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ICLARM

REPORT

1994



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INTERNATIONAL CENTER FOR LIVING AQUATIC RESOURCES MANAGEMENT

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**INTERNATIONAL CENTER FOR LIVING AQUATIC
RESOURCES MANAGEMENT**

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and an ICLARM researcher.

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Contents

Foreword	iv
ICLARM Board of Trustees	v
The Consultative Group on International Agricultural Research	vi
Introduction	1
Background to Change	1
The Challenges for ICLARM in 1994 and Beyond	2
Research Highlights	3
Networks, Training and Information Services	4
Management	5
Board of Trustees	7
Introduction	8
One Year into the Medium-Term Plan	8
Introduction	8
Expected Outputs	9
Progress of ICLARM's 1994-1998 Medium-Term Plan and Impact of Earlier Work	9
Understanding Resource System Dynamics	9
Alternative Management Schemes	13
Improving Productivity of Key Species	18
Information Dissemination	21
Management Services	22
Governance and Management	24
Board Operations	25
Policy Development	26
Management Oversight	26
HQ Agreement and Site	26
The CGIAR and Donors	26
Board Officers	27
Board Composition	27
Mission Statement	27
Board Officers and Committees	28
Board of Trustees Mission Statement	28
National Research Support	33
Education and Training	33
Advisory Services	39
Seminars	39
Meetings Attended, Papers Presented	40
Coastal and Coral Reef Resource Systems Program	40
Inland Aquatic Resource Systems Program	44
Information Division	47
Office of the Director General	47
Special Projects	48
Publications	51
ICLARM Staff	56
Index of Organizations	65

Foreword

This Report presents highlights of the Center's work during 1994 in the context of the impact it has or is expected to have in the near term on ICLARM's partners and beneficiaries: farmers, fishers, national research institutions, scientists around the world and the development assistance community. As a rule of thumb, strategic research achievements generally take a decade or more to have full impact on their intended "audience", in part because of the strategic nature of the work. Strategic research addresses long-term issues and chronic problems; it explores long-term opportunities and provides long-term benefits. Thus, the impacts reported herein are the accumulated credit from past years of research together with expectations for the future.

ICLARM's role and research directions began to change in 1992 when it produced a "Strategy for International Research on Living Aquatic Resources Management", a carefully reasoned plan which was a framework for the Center's work over the next decade or more. As a result of the plan, ICLARM was admitted to the Consultative Group on International Agricultural Research that year, and ICLARM then began working on a more detailed plan of activities for the medium term—five years. This year, 1994, was the first operational year of the Medium-Term Plan. It is fitting that the first Report of results from the new (and old) activities under the Plan should be marked by a new Report format.

This Report marks the completion of ICLARM's eighteenth year of research and related activities since it was incorporated in the Philippines in 1977. The Center's annual Reports have been produced since 1980 using the same format, summarizing the broad progress achieved in various fields of endeavor and providing details of each research project.

A separate account of the Center's projects, their rationale, objectives, results for 1994 and expected output in 1995 is provided in the publication *ICLARM 1995 Operational Plan*, available on request.

Dr. Meryl J. Williams
Director General

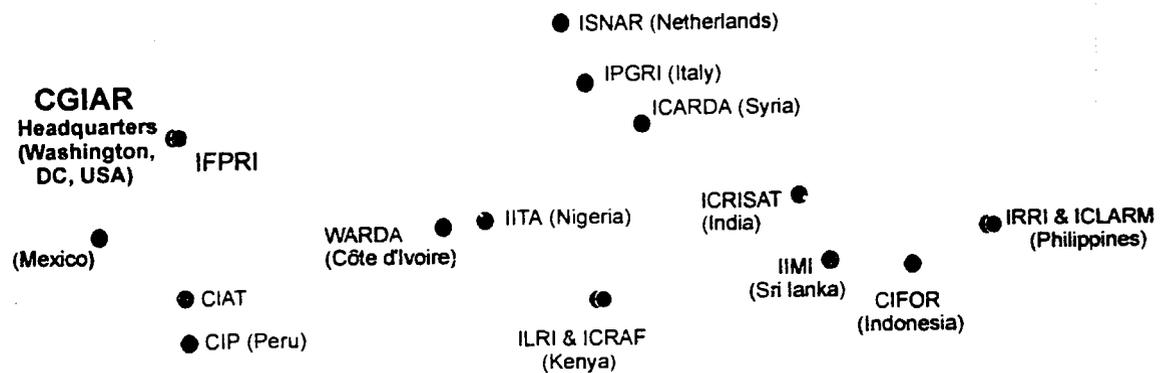
ICLARM

Board of Trustees

- Dr. Dayton L. Alverson: Owner/President of Natural Resources Consultants, Inc., Seattle (1980 to present). Board Member since 1991.
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- Mr. Roberto Sebastian (ex-officio): Minister, Philippine Department of Agriculture. Board Member since 1992.
- Dr. Laurence D. Stifel (ex-officio): Director General until April 1994.
- Dr. Meryl J. Williams (ex-officio): Director General since April 1994.

The Consultative Group on International Agricultural Research (GCIAR) is an informal association of 41 public and private sector donors that supports a network of 16 international agricultural research centers. The group was established in 1971.

Consultative Group on International Agricultural Research (CGIAR) Centers



- | | | | |
|---------|--|-------|--|
| CIAT | - Centro Internacional de Agricultura Tropical | IFPRI | - International Food Policy Research Institute |
| CIFOR | - Center for International Forestry Research | IIMI | - International Irrigation Management Institute |
| CIMMYT | - Centro Internacional de Mejoramiento de Maiz y Trigo | IITA | - International Institute for Tropical Agriculture |
| CIP | - Centro Internacional de la Papa | ILRI | - International Livestock Research Institute |
| ICARDA | - International Center for Agricultural Research in the Dry Areas | IPGRI | - International Plant Genetic Resources in the Institute |
| ICLARM | - International Center for Living Aquatic Resources Management | IRRI | - International Rice Research Institute |
| ICRAF | - International Council for Research in Agroforestry | ISNAR | - International Service for National Agricultural Research |
| ICRISAT | - International Crops Research Institute for the Semi-Arid Tropics | WARDA | - West Africa Rice Development Association |

Introduction

ICLARM, in common with all organizations today, is embarked upon a process of guided and necessary change. This change is both a response to major changes in the external environment of ICLARM, and to internal needs. The main challenges driving the changes are outlined below. At the same time, ICLARM recognizes the importance of commitment to long term scientific efforts. Strategic research achievements generally take a decade or more to have full impact for their intended beneficiaries, in part because of the 'upstream' nature of the work. Strategic research addresses

fundamentally critical issues and many of these are long term; it explores crucial opportunities and can provide long term benefits. Thus, its impacts are the accumulated credit from many past years of research. Organizational transformation, therefore, must be reconciled with the long-term gestation of many scientific outcomes.

This Report presents highlights of the Center's work during 1994, emphasizing the impact it and the work which preceded it have or are expected to have in the near term. The partners and beneficiaries of this work are the fishers, farmers, national research institutions and scientists around the world, and the development assistance community in the private and public sectors. A separate, detailed, account of the Center's projects, their rationale, objectives, results for 1994 and expected output for 1995 is provided in the publication *ICLARM 1995 Operational Plan*. In addition, in 1995, ICLARM plans to embark on a program of rigorous socioeconomic and scientific impact assessments of its work, leading to the development of new methodologies suitable for assessing the outcomes of natural resource management research.

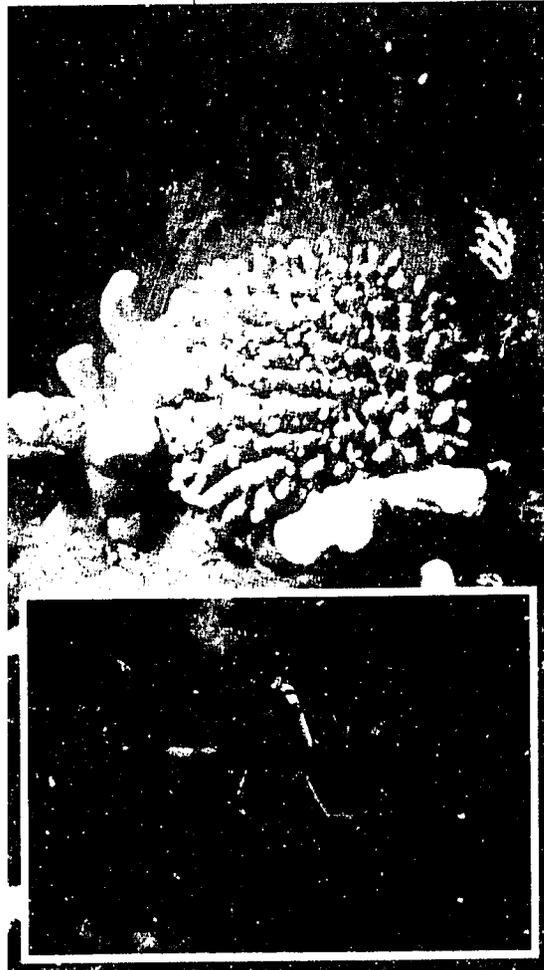
Background to Change

In 1994, ICLARM completed its eighteenth year of research and related activities since incorporation in the Philippines in 1977.

ICLARM's role and research directions began to change most significantly in 1992 when it produced a 'Strategy for International Research

on Living Aquatic Resources Management', a carefully reasoned plan which was a framework for the Center's work over the next decade or more. As a result of the Strategy, ICLARM was admitted to the Consultative Group on International Agricultural Research that year, and ICLARM then began working on a more detailed plan of activities for the medium term of five years. This year, 1994, was the first operational year of the *ICLARM Medium-Term Plan (1994-1998)*.

In line with the program changes forged under the planning processes, changes were also required in governance and internal management to enable adequate delivery of the program, and to overcome earlier shortcomings. All these changes began in earnest in 1993 and have been continued strongly in 1994. A milestone subsequent to the period of this report is the Mid-Term Review of



ICLARM, conducted in the first half of 1995 by the CGIAR to examine the progress achieved since the 1992 External Program and Management Review of ICLARM.

The Challenges for ICLARM in 1994 and Beyond

Seven key challenges shape the organizational changes occurring in ICLARM. The major process of change is expected to continue over the next several years, to be followed by ongoing developments. The key challenges are:

1. *How can ICLARM make the most effective contribution to international public good research for aquatic resource management?* This challenge recognizes ICLARM's small size, the need to focus its efforts on carefully selected topics and modes of operation, and the need to anticipate critical issues in aquatic resource management.

2. *What organizational systems, procedures, processes and facilities are required to improve internal management of research, people, financial, physical and information resources?* ICLARM's total budget and staff numbers have grown over the years and high priority is being given to implementing better internal management to meet present and future needs.

3. *How should ICLARM form and nurture productive research and other partnerships, with developing-country as well as advanced-country partners so as to best deliver its work for the benefit of low-income fishers, farmers, consumers and decisionmakers?* Natural resource management science is a collaborative exercise, whether in its practice with partners from many organizations or disciplines, or through participation by the beneficiaries, or through close links with the managers and policymakers who use the results for decisionmaking.

4. *How can ICLARM maximize its contribution to the CGIAR and the benefits from being one of the members of the CG?* Membership of the CGIAR offers many benefits for ICLARM in the form of expert research management guidance, access to global knowledge in agricultural research, natural resource management and food security, and access to a wide range of contacts in the development assistance community. For its part, ICLARM contributes unique knowledge in the conservation, management and use of living aquatic resources, considerable expertise in the general field of natural resource management and small-scale food production systems and complementary knowledge on aquatic resource systems and their interactions with the terrestrial production systems studied by the other centers.

5. *How can ICLARM improve its internal and external communication to promote greater sharing of information and expertise across disciplines, subject areas and organizations?* Information technology, forms of information and the behavior of our staff in interacting and sharing their knowledge are all important in meeting this challenge.

6. *How can ICLARM develop a more collaborative internal culture and thereby maximize its human resource capital?* The multisite, multidisciplinary, multicultural composition of ICLARM's



workforce is one of its greatest assets but we recognize that this will not automatically lead to full use of the skills, knowledge and abilities our people possess. ICLARM must encourage and nurture personal and professional staff development and promote internal practices and value systems which foster productive collaboration.

7. *What steps are required to improve ICLARM's budget structure and quantum of resources to ensure our ability to deliver an adequate work program?* The limitations of ICLARM's budget size relative to the mandate are well recognized. Not so well recognized is that the majority of funds (51% in 1994) were from project funds of limited duration. In addition, many of these projects were not fully funded but had to be subsidized by the remaining 49% of unrestricted core funds, thus further limiting the Center's ability to perform its strategic research agenda. In 1994, the Center began working on managerial, financial planning and strategic funding strategies to overcome the extreme difficulties posed by the budget structure and size.



Research Highlights

Good progress was noted in ICLARM's research programs in 1994. The highlights of the year represented the maturing of some long-term work, the strong commencement of new studies and activities, and the continuing achievements of others. They were:

Research into the trophic dynamics of global fisheries systems, leading to a paper by Drs. D. Pauly and V. Christensen which was accepted in late 1994 by the journal *Nature* (published March 1995), concerning the amount of the primary productivity of the oceans which is required to sustain the present world fisheries catch.

Production of Version 1.0 on CD-ROM of FishBase, the ICLARM-FAO encyclopedia of essential information on over 12,000 fish species, including all those used by fishers and farmers in the developing world. The FishBase project is led by Dr. R. Froese and has collaborators from over 100 organizations worldwide. A major share of the funding has come from the European Commission.

Contributions on the status of aquatic biodiversity and the technical and policy implications of its use and conservation globally. Dr. R. Pullin has led ICLARM's efforts on biodiversity, including development of internal policies on species introductions and the implications for aquaculture. Dr. J. Munro has also made major contributions to international efforts through his participation in high-level

meetings and contributions to a global status report on biological diversity being coordinated by the United Nations Environment Programme (UNEP).

- || Successful commencement of a global research program on fisheries co-management. Led by Dr. R. Pomeroy, ICLARM scientists and those from the North Sea Centre in Denmark are undertaking a comparative study of fisheries management regimes, with particular emphasis on Asian and African fisheries. Funded for five years by DANIDA, this project is seeking to understand and model better ways of sustainably managing fisheries and coastal resources.
- || Considerable progress was made in Bangladesh in 1994 in projects studying the development and

uptake of technologies for small-scale sustainable aquaculture which are accessible to low-income people, including women and landless farmers. Relationships between the people, government research and extension agencies and with indigenous nongovernmental organizations are critical elements in the successful uptake of fish farming.

- 11 The Genetic Improvement of Farmed Tilapias (GIFT) project completed two generations of selection for growth in 1994. The growth superiority of the GIFT breed in relation to several control groups was consistent with that obtained in previous generations (40-60%). In on-farm trials, significant yield differences between the GIFT strain and the local strains were observed. For example, in one cage farm (volume: 384 m³), the yield difference between the two strains, under identical management conditions was almost 100 kg. By the end of 1994, about seven million GIFT strain fingerlings had been distributed to farmers in the Philippines through the Philippine National Tilapia Breeding Program. Nearly 500 farmers have used them in commercial production.
- 12 The Dissemination and Evaluation of Genetically Improved Tilapia Species in Asia (DEGITA) Project which started in June 1994, with support from the Asian Development Bank, involves national aquaculture research institutes in Bangladesh, China, the Philippines, Thailand and Vietnam. A unified approach has been developed to evaluate the impacts of improved tilapia, involving the disciplines of genetics, economics, sociology and ecology.
- 13 ReefBase, the global database on coral reefs has rapidly expanded its coverage and has attracted great interest as a likely focal point for the proposed International Coral Reef Initiative.



Networks, Training and Information Services

ICLARM's information services continued to produce a high standard of in-house publications for wide dissemination and to answer numerous inquiries for information from around the world. Information services were reviewed in late 1994 and the review raised a number of strategic issues for consideration, including a broader role for information services in ICLARM's corporate public awareness.

ICLARM contributed to the strengthening of national research systems through its two research networks (the Asian Fisheries Social Science Research Network - AFSSRN- and the International Network on Genetics in Aquaculture - INGA). An active system of research information exchange was continued through the Network of Tropical Fisheries Scientists and the Network of Tropical Aquaculture Scientists.

Of note for the AFSSRN was the development of training courses for countries in the Mekong Sub-Region (formerly Indo-China), involving trainers from Asian research institutes which are Network members.

INGA held its first Steering Committee meeting in Bangkok in May 1994 and developed draft protocols for handling fish transfers among member countries, a list of breeding priorities and requests for exchanges of genetic material.

Training of scientists from national institutions has been a significant activity in the GIFT project. The focus of training has been on quantitative genetics and planning of national fish breeding programs. A framework for implementation of the project's training activities has been developed. The project has also been providing significant technical support towards the organization of training to hatchery managers and technicians directly associated with the Philippine National Tilapia Breeding Program (see p. 4).

Management

Dr. Larry Stifel's* term as Interim Director General of ICLARM finished in March 1994. During some of this period, he was absent on duty in his position at Cornell University and Dr. John Munro (Director, Coastal and Coral Reef Resource Systems Program) was acting Director General. Dr. Meryl Williams commenced duty as Director General in April 1994.

The 1994 budget expenditure of ICLARM was US\$6.9 million, down from US\$7.4 million in 1993. This consisted of \$3.4 m (49%) in unrestricted core, \$1.7 m (25%) in restricted core, and \$1.8 m (26%) in complementary funds. The comparable figures for 1993 were \$3.9 m, \$2.0 m and \$1.5 m, respectively. Funds were provided by 24 donors, 12 of which were donors of unrestricted core.

As of 31 December 1994, the total staff employed by ICLARM numbered 209, consisting of 126 at headquarters in Manila, 16 in Bangladesh, 35 in Malaŵi, 41 in the Solomon Islands, 1 in Sierra Leone and 1 in Denmark. Of these total staff, 23 were internationally recruited and the remainder were recruited locally or regionally.

Highlights of 1994 management actions were:

Internally commissioned external reviews

By the end of 1994, all ICLARM programs and divisions had been reviewed through a series of internally commissioned external reviews. The reviews commenced in late 1992 and the Board has determined that a rolling program of such reviews will be conducted so as to cover all areas approximately every five years or more often if required. These internal reviews are essential guides to ICLARM and its research partners as well as providing valuable input to the external reviews conducted by the CGIAR.

Human resource management

1. Personnel policies for nationally recruited staff (NRS) in the Philippines (ICLARM's largest group of staff by number) were approved by the Board in April 1994. These complement the new policies for internationally recruited staff which were approved in 1993.
2. Under the umbrella of the personnel policy manuals, a comprehensive personnel performance management scheme was developed in consultation with all staff, the first full cycle to be implemented from the start of 1995.

* Dr. Larry Stifel passed away 19 April 1995.

3. In Manila, a Nationally Recruited Staff Advisory Committee was instituted to act as a forum for bringing NRS issues before senior management, canvassing opinions on organizational matters, and providing a consultative forum on staff matters and policies. This Committee is proving to be a very effective means of addressing special issues of interest to NRS.
4. International staff salary arrangements were revised to provide a more transparent system for remuneration. Similar principles of salary structures and pay steps were used in developing a new scheme for the NRS to be applied in 1995.

Financial and resources management. Improvements were made in project management, monthly financial reporting to project managers and management, and in automating accounting and reporting functions under the management information system. An improved system of monitoring project reports (technical and financial) was instigated. A full project management manual is in preparation.

CGIAR. The Center also took major steps to align itself more closely with the reporting and other requirements of the CGIAR and to participate actively in the relaunching of the CGIAR. In early 1994, CGIAR Chairman Dr. Ismael Serageldin visited ICLARM to learn more about the activities of the Center and to express his personal support for the Center's research efforts in natural resources management.

