AGR/TAC : IAR/92/17

THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE AND CGIAR SECRETARIAT

REPORT OF THE

EXTERNAL PROGRAM AND MANAGEMENT REVIEW

OF THE

INTERNATIONAL CENTER FOR LIVING AQUATIC RESOURCES MANAGEMENT

(ICLARM)

CGIAR SECRETARIAT

THE WORLD BANK

April 1992

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ICLARM. External Program and Management Review Panel.

REPORT OF THE

EXTERNAL PROGRAM AND MANAGEMENT REVIEW

OF THE

INTERNATIONAL CENTER FOR LIVING AQUATIC RESOURCES MANAGEMENT

(ICLARM)

Panel: Dr. L. Stifel (Chairman)
Dr. P. Burbridge
Dr. J. Caddy
Dr. S. Paul
Dr. H. Rosenthal
Dr. S. Ozgediz (CGIAR Secretariat)
Dr. M. Collinson (CGIAR Secretariat)

CGIAR SECRETARIAT

THE WORLD BANK

April 1992

Consultative Group on International Agricultural Research

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April 2, 1992

Mr. V. Rajagopalan
Chairman
Consultative Group on International
Agricultural Research (CGIAR)
World Bank
1818 H. Street, N.W.
Washington, DC 20433

Dear Mr. Rajagopalan,

We have pleasure to submit to you the Report of the External Program and Management Review of the International Center for Living Aquatic Resources Management (ICLARM). The External Review Panel was chaired by Dr. Larry Stifel who presented the report to TAC at its Fifty-Seventh meeting in Aleppo in March 1992 in the presence of Dr. Kenneth MacKay, Director General of ICLARM.

TAC considered the report, together with ICLARM's Strategic Plan for International Fisheries Research, and the response of ICLARM's Board and Management to the Review.

We draw your attention to the special nature of this external review. The objectives were to assist TAC in assessing ICLARM's Strategic Plan, ICLARM's institutional capacity to become a CGIAR-supported institute for international research on fisheries, and whether ICLARM should be recommended for permanent admission to the CGIAR. TAC commends the Chairman and members of the External Review Panel for the effective way in which they completed their difficult task. TAC generally endorses the report of the Panel and the recommendations to ICLARM.

TAC's detailed comments are found in the front of the Panel's report. The CGIAR Secretariat has contributed to the formulation of this commentary, is in broad agreement with its contents, and offers no additional commentary on management in the case of this external review.

TAC recommends that ICLARM be admitted to the CGIAR unconditionally, but recognizes that ICLARM's success as a CGIAR institute will depend upon implementation of a range of program and management recommendations made by the Review Panel. Thus, there is need for monitoring to keep CGIAR appraised of ICLARM's progress in building the new programs outlined in the Strategic Plan and improving its organization and management.

We further note that it is critical for the CGIAR to recognize that the program proposed by ICLARM, and tentatively endorsed by TAC, will require more than modest resources for its implementation. To admit ICLARM without a commitment to increase core support for fisheries and aquaculture would lead to

a situation in which either ICLARM has inadequate resources to succeed, or resources are taken away from agriculture and forestry research which TAC has recommended against in its Review of CGIAR Priorities and Strategies.

We provide this document to the Group as an analytical background for your debate and final decision making regarding ICLARM. We stand ready to elaborate on our views at the Mid-Term Meeting.

Yours sincerely,

A.F. McCalla
Chairman, TAC

A. von der Osten
Executive Secretary, CGIAR

TAC COMMENTARY ON ICLARM EXTERNAL REVIEW REPORT

TAC is grateful to the Chairman and members of the External Program and Management Review Panel for their efforts in undertaking a comprehensive evaluation of ICLARM and its strategic plan. The Committee is particularly pleased about the forward looking nature of the report, which is balanced, critical, constructive and well argued, and highlights the major issues facing ICLARM as it prepares for entry into the CGIAR. TAC endorses the Panel's recommendations to ICLARM and offers the following commentary to supplement the Panel's report. The commentary was prepared with valuable inputs from the CGIAR Secretariat.

Background

TAC proceeded on the basis of the recommendation of the CGIAR in 1990 to extend a conditional invitation to ICLARM to join the CGIAR, pending the preparation of a strategic plan for international research on fisheries, which would identify a set of activities suitable for implementation by a CGIAR-supported institute, and pending an external review which would assess whether or not ICLARM had the institutional capacity to realize these new objectives.

TAC, therefore, points to the special nature of this external review which had as its focal point the assessment of ICLARM's ability to transform itself from a small project-driven organization into an international center with the standards of excellence expected in the CGIAR, and the capacity to provide leadership in international fisheries research.

TAC noted its comments on ICLARM's draft strategic plan discussed at TAC 55 and 56, and in particular on the need to narrow the focus for the center.

Accomplishments of ICLARM

Since its inception in 1977, ICLARM has developed into a dynamic organization with a core group of strongly motivated scientists with recognized expertise and substantial experience in aquaculture and coastal fisheries. The Center has developed a wide set of inter-institutional linkages, and can count on strong goodwill from national programs and other fisheries organizations. ICLARM has also contributed significantly to existing international mechanisms such as FAO for the collection and dissemination of information on fisheries research in developing countries.

Because of abrupt loss of core support, financial difficulties and lack of continuity in leadership, ICLARM's programs became increasingly project-driven. The organization lacked a cohesive institutional identity and strategy. Priorities were largely donor-driven and set on an ad hoc basis within individual programs.

The key challenge now faced by ICLARM is the development of institutional coherence while implementing its strategic plan which calls for a major shift from current activities.

Strategic Plan

ICLARM offered a revised strategic plan to the External Review Panel in January 1992. As a result of the Review ICLARM made further revisions to the Plan, in particular the chapters on the proposed Coastal Resource Systems Program and the Coral Reef Resource System Program. The plan, with these revisions, was submitted to TAC for consideration together with the report of the External Review Panel.

TAC recognizes the significant improvements, in each iteration of the ICLARM strategic plan. It endorses the utility of the systematic priority setting among identified fishery resource systems. It appreciates the transparency of this approach which incorporates productivity, equity and sustainability criteria. Based on the analysis, ICLARM designates inland pond aquaculture, estuaries and lagoons, and coral reefs as priority resource systems for research. Despite the fragile nature of some of the data and assumptions used, TAC in general concurs with the Panel's assessment of ICLARM's priority setting.

ICLARM's Strategic Plan proposes the development of four programs: Inland Aquatic Systems (IASP), Coastal Resources Systems (CRSP), Coral Reef Resource Systems (CRRSP) and the National Research Support program (NRSP). Of these the External Review Panel endorsed the IASP, and expressed some reservations on the other three. TAC also endorses the IASP and supports ICLARM's intention to include freshwater lakes and reservoirs, especially important in sub-Saharan Africa, in this program.

The Panel recommended clearer definition of objectives and researchable issues in the Coastal Resource Systems. It also raised serious questions as to the Coral Reef Resource Systems Program, particularly with respect to ICLARM's comparative advantage and the need to integrate its activities with those of advanced research institutes, its projected economic return, and about the transferability of approaches from sparsely to densely populated regions. The National Research Support Program was tentatively supported by the Panel with the proviso that study of research policy and management of national research systems be limited to pilot enquiries.

TAC considers that the newly revised section of the plan on Coastal Resource Systems better articulates program objectives, but that priorities, researchable issues and research strategies, as well as the need for particular research activities, remain obscure. It endorses the Panel's recommendations for a still clearer definition of the researchable issues in the Coastal Resource Systems Program. As to the revised plan for the Coral Reef Resource Systems Program, TAC encourages ICLARM to address more specifically the opportunities for increases in productivity and technology dissemination, given socioeconomic and demographic characteristics across coral reef areas in different regions.

The Committee would welcome further clarity as to how ICLARM intends to address issues related to equity and resource conservation and degradation, particularly with respect to coastal resource systems and coral

reefs. Special recognition should be given to the need for collaborative efforts in this regard. Finally, TAC urges ICLARM to spell out more clearly its strategies and plans for the information and training components of the National Research Support Program. TAC will carefully take into account these suggested further revisions and those made by the External Review Panel, as it considers ICLARM's mid-term program and budget proposals.

Management

TAC agrees with the views of the Panel that ICLARM will need to take steps to strengthen its management so that the Center is able to implement the proposed strategic plan. The Committee is encouraged about the progress already made in improving its legal international status and about the apparent commitment of the Board and Management of ICLARM to strengthen its personnel, financial, administrative and research management. TAC urges that ICLARM give these matters immediate consideration as they are essential conditions for a successful implementation of its programmatic proposals, for the development of institutional cohesion and to allow effective partnership with its collaborators.

Resource Allocation

TAC will consider the resource implications of the strategic plan when assessing ICLARM's medium-term program proposals. While TAC generally agrees with the need for a minimum set of facilities and in-house research capacity, it urges ICLARM to make maximum use of existing infrastructure of regional and national institutions. This would not only enhance more efficient use of scarce resources, but also allow for the development of more effective partnerships with other fisheries research institutions. TAC considers that the rationale for the capital investment needs identified is inadequately argued, and will need to be more thoroughly supported in ICLARM's medium-term proposals.

Furthermore, on the basis of the documentation in the strategic plan, TAC cannot and should not endorse the proposed needs for financial resources. The analysis of those needs would be undertaken within the framework of ICLARM's first five year program and budget, should the Center be admitted to the CGIAR. However, it is critical for the CGIAR to recognize that the implementation of the program proposed by ICLARM, and tentatively endorsed by TAC, will require more than modest resources. To admit ICLARM without a commitment to increase core support to fisheries and aquaculture could lead to a situation in which either ICLARM has inadequate resources to have a chance to succeed, or resources have to be taken away from CGIAR-supported agriculture and forestry research which TAC has recommended against.

Recommendation to the CGIAR

TAC concurs with the view of the External Review Panel and recommends that ICLARM be admitted into the CGIAR. TAC also agrees with the Panel that ICLARM's success as a CGIAR institute will be dependent upon the implementation of a range of program and management recommendations made in the report of the Panel. TAC shares the Panel's qualified optimism about

ICLARM's capacity to meet these challenges, and also their concern about the size of the task that is to be completed.

TAC, therefore, supports the recommendation made by the Panel to have a monitoring review conducted in about three years in the light of the uncertainties surrounding the new programs outlined in the strategic plan, and ICLARM's apparent weaknesses in organization and management. This interim review should be conducted over a short period and by a small panel. Its main role would be to bring TAC and the CGIAR up to date on ICLARM's progress in developing its programs and improving its management.

TAC is sympathetic to the Panel's cautionary attitude towards admitting ICLARM into the CGIAR unconditionally, without some assurance that the Center would be successful in program implementation, developing institutional cohesion, and strengthening of management. TAC has carefully considered the Panel's recommendation to build-in a sunset clause specifying that ICLARM's entry in the CGIAR should be for an initial period of six years. The Committee considers that this may not be the most appropriate approach to address the shared and genuine concerns. TAC appreciates the Panel's views about the need for an "insurance policy", should these concerns not be adequately met by ICLARM. TAC would rather build this insurance around the following CGIAR processes: the assessment of the medium-term program proposals, the recommended interim review of ICLARM in about three years, and a full and penetrating external program and management review at the end of ICLARM's medium-term plan period. The Committee expects that by the conclusion of its first six years in the CGIAR, ICLARM would have demonstrated its effectiveness in addressing fisheries research issues of international significance.

ICLARM's Response to the Report of the 1992 External Program and Management Review Panel

ICLARM would first like to express its sincere appreciation for the comprehensiveness and incisiveness of the Panel's findings and the clarity of their presentation. A great deal of effort has gone into the preparation of the Report under considerable time pressure and ICLARM finds that it is a most useful document for its strategic and medium-term planning. ICLARM is particularly pleased that the Panel was able to visit outreach projects in Malawi and the Solomon Islands and consult widely with partners, collaborators, donors and other organizations active in fisheries research. The contribution of these stakeholders is deeply appreciated.

The report, while recognizing many of the hardships ICLARM has faced recently, concludes that ICLARM is a dynamic organization with outstanding scientific leadership and solid record of research accomplishments. The recommendation that ICLARM serve as an international center for fisheries research in the CGIAR is a recognition of these past achievements.

ICLARM is confident that on the basis of the Panel's comments, ICLARM can be quickly transformed into a fully fledged center in the CGIAR mould and contribute some new perspectives to the system.

A major source of concern is securing the financial resources necessary to make the transition to CG status. There are substantial costs in development of a medium-term plan, building the required infrastructure and acquiring the information needed to guide choice of a headquarters location, all before new hiring can begin. ICLARM will actively pursue sources of support and will appreciate the assistance of the TAC and the CGIAR in this process.

The following responses to the Panel report, and in particular to the recommendations, are brief and focused on the issues for which there are some facets of disagreement. Many of the suggestions and recommendations had been inferred from the interviews with the Panel and previous discussions with TAC and the CG secretariat. In consequence, action has already been taken on some matters. Immediately following receipt of the Panel report ICLARM convened a full staff meeting to facilitate action on some other matters. The brevity of the responses is thus intended to indicate agreement with most of the Panel's observations.

The report contains twelve recommendations to ICLARM and one to the CGIAR.

ICLARM endorses most of the recommendations and is already implementing a number of them. These are detailed below. The review report also includes a number of less formal recommendations and suggestions for improvement and future directions. These are also addressed below. The suggestions will be considered during the development of the medium-term plan during which time there will be close involvement of ICLARM staff and Board and the major stakeholders.

ICLARM's Evolution and Accomplishments

The Panel, after a very detailed consideration of ICLARM's current programs, commented favorably on the past accomplishments. ICLARM agrees with the Panel's suggestion that stronger institutional vision is needed of both the key strategic issues and how to provide leadership in international fisheries research. In fact (in spite of the "planning fatigue" that the Panel quite correctly recognized), the strategic planning process has already initiated a widening of the ICLARM vision.

ICLARM's Organization and Management

ICLARM is in general agreement with the Panel's assessment of the Center's organization and management. The Center is pleased that the Panel has taken note of and is supportive of the directions that the Board and management have recently taken to start resolving the problems. ICLARM is also pleased that the Panel has appreciated how the turnover in the Center's Directors General, financial instability and project-driven nature have contributed to these problems.

ICLARM is committed to strengthening the administration and management to accomplish the demanding task of serving as an international center for fisheries research in the CGIAR.

Steps have already been taken to improve internal communication and improve program and project planning. The Board and staff will have an increasing role to play in program planning, monitoring and review. Because of the dependence to date on restricted project funding, ICLARM has not placed strong emphasis on concerted integration of projects within programs and coordination among programs. The preparation of a strategic plan has brought this issue to the forefront. Adherence to the plan and oversight of its implementation will take up much of the attention of the Board. In these functions and in the formulation of new programs, the Program Committee of the Board will be augmented on an ad hoc basis with appropriate expertise, a procedure seen to be more flexible, less expensive and yielding more focused advice than a separately constituted program advisory board.

The medium-term planning process will be used as the opportunity to put into place many of the structures and processes necessary for future planning. A staff program review, evaluation and planning meeting will occur annually. ICLARM is also currently purchasing software to complement the project management process and is in conversation with other CG centers to make use of their experiences.

Assessment of the ICLARM Strategy

ICLARM appreciates the considerable time and effort that the Panel directed to ICLARM's strategic plan. All of the suggestions will serve as input into the medium-term plan and some suggestions will be incorporated into a redrafted strategic plan for presentation to the 1992 CGIAR midyear meeting. A few of the suggestions as noted in the following sections have been incorporated into the strategic plan submitted to TAC 57.

The Panel noted that the values proposed as major criteria to guide ICLARM's operations appear to be more "form" than "substance". ICLARM reaffirms that these values are indeed

guiding principles and have and will be used to guide critical institutional choices. To that end the "Guiding Principles" section of the strategic plan presented to TAC 57 has been redrafted to better reflect the principles as originally outlined in the document presented to TAC 55.

The need to exercise caution in proceeding with NARS research policy and research management activities (jointly with ISNAR) is well noted.

ICLARM thanks the Panel for its commentary on social sciences issues, their importance in ICLARM's role in the future and the importance of the Asian Fisheries Social Science Research Network (AFSSRN) in that role. Increased social science research is crucial to assist in solving the aquaculture production and fisheries management questions. To some extent the descriptions of social science research and strengthening activities in the draft strategy were "underplayed". The intention to devote 20% of ICLARM's research and strengthening resources to this disciplinary group is the clearest evidence of the true appreciation for the importance of social sciences in living aquatic resources management. In addition, external consultants will assist in developing the social science thrusts for the medium-term plan.

Recommendations

In the following, we would like to respond to the 12 recommendations by the Panel to ICLARM.

Recommendation 1: initiate early action to change its legal status to that of an international institution with privileges and immunities similar to that of the CGIAR centers

The Board has put a very high priority on resolving the legal status issues of ICLARM. An international agreement is currently being drafted to establish ICLARM as an international organization. Preliminary contacts have been made with a number of governments who have expressed willingness to sign such an agreement. Once the international agreement has been formalized, a Headquarters agreement will be explored with the Philippines (initially). The Philippine Department of Agriculture has given strong positive indications that it will assist in expediting the process including making available the necessary land.

Recommendation 2: formulate and approve a comprehensive set of human resource management policies and create a personnel office to assist in their implementation

A Center-wide personnel policy for Board approval will be prepared. ICLARM management has already begun to review and install comprehensive human resources management systems. These systems should be in place before year-end as will the recommended personnel office.

Recommendation 3: adopt an integrated system for project and program planning, monitoring and review across all programs

Starting late last year ICLARM began the development of an integrated, project-based management system designed to allow the Center to effectively plan, monitor and evaluate its activities in the context of the strategies the Center has adopted. The initial implementation of this system started in 1991 with the required review of all new projects and project amendments by a Research Committee. Components of the research management system will begin functioning in

1992 and the complete system will be in place by early 1993, at which time management information systems will also be developed to improve communication and efficiency.

Recommendation 4: strengthen its financial management and improve its internal reserves (fund balances) and expenditure controls

The Panel's findings on ICLARM's financial management were well received and action has begun to strengthen this aspect. The Board has already met with ICLARM's external auditors and has expanded the scope of the audit they will be conducting at ICLARM. ICLARM's management will incorporate the external auditor's recommendations in the new financial management systems which will be in place by year-end. ICLARM will also fill the Financial Controller and Internal Auditor positions in 1992. The Center's working capital requirements will be included in the budgeting process and fund raising efforts.

ICLARM's Strategy

The contents of the Report dealing with ICLARM's draft strategy (Chapter 4) largely coincide with ICLARM's views. In some cases, however, we would like to express reservations about the Panel's conclusions from their findings.

Recommendation 5: reassess its stated goals and objectives to give more emphasis to research and make them more consistent with those of the CGIAR

With respect to the Panel's commentary on *Goals, Mission Statement and Priorities*, ICLARM recognizes that more clarity is required in the expression of the objectives. The goal was derived from the new CGIAR mission statement. We would not wish to change it. The objectives, however, omitted reference to the means of attaining them - research and related activities. The following text has been inserted in the strategic plan.

Objectives

"Through international research and related activities, and in partnership with NARS, to:

1. Improve the biological, socioeconomic and institutional management mechanisms for sustainable use of aquatic resource systems.
2. Devise and improve production systems that will provide increasing yet sustainable yields.
3. Strengthen national programs to ensure sustainable development of aquatic resources."

ICLARM's reference to primary and secondary clients has conveyed the impression that its activities will include a substantial component of technical assistance. This is not the case, but is an artifact of shortening the document for the Panel. We have replaced the section on clients with the text of the May 1991 draft as earlier seen by TAC:

Clients

"[ICLARM's] research will not generally reach beneficiaries directly but through organizations and individuals to which the [center] will direct its output, i.e., clients. The principal clients, those using the output in their research, development planning and management, are international and regional development organizations; national research and development organizations; educational institutions; nongovernment organizations (NGOs); policymakers; individual scientists and the private sector.

Organizations such as international fisheries organizations, development banks and donors will also make use of the output in planning and implementing their programs.

Amongst the clients of the [center], the most important group will be the NARS."

Recommendation 6: place greater emphasis in the short-run on improvement in breeding and husbandry practice than genetic manipulation in its proposed Inland Aquatic Systems Program

ICLARM agrees with the Panel that in the short-run breeding (which we understand as improving farm breeds of fish by selection) and husbandry improvements should receive greater emphasis than genetic manipulation. Several ASIs are working in the latter field and there may be rapid advances. ICLARM would then wish (for example, at the proposed interim external program and management review in about 3 years) to reassess its approaches and examine the possibilities for combining such techniques with breeding schemes, bearing in mind all the possible social and environmental consequences.

Recommendation 7: develop a revised research plan for its proposed Coral Reef Systems Program clearly justifying any large expansion, taking advantage of opportunities for collaboration with advanced scientific institutions, and present it to TAC for approval either as a part of ICLARM's presentation of its Medium-Term Plan, or, if ICLARM requires more time, on the occasion of the interim external review

ICLARM is in agreement with the Panel's statements regarding the issues and problems in research on coral reef resources. We support the original intent and need for the program. The Panel raised questions about some of the assumptions used in assigning priority to this system. The priority setting for resource systems has been redone using conservative estimates as suggested by the Panel (see Table 2.1 and footnote *i*). Coral reefs still retain a high priority even when using these conservative assumptions.

Coral reefs are one of the most productive ecosystems although their actual production is underestimated. The resource is accessible to millions of people in coastal communities, many of whom are landless. It is also a system which is under severe threat from terrestrial pollution caused by industrialization, unsustainable agriculture and forestry practices, and destructive fishing techniques. More importantly, there are indications that research can make a difference and increase the production from these systems.

ICLARM agrees that the program objectives and thrusts presented in the draft strategy did not adequately represent the scope of strategic research on coral reef resource systems and, in part, conveyed an incomplete impression of the nature of the proposed program due to the need for brevity. Contrary to the Panel's statement, the envisaged research program will have a heavy component of social and economic research (three out of seven senior positions) including the important research on community-based management and only a small component of desk-based modeling, with the remainder on coral reef ecology, fisheries enhancement and aquaculture. Additionally, it is pointed out that contrary to the Panel's findings, current senior staff have substantial previous research experience in coral reef fisheries and in issues related to the coral reef environment.

The current strategy is under revision and is being discussed at a program planning meeting in Australia on 2-5 March 1992 with NARS and ASI coral reef scientists. The Panel's views on location of the Program Director will also be taken into account. The revised research plan could be available as an addendum (if TAC wishes) at the TAC 57 meeting.

ICLARM requests that TAC consider conditional approval for this program rather than delay approval until 1993 as suggested by the Panel. The early approval will allow a modest start in 1993 which will be essential for the planning and development of the future research program. The 1993 plans would include the hiring of a program director, collection and review of basic data on the current status, production and potential of coral reefs and initiation of research on community-based management of coral reef fisheries.

Recommendation 8: revise the strategy for its proposed Coastal Resource Systems Program to reflect the nature of the problems faced in the coastal zone and present it to TAC as part of the center's response to this review

The Board and staff agreed with the Panel that the proposed *Coastal Resources System Program* would benefit from being better articulated. In particular, the rationale and research thrusts in this program should be restructured. This improved articulation is provided with this response (Annex 1). We hope that it will, as requested, provide rationale for the allocation of ICLARM's core resources to the strategic research required to address this entire range of issues, from biology and modeling on the resources side to social science and policy research for dealing with sectoral and national policy issues.

Recommendation 9: recruit a training specialist and with her/his guidance carry out an assessment of training needs in client developing countries in order to formulate strategies and plans on training

Recommendation 10: spell out its strategies and plans in the information area clearly, and not expand its staffing and expenditures in this area before completing such an effort

ICLARM agrees that more thought is needed to develop further the *National Research Support Program.* A better assessment of training and information needs will be attempted, the former through recruitment of a training specialist, as proposed by the Panel, and the latter by use of consultants and extensive consultation with our clients. These will be used in developing the medium-term plan.

Recommendation 11: ensure that capital requirements, including permanent headquarters facilities in terms of offices and laboratories, are the critical minimum needed to carry out its programs

ICLARM's activities in the past have been characterized by a particular leanness in capital requirements and it is not foreseen that policies would change in the future. Full use will be made of facilities provided by NARS and other agencies wherever feasible. Thus, in accord with the recommendation, facilities at headquarters and elsewhere will be designed for a critical minimum of both capital and operating costs. Wherever land is required for facilities it will be obtained as a donation or through a minimum cost lease. It is an established policy of ICLARM to keep capital, maintenance and operating costs to the lowest levels consistent with program requirements.

Recommendation 12: Clarify the rationale and the role of the proposed Deputy Director General

The Deputy Director General is considered a key component (along with the DG) of the senior management team. The DDG will work closely with and complement the DG. A detailed job description will be developed as part of the medium-term plan but ICLARM agrees with the Panel's position that access by directors and other staff to the DG should not be blocked.

Recommendation to the CGIAR

ICLARM is very pleased with the Panel's recommendation "that ICLARM be admitted into the CGIAR at the May 1992 meeting".

The Panel suggests two conditions:

Condition 1: an interim external program and management review should be conducted in about three years to monitor ICLARM's progress in implementing the range of program and management recommendations made in this report.

Condition 2: ICLARM's entry into the CGIAR should be for an initial period ending with the 5th year of its Mid Term Plan, by which time TAC will have deepened its understanding of the special problems of international fishery research. At that time another External Review Panel should be constituted to review ICLARM's effectiveness in providing strategic leadership in international fishery research and make a recommendation concerning continuing support from the CGIAR

The interim review proposed in Condition 1 appears to be a sensible and logical consequence of the Panel's findings.

The second condition gave ICLARM considerable concern. The notion of a review at the end of five-year period is strongly supported. As noted in the recommendation, by that time TAC will be more familiar with technical evaluation of international fisheries research. Additionally, the CGIAR may have developed a comprehensive conceptual framework for ecoregional research in which ICLARM might play a significant role. Meanwhile, ICLARM will have restructured its operations to conform to the strategic plan and will be well into a transition predicated upon continued support from the CGIAR.

Unfortunately, the wording of the condition is open to a variety of interpretations. If the intent is to review the appropriateness of the strategic plan in light of circumstances five years hence, ICLARM is strongly in support of the recommendation. If it is meant to suggest that in the view of the Panel ICLARM is to be given only provisional admission into the CGIAR, there is grave concern. Planning would perforce be tentative, preserving options that might compromise vigorous implementation of the strategic plan. Donors might be hesitant to provide a full measure of support. There are implications also for our ability to attract the best scientists to the proposed research programs.

With these considerations ICLARM strongly requests that the wording of the second condition be revised to indicate the criteria that would be used in reaching a decision in five years time and that it be made clear that there is an underlying intent to maintain ICLARM in the CGIAR system after the five-year review.

January 31, 1992

Dr. Alex F. McCalla
Chairman
Technical Advisory Committee/CGIAR
University of California
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U.S.A.

Dr. Alexander von der Osten
Executive Secretary
CGIAR
World Bank
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U.S.A.

Dear Alex and Alexander,

I am pleased to submit to you the Report of the External Review of the International Center for Living Aquatic Resources Management (ICLARM).

The focal point of this Review has been the special terms of reference we received from TAC - to assess ICLARM's Strategic Plan, to judge ICLARM's capacity to transform itself into an international fisheries research center with the standards of excellence expected in the CGIAR, and to recommend whether ICLARM - or some modified version of ICLARM - should be invited to join the CGIAR. In the sense that we have examined the past primarily to assess potential in the future, this has not been a conventional CGIAR external review.

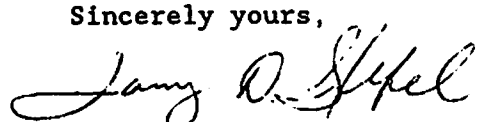
The Panel is convinced that ICLARM's research record, outstanding leadership and institutional resilience add up to a small but substantive base for building an international fisheries research program - at the same time, the Panel's detailed examination of the Center revealed that much remains to be done to strengthen aspects of its management and integration of its program.

After carefully weighing ICLARM's considerable strengths and remaining challenges, the Panel unanimously and recommends that ICLARM be immediately admitted into the CGIAR. The Report details several conditions that have been added to monitor ICLARM's progress in consolidating its infrastructure for launching the new programs in its Strategic Plan.

ICLARM's Board of Trustees, senior management and staff at all levels have been generous in support of the Panel's work, and we wish to record our appreciation for their cooperation and admiration for their dedication to ICLARM and its social purpose.

Finally, I want to express my personal appreciation to the Panel Members, especially the two members from the CGIAR Secretariat whose wise counsel greatly facilitated our deliberations.

Sincerely yours,



Laurence D. Stifel
(Panel Chairman)

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EXECUTIVE SUMMARY

The focal point of this review has been the assessment of ICLARM's ability to transform itself from a small project driven organisation into an international center with the standards of excellence expected in the CGIAR and the capacity to provide leadership in international fisheries research. This focus has been in response to the special Terms of Reference provided by TAC for this review:

- To assess whether ICLARM's Strategic Plan addresses the priorities for international research on fisheries and identifies a set of activities suitable for implementation by a CGIAR supported institute.

- To assess whether ICLARM is likely to have the institutional capacity to realize its stated objectives.

- To recommend whether ICLARM, or some modified version of ICLARM, should join the CGIAR.

The general conclusion of the Panel is that ICLARM is a dynamic organization with outstanding scientific leadership and a solid record of research accomplishments. The Panel believes it has the potential to serve as the international center for fisheries research in the CGIAR. However the detailed review of the Center indicates that much has to be done to strengthen aspects of its management and the conceptualization and integration of its programs.

ICLARM's Evolution and Accomplishments

ICLARM is an autonomous, non-profit international fishery research center established by the Rockefeller Foundation based on the CGIAR model to serve as a catalyst to promote and coordinate fisheries research. Termination of unrestricted support in 1984 made ICLARM heavily dependent upon short-term, restricted funding and special projects. There are currently four Programs at ICLARM:

The **Aquaculture Program** began in 1977 with the "blue revolution" concept of the early 1970's. It has avoided capital intensive and technologically advanced systems by focusing on improving genetic resources, husbandry and integration of small-scale aquaculture with agriculture. Most work is carried out jointly with NARs, ASIs, and national resource management institutions.

The Aquaculture Program's achievements include: defining research areas geared towards sustainable aquaculture to meet the needs of the rural poor, designing and implementing integrated farming methodologies in Asia and Sub-Saharan Africa based upon low-cost inputs, formulating improved approaches to national breeding programs now adopted by several developing countries, and preparing hatchery and nursery manuals that are widely used.

One weakness has been insufficient attention to environmental inputs, including public health. The Panel considered that, despite problems of funding and limited staff, this program has been successful.

The **Coastal Aquaculture Project** in the Solomon Islands focuses on research on giant clams and coral reef based aquaculture. The original range of the clams has been documented, breeding and culture technologies developed and adopted elsewhere, social aspects of reef farming understood, and new research topics identified. The Project can be considered a success, but doubts remain on the economic feasibility of commercial rearing of giant clams.

