of client activities. Current technologies will be tapped, depending on client needs to improve the quality and efficiency of work carried out at ICLARM.

### **1998 Results**

*Standardization of the IT Environment:* A global account was established with Dell to avail of discounted direct pricing. With this pricing, the Center saves as much as 40-50% in its purchases and has after-sales service and guarantees for three years. There are now 31 powerful and richly configured Dell systems in use at ICLARM (18 desktops, 5 workstations, 7 laptops and 1 server) which are equipped with the relevant technology. Among these systems are state-of-the-art workstations used for GIS and desktop publishing. A system study of the PU's PC environment was conducted in which

computing problems were assessed and recommendations to improve the system were put forward.

*Migration to Exchange:* All inbound and outbound mail for ICLARM now go via the Exchange connector, providing an instantaneous and reliable delivery of messages, with the installation and configuration of the Exchange server in July 1998; a number of travel mailboxes were configured to enable access to ICLARM's Exchange server - this solved problems with mail forwarding and provided a less expensive means to access mail remotely; the Dynamic Remote Access Service was configured for continuous Email operation during IVDN line connection problems.

*Internet Support:* Increased the number of computers that can access the internet from 90 to 120; provided technical support to and online maintenance of two additional links to ICLARM's web site—the ADB-RETA 5766 Project and Asian Fisheries Society web pages; developed the intranet pages to include the IRS and NRS policy manuals and the PMP guideline.

*Year 2000 Problem Support:* Conducted a seminar entitled "Preparing for the Year 2000" to explain the meaning, history and implications to the staff; all ICLARM PCs checked to see if they were Y2K compliant and results showed that out of 144 computers, 85% are Y2K compliant.

*Communications Support:* The Ariel document delivery system was installed at LISU. The system, optimized for Internet transmission, is faster, more reliable and less expensive than fax and produces images of greater resolution and quality. Users can scan articles, photos and similar documents, transmit the resulting electronic images over the internet to another Ariel workstation, or Email them to properly equipped Email accounts, and print them on any printer supported by Windows, preferably laser printers. This facility can be used in document exchanges among sites. In November, the IVDN voice board was upgraded to provide better quality at lower bandwidth.

### **Expected Outputs in 1999**

*Standardization of the IT Environment:* Replace more PCs with Dell models; an updated inventory of hardware and recommendations for obsolescence will be made; configure all computers to log on to the Windows NT domain, ICLARMNET, to

provide better security and easier file and printer sharing, and standardize the network operating system; improve efficiency through the design and customization of standards applications, using macros, templates and simple programs; provision of technical support and advice.

*Migration to Exchange:* Conduct an in-house training in January 1999 in the use of Microsoft Outlook 98 for all ICLARM Email users; participants' accounts scheduled for migration to Exchange after the training; customize the use of electronic forms in Microsoft Exchange and use its public folders for better collaboration; from within ICLARM and the Philippines, access will be directly through the ICLARM Remote Access Server (RAS) and elsewhere in the world, TAS2 will provide the local access to the Internet from more than 150 countries worldwide; continue provision of technical support to staff in the use of the new Email program (Microsoft Outlook).

*Internet Support:* Continue the development of the intranet by publishing the Center's policies, manuals and other relevant documents and creating links to databases and other applications; continue provision of technical support in the development, improvement and maintenance of the Center's home page; explore other ways of increasing the number of computers that can access the internet and intranet.

*Year 2000 Problem Support:* Make a complete inventory of applications and systems being used; extend technical support to outreach offices; replace or upgrade non-Y2K compliant computers; standardize applications and versions of applications; provide technical support and guidance in the upgrade or migration from non-Y2K compliant applications; propose a plan for upgrade/replacement of the PBX system to make it Y2K compliant.

*Communications Support:* Experiment with faxing via the internet and video conferencing; provide technical support in producing publications on CDs; upgrade the current network infrastructure concentrating on bottleneck areas and old equipment; propose a plan for upgrade/replacement of the PBX system and monitor the IVDN upgrades and changes in Philippine telecom capabilities, internet phones and voice mail.