Internal communication. Weekly meetings of senior managers were instigated, along with reports from these meetings to all staff. A fortnightly *Board Notes* report was produced, and distributed to all Trustees and ICLARM staff. The monthly staff newsletter underwent substantial changes throughout the year and emerged at the end renamed as *ICLARM Newsplash* and with a format that seeks to inform staff of events, people and issues in an informal but accurate way.

Space at headquarters. ICLARM's rented headquarters in central Makati (Manila) were clearly inadequate for the numbers of staff and extra space was negotiated in the same building for takeover in early 1995. The Board established a headquarters site committee to investigate selection of a suitable headquarters site in the Philippines.

Information technology. Despite limited funds, ICLARM gave high priority to extending its connections to international information technology networks, especially through the CGIAR's e-mail network, CGNET. The in-house local area network (LAN) was extended during the year and many personal computers were upgraded to run Windows software. Plans are in hand to complete the headquarters upgrades during 1995 as the facilities are still far short of satisfactory.

Facilities. In late 1994, ICLARM received an offer from the Government of Egypt for the use of the Central Laboratory for Aquaculture Research (CLAR) in Abbassa for ICLARM's international research activities. The Government of Egypt indicated its willingness to turn over these facilities to ICLARM and to host an ICLARM presence in Egypt.

Board of Trustees

The Board of Trustees held two full meetings in 1994, the first on 11-16 April at the time of the handover from Dr. Stifel to the new Director General Dr. Williams, and the second on 14-19 November. Field visits were made to the Central Luzon State University (Nueva Ecija, Philippines) during the April meeting and to tilapia farms and hatcheries in the Los Baños area during the November meeting.

The Board maintained an updated Board Action Plan throughout the year.

The Chairperson of the Board of Trustees officiated as chair of the Committee of Center Board Chairs of the CGIAR for 1994, and, with the Director General, attended the Mid-Term Meeting of the CGIAR in New Delhi, India, and International Centers' Week, 19-28 October, in Washington, DC.

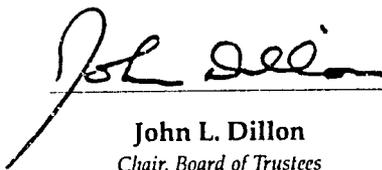
ICLARM's Mandate

A final note in relation to ICLARM's mandate stresses the urgency of external changes affecting us. During 1994, international attention was focused on the plight of the world's marine fisheries as more and more evidence, including that from work by ICLARM, showed the state of heavy exploitation in most fisheries.

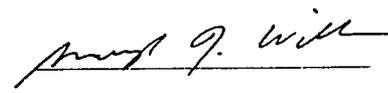
In reviewing the world fisheries situation in a paper presented at the 65th meeting of the Technical Advisory Committee (TAC) of the CGIAR in October 1994, the Director General concluded that we were witnessing global-scale changes in the supply, demand, value, management and uses of living aquatic resources and that these changes could threaten progress towards sustainable food security in many parts of the developing world. On the other hand, they could also stimulate improved management and use of the resources. Users of the resources face a period of transition in which actions, even small ones, can have great impact.

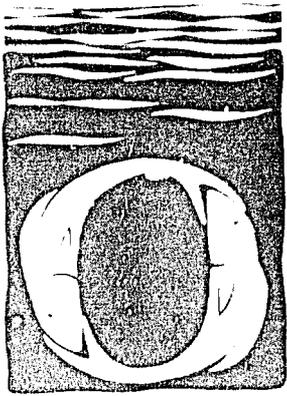
During this transitional period, research, well-targeted to the strategic issues facing management of the resources, can and must play a vital part to improve the outlook for low-income people in the developing world. ICLARM's mandate can never be more vital than at present.




John L. Dillon
Chair, Board of Trustees




Meryl J. Williams
Director General



One Year into the Medium-Term Plan

Introduction

At the beginning of 1994, ICLARM began the first year of its Medium-Term Plan (MTP), a five-year (1994-1998) plan of research and related activities derived from a Strategic Plan drawn up in 1992. The Strategic Plan provided, as well as a framework for its research work over the next 10-15 years, the basis of ICLARM's admission in 1992 to the Consultative Group on International Agricultural Research (CGIAR, see p. vi).

The MTP is a priority set of investigations and activities focused on improved resources management as the means to sustainable improvements in both capture fisheries and aquaculture. The management studies are supported by work to improve the productivity of selected species.

The research activities under the MTP are guided by principles of sustainability, equity, gender, user participation and a systems approach. They take place in the three most critical aquatic resource systems for low income people in the developing world - coastal (especially estuaries, lagoons and bays), coral reef, and inland (focusing on ponds and rice floodwaters). Geographically, they are focused on the Asia-Pacific and subSaharan African regions.

These research activities, which are carried out in collaboration with many partners, consist of the following:

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

The research areas are divided into three for administrative purposes: the Inland Aquatic Resource Systems Program, with a focus on integrated resources management and fish productivity; Coastal and Coral Reef Resource Systems Program, in which resource management and enhancement are the prime foci; and a group of Special Projects, research networks in social sciences and fish genetics, respectively, and an international fisheries co-management project investigating joint government-community management of fisheries.

Expected Outputs

The MTP envisages that the work will result in new analytical tools for understanding coastal aquatic resources dynamics, new management concepts and schemes for managing coastal and coral reef fisheries, new farming systems for inland and coral reef resource systems and new breeds of fish.

The MTP was built on the key researchable issues in the priority resource systems, a solid foundation of work in progress and on the comparative advantage of the Center's expertise in its fields of endeavor. Thus, although ICLARM is only one year into the Plan, results are already emerging. However, significant impact of the Center's work is now deriving from the accumulated results of research over several years. In the following, the impact of the Center's work, due to the outputs in the three broad headings above, i.e., understanding resource system dynamics, developing alternative management schemes and improving productivity of key species, is presented.

Progress of ICLARM's 1994-1998 Medium-Term Plan and Impact of Earlier Work

Understanding Resource System Dynamics

ICLARM's work in tropical fish population dynamics has led to a very wide range of fisheries assessment concepts and software developments which have impacted greatly on tropical fisheries science in the past decade (Fig. 1). In 1994, ICLARM's suite of stock assessment software (ELEFAN - Electronic Length-Frequency Analysis) was integrated with materials developed by FAO in a product called FiSAT, FAO-ICLARM Stock Assessment Tools. The predecessors of these tools have been used in dozens of training courses, principally mounted by FAO/DANIDA (Danish International Development Assistance), and are routinely used in fisheries science courses in many universities in both developed and developing countries. Consequently, ICLARM's stock assessment systems are in daily use in the assessment and management of fisheries throughout the tropics.

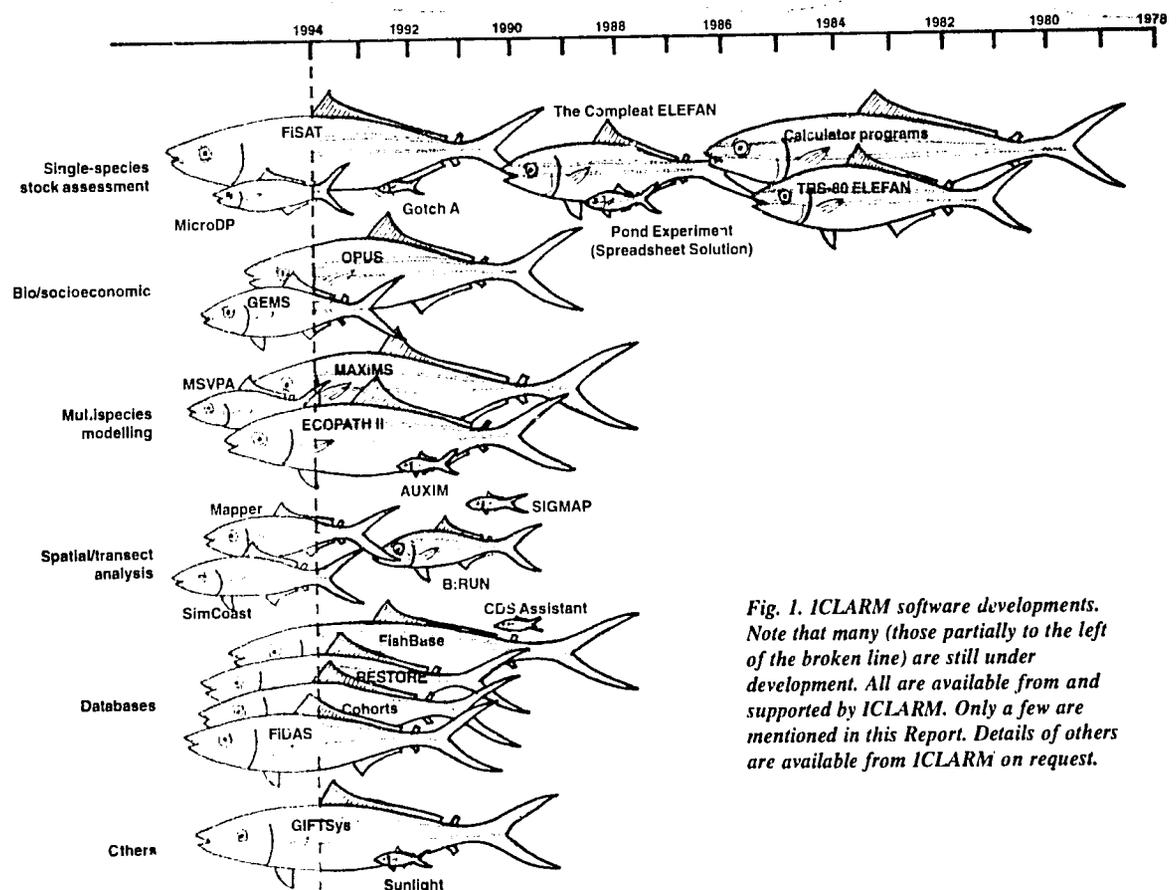


Fig. 1. ICLARM software developments. Note that many (those partially to the left of the broken line) are still under development. All are available from and supported by ICLARM. Only a few are mentioned in this Report. Details of others are available from ICLARM on request.

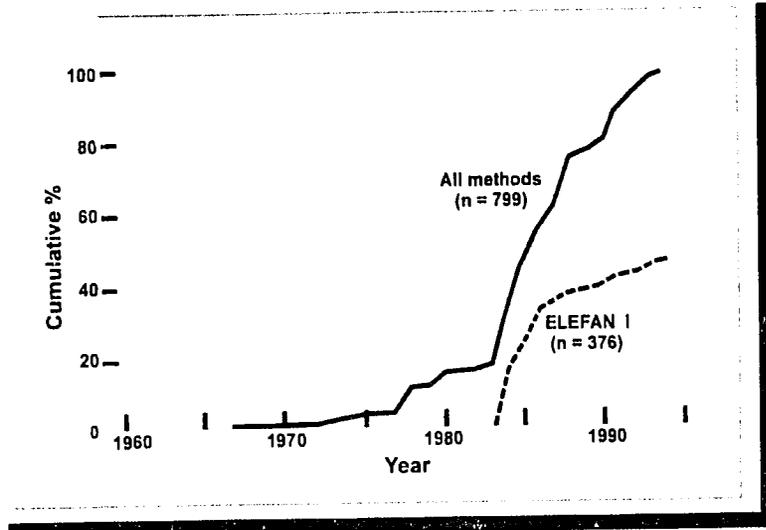


Fig. 2. Methods used to estimate management parameters for fish stocks in the Western Central Pacific area (FAO Area 71), as recorded in FishBase. ELEFAN has accounted for 47% of all published estimates in this region. Typically, one data point represents the work in an MS thesis or in a short journal article. For most assessment methods, such work represents in turn an effort/investment of about \$10,000. Using ELEFAN, the equivalent investment is \$2,000 or less.

One measure of the spread of ELEFAN is through its reported use in research literature. This was measured by looking at the sources of stock assessment data for the 12,000 fish species presently covered by FishBase, ICLARM's electronic encyclopedia of fish. On a global basis, 14 per cent of all data had come from the use of ELEFAN by the end of 1994. In the tropics for which it was designed, ELEFAN's impact has been more marked; nearly 50 per cent of all assessments in the Western Central Pacific area, which includes Southeast Asia, were based on ELEFAN by end-1994 (Fig. 2).

While the single-species ELEFAN approach was being developed, ICLARM also analyzed several multispecies fisheries, using an innovative combination of standard biological and economic approaches. In the case of the Philippines, one study in 1988 showed that bottom living or demersal resources were overfished, while another showed that fisheries for small open-water or pelagic fish were also heavily overfished; our 1993 biometric study put the annual losses of the pelagics fleet at some US\$250 million (see Fig. 3). These results are now being used by the Philippine Bureau of Fisheries and Aquatic Resources as the basis for a proposed five-year ban on the issuance of licenses for new commercial fishing vessels in an effort to make Philippine fisheries sustainable.

Then, the Center turned to the effects of fishing on whole ecosystems. ICLARM scientist Daniel Pauly wrote about the concepts this involves in an article published in the Information Newsletter of the International Council for the Exploration of the Sea during 1994, entitled "From managing

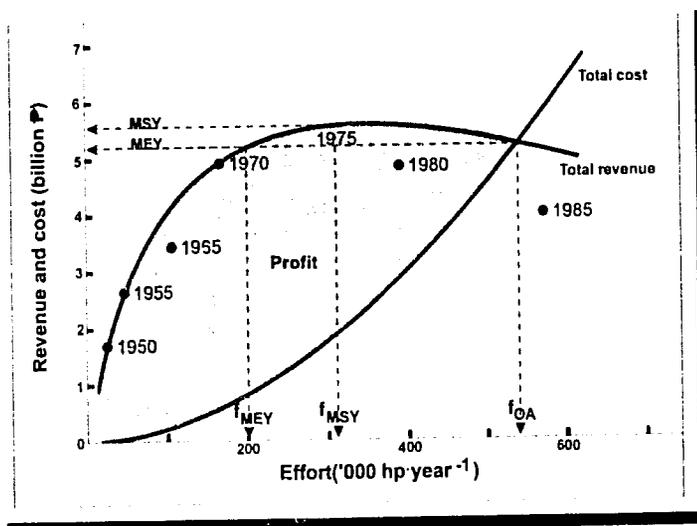


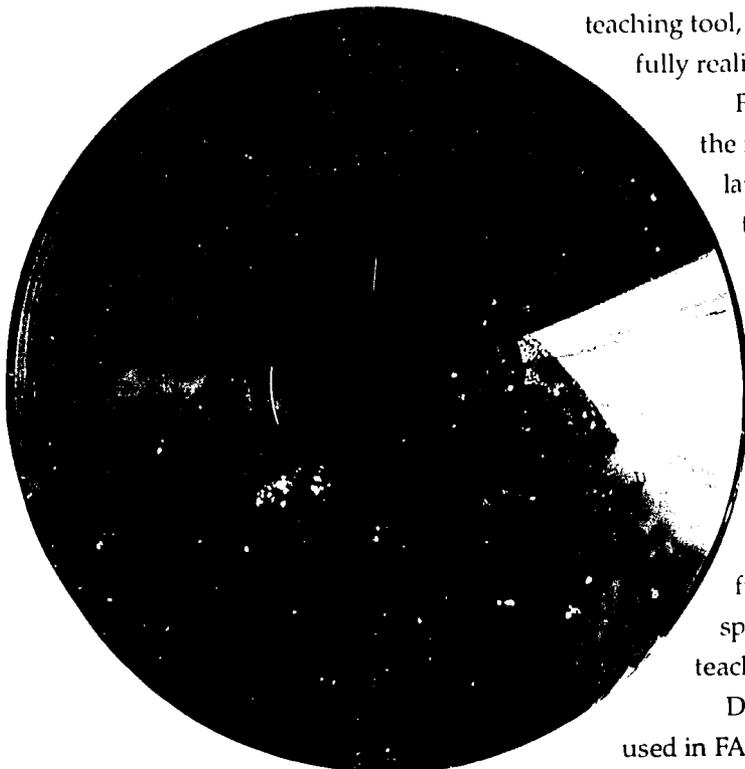
Fig. 3. This figure in the 1993 ICLARM Technical Rep. 38 entitled "Bioeconomics of the Philippine small pelagics fishery" shows how profits have declined from a maximum level in 1970 as effort increased. By 1985 the fishery was incurring losses amounting to P9.4 billion corresponding to effort level 60% greater than optimum. The information has helped the Philippine government in its recent moves to limit effort in the fisheries. MSY = Maximum sustainable yield; MEY = Maximum economic yield; OA = Open access; f = effort.

fisheries to managing ecosystems". The editor called it "one of the most important articles ever published in the twelve-year lifespan of this publication."

ICLARM's major contribution to an ecosystem approach, supported by DANIDA, is through the software ECOPATH II, which models the trophic structure of ecosystems and has over 100 active users at the present time. The number is growing as a result of recent training courses in Brazil (2), Canada, Germany (2), Malaysia and Thailand (2). It has been the subject of special university courses in Canada, Germany and Thailand, and is being used in course work at the University of Newcastle-Upon-Tyne, UK. The training is often in an applied context. For example, a 2-week course at the Instituto Oceanográfico da Universidade de Sao Paulo in Brazil in June 1994 given by former ICLARM scientist Dr. Astrid Jarre-Teichmann, was in response to the expressed need of scientists working on the Brazilian shelf ecosystem to integrate the results of their studies into a complete picture of energy flows through this ecosystem. Six Brazilian institutions are interested in further application work.

The Center's own work in applying ECOPATH has resulted in a finding of major global significance: possibly one-third of coastal water primary productivity worldwide is being used to support fisheries production. This study presents strong evidence for broad limits to the carrying capacity of the world's oceans. One implication is that the present rate of fishing in coastal waters, where 90 per cent of fisheries production takes place, is likely to cause significant changes in the continental shelf ecosystems. The Brazilian scientists, now using ECOPATH to study their continental shelf, may end up pointing the way to how to document such changes in a rigorous fashion.

ICLARM began its project to create an electronic encyclopedia of fisheries resources in 1988 in collaboration with FAO and with financial support from the European Commission. The project was to assemble biological information on as many species as possible to create a research tool as well as a database of facts. Over the years, the 10-person team at ICLARM has collaborated with dozens of institutions and individuals around the world in inputting and checking the accuracy of the information. The result, FishBase, is a powerful research and teaching tool, the capacity of which has not yet been fully realized.



FishBase became a reality in 1994 when the first CD-ROM disc was produced and launched at the meeting of the Parties to the Convention on Biological Diversity in the Bahamas in early December. FishBase version 1.0 contains information on more than 12,000 species - half the world's total and all of the species that are important to humankind. FishBase has useful applications for aquaculturists, conservationists, ecologists, the fishing industry, funding agencies, research directors, sport fishers, students, taxonomists, teachers and zoologists.

Diskette versions of FishBase have been used in FAO training courses in fish stock

assessment. The Program of Ecology, Fisheries and Oceanography of the Gulf of Mexico (EPOMEX) has received a grant from the Mexican Science Foundation to link FishBase with their national biodiversity information system. Many other organizations and individuals are actively formulating plans on the basis of the availability of FishBase.

There are many potential applications of FishBase. One less obvious one was its use to learn the impact of ELEFAN in stock assessment methodology noted above. In another, an international group of flatfish scientists in 1990 raised the idea of "fact-sheets" on each species to stimulate comparative studies. FishBase now offers a template containing tables for almost all the information sought. Another useful application not anticipated earlier is that FishBase can be used to identify the current (=valid) scientific names of species listed early, but still widely used taxonomic works. This was recently exemplified through a study by R. Froese of the book "Trawled Fishes of Western Indonesia and Northeastern Australia" by T. Gloerfeldt-Tarp and P. Kailola. Since the book was published in 1986, 10 per cent of the scientific names have ceased to be current.