The **Capture Fisheries Program** focuses on assessment of tropical fish populations in support of rational exploitation, and concentrates on modifying methods of analysis developed for cold-temperate seas for use in the tropics. The Program developed innovative procedures for stock assessment, reaching a wide audience through networking, publications and training, and the Panel considered the Program highly successful in meeting its objectives. This has been accomplished through coherent if rather restricted research objectives that emphasize biological disciplines - the principal client being the community of fishery biologists, and not primarily those responsible for fishery management. For example, ICLARM has not given priority to original data collection or to the 'follow through' of the techniques in their application to improving fishery management.

The **Coastal Area Management Program** began in 1989, and centers upon implementing the ASEAN/US Coastal Resources Management Project (CRMP), and developing a GIS for coastal resource systems management. The CRMP is a grant funded project designed to strengthen the technical abilities of ASEAN nations through collaborative research and the formulation of plans for integrated and sustainable coastal resource management for pilot areas, and through manpower development and information dissemination.

The original project objectives have been modified to include some research on sustainable resource management and fisheries. Major progress has been achieved in meeting its objectives and the program has a good reputation for addressing relevant institutional issues and enjoys strong political support in the ASEAN region.

The **Information Program** publishes and distributes ICLARM's own information materials, provides information to ICLARM staff, and to clients and institutions collaborating on research based on an extensive library. A research unit studies the impact of ICLARM's work on aquatic science. ICLARM's publications are the most visible output of this program. Extensive networks have been established to improve communications among ICLARM's clients.

ICLARM's primary publications are generally high quality and of relevance to clients and the scientific community. There is concern that some materials are published without formal review and may be uncritically applied by clients. The various bibliographies produced are considered of relatively low value unless they are annotated.

The Panel considers that the Information Program effectively supports the research programs within ICLARM and is of high value to NARS and other clients.

Training is undertaken within programs - there is no coordinated strategy to serve the needs of ICLARM's clients. Only the Coastal Area Management Program incorporates a major regional training component. All programs are considered

responsive to clients and have made a contribution to the development of their skills.

ICLARM coordinates four networks. Two of the information networks - Tropical Fisheries Scientists and Tropical Aquaculture Scientists - are well known and respected internationally. The Asian Fisheries Social Science Research Network has made a substantial contribution to strengthening fisheries social science. ICLARM can take credit for a share of this achievement. However, this network has suffered from changes in management and clients perceive that stronger, more consistent and visionary leadership in needed from ICLARM.

ICLARM - Organization and Management

ICLARM is a dynamic organization with dedicated staff and a fine record of achievements. In spite of instabilities in top leadership, it has expanded its programs and resource base, and developed a wide network of inter-institutional linkages while preserving an informal style of management.

There are several areas of organization and management in which ICLARM needs to fill gaps and take action to improve institutional effectiveness. It has to transform itself from a somewhat fragmented, project driven organization to one that is integrated and client oriented. A Center-wide strategy can be an aid to this process. It must reinforce the scientific concern for quality at the personal level with supportive institutional mechanisms so that quality becomes a pervasive value in ICLARM.

The major organizational and managerial directions for change that should receive ICLARM's priority attention are:

- Early action to change its legal status to that of an international institution with privileges and immunities similar to other CGIAR centers, and if necessary, to evaluate alternative countries for a headquarters location.

- Approval and implementation of an improved set of human resource management policies and practices, with special attention to the composition and quality of its internationally recruited staff.

- Achievement of a better balance between restricted and unrestricted funding and the overhaul of its financial management in terms of planning and control.

- Improved integration and coordination of its research and related programs through more systematic project and program planning, monitoring and review, including external peer reviews and client interactions.

- The need to enrich its understanding of NARS as the primary client system and to build stronger linkages with them.

ICLARM's Strategic Plan - An Assessment

In its draft Strategic Plan ICLARM has successfully narrowed down its focus onto the estuarine, lagoon and reef fishery resource systems, and pond aquaculture, to maximise the sustainable impact on the improvement of livelihoods for poor fisherfolk. A largely Asian focus is proposed with limited outreach to Africa for aquaculture and Oceania for reef production. The scale and focus of resources to be applied to reef fisheries and the scale of national research support proposed were questioned. ICLARM should reformulate its mission statement to make its international research role explicit.

The Inland Aquatic Systems Program (IASP): The emphasis within the program on gaining new entrants through research on improving productivity, the integration of aquaculture with agriculture, and the removal of socio-economic and environmental constraints to entry is appropriate. The potential impacts on production over the next decade may be overoptimistic, especially for Africa.

The Coral Reef Resource Systems Program (CRRSP): The Panel considers that the uniqueness and replicability of the coral reef resource system provides sufficient rationale for having a seperate program. The Panel, however, did not approve this program because of its conclusion that the logic for the choice of program thrusts and the proposed organization of the program are not convincing. ICLARM should continue with current activities until strategies are articulated more clearly in collaboration with potential research partners. The proposed program addresses too wide a range of issues, and overemphasizes the role of biology. The Panel suggests more emphasis on comparative field studies, and less on modeling in the early years. The key issue of user rights should be more strongly addressed. The revised program proposal should be submitted to TAC at a later date.

The Coastal Resources Systems Program (CRSP): Two sets of issues are addressed by this program: intersectoral issues in the coastal zone that affect the sustainability of fisheries, and a narrower set centered around the fisheries resource and its management. These broadly reflect the thrusts of the present Coastal Area Management and Fish Capture Programs. The Panel applauds the integration of these two pillars of ICLARM. However integration is not well reflected in the program strategy which fails to articulate researchable issues. and gives an inadequate emphasis to field activities in data collection and model validation. The Panel believes the strategy described does not draw adequately on ICLARM's valuable experience of coastal area management or address adequately the socioeconomic dimension of the fishery. An alternative approach is suggested with strong emphasis on interaction with ICLARM's clients.

The National Research Support Program (NRSP): This program integrates ICLARM's information and training activities and proposes a thrust on strengthening (aquatic) NARS. The Strategic Plan is not clear on goals and strategies in these areas, which gives the impression to the Panel that ICLARM's thinking on this has not progressed much beyond the need to integrate these three related activities. Nevertheless the Panel endorses a program integrating these three thrusts. ICLARM could usefully look to the CGIAR centers for strategies and modes of operation, particularily in training. Any strategy should recognize the collective responsibility of all programs to support training.

One of the three thrusts of this program concerns research policy and management in NARS. The Panel endorses entry into this field only on a pilot basis, and then in collaboration with institutions such as ISNAR with experience in the field.

The Panel has separately addressed its concern with the proper weighting and focus of the social sciences within ICLARM. Three priority areas, useful across the three proposed programs, are identified:

- Research on and research using rapid rural appraisal and participatory methods, particularly in understanding fishing communities.

- Strategic research to quantify, model and understand the economics of widely pursued farming and fishing systems.

- Research on macro-level policy and institutional constraints to fisheries improvement.

Future planning of interdisciplinary program thrusts should carefully weigh the balance between biological and social sciences. The Panel believes that the Asian Fisheries Social Science Research Network is raising awareness of the importance of social science in the solution of fishery management problems in the region.

Given the need for reformulation of aspects of the ICLARM strategy, the resource requirements and transition issues cannot be meaningfully addressed. It is clear to the Panel that ICLARM needs to strengthen both its institutional and administrative base before progress can be made in expanding its programs.

The Panel made several observations on the structure and organization of the Center, management of outreach centers, the role of committees, internal systems and practices, facilities and staffing requirements. The Panel has concluded that ICLARM needs a permanent headquarters with office and laboratory space.

The Panel's overall assessment is that the January 1992 draft of the ICLARM Strategic Plan is a noticeable improvement over the two previous drafts presented to TAC. Research is proposed as the main theme of ICLARM's future activities, which the Panel endorses. The Panel also supports ICLARM's adoption of a holistic, systems perspective in the study of aquatic and linked resource systems.

Although several aspects of the proposed ICLARM strategy are highly innovative, of the four programs proposed, the strongest case is made for the Inland Aquatic Systems Program. ICLARM should clearly identify researchable issues within the Coral Reef Resource Systems, the Coastal Resource Systems and National Research Support Programs, and justify proposed strategies and program thrusts. This, together with the urgent need to improve ICLARM's facilities and administration, may lead to delays in initiation of new activities or expansion of the existing programs.

Recommendations to ICLARM

The Panel recommends that, with regard to organisation and management, ICLARM:

1. Initiate early action to change its legal status to that of an international institution with privileges and immunities similar to that of the CGIAR centers.

2. Formulate and approve a comprehensive set of human resource management policies and create a personnel office to assist in their implementation.

3. Adopt an integrated system for project and program planning, monitoring and review across all programs.

4. Strengthen its financial management and improve its internal reserves (fund balances) and expenditure controls.

On its strategic program plans the Panel recommends that ICLARM:

5. Reassess its stated goals and objectives to give more emphasis to research and make them more consistent with those of the CGIAR.

6. Place greater emphasis in the short-run on improvement in breeding and husbandry practice than genetic manipulation in its proposed Inland Aquatic Systems Program.

7. Develop a revised research plan for its proposed Coral Reef Systems Program clearly justifying any large expansion, taking advantage of opportunities for collaboration with advanced scientific institutions, and present it to TAC for approval either as a part of ICLARM's presentation of its Medium-Term Plan, or, if ICLARM requires more time, on the occasion of the interim external review recommended in Chapter 5.

8. Revise the strategy for its proposed Coastal Resource Systems Program to reflect the nature of the problems faced in the coastal zone and present it to TAC as part of the Center's response to this review.

9. Recruit a training specialist and with her/his guidance carry out an assessment of training needs in client developing countries in order to formulate strategies and plans on training.

10. Spell out its strategies and plans in the information area clearly, and not expand its staffing and expenditures in this area before completing such an effort.

11. Ensure that its capital requirements, including permanent headquarters facilities in terms of offices and laboratories, are the critical minimum needed to carry out its programs.

12. Clarify the rationale for and the role of the proposed Deputy Director General.

Recommendations to the CGIAR

After carefully weighing ICLARM's strengths and its remaining challenges, the Panel recommends that ICLARM be admitted into the CGIAR at the May 1992 meeting of the Group subject to two conditions:

1. An interim external program and management review should be conducted in about three years to monitor ICLARM's progress in implementing the range of program and management recommendations made in this report.

2. ICLARM's entry into the CGIAR should be for an initial period ending with the 5th year of its Mid-Term Plan, by which time TAC will have deepened its understanding of the special problems of international fisheries research. At that time another External Review Panel should be constituted to review ICLARM's effectiveness in providing strategic leadership in international fisheries research and make a recommendation concerning continuing support from the CGIAR.

CHAPTER 1: INTRODUCTION AND CONTEXT

1.1 The Expansion of the CGIAR and Extension of its Mandate

At its 1988 mid-term meeting, the CGIAR agreed to review ten non-associated international research centers for possible entry into the system. The agreed list included candidate forestry and fishery research centers at a time when the CGIAR had no mandate for forestry or fisheries research.

Over the following year TAC mounted fact finding missions to the ten centers, including ICLARM (Report of the TAC Fact-Finding Mission to ICLARM, TAC Working Document, June 1989). Following a constructive report TAC commissioned a desk study on the role of the CGIAR in fisheries research (Desk Study on the Role of the CGIAR in Fisheries Research, TAC Working Document AGR/TAC:IAR/90/5 Rev.1, June 1990) and an expert panel on fisheries research (Report of the TAC Panel on Fisheries Research, TAC Working Document AGR/TAC:IAR/90/5 ADD. 1.1, May 1990).

At the 1990 International Centers' Week (ICW), the CGIAR endorsed the TAC recommendation to incorporate fisheries research into the CGIAR. This opened the way to possible membership for ICLARM which had long been recognized as the leading candidate to assume responsibility for international fishery research in the CGIAR.

1.2 Future Fisheries Research in the CGIAR.

The TAC document discussed and accepted by the CGIAR at ICW 1990 (Towards an Expansion of the CGIAR, TAC Paper to the CGIAR, September 1990) defined the Group's role in international fisheries research.

In that document TAC concluded that fisheries were eligible for international support through the CGIAR because of the importance of fisheries in human nutrition, employment and income generation in many small rural communities, and because of the need for strategic research on fisheries. The CGIAR specifically agreed to support research on inland and coastal area fisheries. It concluded that it should not support research on deep sea capture fisheries or capital intensive aquaculture as sectors of the industry dominated by large-scale commercial operators outside the CGIAR's mission.

The TAC document reviewed the actors in international fisheries research and the status of national fisheries research institutions. It concluded that an international center for strategic research had a key role to play in fisheries development. The document made an initial review of ICLARM and observed that most of the activities of ICLARM conform to those considered suitable for a CGIAR center.

TAC perceived that ICLARM's programs are, by and large, international in scope and content. TAC also noted that the programs reflect the interests and needs of some developing countries, as expressed through the planning mechanisms of the networks coordinated by the center. TAC concluded, and the CGIAR accepted, that both the mandate and governance of ICLARM conform to that of the CGIAR centers.

1.3 The Need for International Fisheries Research: UNCLOS, the SIFR Study and UNCED

Paralleling the CGIAR evaluation process on international fisheries research, a group of donors, led by the World Bank, FAO, UNDP and the EEC, organized the Study of International Fishery Research (SIFR). Mooted first in 1986, the study began in 1989 and the final draft dated September 1991 is expected to be released soon. (Report of the Study on International Fisheries Research, Final Draft, September 1991, The World Bank)

The SIFR Study was prompted by two interrelated factors. The first of these dates from the 1982 Convention on the Law of the Sea which assigned the specific responsibilities for the management of living marine resources in their Exclusive Economic Zones (EEZ's), to the adjacent coastal states. Few developing countries have been successful in managing the expanded areas under their control and research is needed to assist them in realizing the potential of their fishery resources.

Secondly, and in part also related to the national focus provided by UNCLOS, the donors have recognized the relatively low success rate from fisheries development projects.

The central problem identified by the SIFR study was that the inevitable consequence of common access to a 'wild' resource such as most marine fisheries, is over-capitalization. This results in the dissipation of the resource to the point at which net revenues will often be less than the costs of fishing.

The study held that future research priorities should focus on the management of access to coastal resources and on providing the technical, social, economic and ecological information needed to support local ownership and management of coastal and marine resources. Against this background the SIFR notes the weak research capability in many developing countries and emphasizes that the actual conduct of research is the best route for capacity building. The study highlights the need for regional research defined as international collaboration between neighboring countries;

> "..there are important research issues which are best addressed cooperatively by institutions in more than one country which share aquatic resource knowledge and/or fish production systems....there is a comparative advantage either for working through a regional institution, or for an approach that involves scientists from more than one country working in collaboration, with an explicit division of labor and a shared interest in the results."

The study also identifies a key role for international fisheries research;

> " ..the development of new theories and methodologies which could be applied in many situations, the study of basic relationships among different types of resources and their users, the implication for fisheries of global environmental trends and problems requiring very

innovative and risky research, not likely to gain priority attention at the national level."

The draft papers produced by the SIFR missions and working groups provided valuable insights to TAC and CGIAR members in their 1990 decisions on future fisheries research in the CGIAR. Similarly the published technical papers and final report of the study have been at the disposal of this Review Panel. The specification of the fishery research needs of the major developing regions of the world, and the reviews of existing fisheries research capability at national, regional and international levels, have provided a valuable foundation for this review of ICLARM as a candidate international fisheries research center.

Further context for this review has been provided by the preparations for the United Nations Conference and Environment and Development (UNCED) to be held in Brazil in June 1992.

Studies have confirmed widespread degradation of many marine habitats due to over-fishing, despoiling for alternative uses, and run off of silt and agricultural chemicals from the land catchment. It is clear from the preparatory conferences that UNCED will seek to ensure that future development programs embrace rigorous environmental assessments to avoid new environmental disasters. The conference will ask that future programs include funds for research to mitigate ongoing resource degradation as well as improving the livelihoods of the dependent human populations.

The accumulated evidence from SIFR and from the build-up to UNCED highlights the need for more research on resource management and the environment. The close interaction of these broader fields and local fisheries management demands a holistic, integrated research approach reaching from fisheries science through fish and farm systems to social and community organization on to policy formulation and institutional coordination. Such an approach is not, as yet, well understood. It implies sweeping changes in the orientation of existing research, coordination of the activities of government ministries and implementing agencies, as well as greater interaction with the fishing communities involved and the grass roots organizations supporting them.

Many developing countries are eager to see their own national research and implementation capacity strengthened and re-oriented to an approach capable of coping with these wider resource management issues. This is a strong justification for an international effort focused on fisheries research working in this broader context essential to the eventual successful application of fisheries science.

The CGIAR is in the course of restructuring itself into global and eco-regional centers. The new eco-regional emphasis seeks to address these same resource management, environmental and human dimensions in the search for sustainable agricultural and forestry production. Similarly, the search for a holistic, integrated research approach will be critical to an international center working to improve fishery production for poor consumers and resource poor fisherfolk and fish farmers.

1.4 Towards a Decision on ICLARM Entry into the CGIAR

At ICW 1990 the CGIAR issued a conditional invitation to ICLARM to join the CGIAR. ICLARM was asked to develop a strategic plan for international fisheries research, to identify a sub-set of research needs which could be addressed by the CGIAR, and to submit the plan to TAC.

ICLARM submitted a Board-approved draft Strategic Plan for International Fisheries Research to TAC in June 1991. (A Strategic Plan for International Fisheries Research, Board Approved Draft for TAC Evaluation, ICLARM May 1991). This was a valuable global assessment of international resource priorities over a 35 year time horizon, but it was not considered sufficient as a strategic plan for ICLARM's program over the next 10-15 years. TAC reviewed it in June 1991, and asked for a more focused identification of those priority research areas suitable for a CGIAR program in international fisheries research, and a more explicit rationale for the choices made.

ICLARM responded to TAC's request with a 17-page supplement rather than a revised strategic plan. (A Strategic Plan for International Fisheries Research Part II September 1991 - ICLARM's Response to the TAC Commentary on the Draft Strategic Plan of ICLARM). TAC's subsequent commentary reiterated the need for a stronger rationale for the choices made and sought several other substantial changes. TAC's November commentary, which is appended in full as Annex 2, concluded:

> ' TAC expects that ICLARM will prepare a revised strategic plan which takes account of the Committee's concerns in time for consideration by the external review panel. This plan, together with the report of the external review panel will then be considered at TAC 57 in March 1992.'

The Panel received the revised draft of ICLARM's Strategic Plan on 18 January, nine days before the Panel's report was scheduled to be delivered to ICLARM's Board of Trustees. The Panel, therefore, conducted its initial visit to ICLARM, its field visits, and the first half of the two-week main phase of its work at ICLARM before receiving the revised Strategic Plan that was the primary focus of the review. The Strategic Plan was considered to be in draft form because it had not been approved by ICLARM's Board of Trustees and because it still required considerable editing to correct errors, remove inconsistencies and improve the clarity of expression to the standards normally expected in the CGIAR.

1.5 The Terms of Reference of the External Review Panel.

The full Terms of Reference (TOR) for this external review of ICLARM form Annex 3. The standard TOR for External Reviews of CGIAR Centers are supplemented by TOR covering the special task of this review panel to evaluate ICLARM for entry into the CGIAR. Specifically:

> - To assess whether ICLARM's Strategic Plan addresses the priorities for international research on fisheries and identifies a set of activities suitable for implementation by a CGIAR supported institute.

- To assess whether ICLARM is likely to have the institutional capacity to realize its stated objectives.

- To recommend whether ICLARM, or some modified version of ICLARM, should join the CGIAR.

These three issues are the focal point of this review. In the sense that the primary purpose is to assess ICLARM's future potential, this is not a conventional CGIAR external review. Past programs and management are examined in order to identify strengths ICLARM could build on and judge ICLARM's capacity to transform itself from a project-dependent organization into an international research center with the standards of performance expected in the CGIAR system.

The TOR include two sets of questions appended: general set which guide all CGIAR external panels in their reviews, and a set of questions, raised by present and potential stakeholders, on ICLARM itself. The two sets of questions are also included in Annex 3.

1.6 The Panel's Approach to the Review.

For reasons explained in Section 1.4, the Panel conducted this review under severe time pressure. Because the Strategic Plan was not available until very late in the process, the Panel deliberately separated ICLARM's past from its future. Thus, in the next chapter, the report starts with an assessment of ICLARM's evolution and accomplishments. This identifies strengths for ICLARM to build on in its future work. Chapter 3 follows with a similar analysis of ICLARMS's existing organization and management, again, it seeks to identify current strengths and weaknesses.

ICLARM's future is discussed in Chapter 4 in the context of its revised draft Strategic Plan, previous discussion of fisheries research issues by TAC and the CGIAR, the Panel's evaluation of its previous work, and issues arising out of the international dialogue on fisheries through the SIFR and related studies. In this chapter the Panel provides both a commentary on what ICLARM has proposed in its revised Strategic Plan and an opinion on the kind of programs the CGIAR should support in the area of fisheries.

The chapter also compares ICLARM's current strengths and weaknesses with the requirements of the program the Panel recommends for CGIAR support. This analysis explains the institutional and organizational changes ICLARM would have to undergo in order to implement the strategy and program recommended, it leads to the Panel's principal recommendation in Chapter 5 about the conduct of fisheries research within the CGIAR and ICLARM's possible role.

The logistics of the review process, including the itinerary of the Panel, the institutions visited, the persons interviewed and the surveys conducted, are described in Annex 4.

CHAPTER 2: ICLARM'S EVOLUTION AND ACCOMPLISHMENTS

2.1 Background

ICLARM is an autonomous, non-profit international fishery research center that was organized by the Rockefeller Foundation on the model of the research centers in the CGIAR. The Foundation initiated a series of consultations with fishery scientists in 1971, the year of the CGIAR's establishment, to identify key problems in international fisheries research and to assess whether an international research center such as IRRI could be effective in addressing these problems. Convinced of the need for such a center, the Foundation created ICLARM in 1975, basing it in Hawaii for two years before moving it to its present location in the Philippines in 1977.

With the assurance of unrestricted support from the Rockefeller Foundation, ICLARM was in a position to plan and conduct a core program like centers in the CGIAR system. It developed its research agenda in close consultation with fishery leaders in Asia and with a distinguished Program Advisory Committee that met until 1985 when it was disbanded due to lack of funds.

The reference to "management" in the name of the new center was early recognition of the need to shift the fishery research agenda from the expansion of capture fisheries to the problem of the assessment and conservation of aquatic resources, an area in which ICLARM has provided valuable leadership. In contrast to the CGIAR centers ICLARM was not planned to be an operating institute with its own research facilities, but to serve as a catalyst to promote and coordinate fisheries research, initially in Asia and the Pacific. It operates in a decentralized mode, emphasizing communication, collaborative research and networking with existing institutions. Four talented young research scientists, who joined the ICLARM staff during its first three years, constituted a multidisciplinary team that provided leadership and remarkable program continuity despite high turnover at the level of the director general. [1/]

ICLARM has not had a mission statement in the formal sense, but it has related its activities to the statement of purpose set forth in the 1977 Articles of Incorporation, the principal sections of which are as follows:

> To improve the efficiency and productivity of culture and capture fisheries through coordinated research, education and training, development and extension programs;
>
> To upgrade the social, economic, and nutritional status of people in the less-developed areas of the world through improvement of small-scale rural subsistence and market fisheries;

1/ Three of the four scientists are currently program directors and the fourth, Ian Smith, served as Director General from 1985 until his death in 1989.

To work toward the development of labor-intensive systems to aid employment and of low energy systems to minimize capital and cost requirements;

To publish and disseminate research findings and recommendations of the center; and

To organize or hold periodic conferences, forums, and seminars, whether, regional, local or otherwise for the purposes of discussing current problems.

The Rockefeller Foundation's decision in 1984 to terminate its unrestricted support for ICLARM created a financial crisis that strained program continuity and threatened institutional survival (see Annex 7). 1985 was therefore a critical transition year in which ICLARM urgently launched efforts to secure alternative sources of funding, much of which would have to come from restricted grants for special projects. Partly to assist in fund raising, ICLARM prepared a Five-Year Plan (1988-1992), in which it was stated that, "Over the past four years, ICLARM has never been more than a few months from insolvency. Funding strategies have not only led to cutbacks in core staff, but also have contributed to dangerous compartmentalization of staff and activities as the Center's dependence on short-term, highly restricted and special project support increased."

UNDP provided leadership in late 1986 to organize donors into an ICLARM Support Group in order to seek more diversified and longer-term support. ICLARM's accomplishments since then in research, training and information evidence success in fund raising, but the costs of this precarious mode of operation are substantial: the heavy burden of understanding and responding to donors' interests, severe personal strain upon key directors and staff, and the inevitable danger of diversion from planned research thrusts because of the need for financial security.

ICLARM's unrestricted core support declined from 99-82% of total funding during its first five years to 21% in 1987, and it is currently running under 30%, far below the level customary in CGIAR centers. Although energetic and creative in seeking project funding, ICLARM has been seriously constrained in carrying out the coherent research program in its Five-Year Plan by the shortage of flexible funds. This should be kept in mind when assessing the research accomplishments described in this chapter.

Since 1985, there were three major program innovations:

1. Coastal Aquaculture Center - ICLARM acquired land in the Solomon Islands in 1985 for the construction of its first research and hatchery facilities, primarily for work on giant clams. This site became ICLARM's first regional (South Pacific) office, which began in Townsville, Australia, in 1985, transfering to the Solomon Islands in 1986.

2. Research on appropriate aquaculture technology for Africa - ICLARM received funding from GTZ in 1985 for an aquaculture research project in Malawi, its first field program outside of Asia.

3. ASEAN-US Coastal Resources Management Project - ICLARM assumed responsibility in 1986 as executing agent for this large AID-funded, technical assistance project involving six countries, and in 1989 the Board of Trustees approved the new Coastal Area Management Program. By 1987, the income from the ASEAN-US Project provided over one-third of ICLARM's total funding.

ICLARM's present program structure has evolved since the original "five-element program" recommended by the Center's Program Advisory Committee was adapted in 1977, shortly after ICLARM set up offices in Manila. The program titles over the years are shown below:

1977	1985	1990	Proposed
Aquaculture	Aquaculture	Aquaculture	Inland Aquatic Systems
-	-	-	Coral Reef Resources
Traditional Fisheries			
Resource Development and Management	Resource Assessment and Management	Capture Fisheries Management (from 1989)	Coastal Resource Systems
	-	Coastal Area Management (from 1989)	
Marine Affairs	-	-	-
Education and Training	Education and Training	-	National Research Support
-	Information	Information	

Aquaculture remained a program from the beginning with emphasis gradually shifting from production issues to consideration of integrated farming system issues. Recognition of the importance of genetics and improved breeds has been reflected in project activities since 1982 and breeding work commenced in 1988. Aquaculture in coral reef areas has been a separate thrust since 1984.

The Traditional Fisheries Program focused on socioeconomic issues of small-scale fisheries. It was merged with the Resource Development and Management Program in 1985 in recognition of the close interaction between biological and socioeconomic issues. The latter program had concentrated on development of length based methodologies for biological management of fisheies resources. This emphasis continued as a major element of the Capture Fisheries Management Program until 1991, when the results to date were adopted by FAO for inclusion in joint software. Biological emphasis has now shifted towards trophic interactions for improved options in management.

The merged program, Resource Assessment and Management (RAMP), began work on economic valuation of coastal resources and included the Coastal Resource Management Project (CRMP), which was started in 1986. The CRMP was

made a separate program in 1989 in view of its size and the importance of the topic. The new program was named Coastal Area Management Program to signal that it would become more than a single project.

Socio-economic research on capture fisheries remained with the RAMP which was then (1989) changed to the Capture Fisheries Management Program. The new title was reflection of the remaining area of emphasis of the RAMP. However, in 1990, one of the socioeconomic activities, the AFSSRN network coordination, was passed to the Coastal Area Management Program, since most network projects were broadly "coastal" and the program lacked an economist.

The Education and Training "Program" was never staffed and officially ended in 1988 in recognition that the activities were integral parts of the research programs. The Information Program began in 1985. The concept was to include fisheries information research, particularly citation analysis and evaluation of the impact of fisheries literature.

The following table, showing the percentage distribution of expenditures by program over time, reflects the important transition in 1984-85 when Rockefeller funding ended.

Percentage of Total Program Expenditures

Program	1980-81	1982-84	1985-87	1988-90
Aquaculture	45%	48%	25%	41%
Fisheries	27%	36	17	19
Coastal Management	0	0	39	26
Coastal Aquaculture	0	0	5	5
Information-Training	24	16	14	9
	100%	100%	100%	100%

2.2 Aquaculture program

2.2.1 Evolution and Current Focus

The term Aquaculture is used in this report, according to the definition in ICLARM's draft Strategic Plan, as "..farming of aquatic organisms .. where the term farming .. implies interventions in the rearing process such as captive breeding, feeding and protection from predators and explicitly involves clear individual or group ownership of the fish until harvested. Aquaculture can be usefully classified as extensive, having no fertilizer or feed input; semi-intensive, having limited fertilizer and/or feed inputs; and intensive, largely or totally reliant on feed inputs."

ICLARM's Aquaculture Program began in 1977 and emerged from the initial planning stage when a "blue revolution" was still anticipated. An integrated farming project, the first field activity in ICLARM's aquaculture program, commenced in 1978. Further activities centered around a few short-term projects mainly in Asia (including conferences and workshops).

Publications included: "The biology and culture of tilapia," 1980; "Catfish production economics", 1981; "Assessment of the potential for mullet production along the northern coast of Luzon' Philippines,"; "Economics of Snakehead fish culture in Thailand", 1982-1984. ICLARM also provided advice on aquaculture technology: "Preparation of guidelines for fish hatchery/nursery development", Egypt 1978; "Advice on the establishment of a freshwater research center", Egypt. 1979.

Strengthening research capabilities of NARS and university institutions in developing countries through collaborative projects was the main mode of ICLARM involvement. A few short-term coastal aquaculture projects were carried out, usually on a consultancy basis.

At the same time ICLARM gradually began to develop its own strategy for long-term research and to move away from coastal aquaculture projects in brackish and marine waters, except for the "international giant clam" mariculture project (see chapter 2.3). This occurred not only because of the involvement of other institutions of the region in this field but also because mariculture development is often capital intensive and will not necessarily reach ICLARM's target group of resource-poor people.

Longer term orientation was also derived from several commissioned reviews and conferences/workshops organized in the early 1980's on subjects of international importance. In the second half of the 1980's several international conferences were organized mainly in cooperation with other organizations on subjects pertinent to development of aquaculture in the tropics.