## **Project 11.6** Financial and Administrative Systems Development Unit (FASDU)

### **ICLARM Staff**

CSU Staff; FASDU Staff; FMIU Staff; Project Administration Staff; HRU Staff; PBU Staff

### **Other Staff**

ABM Consultant; Consultant from the software provider; Price Waterhouse Consultant

**Donor** : ICLARM core funds

**Duration** : Ongoing

### **Objectives**

- *Complete Implementation of the Computerized Accounting System (Platinum for Windows):* Ensure the successful implementation of the Platinum for Windows version of the AP/PO module.
- *Technical Assistance in Human Resources Information System (HRIS):* Provide technical assistance in the evaluation and implementation of a suitable software for the HR/payroll system.
- *Other Financial and Administrative Applications:* Identify manual procedures that can be computerized to ensure accurate and timely processing of financial transactions; design and develop computerized application system to address the processing and reporting requirements not supported by Platinum.
- *Financial Reporting Structure for Users and Donors:* Build management and financial reports for users and donors using special reporting tools and generate accurate and timely financial reports for users and donors.
- *Post Implementation Review of the FMIU Systems:* Coordinate a post implementation review of the newly implemented systems to complete the system development and implementation cycle.

### **Background and Justification**

FASDU was established in 1998 to develop and maintain the financial and administrative system. The Unit operates in a team approach with membership from the user units and CSU for system development and implementation. In system maintenance, it oversees the database administration and smooth operation of applications, and recommends system enhancements/upgrades to address

increasing needs of the users in response to the changing environment.

### **1998 Results**

*New Computerized Accounting System (Platinum for Windows):* First phase: initiated acquisition/upgrade of file server units and user workstations in compliance with the recommended hardware configuration; administered the Platinum file and application servers; fully implemented the general ledger system; redesigned chart of accounts to provide flexibility in budget and financial reporting; designed/coded report specifications using compatible reporting tools to generate financial reports in accordance with the CGIAR format and provided hands-on assistance to FMIU staff in the use of the new system. Second phase: acquisition of Platinum for Windows AP/PO; attendance of the AP/PO user training by the project team members; documentation of current processing flow to identify user requirements and completion of the master file policies and setup.

*Technical Assistance in Human Resources Information System (HRIS):* Provided assistance in the preparation of the user HR/payroll requirements given to software providers; coordinated payroll software demonstrations from various suppliers; evaluated current hardware and software specifications, existing file servers and workstation intended for HR/payroll installation.

*Other Financial and Administrative Applications:* Designed and developed middleware to automatically extract posted transactions from the Platinum system to address various reporting requirements; coded report specifications using the Crystal Reports Writer to generate Statement of Personal Accounts in the auditor's recommended format; designed and developed a user executable, parameter based system using Crystal Reports Writer to generate the subsidiary ledgers and journal voucher entries in the user-specified format; provided hands-on assistance on the use of Crystal reports.

*Financial Reporting Structure for Users and Donors:* Uploaded current year budget figures; designed and coded financial estimates and expense reports in the CGIAR required formats; generated financial statements and expense reports using the FRx for Windows application; provided training on the Project Accounting team in printing the FRx reports using the FRx drilldown viewer.

*Post Implementation Review of FMIU Systems:* Post-implementation review of Platinum is awaiting full implementation of the AP/PO modules.

### **Expected Outputs in 1999**

*Complete Implementation of the Computerized Accounting System (Platinum for Windows):* Continue with the system testing and parallel run to ensure the new modules are addressing the FMIU and Project Administration AP/PO processing requirements and to monitor proper performance of the system; design reports in Crystal Reports to address additional AP/PO reporting requirements; continue Platinum server administration; revise forms/documents to improve data entry and processing flow of AP/PO; provide user training on specific tasks; prepare system and user documentation; fully implement the AP/PO system.

*Technical Assistance in Human Resources Information System (HRIS):* Recommend upgrade/acquisition of both hardware and software installation, as needed; assist in the preparation of an attainable project implementation schedule; develop programs to extract information from the current system during data conversion; develop procedures to facilitate validation of converted information; assist in the documentation of the detailed procedures for payroll transactions; provide technical documentation on system management.

*Other Financial and Administrative Applications:* Design and develop middleware programs to serve processing requirements of the Center such as allocation of overhead and staff costs; design and develop a system that will provide users online access to account balances and project expense reports; implement a fixed assets system interfaced to Platinum for Windows; design and develop a system that will assist the PBU in its travel planning and budgeting processes.