ICLARM is developing ReefBase, with the World Conservation Monitoring Centre and with initial support from the European Commission. This database contains information on coral reefs around the world, enabling global syntheses and predictions as well as providing site-specific data. Coral reefs are major contributors to tropical fisheries but their present and potential contributions remain to some extent unknown. ReefBase will provide a benchmark of reef use and condition against which the impacts of future reef-related activities can be measured. For example, French climate modelers have recently found that coral reefs may be intricately connected with the carbon cycle to the point of influencing global warming. ReefBase staff are now cooperating with researchers in different parts of the world to determine precisely the role of coral reefs in global warming.



Just over a year into the project, ReefBase has become a hub of information exchange among coral reef scientists and managers around the world. A number of enquiries have been received for advice on coral reef survey methods which will yield data compatible with ReefBase. The project is thus playing a major role in standardizing coral reef assessments. Many project proposals now cite ReefBase as the ultimate repository of their data, including a large program in the Pacific Islands. A workshop in Luxembourg in September 1994 led to a general agreement that several major international volunteer programs focused on coral reef surveys would work towards standardizing data acquisition and database development to conform with ReefBase requirements.

ReefBase played a significant role in the "Coral Reef Consultation Day" of the US State Department in January 1994. This led to the development of the International Coral Reef Initiative,

which has been designed to ensure that coral reef management be made a priority issue in national and regional development plans in reef areas. ReefBase has been identified in several contexts as part of this initiative, including: (i) as a repository for information from international survey and monitoring programs; (ii) as a source of information for prioritization and management; and (iii) as a central node for future systems of biodiversity databases.

Therefore, in terms of ICLARM's Medium-Term Plan, the results of the first year in coastal and coral reef systems research are producing new analytic tools for understanding the resource systems: the release of FishBase and FiSAT software; the development of ReefBase; and global estimations made possible through ECOPATH.

Alternative Management Schemes

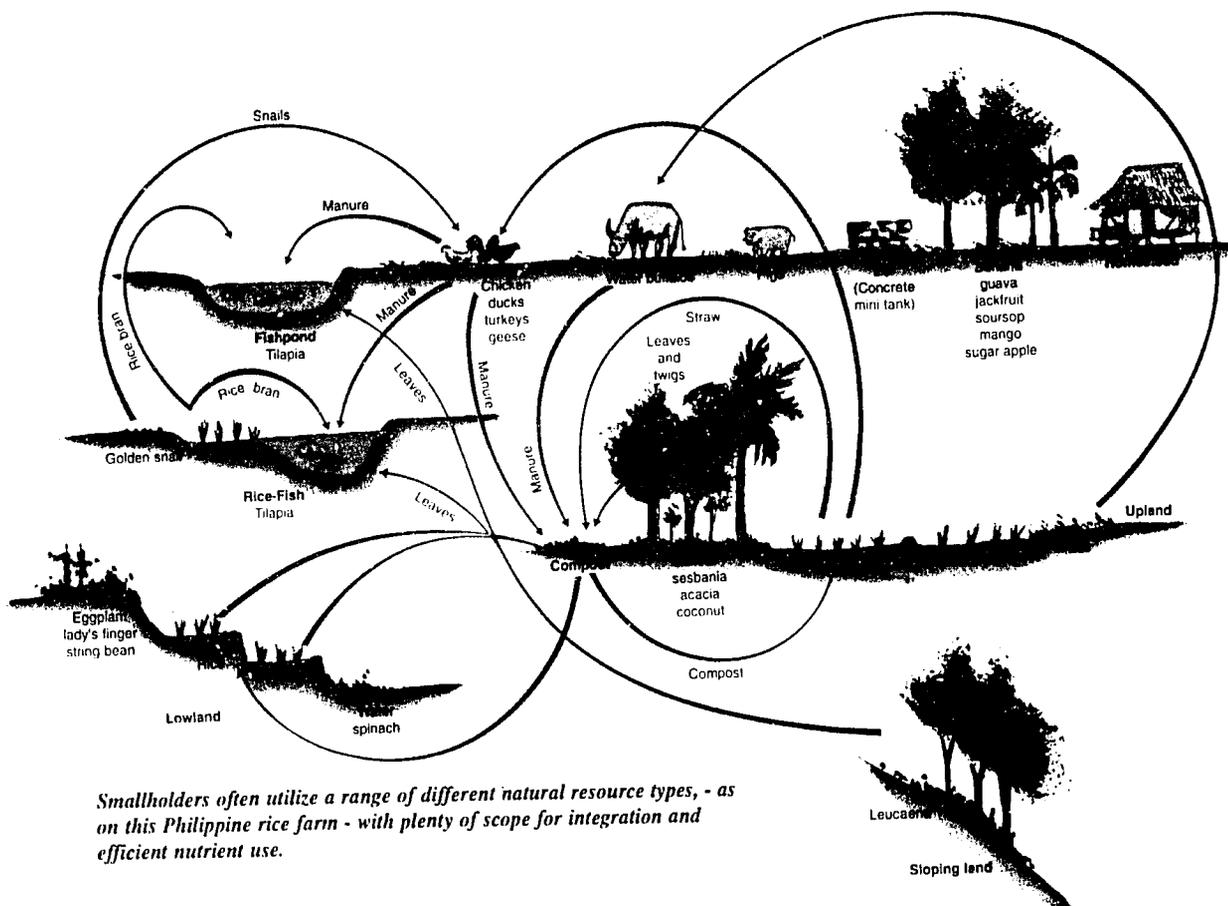
ICLARM has targetted rural smallholders, the small-scale farmers, for research into the development and adoption of integrated agriculture-aquaculture, based on integrated management of all their available resources. This has been termed Integrated Resource Management (IRM). Unlike past efforts at developing new technology and offering this to farmers, the IRM approach relies largely on participation: creating suitable technology with farmers. ICLARM and partners have used this approach to find ways of incorporating fish as another crop on small-scale farms and capitalizing on synergisms among crop, livestock, vegetable and fish enterprises and multiple use of farm ponds.



In Bangladesh, where ICLARM has been working with national institutions such as the Bangladesh Agricultural Research Council, Bangladesh Department of Fisheries and Bangladesh Fisheries Research Institute, farmers and landless persons since 1990, over 25,000 households are using integrated agriculture-aquaculture farming systems developed during the course of their joint efforts. The project has also had widespread impact through training; more than 1,500 farmers and NGO extension workers received 1-5 days training in integrated farming during 1994.

The success of the Bangladesh work has caught the attention of many agencies, especially NGOs which are now training and involving women in aquaculture. For example, two major NGOs in Bangladesh, the Bangladesh Rural Advancement Committee and Proshika, working with government and ICLARM scientists, are helping more than 30,000 fish farmers, nearly 60 per cent of whom are women.

In Malawi, national institutions working with ICLARM - Malawi Fisheries Department, Malawi Department of Research and Environmental Affairs and University of Malawi - have greatly strengthened their capacity to pursue inland aquaculture and Malawi's designated lead role in inland fisheries and aquaculture for the Southern African Development Community subregion. A project between ICLARM and national partners from 1986 to 1994, supported by Bundesministerium für Wirtschaftliche Zusammenarbeit/Deutsche Gesellschaft für Technische Zusammenarbeit, GmbH (BMZ/GTZ) has contributed to a policy shift on the part of the Government of Malawi to foster small-scale integrated agriculture-aquaculture rather than large, intensive estate farm aquaculture. The project has also helped Malawi to strengthen its existing policy of safeguarding its unique fish fauna by excluding exotic species, and has assisted the development work of other organizations in the subregion, e.g., Malawi-German Fisheries and Aquaculture Development Project (MAGFAD),



Smallholders often utilize a range of different natural resource types, - as on this Philippine rice farm - with plenty of scope for integration and efficient nutrient use.

Aquaculture for Local Community Development (ALCOM/FAO) and the Central and Northern Regions Fish Farming Project.

Over 60 socioeconomic and biotechnical studies were conducted during the project; their results have been formulated into an information kit for extension agents, research summaries, and 115 peer-reviewed and other publications. Staff made 75 national and international presentations. The project contributed substantially to the human and material resources available to the university system and

the Malaŵi Fisheries Department. Apart from assisting curriculum development and teaching at the University of Malaŵi, staff supervised 11 graduate students who now work within the region.

Project staff and farmers developed a variety of technologies for integrated agriculture-aquaculture. It was found that a pond, properly used, changes the whole ecology and economy of a farm, providing a wide range of services (water for irrigation and household use, fertile mud for improving garden soils, etc.) as well as producing fish. Some of the Malawian farmers involved have doubled or tripled their farm income using project results. These farmers were also able to grow some



Left: Ponds in Malawi provide more than just fish. Here, a smallholder is watering vegetables with water taken from his fishpond. Using nutrient-rich pond water for irrigation can help farmers through short dry spells.



Right: Harvesting of even small rainfed ponds attracts considerable interest from Malawian villagers who are keen fish eaters.

crops during severe droughts when farmers who had not integrated farm ponds into their system had little or no produce. There is scope for widespread adoption of this kind of farming. It is estimated that nearly one million farm households in Malaŵi - and a further 1.3 million in neighboring Zambia and Zimbabwe - are suitable for adoption of integrated farming. This potential will be tapped in a follow-up regional project in 1996.

A similar approach was taken in Ghana where ICLARM and partners - Institute of Aquatic Biology, Ghana Rural Reconstruction Movement, International Institute for Rural Reconstruction, Institute of Renewable Natural Resources and University of Science and Technology of Ghana - completed in 1994 a three-year project to study the future scope for development of small-scale integrated farming. As in Malaŵi, farmer participation, farm ponds as facilitators for new synergism among enterprises, and IRM were emphasized, rather than aquaculture development *per se*. Aside from countrywide studies and modeling, a research area was chosen, characterized by denuded hillsides, strong erosion, depleted soils, seasonal streams, short fallow periods (1-2 years) and a maize-cassava-plantain intercropping system. Farm ponds helped to catch some of the sediment runoff and provided nutritious mud and water to adjoining plots, especially vegetable gardens. The results indicated large potential benefits from combinations of agroforestry, biointensive gardening and aquaculture of indigenous species.

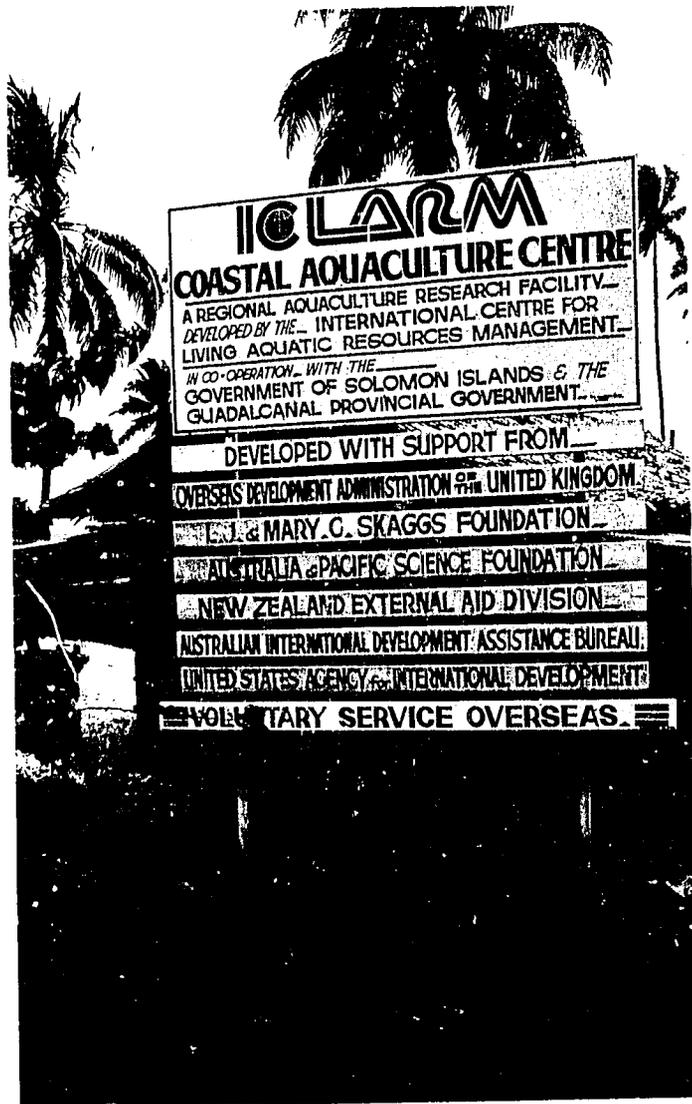
Although the project, which was supported by BMZ/GTZ, has ended, some of the innovations have taken root. Some 40 farmers have formed a fish farmers' association with the aim of exchanging experiences, assisting new entrants, organizing fingerling distribution, and purchasing a communal net for harvesting: a small beginning but, given the largely unsuccessful history of aquaculture in Africa, a significant event. There are 50,000-80,000 potential adopters of these systems in Ghana alone.

These small early successes in developing integrated agriculture-aquaculture through an IRM approach with farmers as research partners, suggest that crop, livestock, vegetable and forestry researchers need to join farmers much more than in the past. ICLARM's IRM thrust will attempt to play a more substantial part in this as the CGIAR's system-wide ecoregional activities evolve.

Development of viable giant clam farming systems in the rural tropics has been a major goal of the ICLARM's Coastal Aquaculture Centre (CAC) in the Solomon Islands since its inception in 1987. The Indo-Pacific in general has been vastly depleted of its giant clam resources, which are highly esteemed food items in nearly all parts of the region. The farming of hatchery-reared clams is one approach to restoring and managing the resources. ICLARM has been working towards viable farming methods with its partners, the Solomon Islands Ministry of Agriculture and Fisheries, and many other collaborators in the South Pacific region. During 1994, farmers in sixteen villages in the Solomon

Islands raised enough giant clams to provide the majority of their household's income. The transfer of the technology to other countries will rapidly widen this impact. Research at the CAC is currently supported by various organizations including the Australian Centre for International Agricultural Research, the Australia and Pacific Science Foundation, the European Union-ESTABEX, and the Australian International Development Assistance Bureau (now AusAID).

The Institute of Marine Biology and Oceanography of the University of Sierra Leone and ICLARM cooperated for nearly four years, with support from the European Commission, to develop and put into place tools for managing Sierra Leone's marine fisheries. The national impact has been to raise the awareness of the national fisheries department in using available



ICLARM's Coastal Aquaculture Centre in Solomon Islands is kept alive by its many collaborators and donors.



A new fishpond on a smallholding in Ghana provides fish for sale and for home consumption, as well as nutrient-rich water and mud for adjacent fruit trees and vegetable gardens.

data for management of the country's industrial fisheries. Four national databases were set up: a cost-effective data acquisition system was developed for use in both industrial and small-scale fisheries; a small-scale fisheries survey; small-scale fisheries landing statistics; and a database to use data from Soviet research surveys which had been carried out in the offshore area since 1976. The immediate impact of these works is local but the systems developed have great potential for utilization elsewhere in the developing world. Full adoption in Sierra Leone, unfortunately, will be hampered by continuing political unrest.

Two initiatives in 1994 offer possible long-term benefits for coastal communities in developing countries. One is a global Fisheries Co-management Project supported by DANIDA, which seeks to provide a set of globally or regionally applicable management models in which the national government and fishing community share authority and responsibility for fisheries management. Many national institutions in countries of Asia and Africa as well as regional institutions in the South Pacific (University of the South Pacific) and the Caribbean (CARICOM Fisheries Resource Assessment and Management Program) are collaborating in the Fisheries Co-management Project.

The other initiative is a new phase of the Asian Fisheries Social Science Research Network, a network of fifteen research teams at research institutions in Indonesia, Malaysia, the Philippines, Thailand and Vietnam, coordinated by ICLARM with support from the International Development Research Centre (IDRC) of Canada. The new Phase (1994-1996) has a major research focus on community-based fisheries management which will link up with the Fisheries Co-management Project and enable a broader research program in this field to be mounted, benefiting both the research groups and fisheries communities.

Projects related to co-management have begun in Indonesia, Malaysia, Mozambique, the Philippines, Vietnam and Zimbabwe. Models derived from the research in these and other countries in the two projects are expected to offer ways of lowering management and enforcement costs, improving acceptance and compliance with management measures, improving data reliability, greater participation of fishers in management and improved social cohesion and community development. The projects are already beginning to have an impact by raising awareness of the concepts and benefits of co-management amongst the collaborating agencies.

The Medium-Term Plan requires ICLARM to produce new management concepts and schemes. The first year's progress documented above shows that several projects towards this end have begun in both capture fisheries and aquaculture and that these will undoubtedly lead to new concepts from which new management schemes can be derived.

Improving Productivity of Key Species

A. Genetic Improvement of Farmed Fish

Several Philippine institutions (Bureau of Fisheries and Aquatic Resources, Central Luzon State University, Department of Agriculture outreach stations and Bureau of Agricultural Statistics), a Norwegian research organization (AKVAFORSK) and ICLARM have been working together since 1988 on the genetic improvement of tropical fish. Tilapia (*Oreochromis niloticus*) was chosen as the first species for development in view of its growing importance in some 75 countries and its emerging status as an international food commodity. UNDP and the Asian Development Bank have been supporting the work of the Genetic Improvement of Farmed Tilapia (GIFT) project.

Selectively bred GIFT tilapia, tested in low-cost input environments, were symbolically released to Philippine farmers by Philippine President Fidel V. Ramos in mid-1993. They grow some 60 per cent faster than regular strains and have almost 50 per cent better survival in ponds.

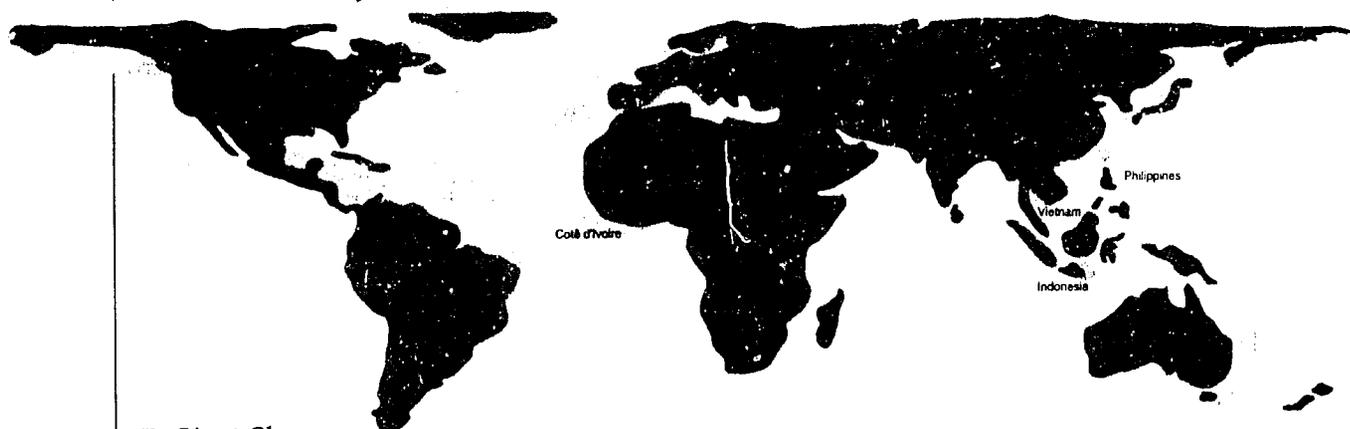
By the end of 1994, about seven million GIFT strain tilapia fingerlings had been distributed to farmers in the Philippines. Nearly 500 farmers had used them in commercial production and many more requests are being received by the BFAR, which has set up a Philippine National Tilapia Breeding Program as a result of this research success. Overseas requests for the fish have been received from 18 countries.

The most significant impact of the work, however, is the international interest in the research methodology and its application to tilapia elsewhere, as well as to other tropical and subtropical species. An International Network on Genetics in Aquaculture (INGA), coordinated by ICLARM, was set up at the request of various developing countries in Africa and Asia in mid-1993.