Due to the short-term nature of donor funding the Center was only able to implement relatively small and restricted projects. These included research with numerous cooperating institutions together with activities such as training, workshops, conferences, net-working, reviews and advisory services. This project-by-project approach was inevitable given the financial constraints. Despite this limitation, the Aquaculture Program was selective in choosing projects and creative in incorporating them into a longer-term concept. Thus the Aquaculture Program developed a perspective on what would be the most appropriate focus for its future development. Although the spectrum of potential research issues in tropical aquaculture is extremely broad, ICLARM has focused on several key areas:

(a) The improvement of genetic resources of aquaculture candidates (mainly tilapia). ICLARM realized that breeds used throughout Asia are generally close to wild fish and that science-based husbandry and breeding have hardly begun compared to crop agriculture. Documentation of natural genetic resources was the first priority, and because tilapia stocks in Asia came from very limited original founder populations, live strains were collected from Africa and, together with strains currently in use in Asia, a breeding program was established. The initial outcome of this program was that an unselected synthetic base population showed substantial gain in growth over breeds currently farmed in the Philippines.

(b) Improved husbandry in conventional aquaculture systems A variety of systems were examined over time and routes explored to better productivity and profitability. Examples of such projects are: milkfish production in the Philippines (1981-1983), tilapia seed supply and management (1983-1984) and tilapia hatchery economics (1984).

(c) Small-scale integrated aquaculture-agriculture systems in the tropics. These efforts have focused on crop-livestock fish systems, especially rice-based systems in Asia (Bangladesh, Philippines, 1989-present) and maize-based systems in Africa (Malawi, 1985-present), together with a project on "Transfer of Asian Technology to Africa" funded by France (1988-present). The initial results show encouraging trends in productivity and profitability, though sustainability still has to be assessed.

To focus efforts towards resource poor fisherfolk, ICLARM has sought to avoid capital intensive and technologically advanced systems that demand heavy purchased inputs. In recent years ICLARM has progressively promoted the concept of integrated farming systems as a route to the development of sustainable aquaculture in developing countries. ICLARM's new "integrated farming systems group" has emerged from this conceptual framework and works for the improvement of the small-scale producer. The present germplasm and husbandry projects also mainly aim to serve these systems.

2.2.2 Achievements and Impact

Most research projects carried out jointly with or in parallel with NARS and with other institutions (including international organizations such as AIT and IRRI) were quite successful from a scientific viewpoint, through the future research agenda has evolved from mistakes as well as successes. ICLARM, for example, learned from an early project on combined livestock-fish farming that achieved fish yields of up to 10t/ha/year from manured ponds. The impact on development was essentially zero because the recommendations were largely beyond the means of the farmers.

The germplasm/breeding activities and the integrated farming systems activities have made good progress and have potential for application but the scientific quality of the short-term project results has been variable.

The major overall achievement of the Aquaculture Program activities has been to define research areas for sustainable aquaculture development which have considerable potential to meet the needs of resource-poor, small-scale farmers, identified by ICLARM as the main potential new entrants to inland aquaculture.

The following summarized the Panel's views on ICLARM's statement of achievements and impact in this program (Panel's views inset below each one).

Devised integrated farming methodologies to be used in sub-Saharan Africa, based on low-cost inputs to fish ponds.

Information disseminated in books and videos and training materials has been adopted by some farmers in Bangladesh and Malawi; potential

for wider application through Malawi's lead role in the SADCC Region should be assessed and, if appropriate, encouraged.

Assistance in devising new methods for short-cycle, low input pond aquaculture in Bangladesh on a trial basis.

This has been demonstrated to produce increased net returns from aquaculture.

Established an Integrated Rice-Fish Group with current collaborative activities in eight Asian countries, prospects for participation with others, and linkages to Africa.

Potential to broaden rice-fish research approaches of participatory groups beyond "fish in the rice-field" to fish in whole rice-based farming systems, especially the use of small pond refuges to allow flexible coupling/decoupling of crop and fish production.

Developed a management plan for aquaculture and fisheries enterprises for families displaced by new reservoir construction in Indonesia.

About 1,000 families became involved in aquaculture operations, though larger corporate concerns are now taking over and its long-term effect remains to be demonstrated.

Formulation of a stepwise approach to national fish breeding programs: (1) documentation/ conservation, (2) evaluation, (3) utilization of genetic resources.

Has stimulated several governments to take steps towards national breeding programs: Ghana documentation/ conservation of fresh water fish genetic resources; Philippines - launching a national breeding program for tilapia.

Demonstration of the deleterious consequences of poor broodstock management and very limited founder populations in tilapia aquaculture in Asia.

Increased awareness at government, NARS and farmer levels of the genetic consequences of broodstock management; requests for new tilapia founder populations from Asia Pacific countries.

Strengthened international moves towards the use of native fish species for aquaculture and appropriate use of international Codes of Practice to introduce or reject the introduction of new species.

Initiation of screening projects in the search for native species rather than exotic (Malawi); carrying through, for the first time, the ICES/EIFAC Code of Practice on introductions in developing countries (e.g. Malawi seeks to eradicate common carp as an exotic species; Indonesia approves introduction of <u>Clupeichthys aesarnensis</u> in reservoirs.

Documentation of tilapia genetic resources in Africa, collection of new founder stocks (Nile tilapia from Egypt, Ghana, Kenya and Sénégal) as tested material for investigating approaches to genetic gain in fish and as new genetic material for future breeding programs in Asia.

Initiation of a tilapia germplasm reference collection in the Philippines as a national and regional resource.

Preparation of a hatchery and nursery manual for breeding of various carp species.

First edition sold out; first and 2nd editions used by researchers and extensionists in most carp farming countries; used as teaching material in aquaculture courses in many regions, including Europe and North America.

Seeking low-cost nutrient inputs into aquaculture production systems. ICLARM joined AIT in preparing the proceedings of an international seminar in 1988 on this subject under the UNDP-World Bank Water and Sanitation Program.

The Proceedings of this seminar can be considered a milestone addressing the controversially debated issue of wastewater-fed aquaculture on a worldwide basis and represent much of the present state of the art in this field. It will greatly assist future research in both developed and developing regions.

2.2.3 Assessment

Given the restricted funding and the strong dependence on collaborative work with many partners, the achievements of the Aquaculture Program are quite impressive. The results have been implemented in several developing countries and have also stimulated research in scientific institutions of several donor countries.

There remain some shortcomings. Project goals have sometimes inhibited strategic thinking. In the integrated fish farming projects in Malawi, for example, staff did not assess the relevance of the location chosen for on-farm experiments to the circumstances of the farmers perceived as the target audience for new entrants. There is a dramatic difference between the siting of ponds on farms with permanent water sources (mountain streams in Malawi), and the circumstances of the mass of the small farm population in the seasonal rainfall areas widespread throughout southern Africa. The choice of representative on-farm sites should have a strong influence on longer-term strategic research thrusts in both breeding and management.

On the side of scientific quality, one would also have liked to see more in-depth studies on water quality fluctuations and effects on primary production and fish health (stress-induced reduction in performance or disease), particularly when various unconventional nutrient sources (e.g. cooking fire ash) are utilized.

The approaches taken in the genetic and breeding are convincing, and a significant improvement in aquacultural production can be expected regionally and interregionally.

One shortfall of ICLARM's aquaculture program is the weak emphasis in environmental issues, because inland and coastal aquaculture itself is a potential source of pollution. ICLARM is now beginning to realize the importance of these issues which become more pertinent as aquaculture expands. Such issues need to be addressed in time to develop compensating strategies. Furthermore, the issue of increasing shortage of freshwater throughout the tropical world and the way it affects the development of pond culture if aquaculture expands may affect the somewhat optimistic forecast of global increases in production.

Although the strong emphasis on modeling (e.g. ECOPATH and whole farm models) is understood, it needs complementing by the collection of sound empirical data to verify models under different circumstances, before their wider use is justified. An appropriate dynamic data base, including multifactorial time series on abiotic and biotic parameters, is urgently needed. These requirements have not been researched appropriately.

Extensive modeling on the dynamics of environmental parameters and biological performance of species in pond systems has been developed by various aquaculture research groups. It was not clear to the Panel whether these have been taken sufficiently into consideration when developing complex models in-house.

The Panel's overall assessment is that, despite these shortcomings, which are largely the function of limited professional staff and precarious funding, this program has been successful.

2.3 South Pacific Office: the Giant Clam Project

2.3.1 Origins, Evolution and Institutional Dimension

The original impetus for this project was the conservation of diversity for giant clams, the world's largest molluscs. Their natural habitat is the photic zone of Indo-Pacific coral reefs, where they are easily collected, and hence are an endangered or extinct species within parts of their formerly very wide range. Islanders attach great symbolic significance to giant clams: their flesh is comparable to other bivalves, and their shells are used for artifacts and curios. A high priced market exists in parts of Asia for the dried muscle, and this provided a further impetus for investigating the possibility of cultivation. Results with unenhanced wild brood stock suggest that a total commercial flesh weight of some 5kgs or more can be reached 5 years from hatching, making this a possible candidate commercial species once selective breeding, and several unique features mentioned later, are taken into account.

The first rearing trials were carried out in Northern Queensland, and transferred to a coastal site near Honiara, Solomon Islands which came into operation in 1986, following a survey of possible island sites for the facility. The current laboratory, rearing, and residence facilities, were

built with the assistance of Solomon Island's Government and Japanese funding, on government allocated land. The infrastructure needed for rearing determined the minimum scale and location of operations, and includes 2 small laboratory/hatchery buildings, 300m2 of outdoor rearing tanks, several residences for staff, independent generating facilities for the seawater and air pumps, and a small visitors center with educational information. To date ICLARM has invested some $400,000 on capital items and funds budgeted in 1991 were $687,000: 71% coming from a wide range of special project donors (AIDAB/ACIAR, FFA/ICOD, ODA, the CFTC, AIMS, Greenpeace, Asian Fishery Society and the Skaggs Foundation).

An almost pristine coral reef area directly offshore from the facilities, closed to fishing, is included in the government lease, and provides significant advantages as a standard for comparison with degraded reefs, particularly if future programs address the coral reef production system as a whole. Preliminary work has begun on the feasibility of wild reef fish restocking in this area, but this is still at a very early stage.

Island communities such as the Solomons Islands offer a comparative advantage for testing the feasibility of marine farming activities, because in contrast to more densely populated areas, their traditional marine tenure systems continue to control access to marine production. Such systems, which are infrequent elsewhere in the world, are examples of 'TURF's' (Territorial User Rights in Fisheries), and a priority was assigned to their investigation by the SIFR study. Unlike common property marine resources in other habitats, they allow different 'treatments' of individual reef systems to be compared in a replicated fashion.

The objectives of the project have widened from restocking to include aquaculture. A serious conservation issue was the original purpose of culture, and urgent action to avoid further loss of genetic resources was needed. The hatchery technique is already allowing this original objective to be addressed, with quarantine and shipping techniques for seed clams developed, and now being evaluated. However, the potential for stock improvement and growth enhancement is considerable with a high growth rate beginning in the second and subsequent years. Once production has reached a significant level, a high unit value export market already exists, and there is a variety of ancillary uses for various clam products on local markets. Reviews support the feasibility of cultivating other valuable resources by island peoples at the Honiara facility, including oysters and trochus.

Giant clams are unique among animal resources exploited for food by man, in that animal protein is synthesized to a significant extent from photosynthesis through the medium of symbiotic unicellular plants (zooxanthellae) embedded in the clam tissue. Production can occur in shallow marine habitats in the circumtropics, even where nutrient levels and hence plankton are too low for the cultivation of other shellfish without supplementary feeding. These areas of coral reef and atoll are very extensive; covering roughly 600,000 square kilometers, and are used at present for foraging and fishing with little or no mariculture. In many cases they have been exhausted by excessive exploitation and degradation due to poor management practices, and the lack of alternative livelihoods for island and coastal populations.

The Subprograms:

An original artificial larval feed is produced from commercially available ingredients which has potential for other bivalve culture. Once juvenile clams acquire zooxanthellae, they are able to grow using the products of photosynthesis of their algal symbionts. Ammonium nitrate as a fertilizer in the outdoor tanks is then an effective and innovative 'feed supplement'. Growth efficiency does not depend solely on the genetic potential of the clam, but also on the species and strain of zooxanthellae, and some experimental work has begun on this aspect, and on biotic control of algal tank fouling. The most serious parasite encountered for which no treatment has yet been devised is a small parasitic snail: its control is important since so far, mechanical removal is the only feasible treatment, and accounts for much of the labor intensive aspect during the growing out phase.

Juvenile clams are transferred at 7mm size from the tanks to floating or bottom cages on the reef, with final grow out in 'exclosures'. Small clams are moved to a field station in Western Province, where nursery, grow out, distribution, and future training facilities will be located. Great interest has been shown by local villages in rearing juvenile clams to commercial size, and young clams have been provided to villagers with instructions for their maintenance. The success of this exercise still cannot be evaluated, since it requires regular attention over a fairly long 'grow on' period, and at this early stage of the project no clams have reached a marketable size. One incidental success of 'clam gardening' in wire enclosures on the 'proprietary' reefs adjacent to the villages, is that villagers now have an appreciation of the high clam growth rates, and the advantages of 'growing on' small clams to larger sizes in 'reef gardens', instead of immediately consuming them. Government fisheries officers have taken an interest in the success of these ventures, and provide an extension service advising villagers on technical problems.

Socio-economic studies have focused on the role of the traditional tenure system as it affects resource use. Traditional knowledge of the large number of products is being documented. Women contribute a high fraction of the yield and potential earnings from an ecosystem with almost unparalleled biodiversity.

The project has also used consultants to make some preliminary and promising attempts to assess markets for the various ancillary products resulting from clam harvesting. The adductor muscle, can easily be exported to Asian markets through the fish (largely tuna) marketing companies located in Honiara, and various smoked, dried and other products can be derived from the rest of the clam.

2.3.2 Achievements and Impact

The Senior Scientist and Director has long experience in coral reef research, and has played a key role in providing research direction and supervision, assembling facilities, and locating funding and temporary staff (2 person-years each from the US Peace Corps and UK VSO scheme), plus making a significant contribution to the research. There are six affiliate research scientists: all but 2 at the M.Sc and B.Sc level, five technical assistants

and 2 outposted government officers. Support staff are generally junior, with a good esprit de corps but limited previous experience and in need of supervision to achieve valid scientific outputs. A serious need is evident to supplement the staff with research workers of greater experience.

The following summarizes ICLARM's statement of accomplishments, with comments by the Panel inset blow each one:

Documented the original range of the clams, and their local extinctions, and locating a center for culture of giant clams using objective criteria.

A successful field station exists with an active program, and a network of correspondents and a data base have been set up.

Developed breeding, rearing, holding, shipping and quarantine technologies, and an artificial food.

These techniques appear valid, but full commercial application has not yet begun.

Studies initiated on the local social context for reef farming.

A number of important new researchable topics were identified such as: 1) the use of inorganic fertilizers for growth enhancement in promoting photosynthetic activity of the zooxanthellae, and 2) reviewing the scope for selective breeding, and recognizing the possibility that selection of zooxanthellae may lead to immediate growth enhancement.

Some very preliminary work on reef fisheries and their potential for enhancement has begun, which it is too early to evaluate.

2.3.3 Assessment of the Giant Clam Rearing Project.

This program and its proposed outgrowths into reef fisheries enhancement is seen as having several strong aspects, particularly relevant to its role as a semi-autonomous subprogram servicing a largely separate zoogeographic zone; notably the coral reef ecosystems of the Indo-Pacific islands. Government of the Solomons Islands has been very supportive, and it is proposed to build a commercial scale hatchery and marine research institution on an adjacent site. Honiara has advantages for dissemination of technologies to Pacific island countries, given that the Forum Fisheries Agency (FFA) is located here with membership of 14 island states plus Australia and New Zealand, and is interested in spreading technology and management techniques to member countries. FFA proposes signing a letter of agreement with ICLARM to this effect. Collaborative work with ASI's is facilitated by air links with Honiara (e.g. AIMS in Northern Queensland has provided some high technical studies on measuring genetic diversity of the brood stock, and other cooperative work).

In evaluating the work of the project, the panel took into account the largely autonomous nature of project operations. The need for the Director to spend a significant part of his time on administrative matters, to

liaise with local government, seek funding and satisfy a range of donors, supervise a largely inexperienced staff, has reduced time available for research. Despite this, a relatively large number of lines of investigation has been started, and although those chosen appear correctly prioritized, the staff and resources needed to fully investigate them, without a close collaborative effort with institutes in developed countries, would have to be substantially increased.

In addition to questions of prioritization however, the Panel referred to the need to consider comparative advantage. For example, further development of a breeding program will need to establish the genetic diversity of the brood stock. Preliminary investigations by geneticists from AIMS in Townsville have already noted the low diversity of the Honiara broodstock, and remedial measures will have to rely on this continued collaboration. This also applies to any further work on zooxanthellae, which although superficially uniform, consist of a range of species and even families which are only identifiable from their microstructure. Transgenic and other laboratory work, on clam symbiosis, for example, might be more efficiently carried out cooperatively, or contracted out to ASI's.

The application of the project findings to the small populations of island states may not satisfy the CGIAR's concern for benefiting large numbers of low income people. However, although the island peoples are not numerous or generally nutritionally deprived, their existing cash crops are low in diversity, and (e.g. copra) of low unit value. Giant clams and other reef species could provide a wide range of potential products for both domestic and export markets. In the long run, a potential for large scale production may exist for island countries as a 'cash crop', if clam rearing technology can be transferred to the private sector within exclusive tenure systems. Reintroduction of the clam, plus its rearing technology, to the more densely populated Asian littoral is a priority, and if feasible, would contribute alternative employment for the surplus of fisherfolk.

Many important field problems can be addressed at the Honiara site, and the prospect of developing the potential of the algae/mollusc symbiotic association, must be regarded as an exciting if futuristic possibility, but one that will depend heavily on work in ASI's.

Considerable progress towards achieving the goals of the program have been made, in that a technology of rearing has been developed and transmitted to users elsewhere, and the major lines for further research defined. As such, this program can already be considered a success. Clients exist; in that there is demand for seed clams and interest in applying the rearing technique elsewhere. With respect to the economic feasibility of commercial rearing, this remains to be established, and will require more detailed socio-economic study, plus several more years of research on the aspects described here, before a further evaluation is carried out.

2.4 The Capture Fisheries Program

2.4.1 Evolution and Current Focus

The Capture Fisheries Management Program (CFMP) was initiated in 1989, by narrowing the focus of the Resource Assessment and Management Program, and has focused its main efforts on the assessment of fish populations in tropical waters in support of rational exploitation. The program has mainly concentrated on methods of analysis of fish population data; modifying analytic methodologies developed in cold-temperate seas; and broadly in parallel with FAO, it adapted these to tropical fisheries where fish have generally shorter lives, greater diversity and higher rates of growth and mortality. (In the tropics, coastal resources and small-scale fisheries are more important than offshore industrial-scale fisheries). The Program has focused on developing innovative procedures in the biological science disciplines, and has been particularly successful especially considering the small size of the scientific team.

Much of the work has been carried out at ICLARM headquarters by a team consisting of a Program Director and assistant, outposted project leaders in the South Pacific Office, Sierra Leone and South America, 3 local research assistants, 3 programmers, and 6 other staff concerned with data coding and secretarial/drafting support. Staff are supplemented by associated scientists (2 currently), and visitors bringing data for analysis to ICLARM.

This is the third largest of ICLARM's programs, with relatively smaller proportion of its budget made up of donor funds for restricted activities, and hence a somewhat higher freedom of action. Work is currently implemented through 7 projects focused on: stock assessment, software, global aquatic ecosystems, database management, support to the Network of Tropical Fishery Scientists, an outreach project on socio-economics in Latin America, and on management-orientated research. With the exception of the last, which is collaborative with scientists from outside organizations, and the penultimate, which involves a single outreach staff member, the others have largely overlapping professional staff membership, with explicit participation by the Director in each. There is an active attendance by the Director at international conferences (e.g the annual ICES meeting); staff act as lecturers at training courses and seminars, and are occasionally seconded to the field. Apart from the South American outreach activity, the work is largely carried out at ICLARM headquarters.

A milestone in the earlier Resource Assessment and Management Program was the publication in 1984 of a first review of methods developed in ICLARM and elsewhere for population analysis of tropical fisheries. This manual was intended for use with programmable calculators. The subsequent change in strategy of the Program to emphasis the use of microcomputers for analysis, modeling and data base development for fish populations, paralleled the 'microcomputer revolution' that made computing power available to developing countries at a low cost.

The stated program objective was "to focus on research relevant to the management of tropical and subtropical capture fisheries" (ICLARM Annual Report 1990). In practice, the main program thrusts have been in applied

fishery biology and stock assessment of tropical commercial species, in assisting tropical countries to assess the potential of fish stocks available to them, and in the development of 'universal' models for fish population analysis, intended to be applied to a wide spectrum of marine resources. The first priority was the development of methods of analysis for size frequencies, to determine the growth and mortality parameters for subsequent assessment of single species fisheries. ICLARM gave high relief to its ELEFAN software through the FISHBYTE Newsletter, organized a world conference on this subject, and taught these methods in FAO/DANIDA courses. As a result, the ICLARM 'package' of methodologies for size frequency analysis has been adopted by many developing country scientists.

Program attention is now focused more on multispecies fisheries: again, on the development of 'universal' models and software to be applied by the user to the specific local situation. This is supplemented by information from data bases on species biology, fish consumption, etc. Some of the products of this program, involving applications of physiological and biological principles to studying fish populations, are very long-range in their strategic significance, and contribute equally to the research objectives of ASI's and NARS.

There has been occasional involvement in practical applications of assessment principles to fishery resources, often in cooperation with NARS, using the data series collected by national agencies, plus information from the literature. This has become an explicit strategy, with data bases now used to compile data from the literature for subsequent analysis, or to form the basis for generalizations.

2.4.2 Achievements and Impact

The following summarizes the Panel's views on ICLARM's statement of achievements and impact (Panel's views inset below).

Developed methods of stock assessment using length data only with emphasis on methods of analysis of existing data sources.

> **Permits some preliminary diagnosis of stock status even if fragmentary data available.**

Encouraged synthesis of program areas through reviews, meetings, networking, and excellent publication record.

> **Published reports and summaries widely used in teaching at university level, high level of citations in fishery literature.**

Arranged diffusion of ICLARM results to wide audience through networks and newsletters.

> **Helped reinforce community of tropical fish stock assessment scientists.**

Recent development of ECOPATH model for tracing flows of materials/nutrients through wild fishery and fish farming systems.

High potential as conceptual training tool, but presently less obvious for stock management.

Data base development in fish biology.

Collaborated in improving access of third world scientists to key data.

Provided publication outlets for third world scientists.

Asian fisheries journal is more useful in the long term than the unrefereed FISHBYTE newsletter as ICLARM now recognized - the final issue of FISHBYTE was in December 1991).

Occasional studies on environmental impacts, time trends in fish populations, and socioeconomics of fisheries, as opportunities arose.

Some useful but largely isolated outputs on these topics.

Assisted in training third world scientists in methods of quantitative evaluation of fish stocks; promoted computer literacy, and use of software/models on size frequency and trophic interrelationships.

A major impact in increasing awareness of quantitative procedures in fishery biology in third world countries.

Helped document high exploitation in many tropical fisheries.

Enhanced government awareness of the reality of overfishing in the tropics, but socio-economic linkage not established to improve application of results by management.

Pioneering work in application of stock assessment models to local fisheries.

Of considerable relevance in post-SIFR context.

Studies on environmental impacts and trends in fish populations, social considerations and economics of tropical fisheries, monitoring of changes, as opportunities arose.

Some useful but largely isolated outputs on these topics.

2.4.3 Assessment

The Program has benefitted from a long continuity of leadership and an unusually coherent, if rather restricted, set of key research objectives. This has resulted in a very impressive output of publications, data bases, training materials, methodologies and software, disseminated widely through

networks and newsletters. All of this has been achieved by one principal investigator, a small support staff of well motivated Filipino graduates, supplemented by visiting investigators. The small number of researchers is not clearly evident from the project-driven structure of the program: the division of the work into 7 projects reflects as much the need to account to separate funding sources rather than the existence of separate teams of investigators. Many program thrusts, particularly into peripheral areas of interest, appear to reflect a necessary opportunism in seeking project funding.

For a small team to achieve an international profile in high quality research requires a close focus on a limited number of objectives that reduces the depth and diversity of subject areas that can be tackled. This restricts the time available for collaboration with other programs in the institute, especially if an ambitious program of dissemination of methodologies and a heavy training load are also undertaken, as is the case here. The CFMP initiated a surprising number of interprogram activities despite this constraint. The emphasis placed on biological disciplines means that the principal clients of the program are the community of fishery biologists in developed and developing countries, and not primarily those responsible for management of the fisheries.

The Program has shown innovation and high productivity in providing tools for workers on fish population dynamics in developing countries. Information transfer of developments in software and methodologies by ASI's, FAO and others, has received lower emphasis. Inevitably, given this high output, some of the program's methodological approaches have received occasional criticism, more as a consequence of occasional inexpert application, than the validity of the methods. Assembling a suite of menu-driven, user-friendly mathematical procedures is convenient but, as for statistical packages, it requires a corresponding training thrust to ensure that inexperienced scientists are aware of the separate assumptions underlying each method. Comments were made to the Panel as to the dangers of premature software release, the need for verification of data entering international data bases, as well as the need for modelers to have personal exposure to the system being modeled. These are all areas that should receive attention, particularly where a high profile approach to the dissemination of methodologies and conclusions is followed.

Quite a number of collaborative projects with other programs of the institute have involved applications of software, suggesting that one of the unstated roles of this Program is providing modeling capabilities for the Center, a function that could be made more explicit in the future.

The Program has been very successful in introducing length frequency analysis, trophic and other considerations into the assessment of tropical fish stocks. However, the 'Fish Capture' label for this program, and the stated goal, " To equip developing-country fishery scientists and managers with the means to assess properly and effectively manage the fishery resources for which they are responsible" (ICLARM Report 1990), are very broad. They have not included corresponding research in the area of fleet dynamics, fishing gear performance and impacts, and the use of catch and fishing effort data, all of which are essential for management. Addressing all of these

problem areas would of course require additional funding, higher staffing levels and special skills not presently available within the team.

The application of so-called bio-economic models models and the other new thrust towards geographic models (of which a simple approach has already been developed by ICLARM) will require much more detailed data on the catch and effort exerted, and the cost of a unit of fishing effort (fuel, manpower, fleet operations, etc) in order to make yield enhancement predictions. They also require more emphasis on collaborative work for field testing of models in cooperation with end users.

Because of the diversity and complexity of many tropical ecosystems, equilibrium approaches such as the ECOPATH model is only a first step, given that managing stocks on a single species basis is now proving problematic, even in high latitude fisheries. ECOPATH describes and quantifies linkages and flows between prey and predator species within a natural food web, and has been used successfully to quantify food linkages in a wide range of natural systems. These kinds of equilibrium models can be thought of as providing a 'snap shot' of an ecosystem at a point in time; they do not offer a complete solution to the problems of describing a stressed fishery, although more dynamic approaches are now being developed.

Many Southeast Asian marine fisheries are experiencing dynamic change, with overexploitation of the marine resources being accompanied by a progressive degradation of the coastal habitats and environments supporting the wild fishery. This has reduced the economic productivity of these systems, and has changed the dominant species and the relative extent of different types of habitat. Some of these changes in species dominance due to heavy fishing were in fact documented in a milestone first issue of ICLARM Studies and Reviews in 1979 which documented long-term changes in resources in the Gulf of Thailand, but recent work of the Program has placed little emphasis on documenting changes in coastal resource systems.

Data base development has become a major component of the work of the Program, and information repositories such as FISHBASE are now being stocked with biological data from the literature on wild as well as aquaculture species. Such 'global' data bases are a useful way of supporting better and more cost effective generalizations, and as such are a legitimate tool for ICLARM's work. It is the Panel's view, however, that data bases should largely be used as a way of better defining researchable issues, and not primarily as a substitute for setting up standard data collection and monitoring systems, since a severe problem in the tropics is the paucity of integrated data sets allowing scientific investigations of tropical marine fisheries viewed as integrated environmental-biological-sociological systems.

Apart from a number of cases cited in the 'Management Orientated Fisheries Project' of the Program, not much emphasis has been placed on 'follow through' in monitoring the application of analyses to the development and implementation of management regulations. This of course, is largely the role of the NARS under UNCLOS. The major constraints to adoption of sound advice on appropriate catch and mortality levels were made explicit by ICLARM's research on the resource and socio-economic interrelationships in the San Miguel Bay region. This provided a common focus to the three main

programs of the Center, illustrated the possibility of local application of stock evaluation methods, and offered a new mechanism to coastal states to benefit from delegating management to local and regional government. This type of approach has been followed up by the CAMP: evaluations of fish stocks in Brunei Darussalam and Lingayen Gulf carried out by project staff selected and supervised by CFMP, which also developed the software and data base used. In the Panel's view, this type of collaborative effort is an area of comparative advantage for ICLARM, and should be encouraged as complementary to the effort of regional fisheries commissions and international bodies such as FAO, which have specific roles at the EEZ level.

2.5 Coastal Area Management Program

2.5.1 Evolution and Current Focus

The Coastal Area Management Program (CAMP) constitutes one of the four programs at ICLARM. Mounting pressures from rapid population growth, competition for land and water resources and disruption of environmental processes are leading to serious deterioration to the health and productivity of coastal ecosystems and consequent adverse impacts on food security and the health and economic welfare of increasing numbers of people. The goal of the CAMP is ..."to provide sound socio-economic justification for the conservation of critical habitats and the pursuit of long-term and sustainable productivity of coastal fisheries, forestry and other compatible uses of coastal resources". The main objective derives from the ASEAN/US Coastal Resources Management Project (CRMP), the core of the program; and it is to promote more sustainable utilization of coastal resources through enhancing existing capabilities within the ASEAN region to develop and implement comprehensive and environmentally sound policies, and spatial planning and resources management strategies for development activities in coastal areas.

There is a direct relationship between the conservation of coastal ecosystems promoted through the adoption of integrated coastal area management and the sustainable development of fisheries. Coastal ecosystems are capable of sustaining continuous flows of renewable resources, such as fish stocks and agricultural crops, if they are properly managed. Because the sustainable development of fisheries is directly linked to the conservation of coastal ecosystems and the environmental functions they perform, the protection of environmental processes that maintain the health and productivity of coastal ecosystems is equally as important as the control of fishing effort in the management of fish stocks.

The ASEAN/US CRMP was formulated in response to a growing appreciation on the part of the ASEAN nations of the critical role coastal resources play in sustaining their economic and social development. ICLARM was chosen to implement this project on behalf of the ASEAN Working Group on Marine Sciences in 1986 and is responsible for coordinating all activities through a network of 47 national scientific and resource management institutions and some 200 scientists and technical staff within the ASEAN region. The main counterpart agencies from the six nations include the: Brunei Darussalam Department of Fisheries; Indonesian Institute of Science; Malaysian Ministry of Science, Technology and Environment; Philippine Council for Aquatic and Marine Research and Development; National Science and

Technology Board of Singapore, and the National Environment Board of Thailand. A Project Steering Committee made up of members from each of the ASEAN nations is responsible for overseeing and evaluating the performance of the project.