*Financial Reporting Structure for Users and Donors:* Maintain management reporting hierarchy to reflect newly created accounts and project codes; upload current year budget and other statistical information to Platinum for comparative reporting; automate generation of other supporting schedules for CGIAR and Board reporting; review format of donor reports and evaluate how standard specifications can be coded to automate donor reporting; train FMIU staff on building reports using FRx and Crystal Reports; enhance report specifications

to reflect approved recommendations; electronic transmission of generated reports for outreach offices.

*Post Implementation Review of FMIU Systems:* Update programs to meet modified requirements; maintain documentation to reflect system and module program changes; present/implement recommended changes in procedures to the concerned users; develop/implement a structure to ensure reliability and long-term management of computerized financial management system which includes performance monitoring, error handling and implementation of disaster recovery procedures.

## **Project 11.7**

### **Planning and Budgeting Unit (PBU)**

#### **ICLARM Staff**

ADG; Program Administration and Administrative Staff; PBU Staff; Program Assistants

#### **Other Staff**

IRRI Consultant

**Donor** : ICLARM core funds

**Duration** : Ongoing

#### **Objectives**

- *Program Administration and Administrative Functions:* Streamline tasks of program administration and administrative staff; provide effective delivery of project and administrative support services to ICLARM's research Programs.
- *Revised Budget Cycle and Revised Budget Process:* Develop and implement a revised budget cycle and planning and resource allocation process.
- *Staffing Patterns by Programs and Staff Levels:* Ensure that all Center positions are controlled and properly financed.
- *Databases and Systems to Support the New Process:* Facilitate the development of the Center's internal and external budget.
- *Budget Management and Control Function:* Improve budget management and control functions.
- *Control, Studies and Analysis:* Provide analyses and projections of revenue and expenditures; assess long-term budgetary implications; prepare cost and inflationary studies.

- *Budgeting Processes and Databases:* Identify manual procedures that can be automated and ensure accurate and timely budgeting processes.

### **Background and Justification**

The PBU was established in 1998 to assist in the formulation, development and management of the Center's budget, including the establishment of suitable databases, procedures and guidelines. In addition to planning and budgeting, the Unit also provides Programs with financial and administrative support services.

### **1998 Results**

*Program Administration and Administrative Functions:* Streamlined the duties and functions of the Program Assistants under one unit effective August 1998; provided assistance to Programs in financial and administrative matters.

*Revised Budget Cycle and Budget Process:* Developed the budget and financial chapter for a rolling MTP 1999–2001; 1999 Financing Plan; revised budget cycle; revised planning and resource allocation process; implemented the 1999 internal budget, based on revised cycle and planning and budgeting process.

*Staffing Patterns by Programs and Staff Levels:* Developed 1998 and 1999 staffing patterns for all ICLARM locations to manage staff positions and related costs.

### **Expected Outputs in 1999**

*Program Administration and Administrative Functions:* Provide effective and efficient financial management support to Board, management, Programs and staff; provide support and assistance to the PBU in performing budget related tasks and activities; assist in the production of the annual budget and budget updates for submission to the CGIAR, TAC Secretariat and donors; work in a team environment to enhance the resource allocation process.

*Revised Budget Cycle and Revised Budget Process:* Review the newly implemented planning and resource allocation process and improve the planning and budget preparation process.

*Staffing Patterns by Programs and Staff Levels:* Automate the database on staffing patterns under one system; implement proper clearance procedures on monitoring of staffing patterns; refine and update the Center's staffing patterns.

*Budget Management and Control Function:* Maintain proper procedures for controlling and monitoring of the budget functions.

*Control, Studies and Analysis:* Generate reports on a regular basis; produce projections of revenue and expenditures, and conduct annual inflationary studies.

*Budgeting Processes and Databases:* Design and develop a system that will provide users online access to budget balances.

## 12. OFFICE OF THE DEPUTY DIRECTOR GENERAL - AFRICA AND WEST ASIA (ODDG-AWA)

### Project 12.1

Office of the DDG-AWA

#### ICLARM Staff

Dr. Roger Rowe (Deputy Director General); Dr. John Craig; Dr. Randall Brummett; Mr. Brian Tierney; nationally recruited staff

#### Collaborating Institution

*Egypt:* Agriculture Research Center, Ministry of Agriculture

**Donors** : Arab Fund; Government of Egypt; Government of Japan; USAID; World Bank; others to be identified

**Duration** : Commenced January 1997

#### Objectives

- Manage the refurbishment of the Abbassa aquaculture research facility and develop its operations as ICLARM's Regional Research Center for Africa and West Asia (Abbassa site).
- Assist the Director General and Deputy Director General (Programs) in developing strategic research programs on fisheries and aquaculture having direct relevance to the African continent and West Asia.