Once, ICLARM's resident GIFT Nile tilapia (*Oreochromis niloticus*).
Photo by David Hodges

Through trials by INGA members in Asia, the GIFT-bred tilapia have been found to perform better than locally farmed tilapia strains in Bangladesh, China and Vietnam so far. A special study, supported by the Asian Development Bank, began in mid-1994 to evaluate fully the genetic, socio-economic and environmental impact of genetically improved tilapia in these countries, and in the Philippines and Thailand and to help them plan breeding programs accordingly. Work has also begun in some INGA member-countries on genetic improvement of other species, including carps such as the silver barb (*Puntius gonionotus*). Thus, the genetics research initiated by ICLARM and its partners has not only produced the first genetically improved tropical aquaculture species to go into regional production, but has also had a strong multiplier effect, benefitting directly the eleven INGA member countries to date - Bangladesh, China, Côte d'Ivoire, Egypt, Ghana, India, Indonesia, Malawi, the Philippines, Thailand and Vietnam - in terms of access to information, methods and, where transfers are environmentally sound, fish.



B. Giant Clams

Giant clams and their utilization have been investigated by ICLARM and partners since 1984, mostly based at the CAC in the Solomon Islands. One major impact has been reversing the drift of the largest species towards extinction over much of their (Indo-Pacific) range. However, transfer of stocks of clams grown or found in one place to another has certain genetic and ecological consequences, as well as being a possible mechanism for disease spread. The CAC has been working with many other institutions in evaluating the risks of indiscriminate introductions of giant clams and in developing genetically sound ways of re-establishing stocks. Conservation of clam genetic resources is not simply conservation for its own sake, but the cheapest and most effective way of developing a biological asset. The impact has been increased awareness of these issues throughout much of the region and implementation in various countries of protocols for transfer of clam stocks.

Giant clams have been the subject of ICLARM research since 1984, reversing their drift towards extinction. Here, a diver checks juvenile clams.

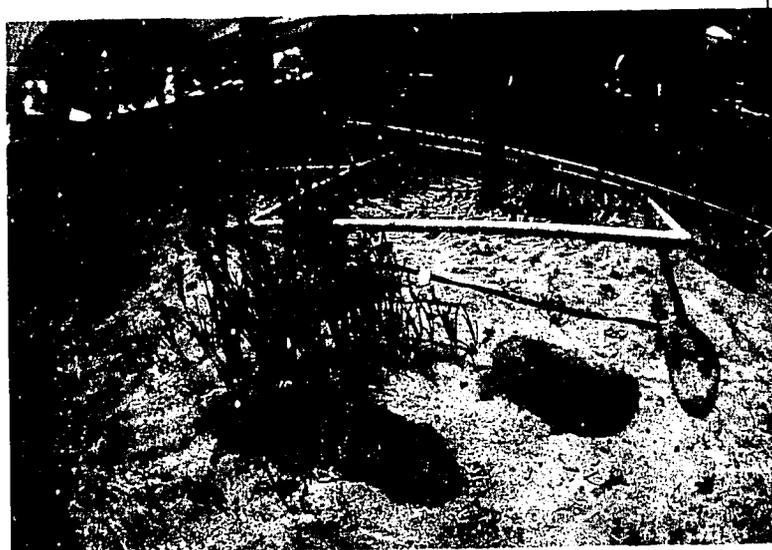


C. Pearl Oysters and Sea Cucumbers

The culture of pearls from blacklip pearl oysters has brought substantial economic benefits to coastal communities in a few tropical Pacific countries where "closed" lagoons have made the capture of wild seed for culture relatively easy.



Recent ICLARM-CAC initiatives include research on sea cucumbers (right) and blacklip pearl oysters (above).



Blacklip pearl oysters occur also throughout the more open coral reefs of the Indo-Pacific region. The CAC and partners, Solomon Islands Ministry of Agriculture and Fisheries and James Cook University (Australia), are investigating whether there are areas where wild seed can be reliably collected or simple hatchery technology can be established; if so, village farming systems like those developed for giant clams may be viable over wide areas of the Pacific. Given the dearth of new opportunities for coastal communities in the region to earn income, the impact of such farms would be considerable. ACIAR is supporting this effort.

Sea cucumbers or *bêche-de-mer* are valuable sources of income in remote areas of the Indo-Pacific because after processing they can be stored without refrigeration and fetch a high price in Asian markets. The re-entry of China into world trade has resulted in a dramatic increase in demand for this commodity. There is widespread concern that catch levels now may not be sustainable. The ability to sustain or increase the yield of sea cucumbers by enhancing wild stocks would be a valuable tool for managers. Enhancement involves liberating juveniles raised in hatcheries into the wild to ensure a large and constant supply of animals for capture each year. ICLARM and the Solomon Islands Ministry of Agriculture and Fisheries, with support from the Australia and Pacific Science Foundation, have so far spawned several species of sea cucumbers. This project will be greatly expanded over the next five years with financial support from ACIAR. The impact that this work may produce would be felt throughout the Indo-Pacific in increasing and stabilizing the production of an international commodity presently in great demand.

The above work on improving productivity of fish, giant clams, pearl oysters and sea cucumbers has so far led to a new fish breed, as promised in the Medium-Term Plan, and new resources that may (1) enhance the productivity of coral reefs; and (2) provide the basis of new farming systems in coral reef areas.

Information Dissemination

ICLARM has been distributing, free of charge, large numbers of books, magazines and newsletters to individuals and institutions around the world, mainly in developing countries. The contents are usually based on ICLARM's research findings. However, in 1983, we published a series of reports by John Munro and colleagues on Jamaican fisheries resources; the reports had previously only appeared in mimeo form over the period 1973-1981. The results and methodologies were both felt to be important - early examples of severe overfishing determined by novel techniques. The book was widely distributed free and many copies were also sold.

Jamaica is the center of coral diversity in the Atlantic Ocean. A recent report in *Science* (Vol. 265, p.1547-1551; 1994) by T.P. Hughes describes the large-scale degradation of Jamaica's coral reefs; the ICLARM publication* by Munro and his colleagues (Fig. 6) was a key resource in ascribing causes of the degradation.

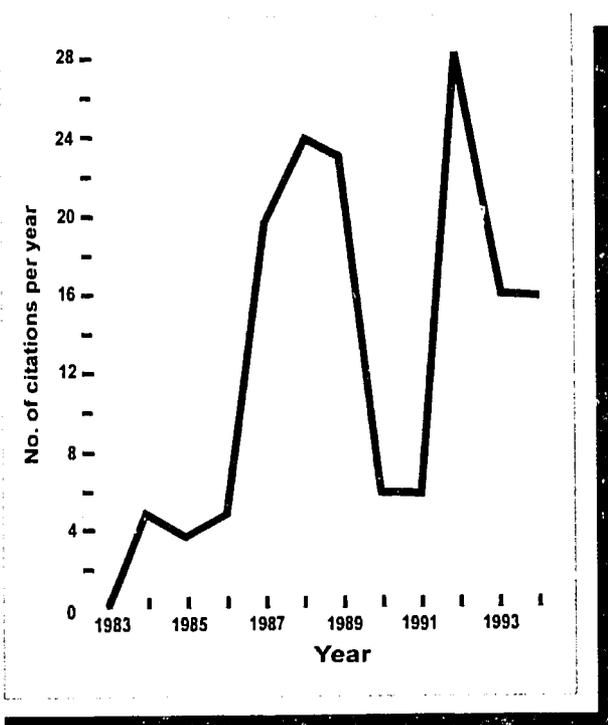
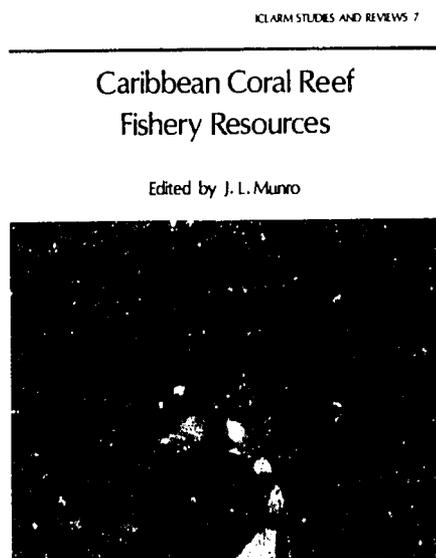


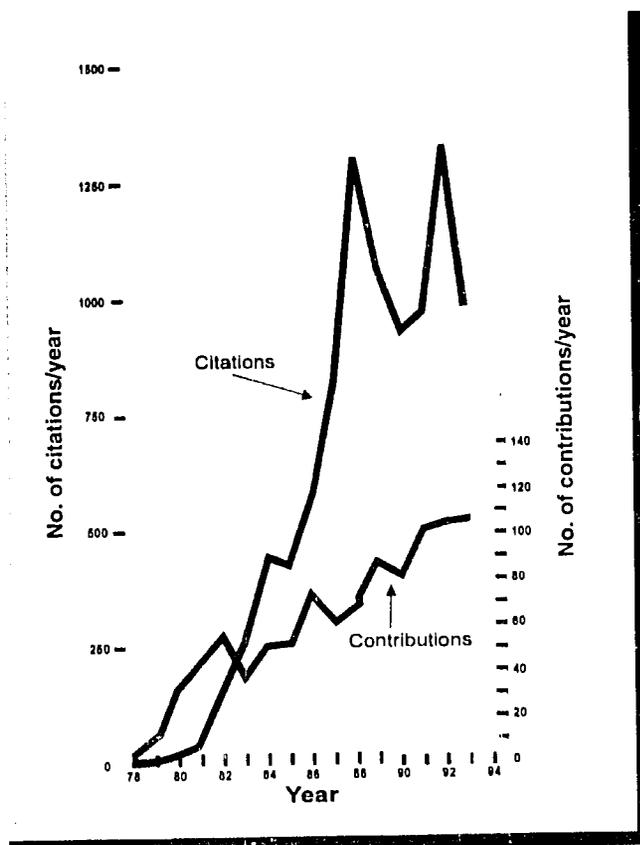
Fig. 6. The ICLARM volume (below) which republished reports on Jamaican fisheries by John Munro and colleagues has proven its value. To date it has received 135 citations by non-ICLARM authors, as shown at left. Generally, scientific articles receive most citations in the first two years, after which the citations taper off. This is not the case in the present compilation which is enjoying a far greater longevity and continuing usefulness.



Scientific publications generally have a more immediate use. They begin to be cited within a year of publication if they are found useful by other scientists and citations cease after 4-5 years. The average article is cited only once! By the end of 1994, the number of contributions to the literature from ICLARM passed 1,100. The number of citations that we have found to them, excluding those from within ICLARM, is 9,500 (Fig. 7). Not all citations are as significant as the Jamaican example. However, since most of ICLARM's output in past years has been written research results, syntheses and advice in the primary literature, in ICLARM's technical series of publications and in magazines such as *Naga*, this large number of citations represents a substantial impact amongst working (and publishing) scientists.

*Munro, J.L. Editor. 1983. *Caribbean coral reef fishery resources*. ICLARM Stud. Rev. 7, 276 p.

Fig. 7. ICLARM contributions (1,100) from 1977 to 1994 and number of citations (9,500) of these contributions.



The Information Division continues to provide seven technical publication series: Studies and Reviews, Conference Proceedings (both series externally peer reviewed), Technical Reports, Bibliographies, Education, Translations and Software; *Naga, the ICLARM Quarterly*, which includes articles and other information of general interest as well as the newsletters of the Networks (and that of the Asian Fisheries Society); *ICLARM Newsbriefs*, an occasional newsheet for donors and colleagues; videos; the Annual Report; an internal monthly *ICLARM Newsplash*; and various brochures and posters. For the first time, a forward-looking *ICLARM 1995 Operational Plan* was published, complementing this Report.

Tracking down citations is a task of the library, which as of December 1994, contained over 13,000 volumes of books and monographs and 945 serial titles. Library staff were also kept busy by over 2,000 visitors, of whom some 500 used the library's electronic databases.

Management Services

Implementing ICLARM's Medium-Term Plan has required increased resources and increased staff, in both research and support areas. The Center's management structures have been evolving to accommodate new projects and project sites, new infrastructure, new financial and administrative arrangements as well as new reporting requirements for the Board and the CGIAR.

In 1994, as in previous years, the Center had to grapple with continuing cash flow difficulties brought on by its poor level of working capital and the uncertainties and unpredictability of donor grants and grant disbursements. For these reasons, cash management was very high on the priority action list of the Center which had to impose additional control measures on advances, to follow-up receivables more aggressively and to obtain short-term liquidity loans from the CGIAR Secretariat. Since these were short-term solutions at best, Management also focused its efforts on establishing

additional systems for improved financial reporting and control while the Board of Trustees agreed to build up working capital by setting aside US\$200,000 annually over a number of years.

Similar efforts were placed by the Division on human resources management systems. Personnel policy manuals for both IRS and NRS were prepared and approved by the Board early in the year. A new Performance Management System was also established toward the end of the year and will be implemented in early 1995 following the training of all ICLARM staff. A review of IRS and Philippine NRS salaries was also conducted in 1994 and new Board-approved scales and salary administration policies will be implemented effective 1 January 1995.



Director General Meryl Williams in one of the meetings with nationally recruited staff.

One of the most important steps taken by ICLARM management in 1994 was to establish various mechanisms for staff to be consulted and involved in the development of personnel policies and procedures. Staff were given the opportunity to comment on successive drafts of the personnel policy manuals and the guidelines for the Performance Management System. The Director General also established the Nationally Recruited Staff Advisory Committee (NRSAC) whose main responsibility is to advise the Director General on issues of concern to Philippine NRS. These issues include salaries and benefits, working conditions and specific policies and procedures.

Governance and Management

With the selection and appointment of a new Director General accomplished in 1993, the ICLARM Trustees focused their 1994 efforts on the continued strengthening of Board operations, the development of policy, the oversight of and support for senior management, the pursuit of a headquarters agreement and site, and the improvement of the Center's donor relations. The Board also monitored Center management's preparation for the External Mid-Term Program and Management Review scheduled for early 1995. The Board Action Plan, as reviewed and updated at the Trustees' fifth and sixth meetings is presented below.

Board of Trustees Action Plan

Action	Meeting agreed upon	Status
1. Develop a Board Mission Statement	3	Done
2. Develop a Board Action Plan	3	Ongoing
3. Develop a Code of Conduct for Trustees	3	Done
4. Improve Internal/External Relations		
- Review NARS Relations/Establish policies for NARS strengthening	3	
- Review Donor Relations	3	
5. Improve Board Operations		
a. Revise the ICLARM Constitution	3	Done
b. Review selection/election procedures for new Trustees, Board Officers	3	
c. Establish Board Rules of Procedure	3	Done
d. Establish and implement procedures to evaluate and improve Board performance	4	Ongoing, started at 5th Meeting
e. Clarify Board Committee roles/responsibilities and streamline committee operations	5	Done
f. Review frequency of meetings and size of Board	3	Done
g. Educate ourselves on roles of Boards within the CGIAR	3	Ongoing
h. Induction/Orientation of New Trustees	3	Ongoing
i. Establish a Board Honoraria Policy	3	Done
j. Board Handbook	3	Done
k. Register of Board decisions (since joining CGIAR)	6	
l. Ensure expert financial advice to the Board	6	
m. Establish annual Board Awards (Science and Corporate) to staff	6	
6. Improve the Board Oversight Function		
a. Review selection procedures for DG	3	Done
b. Give attention to substantive policy issues		
b.1 Investment Policy	3	Done
b.2 External Auditor Appointment	5	Done
b.3 Spouse Employment/Affirmative Action	6	
b.4 Occupational Health and Safety	5	
b.5 Overhead Costs and Recovery	6	
b.6 Designation of Staff/Activities as Core or Non-Core	6	

Continued.

Board of trustees action plan. Continuation.

Action	Meeting agreed upon	Status
c. Give full responsibility and support to DG to restore institutional discipline	3	Ongoing
d. Ensure that management		
d.1 develops staff manuals	3	Done
d.2 establishes staff development policies	3	
d.3 establishes grievance/appeals procedures	3	Done
d.4 finalizes IRS compensation package	6	Done
d.5 establishes more appropriate internal procedures for evaluation and impact assessment	5	
d.6 develops administrative policy manual	5	
d.7 develops a finance and accounting manual	5	Done
d.8 develops a project planning and management manual	5	
d.9 finalizes NRS salaries	5	Done
d.10 establishes a central filing system	6	
d.11 formulates and implements an information technology strategy	6	
d.12 prepares an annual operations plan	6	
e. Establish cycle for IMERS	5	
f. Review ICLARM's Socioeconomics capability	5	
g. Develop a Living Aquatic Genetic Resources Policy	5	
7. Elect a new Chairperson	3	Done
8. Ensure the Center's international status by finalizing a Host Country Agreement	3	
9. Continue Consideration of a HQ site	5	Site Selection Committee formed at 6th Meeting
10. Familiarize some relevant Board members with ICLARM field sites	5	
11. Appointment of two more CGIAR Nominees	5	
12. Review status of MOUs	6	

Board Operations

In April 1994, the ICLARM Trustees reviewed and approved revisions to the ICLARM Constitution. The Board also formally approved Rules of Procedures for itself. These revisions and rules of procedures paid particular attention to the operations and functions of the Board. The Board's committee structure was revised and an Audit Committee was established and operationalized. In an attempt to improve efficiencies, the number of ICLARM Trustees was reduced from sixteen to twelve and a more systematic scheme for the rotation of trustee terms was implemented. For the first time as well, the Trustees implemented procedures to evaluate their individual performance, the performance of the Chair and the overall performance of the entire Board. These evaluations, to be conducted annually, will provide the Trustees with the information they need to continue to improve their operations and effectivity.

Policy Development

The Board approved Center policies in the following areas:

- Personnel
 - NRS Staff Manual
 - Staff Employment
 - IRS Compensation
- Finance
 - Investments
 - Appointment of External Auditors
 - Indirect Cost Recovery

The Trustees also highlighted the need for policies in other areas such as NARS strengthening, impact assessment, staff development, aquatic genetic resources and internally-managed external reviews.

Management Oversight

Dr. Meryl Williams assumed the Director General position in April 1994 and became an ex-officio member of the Board, replacing Dr. Larry Stifel, the previous Director General. Aside from giving attention to substantive policy issues, the Board carefully monitored the progress of senior management's efforts to address personnel, financial and other administrative issues. The Board has also expressed the need for the Center to upgrade its capability in socioeconomic research, develop a clear strategy for information and impact assessment, and the development and formalization of internal procedures through policy and procedures manuals.

HQ Agreement and Site

Also in 1994, the Board established a Site Selection Committee chaired by Dr. Nyle Brady and composed of trustees, staff and external experts. The Board commissioned this committee to establish the guiding principles for the selection of a headquarters site in the Philippines, to prioritize selection criteria and to evaluate various options available to ICLARM.

The Board also expressed continuing concern over the slow progress in negotiating an ICLARM headquarters agreement with the Government of the Philippines. They urged senior management to continue to give a very high priority to the issue of a headquarters agreement and to continuing discussions with Philippine government officials on this issue.

The CGIAR and Donors

The Board has paid particular attention to the Center's effort to present itself well to existing and prospective donors. These efforts have been taken at the level of the DG and through efforts by all staff in presenting ICLARM's work during visits to the donors or by donor visits to ICLARM. A donor database, established last year and recording all significant contacts since 1992, has been regularly updated and serves as a handy source of intelligence on donor contacts and attitudes, as well as giving accurate information on funds obtained.

The Trustees have also supported every effort to obtain funds in the form of unrestricted core to give ICLARM greater flexibility in its strategic research program. This research is heavily constrained by the low ceiling on ICLARM's CGIAR core budget allocation and the general trend among donors to require accountability for funds granted and, hence, to provide additional funds as restricted or complementary funds only.

A significant effort has been made by the Chairman and the Director General to place ICLARM's work more in touch with work of the CGIAR generally, both in an attempt to influence its priority during the next major priority setting exercise and to capture more of the benefits of being a member of the CGIAR System.