The project has two components. The first is the development of coastal resources management plans for a series of six pilot sites each of which was chosen by the individual ASEAN nations. ICLARM played a catalytic role in the formulation of integrated management plans for the pilot sites by stimulating the resource management agencies, NARS, ASIs and other interested parties in the host countries to undertakes a series of coordinated research, planning and management activities. These activities included:

a) cooperative research involving the collection of original data as well as compilation and documentation of existing information to form analyses of the extent, condition and trends in use of resources;

b) interdisciplinary evaluations of problems and issues, such as resource use conflicts, that adversely affect the sustainable utilization of coastal resources; and

c) promotion of improved institutional arrangements for resolving existing problems and the formulation and implementing integrated plans and management strategies for the allocation and utilization of coastal resources.

The second component focuses on information dissemination and manpower development.The main activities undertaken include:

a) publication of: technical reports generated from the pilot research studies; monographs on coastal resources planning and management; workshop and conference proceedings, training manuals; literature reviews; educational materials in the form of audio visuals, booklets and leaflets in various languages, and a newsletter;

b) training, including, short-term courses on concepts, principles and methodologies for coastal resources management; academic courses and on-the-job training programs;

c) technical workshops for managers and conferences dealing with policy issues for senior officials.

The conduct of both components has been supported by modest technical assistance from ICLARM in the form of workshops to introduce concepts, principles and methodologies for coastal resources management, in-service training programs, short-courses and expert advice on applied research and resources management, and publication services.

Integrated resources management plans and comprehensive technical reports have been completed for each of the six pilot sites. Three have been edited for publication, and the remaining three will be completed by mid-1992.

The ASEAN/US CRMP was initially designed as a technical assistance

project where the executing agency would provide technical and scientific advice to NARS and other bodies concerned with the management of coastal resources within the ASEAN region. As a result of the experience gained during the conduct of the project by ICLARM and its ASEAN counterparts, revisions were made to the project design that reoriented objectives placing increased emphasis upon research towards sustainable resource management. Early experience identified the following priority research issues:

- understanding of the human utilization of, and impact on, coastal resource systems;

- understanding of the nature of resource systems and their response to human uses and environmental impacts;

- planning for and managing multiple uses of resources systems to ensure sustainability and to minimize incompatibilities and conflicts;

- promotion of integration of sectoral policies, investment strategies and management arrangements to create conditions under which sustainable capture fisheries and aquaculture can be promoted to improve the nutrition and economic welfare of coastal communities.

These issues are being addressed by the working groups responsible for the pilot studies, however it is unlikely that they will be fully resolved during the remaining life of the project. These research issues are of great importance to the sustainable development of coastal fisheries throughout the tropics and the CAMP provides a mechanism for integrating bio-physical, economic and socio-cultural research to further our existing knowledge and provide creative management solutions.

To-date, execution of ASEAN/US CRMP has constituted the main activity of the CAMP; however, the program's activities have expanded to include:

-Establishment of a Geographic Information System (GIS) for coastal area management and planning. This project began in 1991 and will be completed in 1992.

-Formulation of a community based coastal resources management plan for San Miguel Bay undertaken on behalf of the Philippine Government. This project will begin later in 1992 and will be completed in 1993.

-Technical advice and support for the Asian Fisheries Social Science Research Network (AFSSRN). The AFSSRN was established in 1983 with support from IDRC and Ford Foundation. But the Network was later transferred to the Office of the Director General.

In addition to the new GIS and San Miguel projects, the CAMP is engaged in discussions with the Batangas Foundation comprising multi-national corporations, provincial government agencies and the Singapore Government, to coordinate the field studies and formulation of a coastal area management plan for Batangas Bay in the Philippines.

2.5.2. Achievements and Impact

The CRMP has been instrumental in establishing a wide network of professional and scientific contacts with governments which will facilitate the transfer of scientific advice into local management initiatives. It is an achievement in line with an important recommendation of the SIFR study. The Program has also provided major leadership in the establishment of practical measures to promote the sustainability of capture and culture fisheries through improvements in the manner in which coastal systems and the uses of renewable resources they generate are planned and managed.

Specific achievements attributed to the CRMP in ICLARM documents are stated below along with the Panel's observations inset below them:

Adoption of the principles of integrated coastal area management by the six ASEAN nations.

> There is strong evidence of increased political will to implement sustainable development of coastal resources through the inclusion of CRM in national economic development plans. Each of the main government institutions participating in the CRM project has implemented recommendations made by the project. For example the Thai cabinet has approved the mangrove management plans for Ban Don Bay and approximately US$ 6 million has been allocated for the implementation of the plan. Increased international funding is also being made available for the development of CRM plans to promote sustainable coastal development. One example is the recent ADB initiative to establish CAM plans for 12 major gulfs/bays in the Philippines.

Identification and critical examination of the main management problems and issues that hinder sustainable coastal resources utilization.

> The environmental profiles and draft management plans for the six pilot studies have clearly identified major policy, administration and planning issues that adversely affect the sustainable use of renewable fishery resources within the ASEAN region. Major information gaps and priority topics for research have been identified, for example: social attitudes towards destructive fishery management practices; ecological, economic and social impacts of brackishwater aquaculture on fishing communities; socio-economic impacts of tourism; and alternatives for habitat improvement. The research priorities identified through the project emphasize the need for an international fisheries research institute to apply its knowledge and skills to support collaborative, applied research with NARS and other relevant bodies to share information and derive management solutions that can be applied to other tropical coastal regions.

Formulation of policies, strategies and action plans and management guidelines to promote sustainable resources development for six pilot sites.

Draft management plans have been prepared and are expected to be ratified by the relevant authorities in each of the six nations. Conceptual approaches, techniques and methodologies for CAM and planning have been refined through field testing and the exchange of ideas among people from different disciplines. It is too early to judge whether they will answer all the problems and will be accepted as models that can be applied to other areas.

Development of appropriate institutional and legal arrangements to facilitate the implementation of the CAM plans.

The CRMP has fostered a spirit of cooperation among sectoral agencies and the creation of inter-agency working parties responsible for formulating the management plans and recommendations for new arrangements to protect the integrity of coastal systems. Regional cooperation has been fostered through the development of networks of institutions and individuals involved in CRM activities. There are, however, continuing problems of integrating policies and management strategies to reduce resource use conflicts.

Development of monitoring and evaluation protocols to ensure the effective implementation of and, where necessary, adaptation of the management plans.

These have been designed, but until the draft management plans are implemented it will not be feasible to judge the effectiveness of the protocols.

Implementation of academic and in-service training programs.

The project has organized and conducted four regional workshops and two conferences on policy and technical matters. National coastal resources management capabilities have been enhanced. Opportunities for professional training within the region have been strengthened through the development of a postgraduate CAM curriculum and discussions are under way with regional universities to set up new courses.

Publication and distribution of some 23 major documents (11 more to be published in 1992) on tropical coastal area management.

The information available on CAM has been increased and shared through the collation of secondary data and, where necessary, collection of primary data and the publication of technical reports.

Although there is still one year to go before the ASEAN/US CRMP is completed, it has been a substantial positive impact within the ASEAN region and beyond. This project has helped establish a very sound reputation for the CAMP at ICLARM as is demonstrated by the very high level of political support the program's activities enjoy within each of the six ASEAN nations. For example, the Baguio Resolution signed by senior policy makers from ASEAN

attending the CAMP policy conference collectively expressed their commitment to the sustainable development of their respective coastal areas and the incorporation of integrated CRM into national economic development planning.

2.5.3 Assessment

A number of problems and constraints have been noted in the annual reports of the Project Steering Committee, notably:

- the heavy initial focus on the fisheries sector created some difficulty in bringing in other sectors (e.g. forestry, tourism, etc.) into the project;

- difficulties were experienced in coordinating the work of various agencies and scientists, both at the local and regional levels, in implementing the project;

- national staff assigned to the project were not properly screened to take full advantage of available technical skills;

- a large volume of primary data were generated by the project but some are not useful or have not been properly used;

- the quality of research outputs varied considerably reflecting the differing levels of technical capability among national project staff;

- the inability of some agencies to adopt an integrated approach is reflected in the management plans.

Despite the above limitations, the CRMP has achieved commendable results that have brought measurable benefits to the institutions and individuals who have participated directly in the Project's activities. It has created a considerable body of new environmental, social and economic knowledge concerning problems and issues that reduce the sustainability of fisheries in the coastal regions of Asia.

ICLARM has benefitted substantially from:

- the experience its staff have gained in fields directly relevant to fisheries;

- strengthened professional linkages with NARS, ASIs, resources management agencies, NGOs, donors, the private sector and community groups; and

- and enhanced reputation in international circles for applied research, project management and the promotion of practical measures to achieve more sustainable use of tropical coastal resources.

These achievements set ICLARM apart from other international institutions, give it a considerable competitive advantage in the search for sustainable fisheries development, and provides a sound foundation for future

strategic and applied research. The practical experience gained by ICLARM and its counterparts in adapting coastal management concepts, principles and methodologies originally developed in the United States and Europe to tropical developing nations, provides them with a unique opportunity to extend the lessons learned to other areas of the world.

From an institutional management perspective, criticism has been levelled at the CAMP for adopting accounting, project administration and publication procedures that are independent from the central administration arrangements of ICLARM. This, although with close consultation and approval of the management, is thought to have hindered communication with other programs.

It could also be argued that, because of the nature of the CRMP and the catalytic role played by ICLARM, there will be little institutional memory of the project. However, the Panel believes that the very strong working linkages between the project management team and the wide circle of people who have been involved, the number of publications that have been prepared dealing with common problems and issues affecting fisheries and other activities, and the clear set of researchable topics that were distilled provide a sound basis for enhancing the dialogue between NARS and other interested bodies in ASEAN and the major research programs at ICLARM.

2.6 Information Program

2.6.1 Evolution, and Current Program

ICLARM has a sophisticated information program by most standards. It maintains a broad and comprehensive coverage of aquatic sciences and is linked with fisheries institutions and scientists in both developing and developed countries.

ICLARM's information program has developed four major thrusts over the years:

(1) a publication and distribution unit for ICLARM's own information products,

(2) an in-house information service providing information inputs to ICLARM scientists and other staff,

(3) a multi-faceted external information service responding to the information needs of ICLARM's clients and collaborators in the Philippines and other developing countries; information is often distributed via ICLARM coordinated networks.

(4) a research unit carrying out studies on the bibliographic impact of the work of ICLARM staff and on the aquatic science itself.

Twelve percent ($265,000) of ICLARM's budgetary resources were allocated to this Program in 1986. This percentage has dropped to ($191,000) in 1990. However, this relative decline does not properly reflect the actual situation because of changes in accounting policy. In 1990 publications

costs were charged to the respective programs (approx. $70,000). Thus, costs of the Information Program remained essentially the same in nominal terms, while total budgets increased.

Publications

ICLARM's publications are the most visible outputs demonstrating its impact on science and on its clients. ICLARM publishes under its logo several series. These can be grouped into the following categories:

Category	Cumulative as of 1987	1991
Primary literature journal articles	36	69
ICLARM Studies and Reviews	15	19
Conference proceedings, papers and book chapters	110	177
Report literature (Tech. Rep., Bibliographies, others)		
Semitechnical literature (Newsletters)	217	505
Total	378	770

This output provides a source of information for the Center's immediate clients, NARS and the general aquatic scientific community in the tropics, and it also serves as an outlet for disseminating ICLARM's own scientific results. Additionally, the newsletters and conference proceedings function as an outlet for clients. However, these are not alternatives to peer reviewed scientific journals. Unfortunately, most refereed international journals do not give high priority to manuscripts from developing country scientists. ICLARM may have a comparative advantage for sponsoring a scientific journal in order to fill this gap.

To date, a total of 29 national and international conferences and workshops have been organized or co-organized and the proceedings edited and published by ICLARM. Print runs for conference proceedings range between about 500 to 3000. About 60 to 100% have been distributed within one to three years indicating a relatively rapid rate of distribution. Recently, ICLARM has started to published various software packages, which seems to be well received and widely applied.

Newsletters

Printing levels of the ICLARM Newsletter from 1978 to 1986 were around 4,000 copies of each quarterly issue but ICLARM pruned down its mailing list in 1987 to about 2,000. In 1990, about 3,000 copies of the NAGA Newsletter (ICLARM Quarterly) were distributed to 32 countries in Africa (314 recipients), 23 countries in Latin America (120 recipients) 13 countries in Europe (57 copies), Canada and the US (56 copies) and the rest (over 2,300 copies) in Asia. Various other newsletters such as FISHBYTE, AQUABYTE, AND CLAMLINE are published by ICLARM, sometimes in cooperation with others,

providing linkages between national and regional groups and individual scientists. Within CAMP a newsletter is published with three issues per year and distribution to almost 2000 individuals in 95 countries in 1989.

Library

The library holds over 10,000 volumes of books, monographs, and theses, 780 serial titles, over 4600 reprints and over 2,000 pamphlets. Annual interlibrary exchanges number 186.

The library's acquisition program was geared to the needs of both headquarters and field staff from its beginning. It also provides information to NARS institutions who would otherwise not have had access to scientific information because of the high costs for scientific journals.

The library is a source of information for local clients and those from abroad, handling about 300 mail enquiries per year. Computerization and access to overseas databases are shared with other fisheries libraries. Quick access to marine science libraries worldwide has been made possible through the use of SCIENCENET/OMNET electronic mail. Also, the library staff monitors several electronic bulletin boards for other ICLARM staff as well. The use of the ASFA CD-ROM by ICLARM and by external users has grown continuously (14% in 1990).

2.6.2 Achievements and Impact

The total print run of ICLARM publications as of 1990 were 137,700 copies of which 105,500 have been distributed (76.6%). The publication mailing list includes 148 countries. The most widely distributed item has been the NAGA Newsletter (formerly ICLARM Newsletter). It was mailed in 1990 to 132 countries reaching a total of 2,297 individuals/institutions.

The number of articles in peer review journals has increased steadily. ICLARM studies and reviews cover an adequate range of subjects and are often valuable reports on the state of the art, frequently used in training. Conference proceedings, papers and book chapters meet high quality standards and address often timely subjects of international importance; generally materials are well edited. Technical reports, bibliographies, and others are often of variable quality. Bibliographies are not as important, if there is access to modern retrieval systems. Semitechnical literature (newsletters) appears to address the needs of the Center's clients.

Most of these publications have been well received by the scientific community. This can be partly attributed to the careful selection of invited contributors, but ICLARM's extensive review and careful editing of the original contributions is also important.

Citations

Although an unbiased, in-depth evaluation of the impact of the published ICLARM material on science is not possible, citation analysis can show the overall relevance of the ICLARM material.

Citation research carried out by the Information Program shows that ICLARM publications are well cited in a variety of document types around the world, in primary and secondary literature, in conference proceedings and in textbooks and handbooks. The overall number of citations per year has been increasing.

The International Citation Index, however, is not an adequate measure of the impact of ICLARM literature use in developing countries. In a recent review of the scientific literature in four Asian countries, for example, it was found that the contribution to "core" literature (that is to journals covered by the ISI in the SCI) by such Asian countries was small using the SCI database. When examining journals not in the SCI database, it was found that such journals were useful for recording results of regional or local importance and that papers therein cite reports and conference proceedings extensively. According to Maclean et al. (1990), the most cited ICLARM items were published in conference papers, making up over one-third of the cited documents, followed in rank by technical reports. Thus, it can only be concluded that primary journals and articles are not necessarily the "core" literature in the developing-country fisheries research with which ICLARM is involved.

Networking has been another strong pathway ICLARM has developed to improve communication between its various client groups (Network of Tropical Fisheries Scientists, Network of Tropical Aquaculture Scientists).

2.6.3 Assessment

ICLARM's primary publications (original contributions in peer review journals) are generally of high quality and of relevance to the central research areas of cooperating partners and to the scientific community at large. Its own publications are not only widely distributed but are also frequently cited. The publication mailing list includes 148 countries.

The publications closest to ICLARM's target clientele have always been its various newsletters. The most widely distributed publication is the NAGA Newsletter (formerly ICLARM Newsletter). The subject area coverage in the NAGA Newsletter is relevant to the client needs and provides rapid access to information on ongoing projects for many researchers in developing countries who otherwise have little access to the international literature. It also helps improve communication between fisheries and aquaculture scientists in many parts of the developing world. For many fisheries scientists in Latin America and Africa it has become the major quick information source on projects and research activities carried out in other regions. The recently introduced column "What's new in literature" is a quick client-oriented digest of relevant subjects.

ICLARM ability to organize international conferences, carry them through and publish the material on time is excellent. With a few exceptions, careful reviewing and editing of invited and contributed papers have led to high scientific quality of such publications, despite the often notoriously mixed quality of contributed papers by conference participants.

Some of the conference and workshop proceedings, serve a broader

policy and technical purpose, however, and cannot be judged solely in terms of biological science criteria. This applies in particular to the Coastal Area Management Program. For example, although the contributions to the proceedings of the "Policy Conference on Managing ASEAN's Coastal Resources for Sustainable Development" were not all of international standards, the proceedings led to the "Baguio Resolution" which laid out the rationale for improved management of coastal resources and was signed by senior governmental officials and scientists from throughout the ASEAN region. This demonstrates the role of information exchange in strengthening public awareness and political will to implement sustainable resource development, including innovations in fisheries management technology.

There is some concern that material is often published too fast (e.g. in FISHBYTE) where peer review often may come only after distribution. ICLARM needs to become more introspective in this area and should put less emphasis on "quick methods" and their rapid circulation. Also some publications are of relatively low value. These in particular include the various bibliographies and their preparation should be dropped (unless they are annotated), since there are today many technical means available, in-house and elsewhere, to obtain such reference lists.

ICLARM's approach to disseminating scientific and technical information is appropriate and its visibility is excellent; its two information networks have wide membership.

In-house "research on research" provides staff and management with some "feel" for the needs of the target group and whether ICLARM's information products meet them.

In summary, the elements of the Information Program of ICLARM form an efficient tool that effectively supports the needs of the other program components of the Center and its clients, and provides multiple linkages to the aquatic science community at large. It has a particular high value because the difficulties of access to research information in developing countries is one of the limiting factors inhibiting relevant research. The key value of this program is the contribution it makes to reducing this problem.

2.7 Training and Networks

2.7.1 Training: Current Focus

Much of ICLARM's research is done in a collaborative mode and this itself is a powerful tool in capacity building. Training at ICLARM is not addressed by a separate program. There is no institute-wide training strategy, it is the responsibility of the individual programs. It is difficult to assess the level of effort to training but it is judged to be between 5-15%, varying by program. The training done reflects the needs of the project under which research and other activities are being funded.

The intensity of efforts and modes of implementation vary widely across programs and are usually undertaken as an adjunct to the main work of the program, often on an ad hoc basis. The modes of training used at ICLARM

range from the supervision of theses and the provision of funding for degree programs at universities, through in service training, to the design and implementation of short-term training courses and workshops. ICLARM has published a significant number of training materials produced through each major program. Capacity building in social sciences is a primary role of the Asian Fisheries Social Science Research Network (AFSSRN). Variability in modes and intensity across programs is striking as illustrated in the following paragraphs.

2.7.1.1 CAMP. The ASEAN/US Coastal Resources Management Project (CRMP) within the CAMP is the only program to have incorporated a regional training program as a major component of its project design. The objective has been to build up technical capability in coastal resource management of key personnel in participating countries. Training requirements within the ASEAN region were determined by the participating countries and the need for a range of improved skills was identified. The main requirement was for more resource managers with the skills to plan and execute coastal area management programs. Specialized skills required to promote integrated planning and resources management were also identified. Examples include:

- resource and environmental evaluation;
- the application of social science methods;
- application of geographic information systems in the management and interpretation of information;
- application of remote sensing.

Three main forms of training were implemented to meet the identified needs, namely:

- Academic training in which six young scientists were funded to study for masters degrees. All of the candidates successfully completed their programs.

- On-the-job training where 13 ASEAN nationals worked alongside professional counterparts on coastal management related programs at institutions in the United States and ASEAN to broaden their experience and to increase their skills;

- Short-term training courses conducted by project staff in association with national institutions within ASEAN.

A total of 110 people have participated in the six types of short course: Information-Research and Management (13), Principles of Coastal Resources Management (40), Methods for Socioeconomic Analysis in Coastal Area Management (14), Introduction to Remote Sensing and GIS Applications to Coastal Resources Assessment and Planning (18), Principles of Economic Valuation of Coastal Resources (13), and Remote Sensing and GIS for Coastal Zone Planning and Management (12).

2.7.1.2 Capture Fisheries. This Program has undertaken three forms of training: academic training in the form of theses supervision at Masters and Ph.D level and lecturing in degree programs, the implementation of short courses designed by ICLARM, and teaching participation in collaborative

programs such as the FAO/DANIDA Training Course in Tropical Fish Stock Assessment.

Staff also tutor students in fish stock assessment and the analysis and use of computer software, in scientific writing, and they make inputs in a collaborative mode to the intellectual development of third world scientists visiting ICLARM.

2.7.1.3 Aquaculture. Training forms a major component of the Aquaculture Program's activities. A mix of training activities is undertaken: degree training where ICLARM staff have taught fisheries management, applied statistics and other subjects on the M.Sc programs and theses supervision. Funding has been provided to help a limited number of students complete master's degree programs. Short-term training courses such as the First Training Workshop on Quantitative Genetics of Farmed Tilapias which was held at FAC/CLSU in cooperation with staff from CLSU and the AKVAFORSK from Norway. Farming Systems Research and Extension Training was held in Bangladesh and at IRRI where ICLARM staff worked with staff from the International Institute for Rural Reconstruction. The Program has also prepared innovative training materials in participatory research methods for integrated farming systems research.

ICLARM has been asked to help in future training in aquaculture systems research for the Southern African Development Coordination Conference (SADCC) subregion.

2.7.1.4 The Information Program hosts a number of different training activities. These can be grouped into on-the-job apprenticeships for people visiting ICLARM, lecture/demonstrations of library operations and database management for a variety of organizations, and short-courses for information officers from developing country fisheries institutions.

2.7.2. Networks.

ICLARM coordinates four networks: the Asian Fisheries Social Science Research Network (AFSSRN), a capacity building network set up in 1983 and currently under the Director General's Office; the Coastal Aquaculture Network, a collaborative research and information network founded in 1988; and two information networks, the Network of Tropical Fisheries Scientists (NTFS) in the Capture Fisheries Program and the Network of Tropical Aquaculture Scientists (NTAS) in the Aquaculture Program.

2.7.2.1 The AFSSRN is treated more fully as its sole purpose is capacity building and it is not currently a single program responsibility.

Set up in 1983, it is now an association of teams involving eighty eight researchers at fourteen universities and other research institutions in four ASEAN countries. These institutions have national and regional responsibilities for research and teaching the economic and social aspects of fisheries management and aquacultural development. Coordinated by ICLARM it has received major support from IDRC and other support from the Ford Foundation and ICLARM.

The original purpose of the Network was to address two serious constraints: the shortage of experienced professionals in fisheries social science in Asia and the weak institutional support for long-term fisheries social science research. It was conceived with a capacity building role and has retained this goal.

Originally responsibility for AFSSRN coordination rested in the old Resource Development and Management Program at ICLARM. It was incorporated into Capture Fisheries when this became an independent program in 1989. In 1990 responsibility shifted to the CAMP and in 1991 responsibilities were altered again, and the current AFSSRN Coordinator reports to the Director General. In addition to these frequent changes in line management there has been a high turnover of coordinators, four over the last two years.

The major activity of the Network is the funding and supervision of research projects in fisheries social science at member institutions. There was an early emphasis on the economics of production systems and market analysis, with a recent trend towards more projects on integrated farming systems and coastal resource management. The Network also sponsors workshops to strengthen research skills and there is a cooperative agreement with Simon Fraser University in Canada for members to pursue graduate studies.

The ICLARM Coordinator reviews, or arranges reviews, of project proposals and guides implementation. Seventeen projects were funded under Phase II of the program which was completed in 1988. Activity remains high; thirteen new project proposals were received in 1990 under Phase III of the program. A recent diversification in activities includes Network sponsorship of members who, following short term training in techniques, mount workshops to pass on their new knowledge in their home countries. A newsletter, AFSSR News, was started in December 1990.

2.7.2.2. The Network of Tropical Fisheries Scientists (NTFS).

Started in 1983 this information network reached a membership of 1,000 members across 108 countries world wide in 1990. Fishbyte has been the main vehicle to reach Network members. Members have recently been encouraged to divert their publications to recognized international journals. Fishbyte will be merged with NAGA, ICLARM's quarterly magazine.

2.7.2.3. The Network of Tropical Aquaculture Scientists (NTAS).

Started in 1987 this information network now links 456 scientists in 81 countries with 41% in Asia and 25% in Africa. It reaches 111 fishery and aquaculture research institutes in 35 countries. The Network assists in information and database searches and advises on research methods. The main vehicle for reaching members is the newsletter, Aquabyte, and three issues were published in 1990.

2.7.2.4 The Coastal Aquaculture Network (CAN).

This is a smaller network established formally in 1988 with the aim of exchanging information, primarily among the 13 institutions in the 'Giant Clam Research Group'. It publishes the newsletter 'Clamlines'. The Network

has recently sponsored the movement of germ plasm which hints at an evolution to a wider role.

2.7.3. Achievements

It is difficult to measure achievements in training within the different programs. Each has taken an active role in organizing and implementing a range of different training activities and there is an extensive range of organizations that ICLARM cooperates with in training initiatives throughout the tropical world.

The CAMP is one program to have conducted an evaluation of the effectiveness of its training activities. A survey of 118 past trainees was mounted to understand whether trainees themselves were satisfied with their courses and whether these were perceived as appropriate to the individual trainee's work and to the needs of the host country. 91 (77%) responded, 6% with Ph.D, 45% with Masters and the rest with Bachelors degrees. The findings are quoted below:

> 'The training courses have addressed a growing need for coastal resources management. A significant number [..68% of respondents..] of the trainees are now in jobs where they are able to actively use the techniques and skills learned. Nearly all the respondents acknowledge the relevance of the training courses since these have enabled them to participate more effectively in research activities, to improve operational procedures and services, to influence or make policy, to initiate new projects, to manage projects and to train others.... ....Many have gained job promotions, salary increases, or additional educational opportunities after coming back from the ASEAN/US CRMP training. Although they may have merited these from proven past performance in their jobs, they acknowledge that the training has enhanced their professional capabilities and their potentials have been recognized.' (Source: M.L. Dalusung, January 15, 1992. Final Report on the Post-Training Survey, ICLARM, Manila)

The AFSSRN made a formal evaluation of the activities of its member institutions in 1987. Its conclusions are quoted below:

> " The Network has made significant progress in achieving its objectives. The institutions have made firm commitments to fisheries social sciences research in all but two cases. Professional development is taking place rapidly and the research teams were far stronger than they were a few years ago. The personal professional commitment of almost all the participants is clear..... There has been continuous improvement in the preparation of research proposals and the conduct of research."

Although the review did not explicitly evaluate ICLARM as the coordinating agency, ICLARM can take credit for a share of the achievement recorded in the quotation. The review report did however pick out shortcomings that also reflect on ICLARM's coordination role, some are listed below:

> ...The research program of the Network is not in balance with the national and regional needs.

...the Network has not yet developed criteria for project selection or for reporting.
...there is relatively little interchange among the participants
...Opportunity exists for greater use of the Network for peer review at many stages in a research project.

In the country visits made in the course of this review, Panel members' meetings at institutions participating in AFSSRN brought forth a similar balance of overall achievement and criticisms of Network coordination by ICLARM.

2.7.4. Assessment.

Although the Center has not had an integrated training strategy, ICLARM's Programs have been responsive to client training needs, although often in an ad hoc way. Training activities appear to have reached a wide cross section of people engaged in resource management and fisheries activities. Despite the ad hoc nature of activities, comments from the institutes visited and the small survey of other client institutions indicate that ICLARM is making a an identifiable contribution to training needs within its areas of competence.

The two main information networks NTFS and NTAS are well known and well respected in the region and in the fisheries world generally. There is some overlap with other donor funded networks, particularly in fish genetics. In the case of AFSSRN it is clear that the network has suffered from changes in management which have resulted in client perceptions that stronger, more consistent and more visionary leadership is needed from ICLARM. Despite this, it is the Panel's assessment that overall, this Network has also had a positive influence, particularly on national commitment to, and capacity in, fisheries social science research in the region.

2.8 Overall Assessment

The focal point of this review is the assessment of ICLARM's Strategic Plan and its ability to transform itself from a project-driven organization into an international research center with the standards of relevance and excellence expected in the CGIAR. The purpose of this chapter, unlike conventional CGIAR external reviews, has been to examine ICLARM 's evolution and past performance in order to identify strengths upon which ICLARM could build in the future and to judge their potential to realize their expanded objectives.

In examining ICLARM's past program it is important to recognize that 1985 marked a fundamental turning point in the Center's history. The Rockefeller Foundation established ICLARM in Manila in 1977 on the model of the CGIAR centers and provided core support so that it could plan and conduct a coherent program of international research. During its initial period, ICLARM gained recognition for its pioneering research on the management of aquatic resources.

The unexpected termination of Rockefeller support in 1984 created a financial crisis that threatened ICLARM's survival and forced it into a

project-driven made of operation. ICLARM's unrestricted core support fell from 99-82% of total funding during its first five years to 21% in 1987. By 1990 ICLARM classified only 37% of its expenditures as research, compared to 26% as technical assistance. These severe constraints have been taken into consideration in evaluating ICLARM's accomplishments in research, information and training in this chapter.

The Panel believes that ICLARM has been remarkably successful in sustaining its scientific momentum and coherence since 1985, although the loss of flexible funding has had its consequences. The research on aquaculture has moved to critical new issues of integrated farming systems within resource poor communities and breeding to improve growth performance. In the Capture Fisheries Program, the development of new methods of stock assessment has been internationally recognized as high quality research which has had a useful impact on the training of Third World fishery scientists. With very limited resources, the giant clam rearing project has made impressive progress towards its goal of a new technology for enhancing productivity of the coral reefs.

ICLARM's largest single project, the Coastal Area Management Project, was designed as a technical assistance project but ICLARM significantly incorporated into the project research modules relating to sustainable resource management. The Information Program has continued to be a model of innovation and effectiveness despite sharply declining funding.

The quality of ICLARM's program leadership under unusually difficult circumstances has been fully up to the standards of the CGIAR and warrants special commendation.

These achievements must be balanced against the criticisms discussed in this chapter, many of which cannot be entirely explained by financial stringencies. Lacking a sense of overall mission and strategies for the Center, programs have been relatively narrow and compartmentalized. The increasing awareness of institutional and environmental concerns in the CAMP program had limited impact on other research programs. Moreover, ICLARM's outstanding leadership in fishery economics disappeared and the biological sciences became the driving force in most of the Center's research.

The Panel concludes, however, that ICLARM has a good record and a small, but substantive foundation for building an international fisheries research program. Such a program, however, must be more than an expansion of present activities. To qualify for CGIAR support, ICLARM requires an institutional vision of the key strategic issues and how to provide leadership in the field of international fisheries research. The Panel returns to this issue in its consideration of ICLARM's Strategic Plan in Chapter 4.