#### Background and Justification

ICLARM has taken up the challenge of managing the Central Laboratory for Aquaculture Research (CLAR) at Abbassa, Egypt, that was built with support of USAID. This facility will be developed as a regional center for aquaculture research and as a hub for more extensive activities in Africa and West Asia. ICLARM is guided by a global mandate to undertake aquatic resources research and to improve the management of fisheries and aquatic resources.

During the May 1997 Mid-term Meeting of CGIAR in Egypt, ICLARM formally opened the Abbassa site. Later in the year, the Government of Egypt approved the host country agreement which provides the legal base for ICLARM's operation in the country.

#### 1998 Results

The first phase of the refurbishment of the Abbassa facility was completed early in 1998. Other general refurbishment work was completed during the year. The second phase for the renovation of the dry labs and apartments was launched.

The terms of the host country agreement were activated.

National staff were recruited and employed according to Board approved policies.

ICLARM took over the management of the assets of CLAR according to the terms of the host country agreement. Administrative procedures were established to govern the operation of the site.

Two planning workshops were held during the year to formulate the program of aquaculture research.

Contacts were made with fisheries and aquatic resources research and development organizations in Egypt.

Contacts with scientists in the region were expanded through visits to eight countries and participation in three meetings.

Proposals for research in fish, inland fisheries management and other research activities for West Asia were developed and submitted.

An international workshop was held in Aswan to evaluate the production of Lake Nasser fisheries and to develop recommendations for future activities.

#### Expected Outputs in 1999

Complete the refurbishment of the facilities of the Abbassa site.

Continue to implement the terms of the host country agreement and establish ICLARM's legal base for operations in Egypt.

Expand the research and training program in the region in collaboration with and as an extension of headquarters research programs. Conduct work on

the genetic evaluation and enhancement of tilapia species. Initiate a marker assisted selection project with Auburn University.

Continue the study of hatchery production of catfish.

Implement the fisheries management project in Lake Nasser. Publish the proceedings of the workshop held in 1998.

Collaborate with the Channel Maintenance Research Institute to improve methods for producing triploid grass carp.

Conduct a regional training program on aquaculture in collaboration with FAO and training for fish farmers in Egypt.

Develop further links with fisheries and aquatic resources research and development organizations in Africa and West Asia to collaborate in setting research priorities and extending research results.

Develop and submit funding proposals for research and training activities for individual countries and for the region as a whole.

## 13. OFFICE OF THE DEPUTY DIRECTOR GENERAL - PROGRAMS (ODDG-P)

### Project 13.1

Office of the DDG-P

#### ICLARM Staff

Dr. Peter Gardiner (Deputy Director General); Ms. Ma. Lourdes Hortelano

**Donors** : ICLARM core funds, assistance from ACIAR with strategic planning

**Duration** : Continuous since August 1996

#### Objectives

- Provide assistance to the Director General in the planning, implementation, monitoring and reporting of ICLARM's research and research-related programs.
- Assist in the presentation of ICLARM's program activities and plans to donors, members of CGIAR and others concerned with aquatic resources research and development.

#### Background and Justification

Membership of CGIAR, a nine-Program operating structure and staff activities in four continents require that the Center's research is managed flexibly within the agreed plans and goals. The Office contributes to the development of ICLARM's Program plans, research proposals and the documents which describe them (Operational Plan, MTP and the Financing Plan and Agenda Update). Major emphasis in 1999 will be the finalization and publication of the Strategic Plan looking towards the development of the Center beyond 2000. The office has primary responsibility for convening the internally commissioned external review of the scientific programs. The DDG-P convenes ICLARM's Research Management Committee (RMC) and maintains links with outreach offices, including visits at times of review or program planning. The office continues to assist the flow of information, research reports and proposals among program leaders, management and external stakeholders.

#### 1998 Results

Drafted ICLARM's Strategic Plan and compiled background data and statistics on aquatic resource systems and target developing country regions.

Finalized ICLARM's MTP 1999 – 2001 with other Directors.