Board Officers

ICLARM Trustees maintained the set of officers elected in 1993 as follows:

Chair	:	Prof. John Dillon
Vice-Chair	:	Dr. Nyle Brady
Secretary	:	Mr. Basilio M. Rodriguez, Jr.

Committee Chairs for 1994 were:

Executive	:	Prof. John Dillon
Audit	:	Dr. Barry Filshie
Program	:	Dr. Ben Satia
Nominating	:	Dr. Zimani Kadzamira
Site Selection	:	Dr. Nyle Brady

Board Composition

Three Trustees ended their final terms in 1994. These were: Dr. Phillipp Muller, Dr. Agustin Ayala-Castañares and Dr. Edgardo Gomez. Trustees whose first term expired were also re-elected for terms of various lengths to ensure continuity and more even rotation of membership. In response to the identified need for Asian representation, Dr. Mohamed Shariff (Malaysia) was elected as a Trustee for a first term ending in April 1997.

Mission Statement

Recognizing that certain of the problems of management at ICLARM had their origins in poor performance by the Board, the Board now has in place a Board Mission Statement. A copy of the statement is appended (p. 28). This statement incorporates the general principles and values identified as being important for an international center within the CGIAR and includes those highlighted by its Oversight Committee. This statement represents the unified view of the Board on how it will best serve ICLARM, its partners and beneficiaries, and represents the benchmark against which the Board will continue to monitor and evaluate its performance.

Board of Trustees Mission Statement

The Board's primary mission is the setting of policy to ensure achievement of the Center's stated goals and objectives within the mandate of the CGIAR System. In so doing, it will ensure both the scientific excellence of the Center and the relevance of the Center's work for its partners and beneficiaries. The Trustees will promote stewardship, foresight and responsibility by upholding the values of mutual trust, confidence and transparency, thereby demonstrating loyalty to the Center and to the CGIAR mandate.

The Board will act in trust for all the Center's stakeholders - its partners, donors, management and staff, the CGIAR System and the general public. The Board recognizes that it has final responsibility for the good functioning of the Center in a scientific, administrative, financial, managerial and organizational sense and for the Center's international image.

In order to ensure the success of the Center, the Board will monitor policy implementation, actively interact with management and staff, and oversee the preparation of clear rules and guidelines for the operation of the Center. The Board will ensure its own success through a regular process of planning, monitoring and evaluation of its performance.

Board Officers and Committees as of December 1994

Board Officers

1994:

Chair	-	Dr. John Dillon
Vice Chair	-	Dr. Nyle Brady
Secretary	-	Mr. Basilio M. Rodriguez, Jr.

Board Committees

1. Executive Committee

Functions:

- To exercise the powers and perform the duties delegated by the Board.
- To act for the Board between Board of Trustees meetings on matters requiring immediate attention.

Members:

1994:	Dr. John Dillon - Chair	Mr. Roberto Sebastian
	Dr. Barry D. Filshie	Dr. Meryl Williams
	Dr. Nyle Brady	

2. Audit Committee

Functions:

- To review the external auditor's report and the Center's financial statements and recommend their acceptance by the Board of Trustees.

- To review budget recommendations made by the Director General.
- To make budget and financial policy recommendations for adoption by the Board of Trustees.
- To evaluate the management performance of the Center in relation to policies and budgets established by the Board of Trustees.
- To evaluate the performance of the external auditors.
- To review management issues, including personnel matters, appropriate to the Board of Trustees' responsibilities and make recommendations thereon to the Board of Trustees.
- Other duties and functions delegated to it by the Board of Trustees.

Members:

1994:	Dr. Barry K. Filshie - Chair	Dr. Britha H. Mikkelsen
	Mr. Roberto Sebastian	Dr. John L. Dillon - Ex-officio

3. Program Committee

- Functions:
- To receive and review, on behalf of the Board of Trustees, the Director General's annual report on the Center's research, training and information programs.
 - To review and evaluate proposed changes in and/or additions to the Center's program structure.
 - To review and evaluate the Center's annual and long-term program plans.
 - To conduct all the above functions and duties with due consideration to the Center's mandate and previously established program plans, directions and priorities.
 - To review the results of any external reviews conducted of the Center's programs, as well as the Center's responses as proposed by the Director General, to recommendations made by the external reviewers.

Members:

1994:	Dr. Benedict P. Satia - Chair	Prof. Jacqueline M. McGlade
	Dr. Dayton L. Alverson	Dr. Meryl J. Williams
	Dr. Masaru Fujiya	Dr. John L. Dillon - Ex-officio
	Dr. Serge Garcia	

4. Nominating Committee

- Functions:
- To assist the Board in establishing criteria and procedures for the selection of members to fill vacancies on the Board.
 - To review and identify potential candidates who meet established criteria.
 - To recommend and present to the Board of Trustees a short list of possible members for election to the Board and its subsidiary committees.
 - To nominate persons who would be required to serve in the positions of Chairperson, Vice-Chairpersons and Secretary and any other officers as may be deemed necessary by the Board of Trustees.

Members:

1994:	Prof. Zimani L. Kadzamira - Chair	Dr. Barry K. Filshie
	Dr. Dayton L. Alverson	Dr. John L. Dillon

Statement of Financial Position*

31 December 1994

	US Dollar '000	
	1994	1993
Assets		
<i>Current Assets</i>		
Cash and cash equivalents	137	584
Accounts receivable		
Donors	2,152	1,083
Employees	193	141
Others	292	158
Supplies inventory	19	10
Prepaid expenses	89	86
Other current assets	88	94
Total current assets	2,970	2,156
<i>Fixed Assets</i>		
Property and equipment	711	649
Less: Accumulated depreciation	(492)	(400)
Total fixed assets, net	219	249
Total assets	3,189	2,405
Liabilities and Fund Balances		
<i>Current Liabilities</i>		
Note payable	500	500
Accounts payable		
Donors	707	348
Employees	321	215
Others	809	246
Accrued expenses	122	185
Reserve for transportation services	-	92
Total current liabilities	2,459	1,586
<i>Net Assets</i>		
Capital invested in fixed assets	219	249
Capital fund	492	455
Operating fund	129	192
Total net assets	840	896
<i>Cumulative Translation Adjustment</i>	(110)	(77)
Total liabilities and net assets	3,189	2,405

*Excerpts from the Report by Price Waterhouse, Independent Accountants, PO Box 2288, Manila, Philippines.

Statement of Cash Flows

31 December 1994

	US Dollar '000	
	1994	1993
Cash Flows from Operating Activities:		
Excess of expenses over revenues	(88)	(215)
Adjustments to reconcile net cash provided by operating activities:		
Depreciation	93	73
Decrease (increase) in assets:		
Accounts receivable		
Donors	(1,069)	(191)
Employees	(52)	(68)
Others	(134)	88
Supplies inventory	(9)	-
Prepaid expenses	(3)	-
Other current assets	6	17
Increase (decrease) in liabilities:		
Accounts payable		
Donors	359	(944)
Employees	106	-
Others	563	320
Accrued expenses	(63)	(113)
Reserve for transportation services	(92)	-
Net cash used in operating activities	(383)	(1,033)
Cash Flows from Investing Activities		
Acquisition of property and equipment		
Center owned	(63)	(84)
Funds invested in property and equipment	(30)	-
Increase in capital fund	37	-
Increase in operating fund due to transfer of reserve for transportation services and prior period adjustment	25	(60)
Cumulative translation adjustment	(33)	-
Net cash used in investing activities	(64)	(144)
Cash Flows from Financing Activities		
Proceeds of loan from CGIAR	-	500
Net cash provided by financing activities	-	500
Net Decrease in Cash and Cash Equivalents	(447)	(677)
Cash and Cash Equivalent		
Beginning	584	1,261
End	137	584

1994 Sources of Support

Donors	US Dollar '000	
	1994	1993
1. Core Unrestricted		
AusAID (formerly AIDAB)	213	199
CIDA	181	176
DANIDA	297	274
EC	331	282
Ford Foundation	-	150
France	58	98
Germany	369	303
Japan	216	-
Norway	199	215
Netherlands	270	267
Philippines	98	69
USAID	150	225
World Bank	380	500
Sub-Total	2,762	2,758
2. Core Restricted		
ACIAR	22	11
ADB	25	-
CEC	926	680
DANIDA	576	410
FAO	-	1
FFA/ICOD	-	6
Germany	333	390
Greenpeace Foundation	3	2
IDRC	141	276
IFAD	-	11
Marine Res. Assessment Group	8	3
ODA	-	-
Rockefeller Foundation	44	96
UNDP	974	814
USAID	258	383
University of Wisconsin	-	5
Sub-Total	3,310	3,088
Total Core Grants	6,072	5,846
3. Complementary Grants		
ACCT/ENSAT	15	3
AFSSRN-HIAKI Project	-	-
Australia and Pacific Science Foundation	4	-
DANIDA	-	70
DA (Phils.)	-	391
EC	-	40
Ford Foundation	25	60
Germany	150	258
IDRC	(27)	96
National Oceanic and Atmospheric Administration (NOAA)	23	31
Philippines	333	-
USAID	-	45
Sub-Total	523	994
Total Grants	6,595	6,840

National Research Support

In addition to research, staff undertake activities that support national institutions and researchers. These may be categorized as: education and training, advisory services, and workshops.

Education and Training

As in the past years, ICLARM staff have supervised or been advisors to many M.S. and Ph.D. students; taught in courses at tertiary institutions in both developing and developed countries; assisted in curriculum developments and published educational materials. They have also provided training in specialized nondegree courses, in specific techniques, through on-the-job training, networking or study tours. Details of these activities are shown in Table 1.

Table 1. Education and training activities facilitated/provided by ICLARM staff during 1994.

Scope	Title	Collaborating institutions	Duration
Philippines	RESTORE training, Cavite	IIRR	6 weeks
Vietnam	RESTORE training	University of Can Tho University of Sussex - IDS	7 weeks
Philippines	Aquaculture and environment	AFSSRN - BFAR	15-16 January
Brunei Darussalam	FiSAT	DOF	7-19 February
Bangladesh	Technology transfers and feedback to research for senior government officials and NGOs	FRI, BARC and DOF	20-21 March
Thailand	Coastal resources management in Pak Phanang Bay	AFSSRN - CORIN - Prince of Songkla University	28 March - 2 April
Bangladesh	Broodstock management and opportunities for genetic improvement of cultivated species for hatchery managers, scientists, planners and administrators	FRI	30-31 March
Indonesia	Economic valuation	AFSSRN - CRIF	11-13 July
International	Fisheries social science in Asia	AFSSRN - IIFET	18-21 July
Thailand, Cambodia, Vietnam, Laos	FiSAT Training Course	FAO/DANIDA, DIFMAR	12-16 August
Philippines	RESTORE training in Antique and Nueva Ecija	GU, IRRI, ANIAD	2-6 September & 5-8 December

Continued.

Table 1. Continuation.

Scope	Title	Collaborating institutions	Duration
Philippines	Coastal Resources Management Training Workshop	DA	6-7 September & 14-15 November
Philippines	Workshop on experiences and case studies on coastal resource community-based management, Palawan	PCSDS	12-13 September
Indonesia	Fisheries co-management	AFSSRN - CRIF	19-21 September
Philippines	FiSAT	SEAFDEC-AQD, UP-MSI	23 September & 8 November
Thailand	Fishing rights program	AFSSRN - Kasetsart University	23-25 September
Vietnam	Social science research methods	AFSSRN - MOF	3-8 October
Vietnam	Integrated farming systems research	HAKI - Hungary - Cantho University	27-28 October
Mexico, Nicaragua, Colombia, Venezuela	Tropical fish resources: ecology, dynamics, modeling	EPOMEX; Universidad Autonoma de Campeche, Mexico	24-30 October
Philippines	Common property resource management	AFSSRN - UPV	7-9 December
Bangladesh	Technology transfer and feedback to research for senior government officials and NGOs	FRI, BARC	14-15 December
South Pacific	Training at CAC on village-based farming of giant clams	FD of Vanuatu, Fiji, Tonga and Marshall Islands	Various
South Pacific	Village-based farming of giant clams	FD of Fiji, Marshall Islands, Kiribati, Tonga, Vanuatu	Various
AFSSRN	- Asian Fisheries Social Science Research Network	FRI	- Fisheries Research Institute
ANIAD	- Antique Integrated Area Development Foundation, Inc.	GU	- Göttingen University
BARC	- Bangladesh Agricultural Research Council	HAKI	- (Fish Culture Research Institute, Hungary)
BFAR	- Bureau of Fisheries and Aquatic Resources	IDS	- Institute of Development Studies
CRIF	- Central Research Institute for Fisheries	IIFET	- International Institute of Fisheries Economics and Trade
DA	- Department of Agriculture	IIRR	- International Institute for Rural Reconstruction
DANIDA	- Danish International Development Assistance	IRRI	- International Rice Research Institute
DIFMAR	- Danish Institute for Fisheries and Marine Research	MOF	- Ministry of Fisheries
DOF	- Department of Fisheries	PCSDS	- Palawan Council for Sustainable Development Staff
EPOMEX	- Programa Ecología, Pesquerías y Oceanografía del Golfo de México	SEAFDEC-AQD	- Southeast Asian Fisheries Development Center-Aquaculture Department
FAO	- Food and Agriculture Organization of the United Nations	UP-MSI	- University of the Philippines - Marine Science Institute
FD	- Fisheries Department	UPV	- University of the Philippines in the Visayas

Training of scientists from national institutions has been a significant activity in the GIFT project, focusing on quantitative genetics and planning of national fish breeding programs. A framework for implementation of the project's activities has been developed (see also p. 5). The GIFT team provided significant technical support towards the organization of training to hatchery managers and technicians directly associated with the Philippine National Tilapia Breeding Program. Apart from this, continuous scientific and technical support was provided by the GIFT staff to farmers and DA/BFAR extension workers (Table 2).

Table 2. Details of training activities facilitated/supported by GIFT Project in 1994.

Title	Date	Collaborating institutions
Strategies for dissemination and the role of multiplier stations (Part 1) for DA Regional Directors, BFAR and DA/ROS, farm managers.	20-21 January	BFAR, ICLARM, DA, FAC/CLSU
Genetic research and the tilapia farming industry for ROS/PSS farm managers, farmers.	24-25 February	BFAR, ICLARM, PCAMRD, FAC/CLSU
Hands-on training on GIFT for DA/FSP farm managers, extension workers	4-9 July	DA/FSP, BFAR, ICLARM
Costs and earnings record-keeping activity for FSP/DA extension workers	18 June - 25 July	DA/FSP, ICLARM, BFAR
Hatchery and broodstock management of fish for accredited hatchery multipliers, extension workers.	October	FSP/DA, BFAR, ICLARM
<i>Education</i>		
Training and supervision for 4 graduates taking MS course through GIFT Project.	Continuous	ICLARM, FAC/CLSU

BFAR	- Bureau of Fisheries and Aquatic Resources
DA	- Department of Agriculture (Philippines)
FAC/CLSU	- Freshwater Aquaculture Center/Central Luzon State University
FSP	- Fishery Sector Program
PCAMRD	- Philippine Council for Aquatic and Marine Research and Development
PSS	- Provincial Service Stations of the Department of Agriculture
ROS	- Research Outreach Stations of the Department of Agriculture

As part of the Project's contribution to INGA activities, the team also organized a study visit for three Indian scientists actively involved in the Indian rohu program. Moreover, Dr. Ambekar Eknath co-organized a national workshop on "Broodstock Management and Procedures for Avoiding Inbreeding in Fish Hatcheries" held at Fisheries Research Institute, Mymensingh, Bangladesh on 30-31 March 1994.

During the year, ICLARM's Library staff provided lectures and demonstrations to a number of groups and individuals (Table 3). Two undergraduate students from the Philippines spent their on-the-job training at ICLARM Library in April to October. Bangladesh staff also provided training programs (Table 4).

ICLARM in Malaŵi continued its interactive, extension-support training activities with presentations to field staff from the Fisheries Department and several NGOs (Table 5). In addition, a new

Table 3. Library visitors provided with lectures and demonstrations, 1994.

No. of Participants	Institution	Duration
4 M.S. Lib. Sci. students	University of the East, Manila	17 February
14 employees	Philippine Bureau of Fisheries and Aquatic Resources	10 May
30 participants	INNERTAP's Workshop on Information Management	12 May
One team	SEAFDEC Marine Fisheries Development and Management Department	23 June
3 librarians, 1 computer specialist	Asian Library, Ramon Magsaysay Awards Foundation	19 July
7 participants	UP - Institute for Small-Scale Industries' 11th Small Industry Information Management Course	19 September
30 participants	UPLB's Research Proposal Preparation and Presentation Course	14 October
11 participants	SEAFDEC - Aquaculture Department's Shrimp Hatchery Operation Training Course	21 November

Table 4. List of training programs conducted with ICLARM assistance under "Sustainable Aquaculture Development of Poverty Alleviation and Improved Nutrition in Rural Bangladesh" during 1994.

Course	Date
Integrated rice-fish farming for 44 subject matter specialists of Department of Agriculture Extension	22 March
Improved fish culture management practices for 72 NGO extension workers	4-9 April
Improved fish culture management practices for 34 NGO extension workers	30 May - 4 June and 4-7 July
Farmers' rally: integrated rice-fish farming (625 farmers)	2, 9, 11-12, 23, 25-26 June
Organized genetics in aquaculture course in Canada for the Scientific Officer of Fisheries Research Institute	19-25 June
Integrated aquaculture-agriculture for 80 women farmers	15 July
Integrated rice-fish farming for 139 Department of Agriculture extension supervisors	1-3 August
Improved fish culture management practices for 75 farmers	24-25 August
Organized aquaculture research and development course in Thailand for the Minister for Fisheries and Livestock and the Director of Fisheries Research Institute	3-14 October
Farmers' rally: integrated rice-fish farming for 473 farmers	20 November - 13 December
Improved fish culture management for 25 NGO extension workers	24-26 December

series of Research Bulletins was inaugurated to improve the quality and flow of information to the field. ICLARM was also the major contributor of teaching materials to the Fisheries Department/EC Technical Assistant's training program. For this program, ICLARM worked with the EC to design the course and write most of the lectures. Mr. Fredson Chikafumbwa, an ICLARM Research Assistant, helped teach the program. In 1994, ICLARM began working more closely with other CGIAR centers to coordinate training activities throughout the continent.

With the end of the GTZ-supported project in late 1994, ICLARM shifted gears from a direct research to a research support relationship with the Malaŵi agricultural research system. To effectively implement this new approach, it was necessary to alter the training program which had begun

Table 5. Presentations by ICLARM staff in various training activities in southern Africa.

Place	Title of workshops	Staff involved	Duration
Blantyre, Malaŵi	Council for Nongovernmental Organizations in Malaŵi	F.J.C. Chikafumbwa	4-5 March
Zomba, Malaŵi	Chancellor College Biology Department Career Planning Workshop	R.E. Brummett	30 May
Domasi, Malaŵi	Fisheries Department/EC Training Program Planning	R.E. Brummett, F.J.C. Chikafumbwa, R.P. Noble	26-30 September
Thyolo, Malaŵi	Mulanje Aquaculture Development Technical Consultation for Fisheries Department Technical Assistants	R.E. Brummett	11-13 October
Harare, Zimbabwe	Training Coordination Meeting for SADC project teamleaders	R.E. Brummett	3 November
Lilongwe, Malaŵi	CGIAR Inter-Center Training Group Workshop	R.P. Noble	8-9 November
Domasi, Malaŵi	Fisheries Department/EC Technical Assistant's Upgrading	F.J.C. Chikafumbwa	14 November- 9 December

in early 1993 to transfer to extension agents the basics of aquaculture theory and practice. Rather than the simple transfer of technology which had previously been complementary to ICLARM's stand-alone research focus, a strategy to teach research methods, in conjunction with aquaculture theory, to both extension and station staff was adopted. Rather than classroom teaching, it was agreed with the Department of Fisheries to conduct joint research projects each led by a NARS technical assistant and directed by an ICLARM scientist. While this only began rather late in the year, one research project was completed and is currently being readied for publication. Based on this research support strategy, an entirely new relationship with Malaŵi NARS has been forged which will be formalized and improved throughout 1995. This new approach should hopefully lay the groundwork for the new SADC-regional project scheduled to begin in 1996.