CHAPTER 3. ICLARM'S ORGANIZATION AND MANAGEMENT

3.1 Overview

3.1.1 Legal Status

The International Center for Living Aquatic Resources Management, Inc. (ICLARM) was established by the Rockefeller Foundation in the Republic of the Philippines in 1976 as a non-stock, philanthropic and non-profit corporation. In contrast to the case of IRRI, this was not preceded by an agreement between the Rockefeller Foundation and the Philippine Government. ICLARM continues to be a private, non-profit corporation subject to the laws of the Philippines. It was established to exist for a 50-year period and, in the event of its termination, its physical assets become the property of the University of the Philippines System.

Within a few months of establishment, ICLARM and its expatriate staff were granted certain privileges and immunities (such as exemption from Philippine taxes and duties) by Presidential Decree No. 1105 dated 7 March 1977 of the previous Government. This was implemented through a Department of Finance Order (No. 7-77). In communicating the Order to ICLARM, the Minister of Finance, Cesar Virata, noted that P.D. 1105 "partakes of the nature of an international commitment of the Government of the Republic of the Philippines..." (Letter to ICLARM dated February 9, 1979).

In 1986, the new Philippine President, through Executive Order 93, canceled all tax exemption privileges granted by the Marcos government. However, tax exemptions conferred by international agreements to which the Philippine government is a signatory were not covered by this cancellation. As ICLARM's establishment was not based on such an international agreement, the immunities and privileges granted through P.D. 1105 could conceivably be in jeopardy.

There are three basic differences between the status of ICLARM and that of IRRI, namely IRRI's establishment was preceded by an agreement between the Rockefeller Foundation and the Philippine Government. The Philippine Government provided IRRI with land near the University of Philippines at Los Banos at a symbolic rate, the privileges and immunities granted IRRI are very similar to those enjoyed by diplomatic missions to the Philippines, i.e. more generous than those of ICLARM.

Modifying ICLARM's status within the Philippines has been discussed by the ICLARM Board several times over the last five years. Two options have been considered:

(1) seeking special legislation from the Philippine Senate and Congress that would confer ICLARM international organization status and grant it tax exemption and other privileges and immunities;

(2) re-establishing ICLARM as an international organization by an agreement between two or more governments, including the Philippines.

The opinion of ICLARM's management is that the second option provides a firmer foundation for international status. It is also believed that this option might be the more pragmatic of the two, given the climate of opinion within the Philippines that favors control of, rather than granting benefits to, international organizations.

Although the problem has been known for a long time, the Panel is disappointed that a solution has not yet been found, because it would be difficult to justify capital expenditures for ICLARM's headquarters and research facilities in the Philippines if its status is indeterminate. Nevertheless, it concurs with ICLARM that reconstitution through an international agreement appears to be the better alternative.

Reconstituting ICLARM as an international organization, without specific reference to a particular location, would give it the flexibility to move its headquarters to another country, if this becomes necessary. Also, such an agreement could make it possible to obtain favorable agreements with countries in which ICLARM operates.

In the Panel's view, ICLARM should act with deliberate speed in improving its legal status as an international organization.

3.1.2 Organizational Culture

The Panel's observations, summarized below in the form of "culture themes", agree closely with ICLARM's own analysis of the salient dimensions of its values and culture.

ICLARM is a highly informal organization. Although it is no longer small (187 staff, with half at headquarters), it encourages informal communication throughout the institute. A lack of bureaucracy is evident in every facet of the organization.

It is also a highly fragmented and compartmentalized institution; almost like six centers (the four headquarters programs and the units in Solomon Islands and Malawi) under one institutional umbrella. Although inter-unit communication and coordination is low, intra-unit communication, teamwork and loyalty are high. This has led to what staff has identified as "factionalism" and "territorialism."

Staff share a strong sense of mission to help poor "fisherfolk." Staff believe their work helps developing countries. However, there is little institutional coherence, and a personalized (rather than a rule-based) approach dominates most decision-making. There are few standard institute-wide procedures and policies, particularly in personnel matters: each unit head makes decisions on a case-by-case basis. This raises questions among staff about equity in grading, salary, promotion and benefits.

Each unit clearly reflects the visions of its manager. This high level of autonomy is partly due to rapid turnover of Directors General and partly because of funding history which has forced entrepreneurial initiatives by senior managers to raise funds and supervise the resulting projects. It has enabled ICLARM to survive.

However, coupled with lack of guidance from the Board, this autonomy of senior managers has also inhibited institutional cohesion and the evolution of an identity for ICLARM. The recent strategic planning exercise and this review have begun to stimulate the ICLARM Board and leadership to clarify ICLARM's mission and institutional goals.

The same set of factors has contributed to the emergence of weak institutional accountability and quality control, of both programs and administration. The scientists are largely self-accountable for the quality of their work. There is limited evidence of institute-wide internal or peer reviews. Lack of disciplinary depth within programs (which is a question of critical mass) also accounts for lack of opportunities for collegial criticism and feedback.

If changes in the culture of the organization are called for (as ICLARM believes they are), such changes may need to take place before much progress can be made in implementing the planned strategies.

3.2 Governance

ICLARM has a Board of Trustees which is patterned after and operates similar to the boards of the international centers within the CGIAR System. The Board is made up of 15 members, including two who serve in ex-officio capacity (the Director General and The Secretary of the Philippine Department in charge of fisheries or his/her nominee). The composition of the Board and the roles and terms of members are shown in Table 3.1.

In accordance with the requirements of Philippine corporate law, the Board has five officers: Chairman, First Vice-Chairman, Second Vice-Chairman, Secretary, and Treasurer. Two of ICLARM's directors serve as Secretary and Treasurer.

The committee structure of the Board is similar to that of most CGIAR center boards. The Program Committee, which was formed in 1986 in place of the Program Advisory Committee, provides oversight on research and other programs of the center. The Nominating Committee assists the Board in identifying and evaluating potential members and in nominating the officers of the Board. The Finance and Management Committee addresses budget, audit, administration, personnel and financial policy matters. The Executive Committee reviews the implementation of Board decisions by the center and acts on behalf of the Board between meetings.

Over the last five years the Board has met once every year, immediately preceded by meetings of the board committees. The Executive Committee has met an additional time except in 1988, since 1989 these meetings have been in connection with the CGIAR meeting during the International Centers' Week.

Table 3.1. Members of the ICLARM Board of Trustees.

Board of Trustees		1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	Total calendar years	Current
Dr. James E. Johnston	U.S.A.	X	X	X	X	X	X	X	X	X	X								10	
Dr. Masud S. Alba	Philippines	X	X	X	X	X	X	X	X	X	X								10	
Dr. Max F. Day	Australia	X	X	X	X	X	X												6	
Dr. Jose D. Drilon, Jr.	Philippines	X	X	X	X	X	X												6	
Dr. Jose J. Leido, Jr.	Philippines	X	X	X	X	X	X	X											7	
Dr. Harry Burr Steinbach	U.S.A.	X	X	X	X	X													5	
Mr. John C. Marr[a]	U.S.A.	X	X	X															3	
Dr. Ziad H. Shehadeh[a]	Lebanese				X	X	X	X	X	X	X	X	X	X					10	
Dr. Richard A. Neal[a]	U.S.A.							X	X	X									3	
Dr. Ian R. Smith[a]	U.S.A.										X	X	X	X					4	
Mr. John L. Mackean[a]	Australia														X	X			2	
Dr. Kenneth T. MacKay[a]	Canada																X	X	2	DG
Dr. Otto Soemarwoto	Indonesia		X	X	X	X	X	X	X	X									8	
Dr. Prida Karasuit	Thailand		X			X	X	X	X	X	X								7	
Dr. Harry T. Oshima	U.S.A.		X	X															2	
Dr. Myer Cohen	U.S.A.						X												1	
Sir Kamisese K.T. Mara	Fiji					X	X	X	X	X	X	X	X	X					9	
Dr. Klaus Tiews	Germany							X	X	X	X	X	X	X					7	
Dr. Roy I. Jackson	U.S.A.							X	X	X	X	X	X	X	X	X	X		10	
Mr. Alban F. Guinett-Smith	Australia							X	X	X	X	X	X	X	X	X	X		10	
Minister Teodoro Q. Peña[b]	Philippines							X	X	X									3	
Dr. James A. Storer	U.S.A.								X	X	X	X	X	X	X	X	X		9	
Dr. Edgardo Angara	Philippines									X	X	X	X	X					5	
Dr. Salvador Escudero III[b]	Philippines										X								1	
Dr. Kohki Arneno	Japan											X	X	X	X	X	X	X	7	
Ms. Hannah R. King	Gambia											X	X	X	X	X	X	X	7	M-NC
Dr. Martin Bilio	Germany											X	X	X	X	X	X	X	7	CH-FC, M-FMC
Dr. Cunawan Sastradal	Indonesia											X	X	X	X				4	
Dr. Cunawan Sastradal	Norway											X	X	X	X				4	
Sen. Ramon Mitra[b]	Philippines											X							1	
Sec. Carlos Dominguez[b]	Philippines												X	X	X				3	
Dr. Agustin Ayala-Castañares	Mexico														X	X	X	X	4	M-NC
Mr. Senen Bacani[b]	Philippines															X	X	X	3	FVC, M-FMC
Dr. Phillip Muller	Fiji														X	X	X	X	4	M-FC
Dr. M.S. Swaminathan[c]	India														X	X	X		3	M-FMC, CH-NC
Dr. Edgardo Gomez	Philippines														X	X	X	X	4	M-PC
Dr. Zimasi Kadzamira	Malawi															X	X	X	3	M-FMC, M-NC
Dr. E.A. Huisman	Netherlands															X	X	X	3	SVC, CH-FMC
Dr. Peter A. Larkin	Canada														X	X	X	X	4	M-PC
Dr. Dayton L. Alverson	U.S.A.																	X	1	
Dr. Barry Keith Fishle	Australia																	X	1	
Dr. Cornelia Nauen	Belgium																	X	1	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Trustees per Year		7	10	9	8	10	10	12	12	13	12	14	14	14	15	15	15	14		

[a]Ex-Officio trustees in their capacity as ICLARM DG or Acting DG
[b]Ex-Officio trustees in their capacity as Philippine government official in charge of fisheries.
[c]Resigned effective 12/31/91 to assume IRRI Board Chair.

BCH - Board Chairperson
FVC - First Vice Chairperson
SVC - Second Vice Chairperson
FMC - Executive Committee/Finance
PC - Program Committee
NC - Nominations Committee
CH - Committee Chairperson
M - Committee Member

3.2.1 Results of the Board Survey

Self-assessment of the performance of the Board according to those members responding to a CGIAR Secretariat questionnaire shows that they:

- o view policy-making as their primary role;
- o consider the Board's relations with management to be extremely positive;
- o grade ICLARM's recent overall effectiveness to be very good (B- to B on a grading scale from A to F);
- o grade the Board's own performance somewhat lower in policy making (C+) and oversight (B-);
- o recognize that the Board could strengthen its processes for selecting and developing members, planning board business, assessing its own performance;
- o feel that the members are not compensated adequately.

3.2.2 Observations About the ICLARM Board

The Chairman of the Panel attended the meeting of the Executive Committee held in Washington prior to the last ICW and interviewed the Chairman and members of this committee. Panel members also interacted with recent observers of Board meetings and reviewed the minutes of Board and committee meetings over the last five years.

The overall impression from these observations is that the Board has not played a strong role in guiding the Center through the difficulties faced over the last few years. Like several CGIAR centers, the ICLARM board has been largely passive and reactive to the initiatives of management. The absence of institute-wide policies and procedures can be attributed only in part to the vagaries of management, the Board should play an important role in prompting appropriate action by management.

On a positive note, over the last few years the ICLARM Board engaged in various discussions on the ICLARM strategy and assisted the management in fund raising.

In the area of oversight, the minutes show that the Program Committee has been fairly active over the last few years. However, the Board's weak performance of its audit function is a serious area of concern. The external auditors indicated that they never met with the Board or a Board committee in connection with an audit.

It is encouraging that the Board has recently studied how boards function in the CGIAR, and drawn up plans to improve its procedures and operations. The competencies and experience represented on the Board and the process for selecting board members are also under examination.

It is recognized by the Board Chairman, that ICLARM can benefit from the experiences of the boards of other centers which have initiated improvement programs.

3.3 Leadership

3.3.1 The Director General and Program Leadership

Since its establishment in 1975, ICLARM has had six directors general excluding the present incumbent. The first Director General stayed for only one year. ICLARM was looked after by an acting director general from 1988-91. The present Director General joined ICLARM only in April 1991.

ICLARM's programs have been planned and managed by program directors. Of the present four program groups, three (aquaculture, capture fisheries and information) are led by staff who have been with ICLARM for 12 years or more. One (coastal area management) is led by a director who was recruited about six years ago to initiate this new program. There has been no change in leadership at the program level. A director also heads the Administrative and Finance Unit and services the Board of Trustees as its secretary.

ICLARM has one regional office in the Solomon Islands. It is headed by a senior staff member with director status who set up the office and many of the projects there. In Malawi where ICLARM has a large project, there is a second field staff member who has the title (but not the level) of director. In Bangladesh, Ghana and Chile, project managers report to the concerned program directors at headquarters.

3.3.2 Assessment

Continuity and stability of leadership at the Director General's level has been a serious problem at ICLARM. The rapid turnover of chief executives and delays in the appointment of new leaders together with funding difficulties created considerable uncertainty for the staff and made it difficult for the organization to promote long term strategies and sustain the linkages it needed to grow. This is in sharp contrast to the stability and continuity of leadership that characterizes program activities. It is a remarkable feature of ICLARM's evolution that the stability in program leadership and the commitment of its staff compensated to a large extent for the gap in top level leadership. The program leaders succeeded in mobilizing project funds, facilitated the institute's growth and maintained its strong professional image. Nevertheless, instability at the top has had two adverse consequences for ICLARM. First, the integration of programs and activities in an institutional sense has suffered. Inter-program conflicts, for example, could not be easily resolved in the absence of strong leadership. Second, the kind of administrative and financial support services and the quality of controls required to promote such integration could not be developed without strong direction.

3.4 Program Management

3.4.1 Organizational Tasks and Structure

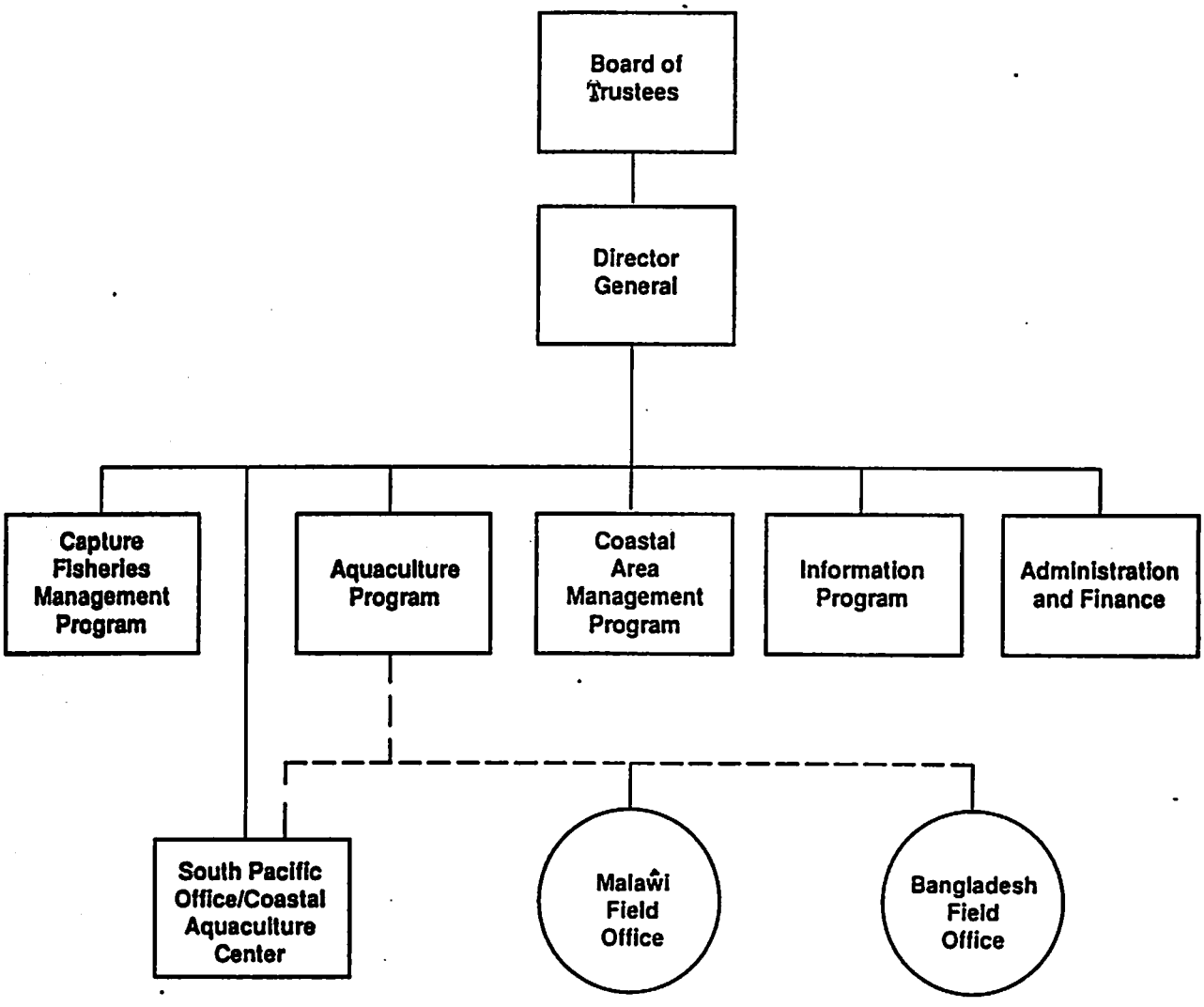
As described in Chapter 2, ICLARM's primary activities are research and related tasks in the areas of aquaculture, capture fisheries, and coastal area management, together with information and training as support to collaborating client institutions. The current organizational structure of ICLARM adequately reflects this differentiation of tasks (See Chart 3.1). The four program directors responsible for the activities referred to above operate under the direct supervision of the Director General who in turn reports to the Board of Trustees as explained in Section 3.2. above. Each program director has under him project leaders/coordinators responsible for individual projects or activities. In the case of the information program director, the librarian and publications head report to him. There is thus a well defined and separate technical group of staff associated with each major program.

The only regional office headed by a director (in Solomon Islands) reports directly to the Director General for administrative purposes. As Chart 3.1 shows, the regional director reports to the aquaculture program director on all technical matters pertaining to work at the Coastal Aquaculture Center. The head of the project office in Malawi and other project scientists in foreign locations report to the relevant program directors on both technical and administrative matters. Of the total staff of 187 as of January 1992, 99 are located in the regional and project offices in other countries (Solomon Islands, Malawi, Bangladesh, Ghana, Chile).

The Director of Administration and Finance has a total staff of 21 persons in the administrative and finance units. The accounts unit is headed by a chief accountant, a position that remains vacant at present. A third unit, the project administration unit, has been established to assist in project planning management and monitoring. The Director of Administration and Finance also performs all other residual functions necessary in an international research organization.

The current organizational structure limits integration across programs and functions. The recently established research committee chaired by the Director General has all program directors and the Director of Administration and Finance as members. New research proposals are discussed and approved by this committee. As a forum for information sharing on research directions it is an attempt at an integrating device within the organization. There is also a new administration and management committee on which both senior and mid level staff are represented. It deals with overall personnel, organizational and administrative policies and practices that concern staff. The committee recently reported on new organizational arrangements to improve research productivity and performance.

Fig. 3.1 Organizational structure of the present ICLARM.



3.4.2 Strategic and Operational Planning

The process initiated by the strategic planning exercise of the last two years has brought the senior staff of the Center together to think about future directions in a way that a donor driven project approach could not have accomplished.

For the most part, strategic planning has been a senior management exercise with the program directors and the Director General playing the lead role. ICLARM has consulted widely with a broad range of external groups on its mission and future activities. The Board of Trustees has played an active role in reviewing draft plan documents. The sharing of the information on the progress and conclusions of the exercise has been confined largely to the internationally recruited staff.

After the Strategic Plan is finalized, ICLARM intends to prepare a five year Medium Term Plan (MTP) following the CGIAR model. The Center had such a plan for the years 1988 - 92, it was not fully implemented due to the financial shortfall faced by the Center.

Annual program plans are discussed with the Program Committee of the Board each year, and the plans for individual projects prepared as and when required. Responsibility for operational planning is divided between the program groups and central administration. The standard practice is for the program director to initiate project proposals and funding arrangements, and for the project administration unit to be consulted on the budget calculations. One large project managed its own administrative, accounting and financial operations through a unit under the program director's control, but this has recently been integrated into the project administration unit.

Operational planning at ICLARM has to embrace the differing accounting and reporting requirements of its variety of donors involved. The project unit tracks project expenditures and prompts program directors on actions to complete projects satisfactorily. Experience with this monitoring has reportedly been uneven until the recent establishment of the research committee, there were no formal communication mechanisms for programs to give adequate notice to the unit about new projects or changes in ongoing projects. The accounts unit is understaffed and often unable to provide the analysis and reports that programs and donors might require on time. The response time for resolving project related problems of ICLARM's staff posted in other countries is often unduly long. When administrative support to project management is so limited it is not surprising that operational planning remains a weak link in the management chain.

3.4.3 Internal Monitoring and Review

Programs and plans, both strategic and operational, require to be monitored, reviewed and corrected in order to facilitate their implementation consistent with the desired objectives. In addition to the general oversight provided by the Board, at the strategic level the only internal mechanism that performs a review function is the research committee referred to in 3.4.1. Instead of being largely reactive, by guiding the preparation of research

proposals and examining them for their rigor and consistency with accepted research directions, this committee could play a useful coordination and monitoring role.

Some programs such as CAMP have external project advisory committees to review and monitor the progress of projects. The results of such reviews are used by the concerned program or project group and are not normally shared with the institution as a whole. On the technical side, thus, the review process is seen as an internal function of each program group with no common formal forum to share the findings and the actions to be taken. A centerwide function is performed at least partially through the informal exchanges among senior staff that frequently occur in the course of other transactions.

3.4.4 Assessment

Program management at ICLARM reflects an informal approach that is gradually moving towards the incorporation of useful formal mechanisms. As the Center expands and the complexity of its activities increases, its leadership may have to move more deliberately and speedily towards a better balance of the informal and formal in its management system. Some of the features of the existing approach to program management that deserve special attention in this regard are summarized below:

1. Notwithstanding the proposed MTP exercise, the prevailing practices in operational planning are not consistent with the institute-wide strategic planning approach adopted by ICLARM. The donor driven and disparate operational planning practices of the program groups need to be replaced by practices that are more uniform across projects/programs. This is not to neglect the need for flexibility, but to emphasize the importance of Centerwide comparability in the ways in which projects are planned and monitored and personnel assigned and managed. Isolated project/program management arrangements, while justified in certain cases and for limited periods, need to be considered temporary and should be the exception.

2. Program/project leaders today spend much time on administrative matters. While the financial constraints of the Center have limited its capacity to strengthen its administrative and financial support services, the current practice of program leaders carrying an overload on this account is neither desirable nor sustainable. Streamlining administration in support of programs should be a high priority. This is even more important with respect to the field offices where such overloads can create severe morale problems for the staff. Clearly, this implies that program/project leaders should be willing to give up some of their roles and to accept that working together with their colleagues in administration to improve support services will have a better payoff in the long run than running on their own tracks.

3. The recent creation of a research committee to review and approve new research proposals is a move in the right direction. It can in due time be an effective device to ensure the consistency of new research activities with the thrusts of the strategic plan. While individual donors monitor and review their projects systematically, there is no institutional mechanism in place to monitor and review the total program

of the Center on a periodic basis other than annual presentations of program progress to the Board's Program Committee. Annual program reviews of the kind that CGIAR centers conduct are also appropriate for ICLARM. In general, external project advisory committees attached to individual projects are no substitute for the Centerwide function of monitoring and review of its programs/projects.

4. The manner in which regional/field project offices are being managed in the existing organizational structure requires a thorough review. The personnel practices in force, the quality of communication with field staff on personnel and administrative matters and the headquarters' ability to give them timely guidance on issues that affect their well-being, etc., seem to vary across locations. This is no doubt a function also of the leadership available in different field offices. Since the leadership variable is not an easy one to order and allocate, the priority should be to create systems and practices that can minimize these problems in the field offices.

5. With the abolition of the external Program Advisory Committee, ICLARM no longer has a mechanism for receiving independent expert inputs on its work program in a systematic fashion. While internal reviews are essential and useful, there is a gap in this area that no international research center can afford to ignore. Peer reviews of the work of individual programs should assume greater importance especially as and when ICLARM's dependence on restricted donor grants decreases.

3.5 Management of Human Resources

3.5.1 Staff Composition

ICLARM's total staff of 187 can be divided into core staff and project related staff. Core staff as defined by ICLARM are staff that are administratively necessary to further the Center's attainment of program objectives and its mandate. There were six such positions in 1985. Although the Board has approved eleven core staff positions, only eight are currently staffed due to financial constraints. The filled positions are:

Director General,
Director for Administration and Finance,
Program Directors (4),
Director for the South Pacific Office and
Research Scientist, Farming Systems.

The positions remaining vacant for financial reasons are the Deputy Director General, and two scientific positions in Genetics and the Social Sciences. Lower level staff positions deemed "core" do not require the approval of the Board but nevertheless are constrained by the Center's finances.

The number of core staff positions that have been filled over the past years are shown below:

	85	86	87	88	89	90	91
Professional	6	6	6	6	8	8	8
Mid-Level Professional	5	6	10	11	12	15	14
Support	8	14	19	19	21	24	21

Professional staff are recruited on an international basis. Other core staff are recruited locally. Project specific staff are recruited both locally and internationally (See Table 3.2 for a classification of staff by level, location and gender).

Table 3.2 ICLARM's Staffing Patten, 1991

Staff level	Total staff	Headquarters	Field office	Male	Female
Professional staff*	22	14	8	21	1
Mid-level professional staff**	35	19	16	22	13
Support-staff***	130	55	75	88	42
Grand total	187	88	99	131	56

Program/unit	Total staff	Headquarters	Field office	Male	Female
Aquaculture	109	15	94	92	17
Capture fisheries	20	15	5	11	9
Coastal area management	18	18	0	8	10
Information/library	16	16	0	8	8
Administrtion	21	21	0	10	11
AFSSRN	3	3	0	2	1
Grand Total	187	88	99	131	56

* Refers to all internationally recruited professional, but does not include seconded staff.
** Refers to all professional staff recruited locally on local terms and conditions.
*** Refers to administrative and technical support staff recruited locally on local terms and conditions.

3.5.2 Personnel Policies and Procedures

ICLARM's administrative and personnel policies have been in a state of flux over the recent years. A comprehensive Personnel Policies Manual was drafted by the Director of Finance and Administration in 1990 and forwarded to the Board. Action on formalization of these policies was delayed to accommodate changes in top management and allow discussion of certain provisions (such as on benefits, performance evaluation and merit increments) by the Administration and Management Committee. These discussions are still in progress. Thus, at the time of the review ICLARM did not have a clear set of Board-approved personnel policies. The lack of clear policies has led to several ambiguities and staff perceptions that most personnel-related decisions were ad hoc.

The local staff provisions of the personnel manual prepared at the headquarters were adapted to local conditions by the Director of the South

Pacific Office and are being used successfully there, although they are not yet in force in Manila. The Malawi Office also follows the personnel guidelines obtained from Headquarters, adapted to the Malawi Government's legal requirements.

Prior to 1990, administrative and personnel matters were handled through the application of a series of administrative memoranda issued over the years. The 1990 manual reflected both a compilation and codification of these memoranda and their modification based on policies used by other international organizations.

Personnel policies for professional staff are based on the initial Rockefeller Foundation system (also found in other international centers established by the Foundation). The payroll and benefits packages of professional staff are administered through the Institute of International Education (IIE) in New York. These policies and packages are essentially similar to those found in other international centers. Examination of the salaries of ICLARM's professional staff by the Panel shows that these are broadly in line with the ranges that are in use in other international centers.

The draft personnel policies for mid-level professional and support staff take into account local Philippine conditions (such as transportation and meal allowances and bonus pay). These staff are divided into seven grades. Grades 1-4 are for support staff, and the rest for mid-professional. Because titles differ across units, questions are often raised about the equivalence of positions across units. A study is underway to define and "price" different jobs at ICLARM.

ICLARM has relied on comprehensive local salary surveys conducted by IRRI in 1986-87 as well as studies (in 1987) conducted by a Wages Review Committee (composed of ICLARM staff) in adjusting its local staff salaries. Salary surveys conducted by other organizations are also studied to calculate annual salary increases. The fact that turnover of local staff is low in part reflects the Philippines staff's overall satisfaction with pay and conditions at ICLARM.

3.5.3 Assessment

Given its financial and administrative constraints, ICLARM has been imaginative in its retention of strong senior scientists and supporting them by competent local staff. It has taken a useful step in preparing a comprehensive manual on its personnel policies and procedures. There remain, however, a number of gaps to be filled and problem areas to be explored in human resource management.

1. Personnel policies need to be approved by the Board and made known to the staff. As the Center grows and informal channels of communication become inadequate, it is important that staff are properly informed about the policies and procedures in place concerning their career progress, evaluation, rewards/penalties and benefits. Individual decisions about staff still remain a source of dissatisfaction for some. Clarity and information about the prevailing policies (including those on resolution

of disputes) can help minimize adverse effects on the morale of staff.

2. There is need for a personnel officer who can administer policies and procedures efficiently. A beginning has been made with the work of a consultant on job analysis/evaluation. Staff need to cooperate with the personnel unit in creating the infrastructure required for good personnel management at ICLARM.

3. Performance planning and assessment practices at the Center are rather uneven. For the professional staff, performance planning at the individual level is an essential pre-condition for performance assessment at the end of the year. Both are extremely weak with respect to the senior professional staff.

4. As the Center's size and staff diversity increase, mid-level and support staff are likely to feel more distant from the senior management. Cohesive program groups can compensate for this to some extent. There is a case, however, for the Center to improve the sharing of information with the staff about its activities and future plans. A cost effective way to meet this need is for the Director General or his Deputy to meet with local staff groups two or three times a year both to share information and to listen to their comments and concerns.

3.6 Financial Management

3.6.1 Budgeting, Financial Planning and Control

The annual budget of ICLARM is prepared by the Director of Administration and Finance in consultation with the Director General and program directors and becomes effective upon approval by the Board of Trustees. As is evident from Table 3.3, ICLARM's budget has increased substantially over the past six years from $1.3 million in 1985 to $4.5 million in 1991. The budget can be divided into two categories, namely, unrestricted income and expenditure, and restricted income and expenditure. The restricted component of the budget currently accounts for nearly 70 per cent of the total (Table 1). The significant increase in the restricted income segment of the budget reflects the concerted and successful efforts of ICLARM staff in fund raising. On the whole, the management of expenditures has been prudent and within the limits of income. As a result, the deficit/surplus left at the end of recent years has been insignificant.