Developed with other Directors, the ICLARM 1999 Financing Plan and 1998 Agenda Update.

Convened ICLARM's Strategic Planning workshop with external facilitation, ICLARM staff and external stakeholders.

Developed position papers or Center's responses to the CGIAR and TAC Secretariat and ICLARM Board.

Convened Internally Commissioned External Review of the AEP and monitored the ACIAR sponsored review of ICLARM's work on aquaculture in the Pacific at ICLARM's CAC in the Solomon Islands.

Visited ICLARM research sites and collaborators in Bangladesh and, for the Caribbean marine protected areas project, the BVI and Jamaica.

#### Expected Outputs in 1999

Finalize ICLARM's Strategic Plan, based on the 1998 priority setting and an external stakeholder review.

Revise and update ICLARM MTP 2000 – 2002.

Develop inter-program projects for research on the basis of ICLARM's new Strategic Plan.

Assist the DDG-AWA and Program staff in the implementation of submitted research proposals for work at Abbassa in Egypt, with renewed emphasis on aquaculture and aquaculture genetics.

Convene and conduct internally commissioned external reviews of ICLARM's Programs and in-house review of ICLARM's scientific Programs (September 1999).

Follow-up outstanding issues from ICLARM's Strategic Plan, including the determination of the beneficiaries for aquatic resources research.

Contribute to the documentation, information and responses to ICLARM's External Program and Management Review.

## 14. OFFICE OF THE DIRECTOR GENERAL

### Project 14.1 Office of the DG

#### ICLARM Staff

Dr. Meryl J. Williams (Director General); Ms. Josephine Z. Hernandez; Ms. Fanny Llego; Ms. Violeta Perez-Corral

**Donor** : ICLARM core funds

**Duration** : Ongoing

#### Objectives

- Manage the Center and ensure that ICLARM's programs are properly developed and carried out.
- Act as ICLARM's legal representative and, within the limits established by ICLARM's Board, to take whatever actions are necessary to attain ICLARM's purposes.
- Manage the staff of ICLARM, observing the policies approved by the Board of Trustees.
- Be responsible for the Center's external relations with research and development organizations worldwide and with potential and current donors.

#### Background and Justification

The ODG serves the Center by creating a supportive organizational environment for efficient delivery of the work program, publicly representing its interests positively and assertively, and assistance in the policy and decisionmaking functions of the Board. The staff of the Office support the Director General in all her functions.

#### Expected Outputs in 1999

Provide leadership to the Center in all its activities. Priority will be given to the following areas:

Completion of the 2000-2002 MTP.

Raising adequate financial and scientific resources from multilateral, bilateral and private sector sources.

Further improving the coherence of the work program and integrating the programs and operations of the Center across its multiple sites.

Supporting the ongoing major upgrade of corporate support services.

Leading the Center through to the successful completion of its current External (CGIAR) Program and Management Review by the Mid-term Meeting of CGIAR in May 1999.

Supporting the Board in deciding the location and implementing the plans for the new ICLARM headquarters site.

Working with international, regional and national aquatic resource research and management partners to improve the understanding of the status of aquatic resources and their ecosystems, identify positive interventions that can be made to improve the welfare of poor people who depend on these resources, and strengthen the capacity of developing country agencies to study and address fisheries sector problems.

Helping raise public awareness of ICLARM's mission, role and achievements in order to have greater positive impact on target beneficiaries and donor agencies.

### Project 14.2 Project Development Coordination Unit (PDCU)

#### ICLARM Staff

Dr. Meryl J. Williams; Ms. Liza M. Camañag

**Donor** : ICLARM core funds

**Duration** : Continuous from 1996

#### Objectives

- Harness the efforts of ICLARM staff for mobilization of resources.
- Develop, maintain and enhance ICLARM's relations with its donors.
- Act as a clearinghouse for proposals and ensure that quality proposals are submitted to donors.
- Help identify new funding sources for ICLARM and act as a repository of donor information.

### **Background and Justification**

PDCU (formerly the External Relations Office) was created to help ICLARM management and staff with activities related to fund-raising and donor relations. Specifically, the PDCU keeps track of the Center's project development activities and performance in terms of proposal quality and approvals. The Unit acts as the Center's catalyst in resource mobilization.