Table 6. Technical assistance provided by ICLARM staff, 1994.

Scope	Area of technical assistance	Collaborating institutions	Duration
Philippines	Marine biology	UP - Institute of Biology	All year
Canada	Fisheries management	UBC	All year
Germany	Fish population dynamics	UB	All year
Philippines	Socioeconomics of small-scale fisheries	VSO - PRRM	March
Indonesia	Coral reef management	IDRC and various GOs	July-December
Malaysia, Indonesia	Use of FiSAT in stock assessment and fisheries management	FAO/DANIDA, DIFMAR	1-30 July
Southern African countries	Long-term strategy for marine fisheries and resources research	SACCAR	5-7 September
South Africa	Marine research	FRD - Zoology Department, University of Capetown	26-30 September
Malaysia	Reestablishment of giant clam stocks	FRI	29 September - 7 October
Brunei Darussalam, Malaysia, Philippines	Resource assessment in the BIMP-East Asian Growth Area	BFAR	8-9 November
Philippines	Socioeconomics of small-scale fisheries	Haribon Foundation	December
Philippines	Biodiversity database	VISCA	28 December - 8 January 1995
Philippines	Fisheries management	BFAR	Various
Philippines	Artificial reefs	Various GOs and NGOs	Various
Philippines	Marine protected areas, fishery enhancement, coastal management	USPC, various GOs and NGOs	Various
Philippines	Lagonoy Gulf management plan	LGUs of Catanduanes, Albay, Camarines Sur, southern Luzon	Various

BFAR	- Bureau of Fisheries and Aquatic Resources	NGOs	- Nongovernment Organizations
DANIDA	- Danish International Development Agency	PRRM	- Philippine Rural Reconstruction Movement
DIFMAR	- Danish Institute for Fisheries and Marine Research	SACCAR	- South African Center for Cooperation in Agricultural Research and Training
FAO	- Food and Agriculture Organization of the United Nations	UB	- University of Bremen
FRD	- Fisheries Research Department*	UBC	- University of British Columbia
FRI	- Fisheries Research Institute	UP-IB	- University of the Philippines - Institute of Biology
GOs	- Government Offices	USPC	- United States Peace Corps
IDRC	- International Development Research Centre	VISCA	- Visayas State College of Agriculture
LGUs	- Local Government Units	VSO	- Volunteer Services Overseas

Table 7. ICLARM seminars held at headquarters, 1994.

Seminar	Date	Speaker	Title
94/1	23 June	Dr. Kevern L. Cochrane Sea Fisheries Research Institute Cape, Town, South Africa	The Anticipated Impacts of Recent Political Change on Fisheries Management in South Africa
94/2	12 Oct.	Dr. Meryl Williams Director General, ICLARM	In Transition: The Role of Living Aquatic Resources in Sustainable Food Security
94/3	22 Nov.	Dr. Garry Russ Senior Lecturer James Cook University	Long-term Effects of Fishing and Marine Reserve Protection on Coral Reef Fishes in the Philippines
94/4	22 Dec.	Dr. Jose Padilla Postdoctoral Fellow, ICLARM	Generic Bioeconomic Modelling Software (GEMS): A Demonstration

Advisory Services

Dr. M.V. Gupta provided advisory services to the Mekong Secretariat, UN-ESCAP, for the appraisal of a project "Rural Extension for Aquaculture Development in the Mekong Delta (Vietnam and Cambodia) during 24 July-11 August. The Manager at the CAC made visits to giant clam hatcheries in the Philippines and Fiji and advised on simple modifications that would improve production. He also visited Niue and Malaysia to advise on the feasibility of establishing giant clam culture and restoration of wild stocks. Other advisory services in the form of technical assistance provided by ICLARM staff are listed in Table 6.

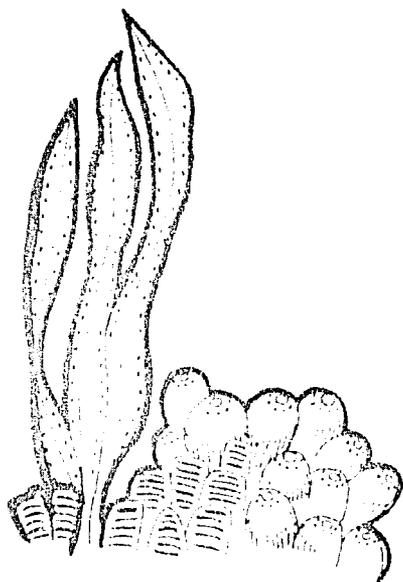
Seminars

ICLARM continued to conduct its seminar series, attended by ICLARM staff and colleagues from a variety of national and regional institutions. Table 7 lists the seminars held at headquarters.

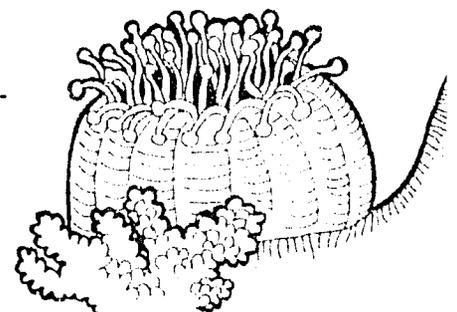
Meetings Attended, Papers Presented

Coastal and Coral Reef Resource Systems Program

- 6-7 January. ReefBase Planning Workshop. World Conservation Monitoring Centre, Cambridge, UK. (J.L. Munro and J.W. McManus)
Paper presented:
McManus, J.W. Tracking the status of the coral reefs of the world.
- 10 January. Coral Reef Consultation Day, US State Department, Washington, USA. (J.W. McManus)
Paper presented:
McManus, J.W. Global coral reef status and ReefBase.
- 7-19 February. Training/Workshop on Fish Stock Assessment and Management with FiSAT, Department of Fisheries, Ministry of Industry and Primary Resources, Bandar Seri Begawan, Brunei Darussalam. (F.C. Gayanilo, Jr., Lecturer)
- 11-12 February. NGO-PO Conference Workshop on Conserving and Managing Philippine Biodiversity for Sustainable Development, Ateneo de Manila, Philippines. (E. Capuli and A. Cabanban)
- 9-10 March. Sixth Meeting of the CODATA Task Group on the Survey of Data Sources in Asian-Oceanic Countries, Academia Sinica, Taipei, Taiwan. (R. Froese)
Paper presented:
Palomares, M.L.D. and R. Froese. FishBase, a data source with key information on IndoPacific fishes.
- 14-18 March. South Pacific Commission 25th Regional Technical Meeting on Fisheries, Noumea, New Caledonia. (J. Bell)
Paper presented:
Bell, J. Current research at the ICLARM Coastal Aquaculture Centre.
- 21-25 March. Workshop on the Biology, Dynamics and Exploitation of the Small Pelagics in the Java Sea, Jakarta, Indonesia. (F.C. Gayanilo, Jr.)
Paper presented:
Gayanilo, F.C. Jr. FiSAT and stock assessment.
- 26 April. Seminar on Fish Stock Assessment using FiSAT. Bureau of Fisheries and Aquatic Resources, Department of Agriculture, Philippines. (F.C. Gayanilo, Jr., Lecturer)
- 2-5 May. 23rd Forum Fisheries Committee, Honiara, Solomon Islands. (J. Bell)
Paper presented:
Bell, J.D. The Current and Proposed Research Programs of the Coastal Aquaculture Centre.
- 3-5 May. WWF-Phil. Program-US Peace Corps Collaborative Training Program for Protected Area Managers, Philippines. (L. Garces)



- 12 May. National Ballast Water Symposium. Canberra, Australia. (M.J. Williams, Opening Address Speaker)
 Paper presented:
 Williams, M.J. Key elements for a national strategy. Opening address.
- 14-19 May. Pearls '94, International Pearl Conference and Exposition. Honolulu, Hawaii. (J. Bell)
 Paper presented:
 Bell, J.D. Variation in abundance of blacklip pearl oyster spat in Solomon Islands.
- 19-24 May. ICES Workshop to Evaluate the Potential for Stock Enhancement, Charlottenlund Castle, Denmark. (V. Christensen)
 Paper presented:
 Christensen, V. Assessing trophic impacts of fish stock enhancement.
- 23-24 May. Third National Symposium in Marine Science, UP-Visayas, Miag-ao, Iloilo, Philippines. (E. Capuli)
- 25-27 May. Fourth National Marine Science Symposium, Iloilo City, Philippines. (J.W. McManus and B.M. Vallejo)
 Papers presented:
 McManus, J.W. and B.M. Vallejo. ReefBase: a global database on coral reefs.
 Vallejo, B.M. Aquarium culture of giant clams.
- 30 May - 2 June. Policy Analysis Workshop for Integrated Ocean Planning and Management Strategies and their Implementation for Philippine Fisheries, Quezon City, Philippines. (G. Silvestre)
- 6-8 June. Regional Conference on Biodiversity, Asian Development Bank, Manila. (R. Froese)
- 14-16 June. International Symposium on Fisheries Management: Global Trends. Seattle, Washington, USA. (D. Pauly)
 Paper presented:
 Pauly, D. Small-scale fisheries in the tropics: marginality, marginalization and some implications for fisheries science.
- 19-26 June. Fifth International Symposium on Genetics in Aquaculture, Dalhousie University, Halifax, Canada. (M.L.D. Palomares)
- 19-29 June. Second Meeting of the Intergovernmental Committee on the Convention on Biological Diversity. UNEP Headquarters, Gigiri, Nairobi, Kenya. (J.L. Munro)
- 20 June - 1 July. Graduate Seminar Course on the Biology and Conservation of Marine Animals, Silliman University Marine Laboratory, Dumaguete City. (E. Capuli)
- 27-30 June. Fish Stock Assessment and the FISAT Software, SEAFDEC, KI Terengganu, Malaysia. (F.C. Gayanilo, Jr., Lecturer)
- 4-5 July. Consultative Workshop on Integrated Fisheries Management for Lagonoy Gulf, Tabaco Albay, Philippines. (G. Silvestre, C. Luna M. Pido and M. Balgos)
- 4-11 July. Combined Meeting of PACON, Australian Marine Sciences Association, Australian Coral Reef Society and International Society for Reef Studies. Townsville, Australia. (J.L. Munro, J.D. Bell and J.W. McManus)
 Papers presented:
 Munro, J.L. ICLARM in the South Pacific.



Munro, J.L., J.D. Bell and V. Christensen. Prospects for stock enhancement in tropical fisheries.

McManus, J.W., B.M. Vallejo, L. Meñez and G. Coronado. ReefBase: Prioritizing global reef information needs.

McManus, J.W. C. Nañola, R. Reyes and K. Kesner. Six years of change in a stressed Philippine reef fish community.

4-15 July. FAO/DANIDA Training Stock Assessment and Management Training, Penang, Malaysia. (F.C. Gayanilo, Jr., Lecturer)

13-16 July. Rapid Biodiversity Assessment Workshop, Bogor, Indonesia. (J.W. McManus)

Papers presented:

McManus, J.W. Assessing the biodiversity of fish.

18-29 July. FAO/DANIDA Training Course on Fisheries Management and Workshop in Fish Stock Assessment, Jepara, Indonesia. (F.C. Gayanilo, Jr., Lecturer)

25-26 July. Fifth Meeting of Experts on the East Asian Seas Action Plan, Singapore. (G. Silvestre)

25-29 July. Workshop for the Preparation of Sections 9 & 10 of the Global Biodiversity Assessment, Bangalore, India. (J.L. Munro)

25-30 July. ADSEA '94: Aquaculture Development in Southeast Asia, Iloilo, Philippines. (J.W. McManus)

Paper presented:

McManus, J.W. Coastal marine fisheries, mollusk culture and seaweed culture in SE Asia: integrated planning and precautions.

21-26 August. Sixth International Congress of Ecology, Manchester, UK. (D. Pauly)

Paper presented:

Pauly, D. and V. Christensen. From local to global ecology: or how to overcome Cassandra's syndrome.

22 August - 16 September. FAO/DANIDA/Mekong Training Course in Fish Stock Assessment, Chiang Rai, Thailand. (F.C. Gayanilo, Jr., Lecturer)

29 August. Estimation of Economic Rent in the Philippine Commercial Fishing Industry, Development Academy of the Philippines, Mandaluyong, Metro Manila. (A.C. Trinidad)

30-31 August. Workshop on Artificial Reefs in the Philippines. ICLARM, Manila, Philippines. (J.L. Munro, J.W. McManus, G. Silvestre and M. Balgos)

Papers presented:

Balgos, M.C. Evaluation of artificial reef development in the Philippines.

McManus, J.W. Future prospects for artificial reefs in the Philippines.

Munro, J.L. Alternative strategies for coastal fisheries rehabilitation.

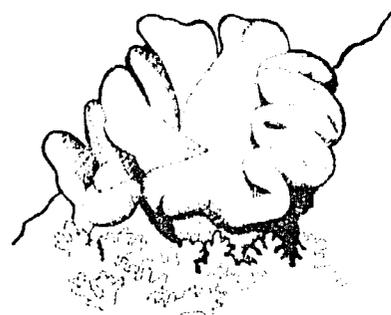
5-7 September. Workshop on a "Long-Term Strategy for Marine Fisheries and Resources Research", Southern African Centre for Cooperation in Agricultural Research and Training (SACCAR), Swakopmund, Namibia. (J.L. Munro, Scientific Advisor)

6 September. International Society for Reef Studies European Meeting, Luxembourg. (J.W. McManus)



Papers presented:

- McManus, J.W., B. Vallejo, L. Meñez and G. Coronado. Prioritizing global reef information needs.
- McManus, J.W., C. Nañola, R. Reyes and K. Kesner. Six years of change in a stressed Philippine reef fish community.
- 21-23 September. Third Annual Review of the National Fisheries Research Program, Quezon City, Philippines. (G. Silvestre, L. Garces, C. Luna, J. McManus and M. Balgos)
- 26-30 September. Evaluation of Research Proposals for a New National Marine Research Programme for South Africa, Foundation for Research Development, Cape Town, South Africa. (D. Pauly, Evaluation Panel Member)
- 12-16 October. Marine Aquarium Conference of North America, Ohio, USA. (B. Vallejo)
- 24-30 October. International Diploma Course on Tropical Fish Resources: Ecology, Dynamics and Modelling. EPOMEX, Campeche, Mexico. (D. Pauly, Lecturer)
- 26-27 October. Davao Gulf Coastal Resources Management Training, Davao Oriental, Philippines. (L. Garces)
- 27-30 October. Sixth Governing Council Meeting of the Network for Aquaculture Centres in Asia-Pacific, Beijing, China. (J. Bell)
- 2-9 November. I. Species Systematics and Information Management Priorities Workshop on Marine and Coastal Biodiversity in the Tropical Island Pacific Region: II. Population, Development and Conservation Priorities. Pacific Science Association/ East-West Center, Honolulu, Hawaii, USA. (J.L. Munro, R. Froese and J.W. McManus)
- Papers presented:
- McManus, J.W., B. Vallejo L. Meñez and G. Coronado. Reefbase: an international database on coral reefs.
- Munro, J.L. Utilization of coastal molluscan resources in the tropical insular Pacific and its impacts on biodiversity.
- Palomares, M.L.D. and R. Froese. FishBase as part of an Oceania biodiversity information system.
- 8-9 November. BIMP-EAGA Working Group Meeting on Fisheries Cooperation, General Santos City, Philippines. (M.L. Palomares and C.S. Luna)
- 14-16 November. Monitoring, Control, and Surveillance Design Workshop for Integrated Ocean Planning and Management Strategies and Their Implementation, Mandaluyong City, Philippines. (G. Silvestre)
- 21-29 November. National Power Corporation Training on Fish Stock Assessment, Manila, Philippines. (G. Silvestre)
- 26-27 November. The Global Biodiversity Forum. Nassau, Bahamas. (J.L. Munro)
- Paper presented:
- Munro, J.L. Conserving genetic resources in the marine environment.
- 28 November - 6 December. First Conference of the Parties to the Convention on Biological Diversity. United Nations Environment Programme, Nassau, Bahamas. (J.L. Munro)
- 12 December. Economic History of Southeast Asia Workshop. Canberra, Australia (D. Pauly)



16 December. Workshop on Policies Affecting the Philippine Commercial Fishing Industry. Development Academy of the Philippines, Mandaluyong, Metro Manila, Philippines. (A.C. Trinidad)

Inland Aquatic Resource Systems Program

9-11 February. ATSAF-Workshop on Integrated Aquaculture Systems: Problems with the Introduction of Concepts of Site-Adapted, Integrated Aquaculture into Africa, under Specific Consideration of the Development and Experience in South East Asia, Bonn, Germany. (M. Prein)

Paper presented:

Prein, M., C. Lightfoot and J.K. Ofori. Participatory methods for the introduction of semi-intensive aquaculture systems into traditional resource management: new approaches.

22-25 February. Workshop on Aquaculture Policy Options for Integrated Resource Management in SubSaharan Africa. Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) and International Center for Living Aquatic Resources, Zomba, Malawi. (R.S.V. Pullin, C. Lightfoot, M. Prein, F.J. Chikafumbwa, R.P. Noble and R. Brummett)

Papers presented:

Brummett, R.E. The context of smallholding integrated aquaculture in Malawi.

Chikafumbwa, F.J. Farmer participation in technology development and transfer in Malawi: a rice-fish example.

Lightfoot, C. Why an integrated resource management approach?

Noble, R.P. Difficulties in farmer-participatory systems research in Zomba District, Malawi.

Prein, M. Farmer participatory development of integrated agriculture-aquaculture systems for natural resource management in Ghana.

16-19 May. International Seminar on The Management of Integrated Freshwater Agropiscicultural Ecosystems in Tropical Areas, Belgian Royal Academy of Overseas Sciences (ARSOM) and Technical Centre for Agricultural and Rural Organization of Cooperation, Food and Agriculture Organization, Brussels, Belgium. (R.S.V. Pullin, C. Lightfoot, M. Prein and R. Brummett)

Papers presented:

Lightfoot, C. and R.S.V. Pullin. An integrated resources management approach to the development of integrated aquaculture farming systems.

Pullin, R.S.V. and M. Prein. Fishponds facilitate natural resources management on small-scale farms in tropical developing countries.

Brummett, R.E. Farmer-scientist research partnerships and smallholder integrated aquaculture in Malawi.

23 May. Overseas Development Group, University of East Anglia Seminar with Dr. David Gibbon. (C. Lightfoot)

Paper presented:

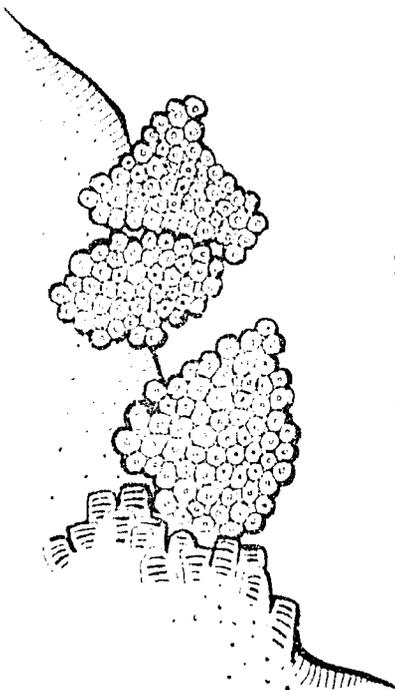
Lightfoot, C. Participatory research for the development of integrated farming systems.

9-11 June. First International Symposium on Aquaculture, Vera Cruz, Mexico. (R.S.V. Pullin)

Paper presented:

Pullin, R.S.V., M.A.P. Bimbao and G.B. Bimbao. World outlook for tilapia farming.