Program budgets are prepared based largely on projected project grants and expenditures. However, project activities and their phasing over time are not planned to facilitate matching expenditures with specific activities, a practice that limits the potential use of the budget as a monitoring and control device.

Financial control over program activities is exercised through the donor requirements for restricted grants and the Center's limits on the use of unrestricted funds. The grant contracts with the different donors and the general availability of funds form the main basis for budgetary control. The accounts unit prepares monthly budget status reports and circulates them to all program directors and activity heads. These reports, accompanied by

financial statements are also divided into restricted and unrestricted expenditures on a project by project basis. Although the reallocation of budgets across line items for restricted grants is limited by the terms and conditions of specific donor grants, such reallocations of line items within program budgets are not at present subject to overall central control or criteria. While flexibility in such reallocations is useful up to a point, a more orderly approach to this issue is made difficult by the absence of activity work plans at the program and project levels.

ICLARM started with a cash accounting system that was appropriate to the single donor and unrestricted nature of its initial funding. The increasing complexity of its funding by multiple donors with their own different accounting and reporting requirements led the Center to adopt the accrual method of accounting in 1986. Its manual book keeping system, however, made the timely preparation and assessment of accounts extremely difficult in recent years. The computerization program under way currently is expected to resolve these difficulties and to pave the way for a more efficient and effective accounting and financial planning and control system for the Center. As of now, the accounts and finance unit is unable to provide the kind of management information system required by the chief executive to effectively monitor and review ongoing activities and to make midcourse corrections to improve the programmatic and financial performance of the Center.

As part of a recent reorganization, payroll and personnel services have been separated out of the rest of the accounting function in ICLARM. This move has minimized the delays in the processing of personnel information while ensuring the confidentiality of salary and compensation data. Similarly, the creation of the project administration unit and separate accounts for administrative services such as transport and communications have enabled accounts to record and monitor the costs of these activities more quickly. With assistance from a consultant, financial flows and the recording of transactions have been examined with a view to improving the accounting and financial management systems and practices. This and the computerization of accounts referred to above are expected to be completed in 1992.

At present, ICLARM's accounts unit does not integrate the accounting and financial operations of its field offices adequately with project and related activities. Funds disbursed to projects are treated as advances which are liquidated by the concerned project leaders through the subsequent submission of expense reports. There is a need for a better integration of the activities and budgets of the field offices and headquarters.

3.6.2 Funds Management and External Audit

ICLARM's financial management has both positive and negative features. In the mid-1980s, it successfully tided over a major financial crisis largely by drawing upon its internal reserves (fund balances) which had been built up over the first few years. It has brought down its grant receivables from donors (as a per cent of total assets) from 10% in 1989 to 6% in 1991. Its accounts payables have also improved over the recent years. It has diversified its donor support though the average length of grant period

Table 3.3. ICLARM financial summaries.

Assets	1991	1990	1989	1988	1987	1986	1985
Cash	1,046	1,065	1,283	1,531	1,164	995	965
Project Advances	344	233	68	86	62	29	13
Grants Receivable	122	160	194	102	109	82	0
Prepaid Expenses, Deposits and other Receivables	275	233	166	194	75	47	73
Property and Equipment	361	301	166	146	131	133	71
Total Assets	2,148	1,992	1,877	2,059	1,541	1,286	1,122
Liabilities							
Accounts Payable and Accruals	143	136	196	121	177	56	33
Grants Applicable to Succeeding Years	1,509	1,438	1,391	1,747	1,073	825	721
Total Liabilities	1,652	1,574	1,587	1,868	1,250	881	754
Fund Balances							
Invested in P & E	361	301	166	146	131	133	71
General Fund Balance	135	117	124	45	160	272	297
Total Fund Balances	496	418	290	191	291	405	368
Revenue							
Restricted Grants	3,044	2,961	2,354	2,570	2,299	1,287	830
Unrestricted Grants	1,231	1,165	1,175	878	647	681	348
Other Income	221	143	278	166	187	256	141
Total Revenue	4,496	4,269	3,807	3,614	3,133	2,224	1,319
Restricted Expenses							
Aquaculture	1,260	1,505	946	972	819	443	367
Capture Fisheries	592	463	317	429	263	107	368
Coastal Resources	815	709	845	1,014	1,117	428	5
APSSRN	128	69	48	61	83	87	0
Information	32	30	45	21	17	45	90
Admin. & Operations	217	185	153	73	0	177	0
Total Restricted Expenses	3,044	2,961	2,354	2,570	2,299	1,287	830
Unrestricted Expenses							
Aquaculture	336	317	459	279	1	122	153
Capture Fisheries	263	207	220	137	159	50	56
Coastal Resources	29	46	11	0	0	0	0
APSSRN	25	22	46	6	30	70	0
Information	212	161	170	178	162	220	120
Admin. & Operations	543	457	407	559	594	407	320
Others	22	104	(3)	0	0	32	29
Total Unrestricted Expenses	1,430	1,314	1,310	1,159	946	901	678
Surplus (Deficit)	22	(6)	143	(115)	(112)	36	(189)

(new restricted grants) has declined from 2)
However, a number of problems remain:

1. ICLARM's reserve funds need to be built
over unexpected emergencies. Fund balanc
declined from 23% in 1985 to 6% in 1991.
adequate to cover only 11 days of operat

2. The Center's overhead earnings from rest
16% in 1986 to 13% in 1991. The Center e
20%. Donor grants should be used to cor
realistic basis, an aspect which is rec
attention.

2. Such integr
the Cente
of the r
reser
pro
ur

3. While grants receivables in relation to assets have [illegible]
amounted to 33%, as a per cent of total payments due by June 1991, an unusually high level. A probing of the donors involved and ways and means to reduce delays in reimbursement are in order.

4. Of the 24 projects completed since 1985, only 5 (about 20%) met the original time and budget deadlines. The remaining were extended for varying periods of time. Similarly, project advances (outstanding at year-end) as a per cent of project expenses increased from 3% in 1989 to 11% in 1991. Both are manifestations of problems in project planning, monitoring and control. This is an issue that pertains not only to funds management but also to the quality of overall project management at ICLARM.

ICLARM's accounts are audited by S.G.V. Inc., a reputed Philippine based accounting firm which also audited IRRI's accounts. Their audit reports and comments confirm that ICLARM's accounts are being maintained satisfactorily and that ICLARM has cooperated fully in clarifying all issues that were raised in the course of their audit operations. S.G.V. Inc. have also audited the accounts of the field offices based on the documented evidence provided by headquarters. Though some of the field offices have assets no local audit of these facilities has taken place.

3.6.3 Key Issues

The key issues arising out of this review are the following:

1. The accounts unit prepares a monthly expenditure statement that is broken down by project. While this is useful, it is only a small part of the management information system that the Director General requires to monitor and review the programs and related activities of the Center. The creation of a new information system will require more than computerization and reorganization within the unit. It calls for better activity planning in programs and the linking of budget planning with the phasing of project activities. The integration of project activities with planned expenditures and the use of periodic and timely information on project milestones and expenditure by the Director General for monitoring and evaluation purposes is a priority task for the future.

ation can have a positive impact on the funds management of
. It will need to be followed up by a systematic examination
reas for improvement in funds management, such as building up the
e funds, collecting realistic levels of overhead from special
ects and reducing delays in donor reimbursements. That the accounts
it has a reasonably well trained staff including three CPAs is a
positive feature. The proper use and direction of the staff, however,
require that a chief of the unit be appointed without delay.

3. The accounts function in regard to the field offices deserves special attention. The underlying problems referred to above are exacerbated by the uncertainty of field projects and the high costs of supervision associated with field offices. As ICLARM expands, the real cost of neglecting this aspect of managing its field operations may turn out to be substantial indeed.

3.7 ICLARM's Institutional Relationships

3.7.1 Host Country Relationships

ICLARM has two outstanding issues with the Government of Philippines: its legal status as discussed in Section 3.1 and ICLARM's need for land to establish its headquarters and research facilities. Despite these issues ICLARM has positive relationships with the Secretary of Agriculture, Departments of Natural Resources and Environment and Science and Technology and with a range of Philippine institutions. It is involved positively in several levels of government and with various universities. The longest standing relationship is the collaborative research partnership with the Central Luzon State University, ongoing since 1978.

ICLARM has maintained a relatively low profile in the Philippines and its mission is not well understood even in the research community. There is widespread recognition in the Philippines of the degradation of its coastal areas and overexploitation of its fish stock. ICLARM should mount a modest public affairs effort to increase public awareness of its role in addessing these issues and benefiting the Filipino people.

3.7.2 National Institutions and ICLARM

ICLARM collaborates with a large number of resource management and fishery institutions, including NGOs, because of its emphasis upon promoting research through networking, training, information and collaboration. Many of its clients are also its partners.

At the end of November 1991 ICLARM had 39 Memoranda of Understanding (MOU) of which 26 are with national and regional partners and 13 with developed country and multilateral organizations. Ninety four percent of these agreements have been concluded in the last five years. Fifteen are with developing country national fishery institutions, 9 of these are in Asia, including 3 in the Philippines, 5 in Africa and 1 in Latin America, eight are with developing country universities; 7 in Asia, again including 3 in the Philippines, and 1 in Africa. In addition ICLARM has two MOU's with the South East Asian Fisheries Development Center (SEAFDEC), specifically with the

Aquaculture Department based in the Philippines. It also has an MOU with the International Institute of Rural Reconstruction (IIRR) located close to Manila.

The nature and extent of the collaborative programs under these MOU's vary greatly. For example the Asian Fisheries Social Science Network has a modest budget and fourteen institutional members from four South-East Asian countries. ICLARM provides coordination and administration. Similarly, but across very much wider dimensions, CAMP provides the coordination and leadership for the USAID sponsored coastal area management project at seven coastal sites in six ASEAN countries. This involves 47 institutions with mandates ranging from fisheries research to national planning. The capture fisheries program on the other hand, with its emphasis on modeling, has a wide range of informal contacts, few with formal MOU's, with scientists in both developing country and advanced scientific institutes.

The Panel explored ICLARM's relationships with its national and regional collaborators in the course of its country visits. Generally relationships were perceived as positive in the Philippines, in the Solomon Islands and in Thailand and Malawi. Similarly the responses to a sample survey of institutions in Bangladesh, Chile, China, Ghana and Malaysia, countries which Panel members were unable to visit, were also generally positive.

With one or two exceptions the institutions felt their relationships with ICLARM were of benefit to them, and to their country, and were friendly. Several comments reflected frustration at the uncertainties which project funding brought to an otherwise valued collaborative relationship.

In the Philippines a question was raised whether ICLARM ought to qualify for new contracts on coastal area management without at least one national institution as a partner which would justify a contract on capacity building grounds. From this same capacity building perspective the value of ICLARM operating collaboratively in national institution facilities, rather than with its own, was also emphasized.

Some respondents expressed the idea that ICLARM had exploited local and national contacts without acknowledging their contribution. Respondents also criticized the rapid turnover of coordinators with the AFSSRN. The frequent change of styles was perceived to inhibit the development of the network. They asked for stronger leadership and guidance from the coordinator.

3.7.3. Regional Institutions

ICLARM's programs are largely complementary to those of the major regional institutions; SEAFDEC, devoted solely to fisheries research and training with Departments in the Philippines, Thailand and Singapore; AIT in Thailand with a strong university graduate program in aquaculture; and FFA, an intergovernmental agency, based in the Solomon Islands.

SEAFDEC Aquaculture Department is an active member of the Asian Fisheries Social Science Network (AFSSRN) coordinated by ICLARM. In the early

1980's there was wider collaboration but at present there is no scientific cooperation between the two Philippine-based institutions. SEAFDEC staff acknowledged the value of ICLARM information and training materials, but was surprisingly misinformed about the Center. The lack of pond and laboratory facilities at ICLARM had given staff the impression that ICLARM was only a research contractor and publisher of scientific information.

AIT staff feel the existing close collaboration with ICLARM scientists is important to assure full complementarity between programs. AIT has significant facilities and, historically, there had been a proposal to TAC for a joint approach on international aquaculture research. FFA's staff offered favorable comments on ICLARM initiatives and their relevance to inshore fisheries research and management in the South Pacific, and he expressed the view that FFA management is keen to work closely with ICLARM on issues of mutual interest, perhaps, with the consent of the members, through an MOU.

3.7.4. International Organizations

ICLARM has multiple linkages with FAO which is the strongest single organization in the international fishery field. FAO has established eight regional fisheries bodies covering most of the tropical world. These have contributed significantly to fisheries development at the national and intergovernmental level through their advisory bodies, working groups and networks. FAO has a core of senior fishery scientists, an outstanding library, international fishery data bases, and considerable experience in training and field work. It is not a research agency but promotes and conducts research as an integral part of the fishery development process. This role will be further emphasized following the SIFR.

Such research is primarily adaptive and applied rather than strategic due to FAO's emphasis on national research agendas. However, the adaptation of international knowledge requires strategic analysis to devise solutions to fishery and environment problems at the global or regional level. This problem solving focus makes FAO a client for the results of relevant strategic research that would be emphasized by a fishery center in the CGIAR.

ICLARM's current collaboration with FAO includes a joint project on fishery stock assessment software, the development of FISHBASE, a computer database on fish, ICLARM's input of a lecturer to FAO/DANIDA training courses in fishery stock assessment, and informal FAO regional staff participation in planning meetings of the CAMP. In addition ICLARM senior staff serve on various FAO Expert Groups and participate in FAO global and regional meetings.

There is some overlap between ICLARM and FAO programs that has led to constructive interaction between FAO and ICLARM, but also to competition, duplication of effort, and occasional friction. Recognizing FAO's intergovernmental role, ICLARM should foster a special relationship with FAO by building on the respective comparative advantages of the two organizations.

ICLARM's only active collaboration with a CGIAR center is with IRRI on integrated rice-fish farming systems, particularly through the Asia Rice Farming Systems Research Network. Both Centers consider this an important

long-term initiative. ICLARM has also actively explored opportunities for collaboration with other CGIAR centers such as WARDA and IITA on integrated farming systems and, more recently, with IFPRI on fishery policy and ISNAR on strengthening of fishery research agencies.

The CAMP also has contacts with UNEP and UNESCO and the Fish Capture Program collaborates with I.O.C.

3.7.5 Advanced Scientific Institutions

ICLARM has Memoranda of Understanding with nine advanced scientific institutions in developed countries as at November 1991. Four other advanced institutes, including the Marine Science Institute of UP in the Philippines, were also involved in collaborative arrangements in the support of specific projects. In 1990 the following ASI's were involved with the three ICLARM science programs:

CAMP	- University of Rhode Island (USA), The Marine Science Institute, UP, Dilimon (The Philippines) The Department of Zoology, National University of Singapore
CAPTURE FISHERIES	- the Marine Science Institute, UP, Dilimon (The Philippines), the Institute fur Meereskunde, Kiel University (Germany)
AQUACULTURE	- the Marine Science Institute, UP, Quezon City, (The Philippines), Center Technique Forestier Tropical - ENSAT - (France), the Institute of Aquaculture research of Norway - AKVAFORSK - and the Center for Development Studies, University of Bergen (CDS) (Norway), the University of Ghent (Belgium), James Cook University, (Australia).

Additionally the two information networks run by ICLARM include numbers of other ASI's as network members. The Coastal Aquaculture Network includes the Fisheries Research Branch, Department of Primary Industry, Brisbane (Australia), the Natural Resources Institute, Chatham (UK), the University of Newcastle-upon-Tyne (UK), and the Australian Institute of Marine Science, Townsville.

There is extensive contact and collaboration with ASI's. Through these contacts ICLARM is clearly well placed to bridge new ideas and methods in the search for solutions to tropical fisheries problems to developing country fishery researchers. Wide contact with ASI's is an operational strategy adopted by most CGIAR centers.

3.7.6 Donors

The Panel Chairman met with most of the principal donors at International Centers Week 1991 to discuss their views of ICLARM and its candidacy for membership in the CGIAR. They consistently expressed good will towards ICLARM, admiration for the dedication and achievements of its scientists, and respect for its cost-effectiveness.

3.7.7 Assessment

ICLARM's dependence on collaborators and their facilities to implement its research programs has, on the whole, made the center particularly sensitive in its relationships with national programs. Occasional lapses in diplomacy, as well as uncertainty and discontinuity from its project dependence, are reflected in the criticisms identified. The center must endeavor to maintain its partnership approach to collaboration if and when its financial circumstances improve.

Overall, the Panel was impressed with the wide range of institutional linkages established by ICLARM. Although priorities in linkages may change as a result of the new ICLARM strategy, ICLARM has a good base to build on.

3.8 Overall Assessment: ICLARM's Organizational Strengths and Weaknesses

ICLARM is a dynamic institution with dedicated staff and a good track record of accomplishments. As an institution, ICLARM has shown its innovativeness and resilience by the way it has weathered several life-threatening financial storms in recent years.

ICLARM is now at an important crossroads. It wishes to play a stronger global role in international fisheries research, but its funding base, staffing, systems and structure are not geared towards playing such a role. The foregoing sections have shown that ICLARM needs to strengthen many aspects of its organization and management for improving its overall performance, even if it were to maintain its current program portfolio.

In terms of the overall guidance of the center, ICLARM has suffered from instabilities in top leadership. The Board has not been able to fill this vacuum and has not played a strong role in guiding the Center. The major forces guiding the Center have been the program directors. As a result, ICLARM has moved simultaneously, and rather freely, in several strategic directions. The recent appointment of a director general and formulation of a center-wide strategy are likely to help unify these directions and provide better overall guidance.

ICLARM's resource base and the manner in which the institute has managed them need strengthening.

- First, ICLARM needs to improve its legal status and be recognized as an international organization with privileges and immunities similar to those found in other international centers. This requires careful assessment of alternative headquarters countries and locations. A change in headquarters location would necessarily bring about changes in facilities, staffing and administrative systems and procedures.

- Second, ICLARM needs to examine carefully the composition, quality, and depth of its internationally-recruited professional staff in each department. In addition, it needs to overhaul its human resource management policies and practices.

- Third, ICLARM's financial health needs to be improved. It needs to reduce its dependence on restricted grants and gain a greater degree of freedom in program planning. The Panel recognizes that this is easier said than done--but, without such a shift ICLARM's ability to carry out a long-term program focusing on strategic research problems of international significance will be limited. In addition, there are areas where improvements in financial management are necessary (e.g., appointment of chief accountant, development of financial and management information systems, increasing reserves, reducing delays in reimbursement from donors, improving budgetary planning and control.)

In the area of program management ICLARM needs to improve integration and coordination of the overall program and bring uniformity to program (and project) planning and monitoring. There is room to streamline administration in programs by carrying out some tasks centrally. Most important, ICLARM needs to start a tradition of conducting internal program reviews and external peer reviews to monitor progress, receive feedback and improve quality.

There is also some need to improve internal communication at ICLARM. This applies in particular to institute-wide teamwork and communication, including those with the field units. Both teamwork and communication are much stronger within programs and units.

Finally, ICLARM's relationships with the external world also needs re-appraisal. Although ICLARM has a remarkably wide network of linkages with numerous institutions, these need to be evaluated in the context of the requirements of the new strategy. If ICLARM sees NARS as its principal clients, it needs to expand its understanding of and foster linkages with them.

The overall message emerging from the above is that, even without the requirements of a new strategy, ICLARM needs to improve its organization and management.

The nature of the required changes are fourfold:

- ICLARM needs to transform itself from a project-driven to a client-driven research organization. Having said this, the Panel recognizes that what ICLARM was able to achieve in the past in the form of research or related activities geared towards the needs of NARS, with highly patchy restricted funding, is most remarkable. But, this mode of operation is not appropriate for mounting and sustaining a long-term program of international strategic research geared towards the needs of national institutions.

- ICLARM needs to maintain its informal culture while introducing the minimum required formal policies, systems and procedures. While some degree of formalization is required, this should not be at the expense of the highly innovative and entrepreneurial spirit that exists in most units. The Board and management need to constantly monitor and facilitate this delicate balance.

- ICLARM needs to transform itself from a fragmented to an integrated institution. A center-wide strategy can be the cornerstone of such a change. The creative energies of staff in various units need to be pointed towards the common mission and goal aspired by all. In some cases the entrepreneurial spirit should be channeled towards the institutional rather than personal goals. The Board, the Director General and the newly instituted coordinating committees can help bring about such a change.

- ICLARM needs to reinforce the individual scientist's concern for quality with supportive institute-wide mechanisms so that quality becomes a pervasive value upheld in all aspects of the center's work. Rigorous internal program reviews, external peer reviews, planning conferences, etc. can help strengthen such a tradition.

Recommendations

The Panel recommends that ICLARM:

1. initiate early action to change its legal status to that of an international institution with privileges and immunities similar to that of the CGIAR centers;

2. formulate and approve a comprehensive set of human resource management policies and create a personnel office to assist in their implementation;

3. adopt an integrated system for project and program planning, monitoring and review across all programs; and

4. strengthen its financial management and improve its internal reserves (fund balances) and expenditure controls.

CHAPTER 4 ASSESSMENT OF THE ICLARM STRATEGY

4.1 Goal, Mission Statement, and Priorities

4.1.1 Goal and Objectives

According to its Strategic Plan, ICLARM will have the following Goal and Objectives:

Goal

Improved production and management of fisheries resources for sustainable benefits of present and future generations of low-income users in developing countries.

Objectives

1. Improve the biological, socioeconomic and institutional management mechanisms for sustainable use of aquatic resource systems.

2. Devise and improve production systems that will provide increasing yet sustainable yields.

3. Strengthen national programs to ensure sustainable development of aquatic resources.

This statement is clearly within ICLARM's formal mandate set out in Chapter 2, but it differs from the goal statements of most CGIAR centers in an important respect. CGIAR centers are primarily research organizations but there is no reference in the goal or the objectives to research or research related activities.

It would be useful to review the new mission statement of the CGIAR which reads as follows: "Through international research and related activities, and in partnership with national research systems, to contribute to international improvements in the productivity of agriculture, forestry, and fisheries in developing countries in ways that enhance nutrition and well-being, especially among low-income people."

ICLARM should reassess its stated Goal and Objectives and consider reformulation to make them more consistent with the philosophy of the CGIAR.

ICLARM does not have a conventional mission statement in the sense of a succinct encapsulation of its purpose that is easily understood by its stakeholders. ICLARM describes its "mission" in more discursive form as follows:

1. "Filling gaps in strategic research in the areas of (i) aquatic resources assessment and management and (ii) fish productivity and (iii) human linkages, social sciences and policy. The required strategic research is long term in nature and global in scope, bringing together the building blocks from sites around the world in synthetic multidisciplinary approach to generate new insights and develop widely useful tools and technology.

2. Catalyzing research and other activities in areas that support ICLARM's strategic efforts are also necessary and will be done through linking, coordinating and networking with the large numbers of potential client organizations and countries.

3. The third and equally important element is in strengthening national institutions. Strengthening will occur through collaborative research, information and training."

Research is primarily mentioned in the above description of ICLARM's mission, but another question is raised when it is read in conjunction with ICLARM's description of its clients and beneficiaries that follows:

> "The results of the future ICLARM's research and its strengthening activities will be primarily directed towards the client "audience" described as national aquatic research systems (NARS). Secondary clients are a much broader group, including international, regional and national development organizations; national research and education organizations; NGOs; policy-makers; individual scientists; the private sector; development banks; and donors. The primary beneficiaries are low-income producers and consumers of aquatic produce in developing countries."

ICLARM has been significantly engaged in technical assistance activities in the past, motivated in part by the imperative of financial survival. Technical assistance is often considered difficult to reconcile with the precepts of the CGIAR because it is generally not international in character and the bilateral arrangements may have distorting effects on a center's ability to carry out its primary research mission.

ICLARM identifies national aquatic research organizations as its primary client partners, in accordance with the normal practice in the CGIAR, but it also proposes to work with a wide range of national agencies concerned with development and other activities.

As its name suggests, ICLARM was conceived to be an organization that would focus on the <u>management</u> of aquatic resources at a time when the international community was preoccupied with increasing production. In this regard it is much like the International Irrigation Management Institute (IIMI) which is concerned with research on the management of irrigation systems. Often such research requires hands-on, participatory involvement with some aspect of the management effort. A question then arises on whether such involvement is capacity building, technical assistance, or research.

The Panel's view on this is that in most cases it is a bit of all three and that it would be possible to discern the principal motivation behind the involvement of the center on a case by case basis. if the center's primary motivation is research, the activities of the center contribute to the research component of the overall effort. If it is technical assistance, the center often carries out activities <u>on behalf of</u> the national partners. if it is capacity building, the center usually provides assistance in the "how to" aspects of the work (such as through training), rather than doing the work for the client. ICLARM management needs to be alert to these distinctions.

4.1.2. Priority Setting

TAC's deliberations on the possible expansion of the CGIAR mandate to include fisheries research began as early as 1971, and it continued at intervals until 1990 when it concluded that selected aspects of fishery research should qualify for CGIAR support. TAC viewed fishery production systems as a continuum from capture fisheries to intensive aquaculture. It recommended that CGIAR support should be limited to research on fisheries in inland and coastal areas. Research on deep sea or ocean capture fisheries, or an intensive high-input aquaculture was considered to be outside the mission and goal of the CGIAR.

This was the context in which ICLARM initiated a formal process to set research priorities for the Center. It closely followed the analytical framework used by TAC for the review of CGIAR priorities in 1991 which was considered to be a useful device despite the possible margin of error at each stage of the analysis. ICLARM properly viewed the exercise as a means of narrowing the focus within which detailed research thrusts would have to be developed. The process established priorities sequentially by aquatic resource system, by region, by international research issues, and finally by types of research activity as defined by TAC. The process will be briefly described so that the conclusions presented at the end of this section can be properly evaluated.

1. Aquatic resource systems. At the first stage, ICLARM estimated fishery production for seven aquatic resource systems considered appropriate targets for its research. Fishery production statistics are considered highly unreliable at the species level and even more so by resource system. Nevertheless, the total production estimates constituted the baseline for ranking systems from least important (1) to most important (7).

These baseline production data were then adjusted by two sets of modifiers. The first modifier was based on potential gains in production possible in a decade; the second modifier reflected sustainability and equity concerns. ICLARM indicated that quantitative modifiers as used in the TAC paper were not availabe for the fisheries resource systems thus they relied on qualitative judgements derived from published reports and intensive staff discussions. These judgements are, however, inevitably sensitive to different assumptions and weighting scales.

The details of this process are set out in Table 1 in Annex 8. Following is a brief summary that shows the priority ranking for resource systems from highest (7) to lowest (1). Estimated production is the baseline, modified firstly by estimated production potential and secondly by equity and sustainability concerns. For example, the system with the highest production, upwelling shelves, had a low equity modifier because it is fished by large-scale industrial fleets and it dropped from most important (7) to low importance (3) at the final stage.

	Ponds	Reservoirs and lakes	Streams, Rivers, Floodplains	Estuaries, Lagoons	Coral reefs	Soft-bottom Shelves	Upwelling Shelves
Present Production (million tons)	5.0	2.0	3.6	8.1	6.5	11.1	14.0
Base rankings on current production	3	1	2	5	4	6	7
Based rankings modified by production potential equity and sustainability	6	2	1	5	7	4	3

ICLARM plans to conduct research on the resource systems that have the highest ranking: coral reefs - 7, ponds - 6, and estuaries and lagoons - 5. This is a useful first step for ICLARM which clearly must narrow the scope of its future research agenda.

The Panel does, however, have reservations concerning the data and assumptions used in assessing the significance of the coral reefs resource system. Most of the baseline statistical data are from FAO sources except the estimated production from coral reefs; it depends on several key assumption that may significantly overstate the level of production. The Panel also believe that the potential for increased production in the coral reefs has been exaggerated. It is this assumption that increases the priority ranking of coral reefs resource system from 4th to 7th place in the above table.

The Panel, of course, realizes that this process provides only partial evidence for setting priorities, and it agrees that coral reefs would continue to be a highly significant resource system even if more conservative estimates and assumptions had been employed.

2. Major region. The percentage of total fishery production by region was estimated to be as follows: Asia - Pacific - 62.5%, SubSaharan Africa - 5.0%, Latin America - Caribbean - 28.4%, and West and North Africa - 4.0%. This baseline was modified in a similar fashion, in this case by the number of poor and the regional needs for strengthening NARS. The resulting ranking placed highest priority on Asia-Pacific, followed by Sub-Saharan Africa, Latin America-Caribbean, and West and North Africa. It was decided that research on Asia should focus on all three of the priority aquatic resource systems identified in the first stage, while the focus in Africa should be on freshwater fisheries which have had relatively little research and would contribute strongly to equity. The details are shown in Table 2, Annex 8. The panel generally agrees that ICLARM' main regional thrust should be Asia, followed by Africa and Latin America.

3. International Fisheries Research Issues. The first chapter of ICLARM's Strategic Plan reviews the recent literature on international fisheries research and concludes with the following statement and list of key issues.

"To decrease the gap between supply and demand for aquatic resources; to improve the livelihoods of fishing communities; and to maintain or improve aquatic habitats will require international strategic research. Our analysis and the recent documentation shows that this research must help improve the management and sustainability of current fisheries, and establish the biological and social basis for increased aquaculture. In this context, the critical issues - problems and opportunities - that can be addressed by international research, are:

- Improved management of coral reef fisheries
- Sustainability of coastal fisheries systems
- Removal of socioeconomic and environmental constraints to aquaculture growth
- Improved fish productivity through genetics and husbandry
- Assessing and developing the potential for enhanced fisheries
- Development of Farming systems
- Strengthening of national research systems
- Improved management of fisheries in upwelling areas
- Prevention of post-harvest losses/deterioration
- Development of fisheries for offshore resources of tunas and squids.

ICLARM asserts that these are the 10 key global issues without any justification for their selection. They really represent "activities" rather than "issues", and how they have been defined has direct program implications.

ICLARM decided that it would not conduct research on the last three of these so called issues because 1) upwelling areas had already been ranked low priority, 2) lack of competence in post-harvest technology, and 3) TAC guidelines on offshore resources. At this stage of the analysis, ICLARM claimed to have comparative advantage in research on the first seven of them.

4. Research Activity Types. The final step was to translate these research issues into 5 research "activity types" defined by TAC: resource conservation and management, fish productivity, human linkages, socioeconomic and policy, and institution building and related activities. These research activities were discussed with reference to research issues and then by resource system and by region. The agreed priorities are set out in matrix form in Table 3, Annex 8. The projected balance of resources among activity types was roughly aggregated as follows: Resource conservation and management - 35%, Fish productivity - 25%, Social science (human linkages, socioeconomic and policy) - 20%, and Institution building - 20%.

While the priority setting exercise followed a top-down approach, it had the advantage of being comprehensive and transparent. Extensive consultations at different stages of the process helped to make participants aware of the complex trade-offs involved and the need for critical choices. Moreover, ICLARM properly viewed the conclusions as useful guidelines rather than precise determinants for the development of their research agenda.