The PDCU also assists the Director General in developing, maintaining and enhancing the Center's relationships with its donor stakeholders. This involves developing and implementing strategies and methods for fund raising and donor relations, assisting scientists in their preparation and submission of proposals to donors, and keeping them informed of changing donor priorities and requirements.

### **1998 Results**

A Resource Mobilization Strategy for ICLARM was developed (released July 1998).

A Donor Segmentation Workshop was held (August 1998).

Simplified Guidelines for Proposal Clearance and Submission were prepared.

Information was gathered on several grant making foundations with interests in ICLARM's mandate.

Contacts with donors were improved and increased.

Several proposals and concept papers were prepared.

### **Expected Outputs in 1999**

Gather information about donors and agencies supporting ICLARM thrusts.

Increase assistance to staff on proposal submission and negotiations with donors.

Increase the number of donors visiting ICLARM.

Implementation of the Resource Mobilization Strategy.

Make the donor database accessible to all ICLARM officers.

Improve success in proposal approval.

# ACRONYMS

ABee	Software for estimating coefficients of length-weight relationship
ACIAR	Australian Centre for International Agricultural Research
ACP	African, Caribbean and Pacific countries
ADB	Asian Development Bank
ADG-CS	Associate Director General for Corporate Services
AEP	Aquatic Environments Program
AFSSRN	Asian Fisheries Social Science Research Network
AIMS	Australian Institute of Marine Science
AIT	Asian Institute of Technology
AKVAFORSK	Institute of Aquaculture Research of Norway
ALCOM	Aquaculture for Local Community Development Programme
ALU	Administrative and Liaison Unit
APAARI	Asia-Pacific Association of Agricultural Research Institutions
ASFIS	Aquatic Sciences and Fisheries Information System
AUXIMS	Auximetric grid analysis of growth parameters
BFAR	Bureau of Fisheries and Aquatic Resources (Philippines)
BGRP	Biodiversity and Genetic Resources Program
BMZ	Bundesministerium für Wirtschaftliche Zusammenarbeit (Germany)
BOT	Board of Trustees
BRAC	Bangladesh Rural Advancement Committee
BVI	British Virgin Islands
CAC	Coastal Aquaculture Centre
CARICOM	Caribbean Community
CASEP	Coastal Aquaculture and Stock Enhancement Program
CBD	Convention on Biological Diversity
CBFM	Community-based Fisheries Management
CFPQ	Community Forestry Project-Quirino
CGIAR	Consultative Group on International Agricultural Research
CIDA	Canadian International Development Agency
CIFA	Central Institute of Freshwater Aquaculture
CLAR	Central Laboratory for Aquaculture Research
CLSU	Central Luzon State University
CMS	Centre for Marine Sciences
CNRS	Center for Natural Resource Studies
CRED	Center for Resource and Environment Development
CRIFI	Central Research Institute for Fisheries
CRODT	Centre de Recherche Océanographique, Dakar-Thiaroye
CSD	Corporate Services Division
CSU	Computer Services Unit
CTU	Cantho University
DANIDA	Danish International Development Assistance
DDG-P	Deputy Director General - Programs
DDG-AWA	Deputy Director General - Africa and West Asia
DEGITA	Dissemination and Evaluation of Genetically Improved Tilapia in Asia
DENR	Department of Environment and Natural Resources (Philippines)
DFA	Department of Foreign Affairs (Philippines)