19-25 June. Fifth International Symposium on Genetics in Aquaculture, Dalhousie University, Halifax, Canada. (A.E. Eknath and M.P. de Vera)



Papers presented:

- Bentsen, H.B., A.E. Eknath, M.P. de Vera, M.J.C. Danting, H.L. Bolivar, R.A. Reyes, E.E. Dionisio, F.M. Longalong, M.M. Tayamen and B. Gjerde. Genetic improvement of farmed tilapias: growth performance in a complete diallele cross experiment with eight strains of Nile tilapia (*Oreochromis niloticus*).
- Bolivar, R.B., A.E. Eknath, M.P. Hechanova and H.L. Bolivar. Measurement of age at first spawning in Nile tilapia (*Oreochromis niloticus*).
- de Vera, M.S.P. and A.E. Eknath. Growth performance of male and female different strains of Nile Tilapia (*Oreochromis niloticus*) in different culture environments.
- Eknath, A.E. 'Formal' and 'informal' breeding programs and conservation of genetic diversity.
- Eknath, A.E., R.A. Reyes, H.L. Bolivar, M.P. de Vera, J.C. Danting, E.E. Dionisio and F.M. Longalong. Genetic improvement of farmed tilapias: estimation of genetic variation and heritability for age and size at first spawning of *Oreochromis niloticus*.

Posters presented:

- Bolivar, H.L., R.B. Bolivar, C.C. Janagap, R.A. Reyes and A.E. Eknath. Fry production differences between eight strains of Nile tilapia (*Oreochromis niloticus*) and their crosses.
- Circa, A.V., A.E. Eknath and A.G. Tadian. Genetic improvement of farmed tilapias: the growth performance of the GIFT strain of Nile tilapia (*Oreochromis niloticus*) in rice-fish environments.
- Danting, M.J.C., A.E. Eknath and H.B. Bentsen. Evaluation of growth performance testing methods for strain comparisons of Nile tilapia (*Oreochromis niloticus*).
- Dionisio, E.E., A.E. Eknath and C.C. Janagap. Progeny sex ratio in a complete diallele cross with eight strains of Nile tilapia (*Oreochromis niloticus*).
- Janagap, C.C. and A.E. Eknath. User-friendly computer software for aquaculture geneticists: a GIFT application.
- Longalong, F.M. and A.E. Eknath. Development of techniques for synchronization of natural spawning in Nile tilapia (*Oreochromis niloticus*).
- Morales, G.A., A.E. Eknath, R.C. Sevilleja, M.M. Tayamen, R.B. Bolivar and R.A. Reyes. An evolving national tilapia breeding program for the Philippines.
- Seshu, D.V., A.E. Eknath and R.S.V. Pullin. The International Network on Genetics in Aquaculture (INGA).
- Velasco, R.R., C.C. Janagap, M.P. de Vera, L.B. Afan, R.A. Reyes and A.E. Eknath. Genetic improvement of farmed tilapias: estimation of heritability of body and carcass traits of Nile tilapia (*Oreochromis niloticus*).

1-5 August. SANREM-CRSP Workshop on Sustainability Indicators, Washington, DC, USA.

Poster paper presented:

- Lightfoot, C. RESTORE: A research tool for natural resource management monitoring and evaluation.

5-9 September. XXVth General Assembly of the International Union of Biological Sciences and the International Forum on Biodiversity. Science and Development, UNESCO Headquarters, Paris. (R.S.V. Pullin)

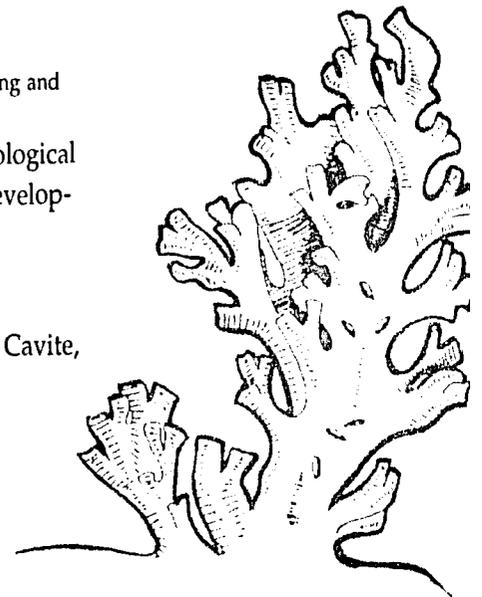
Paper presented:

- Pullin, R.S.V. Biodiversity and aquaculture.

10 & 26 October. International Course on Regenerative Agriculture, IIRR, Cavite, Philippines.

Lectures and course handouts:

- Lightfoot, C. The IRM approach to integrated aquaculture.
- Bimbao, M.A.P. Economic viability of regenerative agriculture.



11-15 October. International Workshop on Integrated Fish Farming, Wuxi, Jiangsu Province, China. (R.S.V. Pullin and M.V. Gupta)

Papers presented:

Ahmed, M., M.A. Rab and M.P. Bimbao. Sustainable aquaculture in small waterbodies: experience from Bangladesh.

Gupta, M.V. Social and policy issues involved in adoption of integrated agriculture-aquaculture-livestock production systems in Bangladesh.

Pullin, R.S.V. Aquaculture, integrated resources management and the environment.

Ruddle, K. and M. Prein. Assessing potential nutritional and household economic benefits of developing integrated farming systems.

Shahad Uddin, M., G. Buddha Das, A. Hussain, M.A. Rahman, M.A. Mazid and M.V. Gupta. Integrated poultry-fish farming: a way to increase productivity and benefits.

24-25 October. 8th Session of the IPFC Working Party of Experts on Aquaculture, Bangkok, Thailand. (R.S.V. Pullin)

Paper presented:

Pullin, R.S.V. Research for the development of sustainable aquaculture in the Asia-Pacific region: ICLARM's perspectives and activities.

6 November. Technology transfer through NGOs and feedback to research: issues, perspectives and outlook. (M.V. Gupta)

7-10 November. ASFA symposium "Conservation and Equitable Growth: The Challenge for Farming Systems", Manila, Philippines. (C. Lightfoot and P. Dalsgaard)

Poster papers presented:

Lightfoot, C. The AFSRE networking database.

Lightfoot, C. An integrated resource management approach to the development of sustainable farming systems.

Papers presented:

Horstkotte, G., H. Waibel and S. Purba. The integration of fish into intensive rice-based farming systems in Asia.

Dalsgaard, P. Ecological sustainability in farming systems identifying quantifiable indicators through steady state modelling.

7-11 November. International Workshop on Genetics in Aquaculture and Fisheries Management in Asia, Bangkok, Thailand. (Attended by BFAR staff involved in GIFT project)

Papers presented:

Dionisio, E.D., R.A. Reyes and A.E. Eknath. Preliminary study on the salt tolerance of difference strains of Nile tilapia (*Oreochromis niloticus* L.) fry.

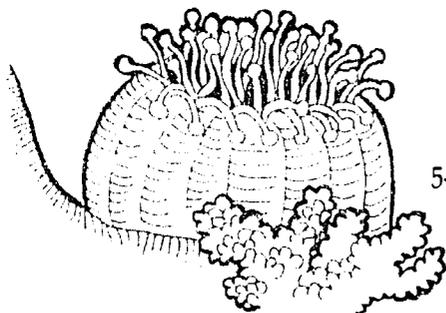
Longalong, F.M., M.J.C. Danting, A.V. dela Cruz, M.C. Tayamen, R.A. Reyes and A.E. Eknath. Combined effects of genetic improvement through selection and sex reversal on survival and growth of Nile tilapia (*Oreochromis niloticus*).

11-14 November. Technical Consultation on Species for Small Reservoirs and Aquaculture in Southern Africa. Food and Agriculture Organization of the United Nations, Aquaculture for Local Community Development, Lusaka, Zambia. (R.E. Brummett)

Paper presented:

R.E. Brummett and K. Katambalika. Protocols for the development of indigenous species: polyculture of indigenous species under Malatian smallholder conditions.

5-7 December. CIFA Seminar on African Inland Fisheries, Aquaculture and the Environment, Food and Agriculture Organization of the United Nations,



Harare, Zimbabwe. (R.E. Brummett)

Paper presented:

R.E. Brummett and F.J. Chikafumbwa. Management of rainfed aquaculture on Malawian smallholdings.

Information Division

18-22 January. Regional Workshop on Fishery Information and Statistics in Asia, Bangkok, Thailand (J.L. Maclean, R.M. Temprosa, N.I. Jhocson and F.E. Gonzalez)

Papers presented:

Maclean, J.L. Nonstatistical information sources for fisheries in Asia.

Temprosa, R.M. and J.L. Maclean. Status of a Union Catalog of Fisheries Serial Holdings in Asia.

6-10 May. Fifth International Conference on Scholarly Publishing, Thessaloniki, Greece. (L.B. Dizon and M.S.M. Sadorra)

Paper presented:

Dizon, L.B. and M.S.M. Sadorra. Patterns of publication by the staff of an international fisheries research center.

13- 17 June 1994. Planning Meeting for a CGIAR Information Strategy, The Hague, The Netherlands. (J.L. Maclean)

30 August. Special Presentation Meeting, Information Management Exhibition (INFORMANEX), Development Academy of the Philippines, Pasig, Metro Manila. (R.M. Temprosa and C.J. Cabalang)

9-13 October. International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC) 20th Annual Conference, Honolulu, Hawaii, USA. (N.I. Jhocson)

11-15 October 1994. Aquatic Science and Fisheries Abstracts Editorial Board Meeting, Tianjin, China. (J.L. Maclean)

17-21 October. Training in Library Methodologies at California Academy of Sciences Library, San Francisco, USA. (N.I. Jhocson)

24-25 November. Seminar Series III: Information Technology and Library Automation for Philippines 2000, Ortigas Center, Mandaluyong, Metro Manila, Philippines. (E.B. Gonzalez, A.P. Mendoza and R.A. Damalerio)

Office of the Director General

12 May. National Ballast Water Symposium, Canberra, Australia 1994. (M.J. Williams)

Papers presented:

(a) Opening address, and (b) Key elements for a national strategy.

20 October. CGIAR Technical Advisory Committee Meeting Washington, DC.

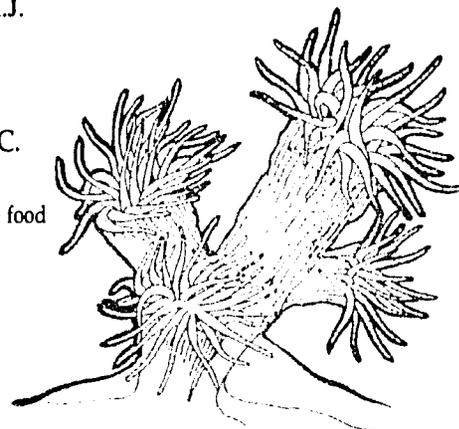
Paper presented:

Williams M.J. Transition in the contribution of living aquatic resources to sustainable food security.

5 December. Pacem in Maribus XXII Madras, India. (M.J. Williams).

Paper presented:

Williams, M.J. The oceans and sustainable food security in the developing world.



Special Projects

(a) Asian Fisheries Social Science Research Network (AFSSRN)

- 15-16 January. Workshop on Environmental Assessment and Management of Aquaculture Development. Philippine AFSSRN National Workshop, Manila, Philippines. (R.S. Pomeroy, M.B. Carlos and M.D. Pido)
Paper presented:
Pomeroy, R.S. Economic aspects of sustainable aquaculture.
- 28 March-2 April. Workshop on Coastal Resources Management in Pak Phanang Bay, Thailand. Thailand AFSSRN National Workshop, Hat Yai, Thailand. (R.S. Pomeroy)
Paper presented:
Pomeroy, R.S. Institutional relationships in managing coastal resources.
- 16-19 April. International Training/Workshop on Integrated Coastal Zone Management. Coastal Resources Institute, Prince of Songkla University, Hat Yai, Thailand. (R.S. Pomeroy)
Paper presented:
Pomeroy, R.S. Economic valuation of coastal resources.
- 11-13 July. Workshop on Coastal Resources Management. Indonesian AFSSRN National Workshop, Malang, East Java. (R.S. Pomeroy)
Paper presented:
Pomeroy, R.S. Economic valuation of coastal resources.
- 18-21 July. Special Session on Fisheries Social Science Research in Asia. International Institute of Fisheries Economics and Trade, Taipei, Taiwan. (R.S. Pomeroy, M.D. Pido and M.B. Carlos)
Paper presented:
Pomeroy, R.S. and M.D. Pido. Initiatives towards fisheries co-management in San Miguel Bay, Philippines.
- 19-21 September. Workshop on Social Science Research. Indonesian Social Science Research Network, Ambarawao, Central Java, Indonesia. (R.S. Pomeroy)
Paper presented:
Pomeroy, R.S. Fisheries co-management.
- 23-25 September. Workshop on Fisheries Rights. Thailand AFSSRN National Workshop, Hat Yai, Thailand. (R.S. Pomeroy)
Paper presented:
Pomeroy, R.S. Fisheries co-management.
- 3-8 October. Training/Workshop on Social Science Research Methods, Vietnam AFSSRN Workshop, Hanoi, Vietnam. (R.S. Pomeroy and M.B. Carlos)
Papers presented:
Pomeroy, R.S. Participatory rural appraisal methods for fisheries co-management.
Carlos, M.B. Socioeconomics research: issues, variables and methods.
Carlos, M.B. Fisheries project analysis.
Carlos, M.B. Data preparation and analysis in social science research.
- 26-28 October. Workshop on Integrated Aquaculture Farming Systems. Organized by W-E-S Netherlands Aquaculture Development Project, Cantho, Vietnam. (R.S. Pomeroy)



Paper presented:

Pomeroy, R.S. Economics of integrated farming systems.

7-8 December. Workshop on Community-based Coastal Resource Management. Philippine AFSSRN National Workshop, Manila. (R.S. Pomeroy, M.D. Pido and M.B. Carlos)

Papers presented:

Pomeroy, R.S. Common property resource management.

Pido, M.D. Rapid rural appraisal in coastal areas.

Pido, M.D. San Miguel Bay coastal fisheries management: experiences.

(b) Fisheries Co-Management Project

4-5 July. Consultative Workshop on Intergrated Management of Lagonoy Gulf Fishers, Philippines. (M.D. Pido)

Paper presented:

Pido, M.D. Organizational models of ICZM.

4-8 July. International Workshop on Traditional Marine Tenure and Sustainable Management of Marine Resources in Asia and the Pacific. University of the South Pacific. Suva, Fiji. (R.S. Pomeroy)

Paper presented:

Pomeroy, R.S. Traditional base for fisheries development: revitalizing traditional community and resource management systems in Southeast Asia.

18-21 July. International Meeting of the International Institute of Fisheries Economics and Trade. Taipei, Taiwan. (R.S. Pomeroy, M.B. Carlos and M.D. Pido)

Papers presented:

Pido, M.D. and R.S. Pomeroy. Initiatives towards fisheries co-management in San Miguel Bay, Philippines.

Pomeroy, R.S., S. Sverdrup-Jensen and J. Raakjaer-Nielsen. fisheries co-management: a worldwide collaborative research project.

19 July. Seminar on Productivity and Sustainable Utilization of Coastal Brackishwater Ecosystems in Tropical and Subtropical Countries. ICLARM HQ, Makati, Philippines. (M.D. Pido and M.B. Carlos)

Paper presented:

Pido, M.P. Fisheries co-management : a worldwide research project.

12-13 September. Forum on Co-Management of Marine Fisheries and Other Coastal Resources in Palawan: Concepts and Experiences. Puerto Princesa City, Palawan, Philippines. (R.S. Pomeroy)

Paper presented:

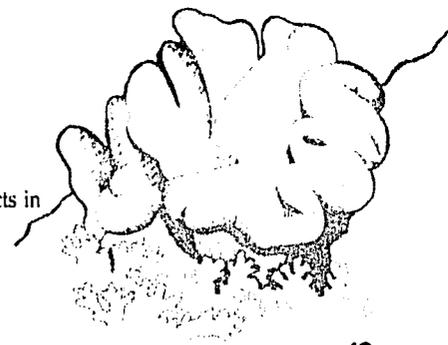
Pomeroy, R.S., M.B. Carlos, M.D. Pido, A. Garces, R.F. Agbayani. The application of institutional analysis research framework in the evaluation of fisheries and coastal resources management systems in Palawan, Philippines.

Carlos, M.B. Fisheries co-management: a worldwide research project.

26-27 October. Davao Gulf Coastal Resources Management Training. Mati, Davao Oriental, Philippines. (M.B. Carlos, M.D. Pido)

Papers presented:

Carlos, M.B. Lessons learned from past community-based resource management projects in the Philippines.



Carlos, M.B. Alternative livelihood in coastal communities.
Pido, M.D. Integrated coastal zone management.
Pido, M.D. Rapid rural appraisal in coastal areas.
Pido, M.D. San Miguel Bay coastal fisheries management: experiences.

(c) International Network on Genetics in Aquaculture

18-21 May. First INGA Steering Committee Meeting, Bangkok, Thailand. (D.V. Seshu)

Papers presented:

Seshu, D.V. Progress and current status of INGA.

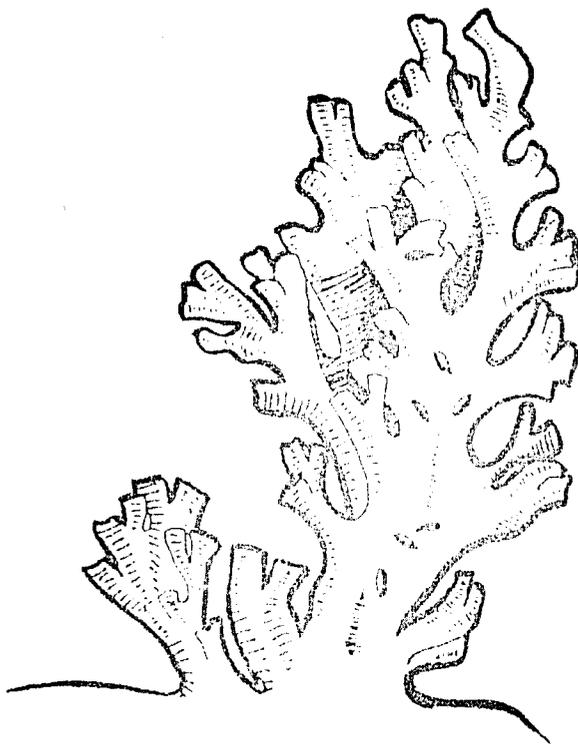
Seshu, D.V. Procedures for data collection and reporting of fish genetic evaluation trials.

19-25 June. Fifth International Symposium on Genetics in Aquaculture, Dalhousie University, Halifax, Canada. (D.V. Seshu)

Poster presented:

Seshu, D.V., A.E. Eknath and R.S.V. Pullin. The International Network on Genetics in Aquaculture.