4.1.3. Proposed Program Structure and Balance

The priority setting exercise helped to define general priorities by aquatic resource system, by region and by international fisheries research

issues. ICLARM decided to structure its future research program on the basis of the priority resource systems: ponds, coral reefs, and estuaries and lagoons. They believed this to be the most effective means of promoting their goal of interdisciplinary scientific effort to improve the management of systems. To address the needs of these resource systems, ICLARM proposes to establish three new research programs: Inland Aquatic Systems Program, Coral Reefs Resources Systems Program, Coastal Resources Systems Program, plus a National Research Support Program.

The priority setting exercise provided useful evidence for narrowing the focus of the research program at the first stage. ICLARM seeks to make the case in the Strategic Plan that in each of these program areas 1) there are critical issues concerning the management of the system which require international research, 2) ICLARM has comparative advantage in conducting the research, 3) planned research is likely to be successful in producing beneficial impacts consistent with the goals of the CGIAR, and 4) the research activity is an integral part of ICLARM's overall mission. This is the topic of the next three section of this chapter.

Finally, we assess the balance among the three programs or their resource systems equivalents in the Strategic Plan. ICLARM has included in the Strategic Plan the number of Senior Staff by program required to implement the core program, and they are used as a proxy for future program expenditures in the following table. The percentages from the priority setting exercise are derived from Table 1, in Annex 8. Total production is modified, firstly, by production potential and, secondly, by equity and sustainability concerns - the third column constitutes the final distribution

Program Balance by Resource System

Program (resource system)	1988-90 Average Spending	Priority Setting Exercise			Strategic Plan Staffing
		Total production	Modified for production potential	Modified for equity sustainability	
Inland Systems (Ponds)	46%	25%	27%	22%	41%
Coastal Resources (Estuaries and Lagoons)	48%	40%	22%	21%	31%
Coral Reefs	6%	35%	51%	56%	27%
	100%	100%	100%	100%	100%

Implementation of the Strategic Plan will result in a significant shift in the balance among the programs toward the Coral Reefs Resource Systems Program. The greatest relative reduction will be in the Coastal Resource

Systems program as the large Coastal Resource Management Project (much of which is technical assistance, not research) is concluded in 1992. The implication of these shifts in program balance will be discussed in the context of the assessments of each program.

The priority-setting exercise excluded consideration of ICLARM's proposed fourth new program, National Research Support, but a few comments can be made concerning its relative size independent of the above table. Activities in support of NARS represented 9% of total program spending 1988-90, compared to 16% for the new program in the Strategic Plan (again using projected manpower as proxy for expenditures). This can be compared to the statement made concerning "research activity types" earlier in this section that ICLARM projected a general guideline of 20% of program resources for institution building.

4.2 Inland Aquatic Systems Program.

4.2.1 Introduction

The Inland Aquatic Systems Program proposed in the draft Strategic Plan intends to address the three overall objectives of ICLARM: (1) improve the biological, socioeconomic and institutional management mechanisms for sustainable use of aquatic resource systems, (2) devise and improve production systems that will provide increasing yet sustainable yields, and (3) strengthen national programs to ensure sustainable development of aquatic resources. The client audience are defined as NARS and, through them, the primary beneficiaries are low-income producers in developing countries.

The major objective of this program is "to foster the adoption of sustainable inland aquaculture by resource-poor, small-scale producers and thereby to increase production and income". ICLARM has made the strategic decision to place major emphasis on increasing the scope of aquaculture production by attracting new entrants rather than intensifying production in present ponds, and this distinguishes it from most other agriculture development projects in the tropics.

4.2.2. Panel's perspective on issues and research priorities

Aquaculture research areas in the tropics of international importance to developing countries are identified in the following list of the research fields that need priority attention:

- search for new candidate species and selection of strains (criteria include low technology, ease of reproduction, low food chain level, wide market acceptance; candidate species are tilapias, carps, grey mullets, Amazonian species, and certain marine bivalves, and macroalgae),
- development of culture technology in marine and freshwater and in extensive and semi-intensive farming systems,
- integrated agriculture - aquaculture farming systems,
- development of water quality criteria (especially for culture situations in tropical environments) and sound site selection criteria in inland and coastal environments, and assessment of the potential environmental impact of various types of aquaculture),

- genetic resources and gene pool preservation,
- disease problems: Disease in cultured species need attention (e.g. diagnosis, mode of transmission, pathology, prophylaxis, treatment, health risk to farm operators), although they are not as important in extensive and semi-intensive systems as in high-tech, intensive modern aquaculture systems. More important, however, are those disease, parasites and pathogens of cultured and co-occurring species that may be transmitted to livestock and/or to humans. The importance of such disease vectors may vary regionally, but may prohibit aquaculture in an area where these diseases are dominant and preventive or control measures cannot be developed, such as Bilharzia and vector snails in integrated rice-fish culture. These issues require strategic international research including research on life cycles of both hosts and disease agent, modes of transmission of parasites, interruption of pathways as well as on the ecology of diseases and the management of their outbreak.

4.2.3. Assessment of ICLARM's Proposed Objectives and Rationale

Even this incomplete list of important subject areas for international strategic research on aquaculture is too long for the agenda of a single international research institution. From among these areas, ICLARM, has placed priority on three major research issues for its Inland Aquatic Systems Program:

(1) Improved fish productivity through genetic gain and better husbandry,
(2) Development of integrated agriculture-aquaculture farming systems,
(3) Removal of socio-economic and environemental constraints to aquaculture growth.

These problems demand concentration on a limited number of strategically relevant research topics, focusing simultaneously on more than productivity problems.

The rationale given by ICLARM for their choices is complex. ICLARM argues that enhancement of inland fisheries in large water bodies such as lakes, reservoirs and floodplains probably has great potential for improved production, but that the development of aquatic production from these systems will require an exploratory long-term approach. Inland pond aquaculture, particularly in Asia but also in Africa, is considered ripe for expansion. ICLARM considered coastal and marine aquaculture capital intensive and not a main thrust for the resource-poor, and omitted it from its proposed research agenda. There are some examples, however, of low-input coastal aquaculture dealing with species low in the food chain, but these systems have faced several major constraints. ICLARM may reconsider its position towards coastal and marine aquaculture research at a later date.

It also argued that semi-intensive aquaculture systems have great scope for integration with other farming enterprises. Semi-intensive aquaculture embraces low-input, low-cost systems that are relatively non-polluting and have few disease problems.

The focus was therefore narrowed to freshwater ponds, including rice field floodwater in irrigated and rainfed cropland agro-eco-systems.

The Panel agrees in principle with this rationale, although it would like to stress that present knowledge and prospects for enhancement of fish populations especially in man-made reservoirs have already shown considerable potential for enhanced fisheries. ICLARM may wish to consider inland water systems other than "ponds" at a later date and link up with other stock enhancement related programs.

Despite its established potential, aquaculture has been slow to spread. The Panel, therefore, supports the program emphasis on integrated farming and on identification and removal of constraints to new entrants as a research strategy. Overall, the Panel agrees with ICLARM's view that small-scale integrated farming systems that incorporate semi-intensive aquaculture and appropriate breeds of fish must be developed together with a clear understanding of the perspectives of existing farmers and potential new entrant and consumers.

With regard to husbandry and integrated agriculture-aquaculture systems, additional professional capacity will be needed to explore the socioeconomic constraints to new entrants. ICLARM has already been involved in several cooperative projects with other institutions and gained some experience in this area. (e.g.IRRI, AIT, etc.)

4.2.4 Program Thrusts

The three major thrusts of the Program are to:

Thrust 1: Improved fish productivity through gain and better husbandry,
Thrust 2: Development of integrated agriculture-aquaculture farming systems,
Thrust 3: Removal of socioeconomic and environmental constraints to aquaculture growth.

The Panel agrees that interactive, interdisciplinary research is a prerequisite to achieve the results required for the development of aquaculture in integrated agriculture systems that will attract new entrants and that all three thrusts are essential for success.

The three major thrusts are reviewed one by one:

Thrust 1: Improved Fish Productivity through Genetic Gain and better Husbandry

This Program component will include two major research areas: "Germplasm and Breeding" and "Nutrient Flow Modeling/Pond Dynamics". Research methods and strategies will be devised and implemented to develop improved carp and tilapia germplasm and breeding programs of farmers operating low-input, inland aquaculture systems. There will be parallel studies on user (farmer and consumer) perspectives and the economic, social and environmental impacts of improved fish breeds. Strain registries and records of wild and captive fish genetic resources will be kept in the multipurpose relational

database (FISHBASE). It is also intended to create an "International Fin Fish Genetics Network" as a promising path to success. The objectives of this network are (1) to document and evaluate fish germplasm of key species, (2) to provide scientific support for efforts to conserve such germplasm in situ through conservation of habitats; (3) to stimulate national breeding programs; and (4) to strengthen NARS by providing related training and information to participating groups.

It is recognized by the Panel that in the new plan more emphasis has been placed on the genetic work than in the past while the addition of Indian and Chinese carps into the target species groups is clearly consistent with the overall aims of the Program. In collaboration with NARS and ASIs, ICLARM intends to develop improved germplasm (in its broadest sense) of a few widely used African tilapia and Indian and Chinese carp species for low-input, semi-intensive systems, with associated germplasm banking and regional testing. In the Panel's view this choice reflects the importance of these species in tropical aquaculture. Because some tilapia strains for future selective breeding are already available through ICLARM's past program, there is a chance for near-term implementation; whereas the lead time for other species is relatively long.

The Panel agrees with the proposal to take advantage of ASI laboratories to minimize inputs in germplasm work in the sense of genetic engineering during the transition phase. The Panel, therefore, would re-emphasise its belief that improvement in breeding and husbandry practice, as outlined in thrust I, should receive higher priority for immediate action than germplasm research. The Panel agrees, however, that a sound germplasm program must rely on documentation of fish germplasm of key species and at the same time stimulate national breeding programs. It is believed that strengthening NARS will help achieve these objectives, as well as promote efforts for habitat conservation.

The Panel also agrees that the fish genetics program will require ICLARM's own ponds and laboratories for research, in particular for brood stock management. The required facilities can be kept relatively small (maximum 4 ha of ponds, some indoor aquaria rooms with adjacent laboratories, e.g. for genetic bench work, biochemistry, water chemistry, fish wet lab). Since the final location for ICLARM headquarters, where these facilities will be constructed, has not yet been determined, and since planning and construction will take some time, the germplasm program will have to continue its research work in collaborative mode. Some of the core staffing will, therefore, be required before in-house facilities are completed.

There are existing regional fish genetics networks in Asia; the IDRC-funded Aquaculture Genetics Network in Asia (AGNA), which has focused mainly on training and support of NARS; and EEC-funded collaboration in fish genetics research for the ASEAN countries; and the genetics activities of the inter-governmental Network of Aquaculture Centers in Asia (NACA). ICLARM has not had very close relationships with these genetics networking activities. The Panel suggests that these relationships must be resolved when ICLARM establishes its collaborative research network in genetics as proposed.

Research on husbandry, as identified by ICLARM, will focus on pond dynamics to understand and optimize the management of nutrient flows. This will provide key information for farming systems research which will develop management strategies for integrating aquaculture into small-scale, crop-based farming systems.

With regard to husbandry issues, the past cooperation with AIT, and the current integrated farming project in Malawi, have placed ICLARM in a good position to expand research towards the needs of new entrants. The established close cooperation in AFSSRN, links with IRRI and its ASEAN Rice Farming Systems Network, are other positive elements to this program component.

While the overall approach suggested by ICLARM is viewed by the Panel as correct, more emphasis should be placed on the need for collaborative interdisciplinary research inputs from soil science, agro-engineering, hydrology and climatology, as well as water chemistry and other disciplines.

In the Panel's view, domestic wastewater use in aquaculture as a nutrient and a water resource, particularly in highly populated regions, may be one area of research that warrants more attention in international research in the future. The strategy has not addressed this question although ICLARM recently considered this problem (see Chapter 2.2). Sanitary issues associated with these wastewater-fed systems will be among the key issues to be addressed in the future. ICLARM might consider becoming involved in this research area in due time.

Studies on pond dynamics will have strong modeling and database components as well as new facilities proposed for "in-house" research. Database systems are necessary to keep records of the developments and can be a good research tool to monitor system performance. The focus will be on "semi-intensive" systems. ICLARM intends to undertake nutrient flow modeling in close collaboration with AIT, with parallel linkages to the USAID-Pond Dynamic CRSP, NARS, IARCs and ASIs. It also intends to pursue networking as a means of maximizing cost-effectiveness of data gathering and analysis.

The Panel agrees that nutrient flow modeling should be undertaken and supported by "in-house" experimental facilities to verify the validity of field data. The panel also feels that too much emphasis is placed on selected and conventional nutrients and general ecology, while the abiotic environmental interactions with other factors (e.g. unconventional inputs, fire ash, plant material of various sources, etc) are not sufficiently addressed. A better understanding of pond dynamics is a prerequisite for all types of management of aquatic production systems since only on this basis will there be effective control of environmental conditions and production efficiency.

Interactive research required to address these environmental and engineering/management issues are mentioned only in a general sense in ICLARM's Plan. However, they will be of central importance (in particular water and soil quality criteria for fish culture and for other integrated uses) if integrated farming systems expand and water sources become more limited. These interactive research aspects will have to be addressed by

agro-engineers, water chemists and soil scientists together with those disciplines in which ICLARM has expertise in its core staff.

In the long run, supplementary feeding may become necessary for the species ICLARM has chosen to concentrate on (even in integrated systems). Research on feed formulation from low-value ingredients and effects of these feeds on environmental quality for both the fish and other crops may become a research issue of international importance.

Thrust 2: Development of Integrated Agriculture-Aquaculture Farming Systems

Low input integrated farming systems are an appropriate choice of system to assist the resource poor fish farming community. The failure of aquaculture to spread despite proven potential demands a new approach. As an enterprise it must fit into the farmers' existing system. This program component will therefore contain two interdependent activities: (1) bio-economic and ecological modeling, and (2) integrated agriculture-aquaculture management strategies. Both activities will largely depend on modeling, using ECOPATH to understand the dynamics of integrated farming systems and FARMBASE to collate information going to and coming from nutrient flow and bio-economic modeling work. The Panel also strongly emphasizes the need to consider dynamic models developed elsewhere for adaptation if appropriate.

The Panel believes that if aquaculture is expanding in areas of progressive water shortages, research is needed to optimize the use of the hydrological resources, with particular emphasis on the needs of multiple users. Here, fish culture may provide only a marginal crop but play a decisive role in the overall balance and economy of the agro-aqua-ecosystem.

Thrust 3: Removal of Socioeconomic and Environmental Constraints

Inland aquaculture will not be adopted by small-scale farmers unless the systems available for adoption are compatible with the social, economic, institutional and physical circumstances of their households and communities. The research proposed will consider all these factors and also the complexity, risks and management requirements of new systems. ICLARM will attempt to accomplish its research agenda in collaborating with NARS, IARC's and ASIS at key work sites.

The Panel felt that this thrust will be a necessary complement to the other two thrusts, given the new entry strategy. The concept of identifying the conditions for new entrants to agriculture-aquaculture integrated farming systems as addressed by ICLARM is particularly attractive and challenging, but not without risk. The level of risk differs by region, it is higher in Africa than in Asia for various reasons. Given the importance of thrust 3 for the entire program strategy the Panel was surprised to find that only one social scientist will be placed on core funding.

4.2.5. Potential Impact - Panel's View and Assessment of ICLARM's Statements

The expected outcome is increased production and improved productivity, contributing to sustainability. ICLARM suggests that the chances of success are high, particularly in Asia. From its past experience dealing with improved husbandry and better breeds, it has extrapolated that the adoption of rice-fish culture yielding only 200 kg of fish/ha/year (double the current lowest estimates for yields using unimproved breeds and systems) by only 10% of rice-based farmers in tropical Asia would probably yield about 1 million tons of fish per year, worth at least US$1.5 billion. Moreover, genetic gain in growth rates of about 10% per generation is expected from selective breeding i.e., up to 15% per year for tilapias and about 5% per year for carps.

While it is agreed that the researchable issues address questions critical to the development of inland aquaculture, the Panel has some reservations as to the the expected outcome of the program. It is certainly too early to predict the success of integrated systems, and the removal of constraints to new entrants. There must be good reasons why only 1% of farmers in countries with a long tradition in aquaculture fail to adopt it.

The Panel doubts that ICLARM's estimate of impact is realstic. While gains will be achieved, any estimate is highly speculative. This may be particularly true in Africa, where the already low overall aquaculture production figure has - despite the funds granted to development projects - declined over the last decade. ICLARM's program in Malawi, however, is a promising new approach.

In the Panel's view, it is very likely that the breeding part of the genetic research program, if linked to proper NARs extension work, networking and solid in-house and "in-the-field" testing, will have a noticeable impact on inland aquaculture development. There are already signs that NARS are keen to adopt improved strains. ICLARM has increased awareness of the poor growth performance of the strains available.

The germplasm (genetic engineering) component of the thrust, although an important long-term strategic issue, does not have the same immediate prospects for impact.

4.2.6 Conclusions and recommendations

In the Panel's view the Inland Aquatic Systems Program builds on past competence and should be approved. Its three thrusts are in general sound, although they require some modification of emphasis in that short-term breeding and husbandry should be given higher priority than germplasm manipulation. The Panel also feels strongly that some of the concerns expressed above arose from lack of clarity in the Strategic Plan.

As to the research in genetics, the Panel understands the need for addressing the bio-engineering issues (germplasm, preservation and manipulation) as an investment for the long-term future. Husbandry and integrated agriculture-aquaculture systems, however, should receive priority

attention as their implementation is prerequisite to the need for genetic improvements.

Therefore, the Panel endorses early core staffing for quantitative and population geneticists, in order to implement the collaborative breeding program and to build the expertise required when in-house facilities will be completed.

The Panel suggests that ICLARM reconcile the new genetics network with other initiatives for networking in genetics for the ASEAN region. The Panel also recommends seeking complementary research inputs (e.g. in soil science, agro-engineering, hydrology, etc) to strengthen the husbandry component of thrust 1, and to reconsider wastewater-fed aquaculture as a possible research issue. Models developed elsewhere on culture systems should be evaluated alongside ECOPATH as possible components for conceptualization.

ICLARM should later reconsider its involvement in coastal aquaculture research, in particular as it relates to environmental issues. The most effective way in which this could be achieved would be in association with the Coastal Resource Systems Proram.

Although the Panel agrees that ICLARM at the present time should not be involved in research on aquaculture diseases, it is stressed that disease problems may emerge as aquaculture expands. In this context the issue of viral diseases as a risk factor for human health in integrated livestock-fish culture systems, an issue that has recently been raised through an article in "Nature", is of relevance. The author of this contribution did not intend to caution against integrated aquaculture agriculture systems but noted that certain species combinations may pose potential risks. ICLARM is aware of this problem and has developed a strategy to avoid such problems.

4.3 The Coral Reef Resource Systems Program

4.3.1 Introduction

Classically, coral reefs have been a biological paradox: highly diverse and productive systems occurring in the 'nutrient desert' that makes up over half of the planet's surface. The first explanation was that plant material makes up a significant fraction of the coral biomass, in part as unicellular plants or zooxanthellae, in the tissues of corals, contributing to their energy needs and the food webs dependent on them. Food for reef fish may come also from adjacent systems such as reef flats and sea grass beds, and some reefs 'import' planktonic food from ocean systems, and these include some of the more productive reefs. All of these factors affect production/area estimates, which must also distinguish between reef residents and those transient fish species occasionally caught around reefs.

Coral reef systems are important throughout the circumtropical area, both on the mainland, but especially to island peoples. They are also of extraordinary scientific interest; not least from the lessons they offer to agricultural science on the feasibility of food production in nutrient poor conditions.

4.3.2 Issues and International Research Priorities on Coral Reefs Research

Fundamental research in ASI's and universities is focused on coral reef systems, but much of it is basic and not devoted to its food producing capacity. Given the complexity of coral reef systems, any strategic research program will draw on this body of research and require significant backup from ASI's, and it is encouraging that the Strategic Plan emphasizes this.

Not much detail is given in the Plan as to the research topics which will be addressed. This evaluation draws on the Panel's views on key researchable priorities for reef fisheries. These can be grouped categorised into five study areas:

a) **Reef productivity studies:** Some typology must be developed before generalizing about reef productivity: what type of reef can produce over 8t/km2? Is this sustainable, or will intense harvesting change species composition to less desireable species? What proportion of such productivity is imported or concentrated from adjacent systems? Finally, what are the mutual effects of fishing and other human activities, including tourism, on production? Establishing the impact of environmental degradation on reefs is important.

b) **Socio-economic and development studies:** There is need for detailed studies of the sociological context of tenure systems, and on community-level scale mechanisms that lead to individual or community property rights and might permit coastal aquaculture and stock enhancement with minimal enforcement. Sociological and anthropological work should focus on traditional roles in utilization of highly diverse reef products. It is important to consider non-exploitive uses. Reefs are important for export revenues, protein self-sufficiency, storm protection and tourism. The comparative advantages, and possible zonation of areas devoted to different reef-associated activities, is therefore an important research topic.

c) **Reef resource enhancement studies:** Recent field studies at AIMS have identified variable annual recruitment, and not available food, as the main factor determining fish biomass, and this supports ICLARM's thrust on reef stocking. The role of cover and carrying capacity needs investigation, and may require experiments with artificial structures. Stocking reefs is now feasible, and other candidates are reef fish. Larval collectors have been developed for spiny lobster, and light attraction accumulates reef fish larvae. These are possible alternatives for stocking small reefs to immediate investment in fish breeding facilities. The coral reef program should seek university collaboration, for studies of oceanic recruitment mechanisms of island fish species.

d) **Alternative harvesting schemes:** An attempt should be made to document the impact of different management schemes (seasonal, rotating and permanent closures), and the possibilities of a) recovery of the reef and b) its fish populations. Mechanisms of local control of fishing by communities on proprietary reefs need documenting: are exploitation rates lower than with common access? Being able to study problems in a controlled fashion will depend on knowing to what extent fish from adjacent reefs intermingle. If

fish from individual reefs are resident, this allows a unique opportunity for replication experiments impossible in other marine environments. The feasibility of fisheries enhancement can be checked, as well as a first field testing of some stock assessment theories on density dependence.

e) Research on coral reef aquaculture: Rearing of giant clams is possible, but is it economically feasible, and in what mode? There is a need to compare intensive small-scale rearing against both extensive cultivation, and reef enhancement using hatchery stock. Once this is done, it seems important to establish whether 'colonies' of brood stock placed in areas where native populations are extinct have any potential for re-establishing progeny. One spin off here would be a better understanding of survival and distribution mechanisms in shellfish. Assessing the feasibility of larger scale rearing mode in reef lagoons or flats, or in floating nurseries, requires technical assessment of possible farming systems. There is also a need to continue research into improving rearing procedures and broodstock, and to investigate low cost, low technology methods of growing other valuable reef species.

4.3.3 Overall Program Objectives

The main objectives of this program as stated in the Strategic Plan are:

> "To improve management of coral reef fisheries and to increase catches and incomes of communities dependent on these fisheries through a mix of management and technological interventions aimed at increasing the sustainability and equity of existing fishing systems, and the adoption of sustainable aquaculture, and enhanced fisheries;" and by priority work in "understanding coral reefs as global production systems."

The three research thrusts, and their subcomponents, proposed in the Strategic Plan to meet these objectives are:

Thrust 1: Increasing and sustaining catches by: a) developing a reef database, b) studies on resource dynamics, c) looking at options for reserves and protected areas, and d) improving policies for habitat enhancement and rehabilitation. Methods: Synthesis of existing data, modeling of yields and of reef recovery by collaborative, comparative approaches: placing emphasis on networking. ECOPATH II models plus models from ASI's, REEFBASE and GIS, are the main tools mentioned.

Comments by the Panel:

ICLARM has some advantages to offer in studying reef fisheries, principally, its qualified staff, Dr. Munro is a recognized authority on reef fisheries, and has worked collaboratively with Dr. Pauly on assessment of reef fish. The nucleus for this team is within the Fish Capture Program with first rate biologist/modelers and database experts, who effectively function as a systems analysis and programming group for the whole Center.

This thrust addresses a very broad range of issues, and the methodological leanings of the staff appear reflected in the dominant role of biological disciplines, computer manipulation, modeling and simulation; using

data either from the literature or from the other thrusts, mediated through compilation oF data bases. The REEFBASE concept incorporating information on reef fisheries will be useful, but primarily for comparing new information collected in a standardized fashion during the program by ICLARM and its network of correspondents. It would be premature to design field sampling to satisfy any single model, or place all emphasis on ECOPATH, since from recent field work, [c) above] the role of trophic considerations in limiting production has been questioned. Addressing some of the key questions mentioned in a) above; notably, evaluating the sustainability of reef production over time; would be another focus. A problem-solving emphasis might therefore be more effective in choosing discrete topics for strategic research: testing concepts against field data.

Thrust 2: Improve management methods by community-based management. Improved analytical/ decision tools will be developed, with multidisciplinary emphasis, based on the results of thrust 1. Bioeconomic models will be developed for fisheries, aquaculture and tourism, and comparative studies made on sociocultural aspects, community based conservation, and resource conflict resolution. These will be field tested by collaborating agencies, (NARS, government agencies, NGO's, community groups and local government) at outreach sites. Experimental management approaches will be tailored to suit local situations. Methods: information synthesis via networks, modeling, coordination, policy issues.

Comments by the Panel:

Like Thrust 1, this appears to have a high component of desk studies, but a disciplinary emphasis on socioeconomics addressing components of b) and d) above. Again, a very broad range of subjects will be tackled, which would need a large dedicated staff. Modeling is again a primary emphasis; bioeconomic modeling is to be implemented, presumably in cooperation with the same program team as above. It appears overly ambitious to apply multiparameter bioeconomic models for almost the first time to multispecies fisheries using the most complex example, the reef fishery, as a test case.

Thrust 3: Increasing coral reef productivity: Improved management measures from thrust 2 will be combined with aquaculture for food or to produce juveniles for stock enhancement to increase reef yields. In the long term, farming systems for other species for pristine and degraded reefs, polyculture and extensive systems will be developed. Improvements of clam germplasm will be sought. Methods: culturing and genetic improvement, farming systems, field experimentation, experimental community-based management.

Comments by the Panel:

Tropical bivalve cultivation offers the clearest comparative advantage for ICLARM. More experience is needed in pilot scale rearing, and hopefully a candidate for technology transfer will allow ICLARM to transmit its hatchery experience over the next 2-3 years in development mode, although a continued advisory role is to be expected for the immediate future. Preliminary testing of the effectiveness of reef restocking now seems feasible [see c) and e) above]. The much larger investment needed to carry out advanced laboratory work in the absence of local technical services, dictates an emphasis on field

procedures, with collaboration with ASI's to achieve other objectives. Some further investment to relieve crowded working conditions at Honiara will still be necessary for this thrust, even with a very modest increase in staff.

This appears the most coherent thrust of the three with a more limited set of objectives. Presumably much of this work would be carried out at Honiara, except where it involves degraded reefs, which could be from ICLARM headquarters on Asian reefs. This should take advantage of local contacts developed under the CAMP.

Overall comments on the choice of program thrusts:

In general, the Panel feels that the scope of the work under this program is far too ambitious for a small staff. There is weak coherence between the 3 thrusts, and too strong an emphasis on biological sciences and on the desk study mode. More stress needs to be placed on cooperative field studies by staff with NARS, especially on the social, legal and economic factors in coastal communities that allow user right systems to develop. Headquarters studies using information collected largely from NARS correspondents may lead to perceptions that NARS are confined to the role of data gatherers, unless there is some field involvement by ICLARM staff, and collaboration in other aspects of the research.

One interpretation of the program might suggest that the necessary work on coral reef fishery research could be accomplished solely by networking and by the proposed REEFBASE - this would have been more convincing if the 'desk study mode' dominating the first two thrusts had looked more promising to the Panel. The Panel emphasises the need for a strong coordinating role by this Program to ensure that new knowledge is created and data is collected in a standardized way by collaborators, and this will involve organizing meetings and training for cooperating agencies prior to field and case studies. The temptation to achieve early impact before improved coordination of the many actors in the program has been effected should be avoided.

The following sequence could be considered as an alternative strategy to follow: (a) preliminary reviews and workshops on the existing situation with potential research partners, (b) joint agreement on standardized data collection and modeling approaches, (c) field experimentation and experimental management at multiple sites, and (d) synthesis and modeling of results, to be discussed at a follow-up workshop.

There is not much emphasis on how to address current environmental research issues. How has this affected changes in reef productivity over time? This may need to be addressed through collaboration with ASI's.

The organization of the three thrusts does not obviously follow from the objectives of the program given in the Plan, and the scope of the proposed work, work procedures and linkages between the thrusts might have been clearer. Consideration should be given to other possible ways of organizing the thrusts into predominant activity and/or locality. One alternative which is compatable with the objectives of the program might be:

(1) **Fisheries ecology of coral reefs:** information gathering, synthesis and

modeling of factors that affect coral reef fisheries. This work would rely on networking and joint projects at outreach sites, with modeling based initially on stationary models, but later, using dynamic models and standardized information sets collected with partners in cooperative research mode. Extension of the modeling work into socio-economic aspects would be attempted. The modeling component can be carried out at ICLARM headquarters in cooperation with the Coastal Resource Systems Program, or aided by a group of systems analysts serving all programs.

2) **Reef enhancement:** This work would be predominantly field based, and divided between Asian and island test sites, with work on degraded reefs at the former locality. It includes rearing activities as necessary, stocking and monitoring trials of extensive and intensive systems of farming, and of enhancement of wild stocks. Requires fishing/farming systems expertise, a biologist and a social scientist to foster community participation.

3) **Fishery management:** Exploring how coastal communities manage and allocate their fishery and manpower resources, and studying successful applications of community based management to determine practical constraints, and the role of women in fisheries, for example in gleaning, husbandry, processing and marketing. Exploring different management schemes, from traditional tenure rights to various types of limited access, closures and marine parks. This would be predominantly field based with biological and social science inputs.

4.3.4 Conclusions and Recommendations

The Panel was initially not fully convinced that management of reef resources is sufficiently different from other coastal resources to require a separate program. There are, however, differences in the mode of operation, involving a creative fusion of rearing and enhancement, in the possibility of carrying out controlled field experiments, and also a difference in the main clients. The base provided by staff skills, including the modeling expertise and the successful existing program at Honiara, make a strong case for ICLARM to have a separate program. However, the current program strategy needs further discussion and clarification.

The Panel feels strongly that full advantage should be taken of the skills available in ASI's and universities to carry out a lean, cost effective program, until greater focus gives a clearer idea of where the limited resources available could be best applied. Although ICLARM has a long and varied experience in tropical fishery management, in this program area its prior familiarity with most of the tasks proposed is less than for the other programs, apart from the small component proposed on clam rearing. Several institutes have a clear comparative advantage and longer history of investigation than ICLARM in pure, and some applied and strategic, aspects of reef resources research and management. They should be consulted in relation to this program's direction in order to avoid waste and duplication of effort. The Townsville institutes, FFA and FAO are some of the organizations that should be closely involved in such consultations.