DFID	Department for International Development (UK)
DG	Director General
DNA	Deoxyribonucleic acid
DOF	Department of Fisheries
DSE/ZEL	German Foundation for International Development/ Food and Agriculture Development Centre
ESCAP	Economic and Social Commission for Asia and the Pacific
EU	European Union
FAC/CLSU	Freshwater Aquaculture Center/Central Luzon State University
FAO	Food and Agriculture Organization of the United Nations
FASDU	Financial and Administrative Systems Development Unit
FAST	Financial and Administrative Systems Team
FIRST	Fisheries Resources Information System and Tools
FISAT	FAO-ICLARM stock assessment tools
FMIU	Finance and Management Information Unit
FMS	Financial management system
FRAMP	Fisheries Resources Assessment and Management Program
GBRMPA	Great Barrier Reef Marine Park Authority
GCRMN	Global Coral Reef Monitoring Network
GEBP	Germplasm Enhancement and Breeding Program
GHK	University of Kassel
GIFT	Genetic Improvement of Farmed Tilapias
GIS	Geographical information system
GoFAR	Group of Fisheries and Aquatic Research
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (Germany)
HRIS	Human resources information system
HRU	Human Resources Unit
HQ	Headquarters
IAA	Integrated aquaculture-agriculture
IAASP	Integrated Aquaculture-Agriculture Systems Program
ICLARM	International Center for Living Aquatic Resources Management
ICM	Integrated coastal management
ICRI	International Coral Reef Initiative
ICW	International Centers Week
IDA	Institute for Development Anthropology
IDAF	Programme for Integrated Development of Artisanal Fisheries in West Africa
IDB	Inter-American Development Bank
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IFM-K	Institut für Meereskunde, Kiel
IFPRI	International Food Policy Research Institute
IIRR	International Institute of Rural Reconstruction
IMOF	Improved Management of Openwater Fisheries
INFOFISH	Intergovernmental Organization for Marketing Information and Technical Advisory Services for Fishery Products in Asia and Pacific Region
INGA	International Network on Genetics in Aquaculture
IPGRI	International Plant Genetic Resources Institute
IPNP	International Partnerships and Networks Program

IRM	Integrated resources management
IRRI	International Rice Research Institute
IRS	Internationally recruited staff
IT	Information technology
ITP	Information and Training Program
IUCN	World Conservation Union
IZAS	Institute of Zoology, Academia Sinica
JSF	Japan Special Fund
KFPL	Kolombangara Forest Products Limited
LISU	Library and Information Services Unit
MAF	Ministry of Agriculture and Fisheries
MCA	Marine conservation area
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPA	Marine protected area
MRC	Mekong River Commission
MTP	Medium-term Plan
MUK	Manobik Unnayan Kendra
NAC	National Aquaculture Centre
NACA	Network of Aquaculture Centres in Asia-Pacific
NAGRI	National Aquaculture Genetics Research Institute
NAIA	Ninoy Aquino International Airport
NARS	National aquatic research systems
NASA	National Aeronautics and Space Administration (USA)
NCICM	National Course on Integrated Coastal Management
NGO	Nongovernmental organization
NRS	Nationally recruited staff
NSC	North Sea Centre
NTAFP	Network of Tropical Aquaculture and Fisheries Professionals
NTAS	Network of Tropical Aquaculture Scientists
NTFS	Network of Tropical Fisheries Scientists
ODG	Office of the Director General
ODDG-AWA	Office of the Deputy Director General-Africa and West Asia
ODDG-P	Office of the Deputy Director General-Programs
PA	Public awareness
PAU	Public Awareness Unit
PBU	Planning and Budgeting Unit
PCAMRD	Philippine Council for Aquatic and Marine Research and Development
PCE	Population, Consumption and the Environment
PDCU	Project Development Coordination Unit
PISCES	Population Interdependencies in the South China Sea Ecosystems
PMP	Performance management program
PRIAP	Policy Research and Impact Assessment Program
PU	Publications Unit
RAMP	Rapid Assessment of Management Parameters
RAS	Remote access server

RESTORE	Research Tool for Natural Resource Management, Monitoring and Evaluation
RETA	Regional Technical Assistance
RIMP	Research Institute for Marine Fisheries
RMC	Research Management Committee
SCS	South China Sea
SEAFDEC	Southeast Asian Fisheries Development Center
SEAFDEC-AQD	Southeast Asian Fisheries Development Center-Aquaculture Department
SEARCA	Southeast Asian Regional Center for Graduate Study and Research in Agriculture
SFIS	Selective Fisheries Information Service
SGRP	System-wide Genetic Resources Programme
SIDA	Swedish International Development Agency
SIFAR	Strategy for International Fisheries and Aquatic Research
SINGER	System-wide Information Network for Genetic Resources
SPC	Secretariat of the Pacific Community
TDT	Technology Development and Transfer
TINMAR	Taklong Island National Marine Reserve
TNC	The Nature Conservancy
TU	Training Unit
UBC	University of British Columbia
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNE	University of New England
UNEP	United Nations Environment Programme
UP	University of the Philippines
UPV	University of the Philippines in the Visayas
URI	University of Rhode Island
US; USA	United States of America
USAID	United States Agency for International Development
UWI	University of the West Indies
UWS	University of Wales, Swansea
WCMC	World Conservation Monitoring Centre
WRI	World Resources Institute
ZIM/UH	Zoologisches Institut und Zoologisches Museum/Universität Hamburg

## **International and Regional Organizations**

- ACP national programs **1**
- African Fisheries Society **68**
- Aquaculture for Local Community Development Programme (ALCOM), FAO **15**
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- reduced pressure on fragile natural resources; and
- people-centered policies for sustainable development.