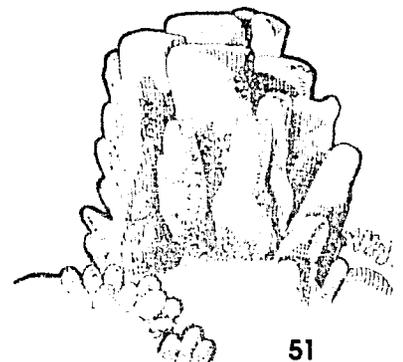
22-24 September. Initial planning meeting of the project on Dissemination and Evaluation of Genetically Improved Tilapia Species in Asia (DEGITA), Los Baños, Philippines. (D.V. Seshu)



1994 Publications

Coastal and Coral Reef Research Systems Program

- Bell, J. Solomon Islands pearl oyster project initiates blacklip spat collector trials. SPC Pearl Oyster Inf. Bull. (7):3-4.
- Christensen, V. Emergy based ascendancy. Ecol. Modelling 72:129-144.
- Christensen, V. On the behavior of some proposed goal functions for ecosystem development. Ecol. Modelling 75/76:37-49.
- Christensen, V. In our experience: a review of *Quantitative Fisheries Stock Assessment*. Book review: Naga, ICLARM Q. 17(1):55-56.
- Froese, R. ReefBase: A global database on coral reef and their resources, p. 52-54. In J.L. Munro and P. Munro (eds.) The management of coral reef systems. ICLARM Conf. Proc. 44, 124 p.
- Froese, R. and D. Pauly. FishBase as a tool for comparing the life history patterns of flatfish. Neth. J. Sea Res. 32(3/4): 235-239.
- Froese, R. and D. Pauly, Editors. FishBase user's manual: a biological database on fish. ICLARM Software 7, pag. var.
- Froese, R. and D. Pauly. A strategy and a structure for a database on aquatic biodiversity, p. 209-220. In J.-L. Wu, Y. Hu and E.F. Westrum, Jr. (eds.) Data sources in Asian-Oceanic countries. DSAO, Taipei, and CODATA, Paris.
- Gayanilo, F.C. Jr., P. Sparre and D. Pauly. The FAO-ICLARM Stock Assessment Tools (FiSAT) user's guide. FAO Comp. Inf. Ser. (Fish.) 7, 186 p.
- Holland, A. The bêche-de-mer industry in Solomon Islands: recent trends and suggestions for management. SPC Bêche-de-mer Information Bulletin 6:2-9.
- Molea, T. and Munro, P.E. Influence of symbiont strain on early growth of tridacnids. Asian Fish. Sci. (7):91-102.
- Munro, J.L. Ecological impacts of seafarming and searanching, p. 145-151. In F. Lacanilao, R.M. Coloso and G.F. Qunitio (eds.) Proceedings of the Seminar-Workshop on Aquaculture Development in Southeast Asia and Prospects for Seafarming and Searanching. SEAFDEC Aquaculture Department, Iloilo, Philippines. 159 p.
- Munro, J.L. Fisheries for spiny lobster in the tropical Indo-west Pacific, p. 75-82. In B.F. Phillips, J.S. Cobb and J. Kittaka (eds.) Spiny lobster management. Blackwell Scientific Publications, Oxford. 550 p.
- Munro, J.L. Prospects for aquaculture in coral reef environments, p. 97-98. In J.L. Munro and P.E. Munro (eds.) The management of coral reef resource systems. ICLARM Conf. Proc. 44, 124 p.
- Munro, J.L. and P. Munro, Editors. The management of coral reef resource systems. ICLARM Conf. Proc. 44, 124 p.
- Padilla, J.E. A bioeconomic model for fisheries management in tropical countries



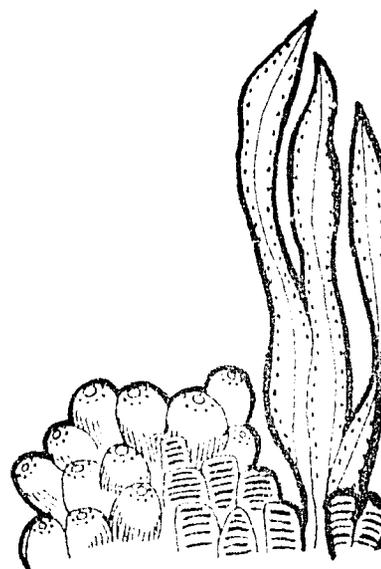
- with application. *FAO Fish. Rep.* 499 (IFPC-Suppl.):76-104.
- Padilla, J.E. and A.T. Charles. Bioeconomic modeling and the management of capture and culture fisheries. *Naga, ICLARM Q.* 17(1):18-20.
- Padilla, J.E. and P. Copes. Bioeconomic analysis of management options for tropical fisheries using a bicriteria programming model. *Mar. Res. Econ.* 9(1994):47-66.
- Palomares, M.L.D. Flat files and FishBase. *Naga, ICLARM Q.* 17(1):17.
- Pauly, D. Assessment methodologies and fisheries management: how to keep making sense, p. 121-132. *In* C.W. Voigtlander (ed.) *The state of the world's fisheries resource. Proceedings of the World Fisheries Congress, Plenary Sessions.* Oxford & IBH Publishing, New Delhi.
- Pauly, D. A framework for latitudinal comparisons of flatfish recruitment. *Neth. J. Sea Res.* 32(2):107-118.
- Pauly, D. From managing fisheries to managing ecosystems. *ICES/CIEM Information* (24):7.
- Pauly, D. On the sex of fish and the gender of scientists: essays in fisheries science. Chapman and Hall, London, 250 p.
- Pauly, D. Quantitative analysis of published data on the growth, metabolism, food consumption and related features of the red-bellied piranha, *Serrasalmus nattereri* (Characidae). *Environ. Biol. Fish.* 41:423-437.
- Pauly, D. Resharpener Ockham's razor. *Naga, ICLARM Q.* 17(2):7-8.
- Pauly, D. Un mécanisme explicatif des migrations des poissons le long des côtes du nord-ouest africain, p. 235-244. *In* M. Barry-Gérard, T. Diouf and A. Fonteneau (eds.) *L'évaluation des ressources exploitables par la pêche artisanale sénégalaise. Tome 2. Documents scientifiques présentés lors du symposium, 8-13 février 1993, Dakar, Sénégal.* ORSTOM Éditions, Paris. 424 p.
- Pauly, D. and A. Yañez-Arancibia. Fisheries in coastal lagoons, p. 377-399. *In* B. Kjerfve (ed.) *Coastal lagoons processes.* Elsevier Science Publishers B.V., The Netherlands.
- Pauly, D. and S. Garcia. Announcing the release of FiSAT (version 1.0). *Naga, ICLARM Q.* 17(4):46-47.
- Pauly, D. and V. Christensen. Modeling coral reef ecosystems, p. 58-60. *In* J.L. Munro and P. Munro (eds.) *The management of coral reef systems.* ICLARM Conf. Proc. 44, 124 p.
- Pauly, D., P. Sánchez-Gil and F. Arreguin-Sánchez. Modelación de recursos pesqueros y su ecosistema: algunos tópicos relevantes (Modeling fish resources and their ecosystem: some issues). *Jaina, EPOMEX Newsl.* 5(4):4-5.
- Paw, J.N. Mapping point data in geographic information systems. *Naga, ICLARM Q.* 17(1):21.
- Richards, A.H., L.S. Bell and J.D. Bell. Inshore fisheries resources of Solomon Islands. *Mar. Pollut. Bull.* 1994 (28):90-98.
- Sanchez, F.A. and R. Froese. FishBase: Base de datos biológicos, módulo México. *Jaina, EPOMEX Newsl.* 5(4):2-3.
- Soule, S.M. Our coral reefs. *ICLARM Educ. Ser.* 15, 27 p.
- Yañez-Arancibia, A., A.L.L. Domínguez and D. Pauly. Coastal lagoons as fish



habitats, p. 363-376. In B. Kjerfve (ed.) Coastal lagoons processes. Elsevier Science Publishers, B.V., The Netherlands.

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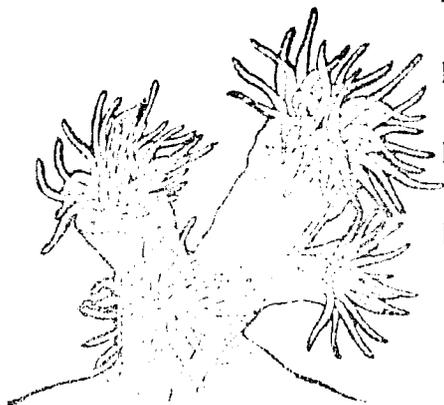
- Begum, N.N., S. Chakraborty, M. Zahar, M.A. Mazid and M.V. Gupta. Replacement of fish meal by low-cost animal protein as a quality fish feed ingredient for Indian major carp *Labeo rohita* fingerlings. J. Sci. Food. Agric. 64:191-197.
- Bell, J.D. Solomon Islands pearl oyster project initiated blacklip spat collection trials. SPC Pearl Oyster Info. Bull. 7:3-4.
- Boliva, R.B., H.L. Bolivar and A.E. Knath. Effect of sampling frequency on the growth and survival of Nile tilapia *Oreochromis niloticus* in hapas. Asian Fish. Sci. 7(2):129-133.
- Brummett, R.E. How can research best serve the needs of aquaculture in subSaharan Africa? Naga, ICLARM Q. 17 (3):15-17.
- Brummett, R.E. Training in African aquaculture development. Naga, ICLARM Q. 17(2)4-6.
- Brummett, R.E., Editor. Aquaculture policy options for integrated resource management in subSaharan Africa. ICLARM Conf. Proc. 46, 38 p.
- Cagauan, A.G. and R.S.V. Pullin. Azolla in aquaculture: past, present and future, p. 104-130. In J.F. Muir and R.J. Roberts (eds.) Recent advances in aquaculture, Vol. V. Blackwell Scientific Publications, Oxford.
- de la Cruz, C. Editor. Role of fish in enhancing ricefield ecology and in integrated pest management. ICLARM Conf. Proc. 43, 39 p.
- Gupta, M.V. Adoption and economics of silver barb (*Puntius gonionotus*) culture in seasonal waters in Bangladesh. ICLARM Tech. Rep. 41, 39 p.
- Horstkotte, G. Socioeconomic complementarities between integrated pest management and aquatic life management - the key to long-lasting adoption?, p. 41. In C.R. de la Cruz (ed.) Role of fish in enhancing ricefield ecology and in integrated pest management. ICLARM Conf. Proc. 43, 39 p.
- Kohinoor, A.H.M., M.G. Hossain, M.A. Mazid, D.A. Jahan and M.V. Gupta. Comparative production performance of rajpunti (*Puntius gonionotus*) and local sharputi (*Puntius sarana*) in a semi-intensive culture system. Prog. Agric. 5(1):49-53.
- Kohinoor, A.H.M., M.Z. Haque, M.G. Hussain and M.V. Gupta. Growth and survival of Thai punti, *Puntius gonionotus* (Bleeker) spawn in nursery ponds at different stocking densities. J. Asiat. Soc. Bangladesh, Sci. 20(1):65-72.
- Lassoie, J. and C. Lightfoot. Resource endowments: fragile natural resources, favored farmers, p. 18-20. In CGIAR. Reconciling sustainability with productivity growth: opportunities for collaboration among US universities, CGIAR Centers, and the NARS. Final Report of the May 1993 Workshop, Gainesville, Florida, USA.
- Lightfoot, C. *Challenging the Professions: Frontiers for Rural Development* by



- Robert Chambers - Book review. *Amer. J. Alternat. Agric.* 9(4):189-198.
- Lightfoot, C. and R.S.V. Pullin. Why an integrated resource management approach?, p. 7-9. *In* R.E. Brummett (ed.) *Aquaculture policy options for integrated resource management in subSaharan Africa*. ICLARM Conf. Proc. 46, 38 p.
- Lightfoot, C., M. Prein and T. Lopez. Bioresource flow modeling with farmers. *ILEIA Newsl.* 10(3):22-23.
- Lightfoot, C., P.T. Dalsgaard, M.P. Bimbao and F. Fermin. Farmer participatory procedures for managing and monitoring sustainable farming systems. *J. Asian Farm. Syst. Assoc.* 2(2):67-87.
- Lightfoot, C., P.A. Roger, A.G. Cagauan and C.R. dela Cruz. Steady-state models of a rice paddy ecosystem, with and without fish. *In* V. Christensen and D. Pauly (eds.) *Trophic models of aquatic ecosystems*, p. 56-64. ICLARM Conf. Proc. 26, 390 p.
- Prein, M. Farmer-participatory development of integrated agriculture-aquaculture systems for natural resource management in Ghana, p. 18-20. *In* R.E. Brummett (ed.) *Aquaculture policy options for integrated resource management in subSaharan Africa*. ICLARM Conf. Proc. 46, 38 p.
- Pullin, R.S.V. Exotic species and genetically modified organisms in aquaculture and enhanced fisheries: ICLARM's position. *Naga, ICLARM Q.* 17(4):19-24.
- Seshu, D.V., A.E. Eknath and R.S.V. Pullin. *International Network in Genetics in Aquaculture (INGA)*. International Center for Living Aquatic Resources Management, Manila, Philippines.
- Vakily, J.M. *Sierra Leone Fishery Surveys Database System (FiSDAS)*, Vol. 1. User's Guide. International Center for Living Aquatic Resources Management (ICLARM), Manila, Philippines.
- Vakily, J.M. and S.E. Pedro. 1994. Sierra Leone fishery library. A case of sleeping beauty. *Naga, ICLARM Q.* 17(3):22-23.

Information Division

- Dizon, L.B. The performance of two Philippine fisheries journals in international scientific literature. *Philipp. Sci.* 31:158-168.
- ICLARM. *Annual Report 1992*. International Center for Living Aquatic Resources Management, Manila, Philippines, 124 p.
- ICLARM. *ICLARM Directory of Activities to December 1993*. International Center for Living Aquatic Resources Management, Manila, Philippines, 36 p.
- ICLARM. *ICLARM Report 1993*. International Center for Living Aquatic Resources Management, Manila, Philippines. 101 p.
- Maclean, J.L. On Tonle Sap, the great lake of Cambodia. *Naga, ICLARM Q.* 17(4):5-6.
- Maclean, J.L. Fisheries information 1994. *Naga, ICLARM Q.* 17(3):20-21.



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- MacKay, K.T. Welcoming address, p. 113-115. *In* J.L. Munro and P. Munro (eds.) The management of coral reef systems. ICLARM Conf. Proc. 44, 124 p.
- Williams, M. How science serves fisheries management. *Naga*, ICLARM Q. 17(3):13-14.

Special Projects

- Pomeroy, R.S. Common property regimes. *Naga*, ICLARM Q. 17(2):37-38.
- Pomeroy, R.S. Institutional arrangements for community-based coastal fisheries management: common property resources, p. 58-60. *In* M.P. Collinson and K.W. Platias (eds). Social science in the CGIAR: Proceedings of a Meeting of CGIAR Social Scientists held at the International Service for National Agricultural Research, The Hague, Netherlands, August 1992. The World Bank, Washington, DC.
- Pomeroy, R.S. Introduction, p. 1-11. *In* R.S. Pomeroy (ed.) Community management and common property of coastal fisheries in Asia and the Pacific: concepts, methods and experiences. ICLARM Conf. Proc. 45, 189 p.
- Pomeroy, R.S. Management options for small-scale fisheries, p. 78-81. *In* J.L. Munro and P. Munro (eds.) The management of coral reef systems. ICLARM Conf. Proc. 44, 124 p.
- Pomeroy, R.S., Editor. Community management and common property of coastal fisheries in Asia and the Pacific concepts, methods and experiences. ICLARM Conf. Proc. 45, 189 p.
- Pomeroy, R.S. and M.J. Williams. Fisheries co-management and small-scale fisheries. A policy brief. 15 p.
- Seshu, D.V., A.S. Eknath and R.S.V. Pullin. International Network on Genetics in Aquaculture. ICLARM, Manila, Philippines. 22 p.
- Seshu, D.V. International Network on Genetics in Aquaculture. *World Aquaculture* 25(3):88.



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Index of Organizations

AKVAFORSK, the Institute of Aquaculture Research, Norway	18
Antique Integrated Area Development Foundation, Inc. (ANIAD), Philippines	34
Aquaculture for Local Community Development Programme (ALCOM/FAO)	14
Asian Development Bank (ADB)	4, 18, 19, 32
Australia and Pacific Science Foundation (AFSF)	16, 20, 32
Australian International Development Assistance Bureau (nowAusAID)	16, 32
Australian Centre for International Agricultural Research (ACIAR)	16, 20, 32
Bangladesh Agricultural Research Council (BARC)	13, 34
Bangladesh Department of Fisheries (BDOF)	13
Bangladesh Fisheries Research Institute (BFRI)	13
Bangladesh Rural Advancement Committee (BRAC)	14
Bundesministerium für Wirtschaftliche Zusammenarbeit (BMZ)/ Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)	14, 16
Bureau of Fisheries and Aquatic Resources (BFAR), Philippines	10, 18, 33, 36
Bureau of Agricultural Statistics (BAS), Philippines	18
Caribbean Community (CARICOM) Fisheries Resource Assessment and Management Program	17
Central and Northern Regions Fish Farming Project, Malawi	14
Central Laboratory for Aquaculture Research (CLAR), Egypt	6
Central Luzon State University (CLSU), Philippines	6, 18
Central Research Institute for Fisheries (CRIF), Indonesia	34
Consultative Group on International Agricultural Research (CGIAR)	vi, 7, 8, 16, 22
Danish Institute for Fisheries and Marine Research (DIFMAR)	34, 38
Danish International Development Assistance (DANIDA)	3, 9, 11, 17, 32
Department of Agriculture (DA), Philippines	18, 32, 35
European Commission (EC)	3, 11, 12, 16, 32
Fish Culture Research Institute, Hungary (HAKI)	34
Food and Agriculture Organization (FAO)	8, 9, 11, 32, 38
Forum Fisheries Agency (FFA), Solomon Islands	32
Freshwater Aquaculture Center/Central Luzon State University (FAC/CLSU), Philippines	35
Ghana Rural Reconstruction Movement (GhRRM)	15
Göttingen University (GU)	34
Greenpeace Foundation	32
Institute of Aquatic Biology (IAB), Ghana	15
Institute of Marine Biology and Oceanography (IMBO), University of Sierra Leone	16
Institute of Renewable Natural Resources, Ghana	15
University of Science and Technology, Ghana	15
Instituto Oceanográfico da Universidade de Sao Paulo, Brazil	11
International Council for the Exploration of the Sea (ICES)	10
International Development Research Centre (IDRC) of Canada	17, 32

International Coral Reef Initiative	4, 12
International Fund for Agricultural Development	32
International Institute for Rural Reconstruction (IIRR), Philippines	15, 33
International Institute of Fisheries Economics and Trade (IIFET)	34
James Cook University, Australia	20
L'Agence de Coopération Culturelle et Technique/ Ecole Nationale Supérieure Agronomique de Toulouse, France (ACCT/ENSAT)	32
Marine Resource Assessment Group (MRAG)	32
Malawi Department of Research and Environmental Affairs	14
Malawi Fisheries Department	14, 37
Malawi-German Fisheries and Aquaculture Development Project (MAGFAD)	14
National Oceanic and Atmospheric Administration (NOAA)	32
North Sea Centre, Denmark	3
Overseas Development Agency (ODA)	32
Pacific Science Foundation (PDS)	20
Palawan Council for Sustainable Development Staff (PCSDS)	34
Philippine Council for Aquatic and Marine Research and Development (PCAMRD)	35
Philippine Rural Reconstruction Movement (PRRM)	38
Program of Ecology, Fisheries and Oceanography of the Gulf of Mexico (EPOMEX)	12
Proshika, Bangladesh	14
Rockefeller Foundation	32
Solomon Islands Ministry of Agriculture and Fisheries	16, 20
South African Center for Cooperation in Agricultural Research and Training (SACCAR)	38
Southeast Asian Fisheries Development Center-Aquaculture Department (SEAFDEC-AQD)	34, 36
Southern African Development Community (SADC)	14, 37
United Nations Environment Programme (UNEP)	3, 32
United Nations Development Programme (UNDP)	18, 32
United States Agency for International Development (USAID)	32
United States Peace Corps (USPC)	38
University of Bremen (UB)	38
University of British Columbia (UBC)	38
University of Can Tho, Vietnam	33
University of Malawi	14
University of Science and Technology, Ghana	15
University of Sussex	33
University of the Philippines - Institute of Biology (UP-IB)	38
University of the Philippines - Marine Science Institute (UP-MSI)	34
University of the Philippines in the Visayas (UPV)	34
University of the South Pacific, Fiji	17
University of Newcastle-Upon-Tyne, UK	11
University of Wisconsin	32
Visayas State College of Agriculture (VISCA), Philippines	38
Volunteer Services Overseas (VSO)	38
World Bank	32
World Conservation Monitoring Centre, UK	12