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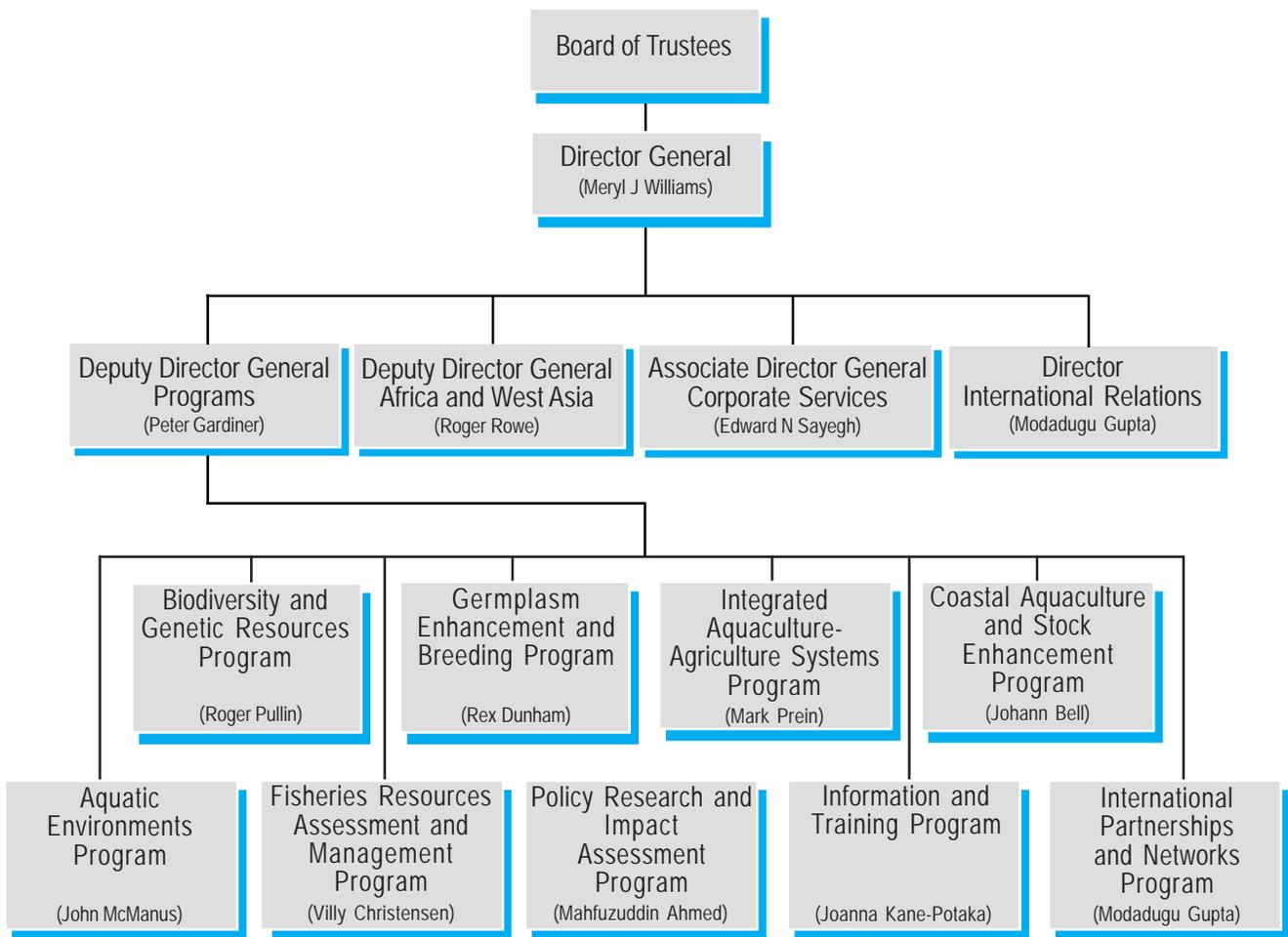
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