The Panel appreciated the motives for concentrating senior staff in one locality in order to achieve critical mass, but this should not be at the expense of appropriate supervision at outreach or test sites. For this

program, a strong argument for its separate identity from the Coastal Resource Systems Program, is the successful semi-autonomous program developed at Honiara. A moderate expansion of this facility would seem to be incompatible with an Officer in Charge who is remote from the facility. The Panel recognized the problems of liason raised by the present outposted Director's position, although as for any outreach facility, lack of coordination within a program may be more immediately disruptive than between programs. The Plan recognizes that, for example, the socio-economists will divide their time between the different programs, and this already implies a significant travel component. Regular exchanges of visits by the Director General and OIC of the Honiara facility, plus modern facilities for communication, should overcome such difficulties.

An alternative picture to that presented in the Plan may be considered, namely, of a Program Director, who is also director of the Honiara facility, has good local air connections with the Townsville ASI's, and maintains contact with ICLARM's headquarters and the island states, possibly via FFA's satellite communication linkages. The program could have outposted officers at ICLARM headquarters on the mainland, who work on the degraded reef systems, and act as liason for Honiara with a central group of ecosystem modelers.

Potential beneficiaries of the program: Work on coral reefs needs international focus, but will require both cooperative work with NARS where these exist, as for the continental and larger island states. This is not so for many smaller island states, and work will have to be closely coordinated with international organizations such as IUCN, UNEP, FAO, and with regional organizations such as FFA, OECS, CARICOM and the South Pacific Forum. These are the other potential beneficiaries of the program, who together with the bilateral aid agencies concerned with small island states, will profit from technical advice on investment priorities.

The Panel endorses ICLARM's decision to establish a Coral Reef Resource Systems Program, because of the importance of this resource system, and based on the promising work under way at Honiara. The Panel notes however that the substantial increase in core resources proposed to allow this program to expand into critical new areas, is not justified sufficiently by the proposed research strategy and the topics to be addressed. ICLARM will be able to start strategic discussions on the researchable issues and possible collaborative mechanisms at the planning meeting with the relevant ASI's and other parties scheduled to be held in Townsville in March.

For the above reasons, the Panel believes that it would be premature to approve the expanded Coral Reef Resource System Program presented in the Strategic Plan. It recommends that ICLARM should develop a completely revised research plan for the Coral Reef Resource System and present it to TAC for approval, independent of the Strategic Plan, either as part of ICLARM's presentation of its Mid-Term Plan, or if more time is required, on the occasion of the interim review that is recommended in Chapter 5.

4.4 Coastal Resource Systems Program

4.4.1 Introduction and Perspective of the Panel

The sustainable development of capture fisheries and aquaculture in coastal areas depends heavily upon two related sets of issues. The first and wider set is the maintenance of environmental processes that control the health and productivity of coastal ecosystems whose functions sustain fish

populations. Many of the factors that adversely influence these ecosystems, and fishery activities within them, are beyond the control of the fishery sector. For example, poor standards of land management in watersheds can increase the severity of flooding with disastrous consequences for coastal aquaculture. Resolution of these wider problems requires cooperation across all the sectors involved, agriculture, industry, the environment and fisheries, as well as planning agencies which guide them and funding agencies which finance them, in the formulation of integrated approaches to the management of land and water resources for a variety of human activities.

The second, narrower set of issues, is restricted to the management of the fishery resources. There are also resource management conflicts within the fishery sector leading to habitat destruction and declines in fish stocks and impacting the social and economic welfare of large numbers of small-scale fishers.

Figure 1 is a diagrammatic representation of one nested hierarchy of systems. The three inner systems of the diagram make up the narrower set of issues described, directly relevant to fisheries management. The wider set of issues described are located in the outside system in the diagram, with a great, if indirect, influence on fisheries management. Each of the four levels in the diagram has researchable issues appropriate for international strategic research. Sets of issues for each level and one specific example from these sets are listed below:

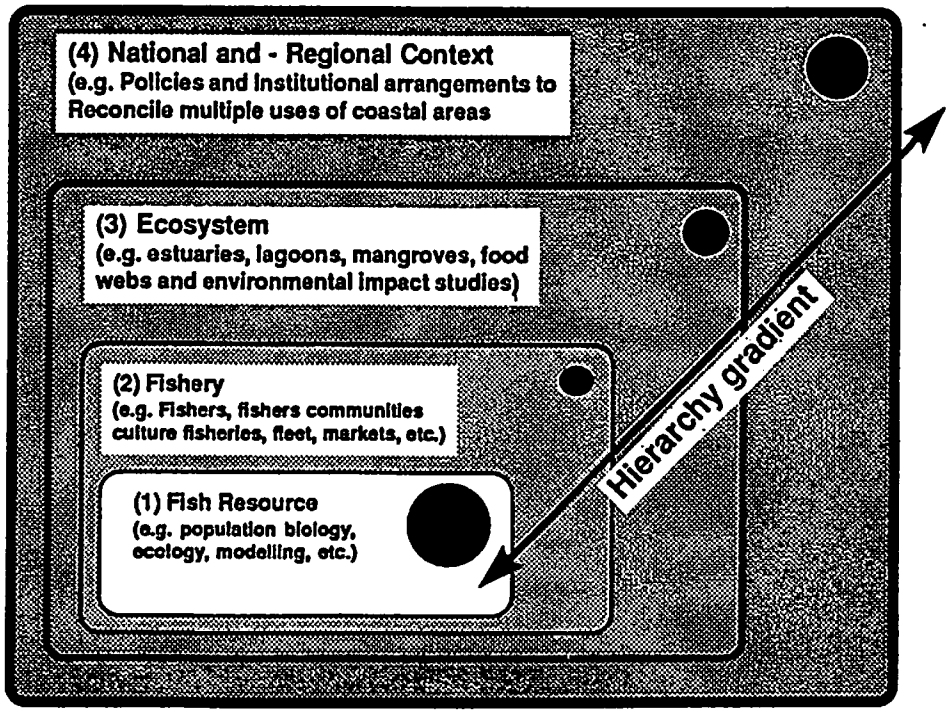


Fig. 4.1. Hierarchy of problem definition in coastal systems research

Relative strength and emphasis in previous work of ICLARM

(1) - The FISH RESOURCE: represented by wild fish stock or cultivated species, often a multi-species resource, life cycles, population dynamics, environmental impacts, harvesting options and impacts of management measures.e.g. What is the biomass of small pelagic fish in coastal waters and what would be the impact of fishing on larger, higher value predators relying on it for food.

(2) - The FISHERY: investment in gear, allocation, equity and access considerations at the individual and community levels. e.g. How to identify the strategy to be used to optimise community welfare in the fisheries sector and sustain the fish resource ?

(3) - The ECOSYSTEM; habitats, their mapping, the impact on them of human activities, biotic and abiotic changes in the environment. e.g. What is the effect of different levels of nutrient enrichment/siltation from human activities in the watershed on the incidence of red tides, the growth of oysters and the onset of anoxia in waters affecting bottom fish ?

(4) - The NATIONAL AND REGIONAL CONTEXT: employment and welfare from coastal areas through agriculture, industry, fisheries, commerce, tourism. Intersectoral coordination, policies, institutional arrangements, planning. e.g. What inter-sectoral institutional arrangements generate national policies which are effective in allocating rights of access to coastal resource systems ?

The perspective of professionals on fisheries management depends almost wholly on the level and role of their location in the hierarchy. Understanding the full range of these perspectives is important to the sustained solution of the fisheries management problem. ICLARM's past experience and present skills form the foundation of its current comparative advantage, this is represented in Figure 1 by the scale of the shaded circles against the gradient line. There is strong experience from the existing capture fisheries program at the fishery resource level, the narrowest of the four, and from the existing CAMP program with intersectoral policy and institutional research and planning issues dominating the widest national and regional level of the hierarchy. Experience at the ecosystem level, and particularily recent experience at the fishery level, is more limited.

Key researchable strategic issues in the fisheries sector are obviously central to the agenda of an international fisheries research institute. Yet the Panel believes the issues in coastal area management research in the wider set are so threatening to the sustainability of fish stocks that it sees them as a vital source of agenda for research by a future ICLARM. Over the long term it is only by embracing research on the wider policy and institutional issues that fisheries science will be able to play a role for communities in the coastal areas.

4.4.2 ICLARM's Objectives in the Coastal Resource Systems Program.

The Coastal Resource Systems Program (CRSP) set out in ICLARM's Strategic Plan proposes to address both sets of issues through a merger of the

existing Coastal Area Management (CAM) and the Capture Fisheries Programs. It is a potentially powerful amalgamation and the Panel applauds ICLARM's initiative in bringing these programs together. The CRSP sets out its objectives in the draft Strategic Plan:

> "The objectives of the program are to (1) understand coastal aquatic resource systems - the resources, the fisheries and the externalities to aquatic resource systems[s] sufficiently well to be able to (2) design, test, implement and disseminate appropriate management systems for coastal fisheries.....Also, the program should (3) contribute to enabling planners to incorporate such systems into multisectoral coastal management plans."

This statement of objectives appears to the Panel to retreat from the CAMP focus which was on the wider set of intersectoral issues outlined in the introduction. Under objective (3), the only one to touch on wider coastal area management issues, the emphasis is on enabling planners to incorporate aquatic resource systems into their multisectoral coastal management plans. The emphasis of CAMP was on catalysing policy and institutional coordination to achieve multisectoral planning.

The rationale outlined for the objectives in the Strategic Plan places initial emphasis on the capture fisheries side, though on the relatively narrow facet of stock assessment. Later in the rationale there is acknowledgement of the importance of the wider issues of intersectoral collaboration. It closes with the view that ICLARM is one of the very few organisations with experience in these wider issues.

The statement on rationale did not help the Panel to understand the key researchable issues in coastal resource systems. This causes difficulty in relating the substance of the thrusts to the objectives set out for the program.

4.4.3 The Program thrusts.

The strategy statement for the program identifies three thrusts - "identifying coastal management issues, dynamics of coastal resource systems and developing alternative institutional approaches for management". As set out the thrust titles were not informative and the Panel turned to the description of thrusts for elaboration.

The emphasis of the first thrust is the development of two databases, largely from secondary sources, one (FISHBASE) is already ongoing and the new one is to be on country specific information, "largely physical and human systems". The second thrust features the development and collaborative application of system and bioconomic models to understand coastal "situations".

The third thrust does incorporate the CAMP heritage and embraces research through a hierarchy of systems from the grass roots fisherfolk, through communities and local or regional authorities to national institutions and policies. It emphasises understanding the interactions at each level and between levels to learn how processes can be manipulated to influence the livelihoods of the target group. A collaborative mode of research is envisaged

with "selected international, national (NARS, government ministries) and local agencies..". Geographically dispersed case-studies under a variety of conditions will be used to test alternative management approaches with the cooperating agencies.

The Panel believes the new database proposed in Thrust 1, will be valuable to retain the data from the CRM Project and from similar experiences with other multi-level studies. It will accumulate as ICLARM's experience with new studies evolves. However the Panel believes that the major coastal area management issues common to tropical regions are well articulated. The CRMP examined many of them in detail in the case-studies in six ASEAN countries which formed the foundation of that Project. The value of the database will be bringing increasing replications of case-study information to bear on how such issues can be resolved.

The Panel sees FISHBASE, the other data base in Thrust 1, and the modeling emphasis in Thrust 2 as reflecting the continuing priorities of the existing Capture Fisheries Program. The Panel feels that the complementary aspects of fisheries management problems are overlooked, particularily research for the control of fishing effort, and that these are of great importance to an integrated approach to fishery management in the coastal areas.

Finally, the Panel is pleased that thrust 3 recognises the systems hierarchy in Figure 1. It reaches through to the key areas of research on policies and institutional arrangements for intersectoral collaboration. The Panel believes there is an overwhelming case for ICLARM to continue to promote and collaborate in research on the wider policy issues of intersectoral collaboration.

In this emphasis in the third thrust there is some inconsistency with the stated objectives of the program. The Panel suggests that the objectives be restated to more clearly embrace the wider intersectoral dimensions of coastal area management and bring more consistency to the chapter.

4.4.4 Strategies for Implementation.

The CRSP implementation strategy revolves around the wide use of biological, socioeconomic and institutional models, some developed in house, others borrowed and adapted, sometimes with the help of ASI's.

"Initial efforts will be refined through field data and analyses of selected site specific studies and eventually lead to 'global' approaches designed with a view to optimising management processes, particularily by community groups. It is envisaged that NARS would adopt successful field tested management strategies for widespread application".

From this the Panel gets the sense of an iterative approach through data collection, modeling, validation and application to derive widely relevant management strategies for use at the various levels of the systems hierarchy, with an emphasis at the community level explicit (Figure 1.). It concurs with the sequence of stages in the research process but would draw attention to the need, reflected in the Panel's commentary on the existing

Capture Fisheries Program, for CRSP to be directly involved in stages other than model development. In particular the CRSP, in collaboration with NARS and at a limited number of sites, needs to pursue its own primary data collection in the standardised format crucial to the solution of the key thematic research issues central to its program. It also needs more direct involvement in model validation and application in order to draw lessons from the real world of resource systems and make iterations of strategic research profitably progressive.

The Panel has recognized the urgent need for research on policies and institutional arrangements to enhance integrated planning of coastal areas. It has also had to recognize that the scope of the issues at this eco-regional level is so wide and so political that ICLARM can never play more than a catalytic role with collaboration in key research areas.

Neverthless, under the existing CAMP Program ICLARM has established an extensive collaborative network reaching all four levels of the systems hierarchy. Through the network CAMP catalyzed a range of collaborative case studies designed to identify concepts, principles and methods for intersectoral cooperation in the management of coastal areas. Few research institutions have the experience of, or the levels of contacts required for, this broad catalytic networking. In future, in the context of the CGIAR, the catalytic role will emphasis research rather than planning but it is important the Center capitalizes on the foundations already laid in the existing network. The case-studies and local research initiatives implemented by the wide spread of collaborating institutions represent a powerful laboratory for the pursuit of strategic research issues at all levels in coastal area management. Not least such a network can be an important source of a demand driven strategic research agenda for both the fisheries and the coastal area management dimensions of the CRSP. (See a schema, which the Panel used to discuss the network as an operational mode, in Annex IX)

4.4.5 Conclusions

The potential impacts of the CRSP over the next decade are set out in the Strategic Plan:

- demonstrate convincingly that many fishing communities can, if empowered to do so, manage coastal fisheries resources in a sustainable fashion.

- strengthen the capacity of NARS to follow up on the results from collaborative pilot projects and to implement such schemes in a large number of communities.

- provide, through NARS implementation, sustainable fish catches and other benefits such as biodiversity for the relevant sites.

- influence the perceptions of policy makers and resource managers with respect to the development of environmentally sound and socially equitable policies and the formulation of management of development plans for coastal areas.

The Panel feel these impact statements demonstrate wider and clearer

thinking than was immediately apparent from the stated objectives and from the rationale.

The Panel endorses ICLARM's proposed involvement in research on coastal resource systems. It applauds the decision to establish a new research program that, by integrating previous program strengths, can provide synergistic benefits that would place ICLARM in a unique leadership position in this research area.

The Panel however has been disappointed that the discussion of CSRP in the Strategic Plan fails to conceptualize how the previous program strengths would be integrated, and the benefits that can accrue from a broader analysis of coastal area issues.

The Panel urges ICLARM's board and management to continue discussion, taking into consideration the concerns expressed and the suggestions made in this report, to improve the conceptualization, to identify researchable issues for the proposed new program and to analyse the program thrusts in order to improve their formulation.

The Panel concludes that the strategic plan for this program is inadequate. ICLARM should define a course of action to address the issues raised by the Panel and convey then in the Center's response to TAC. If TAC agrees the Panel would support a reformulation of this chapter of the Strategic Plan before this report is submitted to the CGIAR in May 1992.

4.5 National Research Support Program

In its draft Strategic Plan ICLARM proposes to initiate a program under the above heading, geared towards strengthening national aquatic research systems. While the major focus of the three programs discussed above is research, this program is related to capacity building. The proposed program essentially encompasses the activities of the existing Information Program, integrates the training activities of the four existing programs under a new training thrust, and introduces a new thrust on NARS research policies and management.

4.5.1 The Panel's Perspectives

SIFR, TAC and ICLARM have all put forth cases and arguments supporting the view that developing country fisheries and aquaculture research capabilities need to be improved if the sector is to contribute effectively to national development. According to a SIFR Working Party Report ("International Cooperation in Fisheries Research", World Bank Technical Paper Number 150), four common gaps are found in developing country research capabilities: (1) national research agendas do not reflect the opportunities and constraints faced in the sector; (2) the quality of the research conducted is uneven across regions and countries; (3) organization and management of national research systems need improvement; and (4) findings of public research institutions are often of limited use, especially to the private sector.

If the goal is to assist developing nations to fill these gaps, an international strengthening effort needs to focus on: (1) assisting in the

development of relevant research agendas; (2) improving the capacity of individual research institutions and their researchers; (3) helping developing countries diagnose organization and management problems associated with their NARS, and assisting, as appropriate, in the implementation of reform programs; and (4) helping national systems bridge the communication gaps between research institutions and the users of their research findings.

The above actions are all geared towards strengthening national aquatic research systems. The strengthening agenda can be expanded from strictly research to related activities such as management of aquatic resource systems, given the importance of management in the sustainability of these systems. A second possible area of expansion concerns strengthening national agricultural research systems on topics related to the integration of research on agricultural (including forestry) and aquatic systems.

The above scenario is a large task for any single institution, let alone one with very limited resources, like ICLARM. The strengthening job required calls for a collaborative international effort on the part of national institutions and regional and international bodies.

There are a number of considerations that should be taken into account in studying the specific role ICLARM could play in this broad capacity-building arena:

(1) Agriculture-aquatic system interactions can be studied best in an agro-ecological and regional context. The CGIAR is in the process of allocating responsibility for eco-regional research and strengthening to a number of its centers. ICLARM could collaborate with these centers in providing capacity building assistance to developing country agricultural research systems in the various regions, to the extent this is necessary.

(2) Organization and management of aquatic research systems do not differ markedly from those of agricultural research systems. In fact, in many countries aquatic research institutions are often included within the broader agricultural research establishment. As ISNAR has accumulated considerable experience in studying and providing advice to agricultural research systems, ICLARM should work with ISNAR in the strengthening of the organization and management aspects of aquatic research systems.

(3) A center can strengthen others best in the areas of its own competence. A research institution's primary competences are in research and research related activities and capacity building relates to increasing human skills in these areas. An institution specializing in organization and management is usually better equipped to provide assistance in these areas than one specializing on research.

(4) Capacity building is a collective responsibility of all units in a center, not just the one that carries the title "NARS Support Program". In fact, carrying out collaborative research in partnership with a developing country research institution is one of the most effective approaches to capacity building. Choice of a partner is important

because strengthening a strategically important research system or institution can have a demonstration or multiplier effect on other systems or institutions.

(5) Catalytic efforts, such as coordinating networks, can create a forum for the participants to learn from each other--a form of mutual strengthening.

4.5.2 Objectives of the Proposed Program

ICLARM sees its strengthening role to be primarily in the aquatic research area. The stated objectives of the program are:

"o to strengthen national program scientists;
o to strengthen networking between NARS and NGOs;
o to assist NARS in strengthening their research policies and research management related to fisheries research; and
o to strengthen feedback between NARS, NGOs and the future ICLARM."

ICLARM recognizes that its interactions with NARS can take place at three levels: senior policymaking, research institution and individual scientist. ICLARM's previous training and information activities concentrated mostly on the individual scientist.

There is clear overlap between the second and fourth stated objectives. Leaving this aside, ICLARM's intent is to serve as a catalyst between various national institutions, in particular, as they relate to NGOs. It is not clear from the form the objectives are stated, nor from the text, if the catalytic role to be played by ICLARM would be purely in the research area. Playing catalyst among many national institutions can easily steer ICLARM into developmental and technical assistance roles, which, though much needed by the countries concerned, is usually outside the mandate of a CGIAR research institution.

4.5.3 Program Thrusts and Their Rationale

ICLARM correctly recognizes that "the strengthening of NARS is a dual function of this program and the three research programs." However, the ways in which the three research programs would approach the strengthening objective individually or collectively are not spelled out. The program is divided into three thrusts: information, training, and NARS research policies and management.

Information. Little detail is given in the Strategic Plan about the ways in which the proposed program would differ from the existing Information Program. One new focus is mentioned explicitly (public awareness), although many observers of ICLARM believe it has a wider public image, relative to its size, than many CGIAR centers. There is also a hint that ICLARM would produce a broader variety of material for different publics (including beneficiaries). Also, translation of material into various languages is envisaged.

While the Panel has high regard for ICLARM's past work and accomplishments in the information area, the draft Plan does not offer a clear

view of ways in which the program would differ from the present portfolio of activities. Nor does it illustrate how it would continue its current strategy. Carrying out a systematic assessment of the information needs of the clients and other publics of ICLARM would be in order before introducing major changes (and allocating higher resources) to the highly successful present program.

Training. This is a new center-wide thrust. Although no training-related goal is stated, the Plan notes ICLARM will be selective in building this thrust, "confining itself to areas closely related to its research and to training functions where it has a clear comparative advantage, as well as cooperating with other organizations involved with training."

No specific training strategy is spelled out in the Plan, except the note that ICLARM will make the most cost-effective choice among alternative training modes. The Panel is under the impression that ICLARM is not yet prepared to offer a specific training strategy, in part because it has not yet assessed the training needs of its clients and partners. As in the case of information, the Panel considers such an assessment an essential pre-requisite to major overhaul of the current training activities.

NARS Research Policy and Research Management. As with the preceding two thrusts, ICLARM has done little prior strategic analysis of the possible role it could play in strengthening (aquatic) NARS. ICLARM proposes to initiate work in this area on an experimental basis, as a joint ICLARM-ISNAR activity, linked closely also to FAO. The Panel regards this to be an appropriate short-term strategy. The implication is that a full scale effort geared towards strengthening the organization and management of (aquatic) NARS by ICLARM, ISNAR or jointly should await the results of the initial experiments.

4.5.4 Potential Impact of the Program

This program plays an important role in the accomplishment of ICLARM's overall mission. The expected impacts of the program listed in the plan are necessarily general and vague (e.g., "large number of NARS scientists trained and capable of undertaking research...", "improved information flows...", "increased capacity in NARS to effectively collaborate with other institutions..."). These would be clarified when ICLARM is able to define specific goals and strategies for these three thrusts.

4.5.5 Comments on Implementation and Transition Strategies

ICLARM conceives of a future program with senior staff allocation of seven staff years, including a program director, coordinators for training and information, an editor, a research policy and management specialist, two network coordinators, and liaison staff for Asia/Pacific, Africa, and Latin America. This compares with 1.5 staff years currently devoted to this area (the Director of the Information Program and the Coordinatior of the AFSSRN) plus some time from project related outreach staff.

Liaison staff to head the Asia/Pacific, Sub-Saharan Africa, and the Latin America offices are included as part of this program, although the roles they would play are not clarified. Nor is their work discussed as part of the

three thrusts.

The Panel finds the proposed expansion unjustified in the light of the lack of clarity in ICLARM's strategy within this program and offers the following as a possible approach to implementation and transition:

1. This new program could be headed by either a director or possibly the DDG, if the role of the DDG were not to be exclusively on research.

2. There is need to recruit a training specialist early on, so that he/she can carry out the assessments and establish the contacts necessary for formulating strategies and plans. Beyond this staff addition, little justification exists for expanding training activities until about 1994.

3. The staffing in the information area should be held constant until a needs assessment is conducted and a new strategy (if changes in the current strategy are necessary) is drawn up. Because of current strengths, a revised program could start in 1993.

4. The hiring of a research organization and management specialist should be delayed until the ICLARM-ISNAR experiments in NARS strengthening are completed. Current staff of ICLARM (fisheries specialists) can participate in these experiments. If an organization and management specialist is to be hired, the earliest would be in 1994.

5. It is not clear what the networking staff and liaison staff listed as part of this program would do. Roles of the network coordinators and liaison officers should be more clearly justified.

4.5.6 Conclusions

The Panel supports an ICLARM program focusing on national research support. The three program thrusts laid out in the plan are appropriate. However, goals and strategies of the three thrusts are not clear.

The Panel concludes that:

1. ICLARM should recruit a training specialist and with his/her guidance carry out a comprehensive assessment of training needs in client developing countries. The strategies and plans for the training thrust should be formulated after this assessment.

2. ICLARM should spell out its strategies and plans in the information area more clearly. Information activities should not be expanded before such an effort.

3. ICLARM and ISNAR (with FAO inputs as necessary) should carry out one or two pilot strengthening studies of typical Asian or African aquatic NARS, geared towards diagnosing needs and asisting in the formulation of strengthening plans. Further expansion of work (including increased staffing) in this thrust should await the completion of the pilot studies.

4. ICLARM should provide clear justification for the network

coordinators/specialists and the planned liaison officers. The Panel does not see a clear need for ICLARM liaison offices in Africa or Latin America in the short run.

4.6 Social Science at ICLARM

4.6.1 Introduction.

The draft Strategic Plan reviewed by the Panel dilutes the stance on social science research found in the draft originally reviewed by TAC. The SIFR has endorsed the importance of social science to the solution of fishery problems. It recognised the importance of policy level research, particularily in the coastal area management context. It also emphasised the importance of linking the human and technical sides of research in the fisheries sector. ICLARM has been a leader in both the coastal area management and the human and technical linkage dimensions. The Panel endorses the need to continue this leadership.

4.6.2 Social Science in ICLARM's Proposed Programs.

In the draft Strategic Plan the social science directions are identified by the research needs of the three chosen resource systems and the Panel agrees with this integrated approach. A review of the programs and their chosen thrusts sheds light on the social science relevant to the priority research issues in each program. This falls into three primary areas:

(1) - Research on rapid rural appraisal and participatory method development, and its application to program themes. Anthropology and rural sociology will be key disciplines in this field.

(a) - understanding community management strategies and their limitations,
(b) - understanding common property issues and the options for their solution,
(c) - evolution of an effective adaptive research process,
(d) - support for NARS and NGO's through training and information in these areas.

(2) - Strategic research to quantify, model and understand the ecology and economics of important and representative farming and fishing systems. Production economics and farming systems research experience will be central in these areas.

(a) - evaluation of options for proposed new research thrusts and potential system improvements,
(b) - ex ante and ex post interpretation of experimental results.
(c) - ex post impact assessment of disseminated materials and information.

(3) - Research to remove macro-level constraints to fisheries improvement.

(a) - Political economy of institutional coordination, constraints in policy formulation and implementation processes.
(b) - Policy for community management and common property issues,
(c) - Market and pricing policy.

Each program will need a balance of input from the three social science areas described above. The policy research input will be heaviest in the CRSP, the production economics and farming systems heaviest in aquaculture, with anthropology and rural sociology balanced across the three research programs. Capacity in these three areas will also allow ICLARM to support NARS in social science training and information. It will also widen the dimensions the Center can bring to bear in the AFSSRN.

4.6.3 Issues in Social Science at ICLARM

A conclusion from reviewing the social science needs of the programs, as well as the SIFR and other literature outside ICLARM, is that fishery improvement in many coastal areas is hindered by the need for policy reform to coordinate efforts across national, municipal and local institutions currently pursuing their particular, often competing, interests in coastal areas. It closely parallels the forestry/ livestock/crops competition in many marginal arable lands, under similar pressure from burgeoning populations.

This need has made a strong impression on the Panel. It suggests an early social science priority should be to underpin fishery improvement initiatives with policy research in the area of institutional coordination. What is also clear however is that ICLARM can at best play a catalytic role here, much in the style of the ongoing CAMP program though in a research mode.

Catalyzing and collaborating with a range of national institutions to research the issues and the relevance of solution strategies to different sets of institutional circumstances will be of direct benefit to countries involved. In the context of ICLARM's international research role, a catalytic style of operation across a number of countries creates a wide laboratory to bring policy research cases to bear onto the key themes inherent in the policy and institutional coordination issue.

A distinction between rapid rural appraisal, participatory methods and strategic socioeconomic research needs to be clearly drawn in designing the social science input into programs.

Rapid rural appraisal evolved out of a tradition of farm level research pre-occupied with hard data collection as a means of understanding a farming system. The collection of hard data is professionally intensive and expensive and allows coverage of only a tiny fraction of the traditional farming systems needing attention.

RRA methods and soft models, later supplemented by a participatory approach, allow researchers to understand farming systems with a fraction of the time and expense required to collect the hard data needed for quantitative models. Because of their speed and relatively low cost these approaches allow coverage of a large number of traditional systems. They have become an important tool in the adaptive research process; focussing the applied research agenda on key problems and drawing appropriate interventions into local farm systems.

However, those of ICLARM's proposed models which are quantitative need hard ecological, social and economic data. The techniques for their collection are well known and, when such models are to be used, these techniques should underpin the research effort.

For example the initiative to reconcile participatory methods with hard data collection to produce FARMBASE as a data source for quantitative modeling needs to recognise this distinction. The implication is that the aquaculture program, with its new entrant strategy, will need socioeconomic as well as ecological input to ensure quality in its hard data collection. It also needs collection sites which are carefully selected to represent the ecological, social and economic circumstances of large numbers of potential fish farmers.

The recent appointment of a new internationally recruited fisheries economist to AFSSRN brings new blood to the network coordination role. Given the prominence of social science issues in solving the problems of aquatic resource systems and the dearth of social science capacity in fishery related work, the network can be a powerful tool for improvement at all levels of the social sciences. Feedback from the recent (January 1992) meeting of team leaders in the network suggests a new momentum in the membership, partly due to the prospect of stronger leadership from ICLARM but partly also from an enhanced awareness of the important role social science has to play at several levels in the resolution of the fisheries problems.

The Panel believes the network will continue to make an important contribution to national social science capacity in fisheries research relevant to all ICLARM's programs.

4.7 Structural and Operational Concerns

ICLARM's implementation plans include a modest set of proposals to reorganize its structure, to increase its staff strength and to create permanent facilities at headquarters and outreach offices. The Panel's comments on these proposals are given below under six categories: (1) changes in the organizational structure, (2) management of outreach activities, (3) role of the Research Committee, (4) other internal systems and practices, (5) permanent facilities, and (6) staffing requirements.

4.7.1. Structural Changes

The new structure is headed by the Director General (DG) and his Deputy (DDG) to whom the program directors in charge of the proposed four programs and the director of management services will report (see Fig 4.2). The Center's professional staff will belong primarily to the different program groups, but will also be divided into discipline based groups called "research divisions" the heads of which also will report to the DG and DDG. The rationale of these new divisions is that they will provide a discipline based home to the professional staff who will be part of interdisciplinary teams in their program activities. The three divisions proposed are ecology/biology, fishing/farming systems, and social sciences.

A matrix structure based on the division of professional staff by program and by discipline is an improvement on the existing organizational

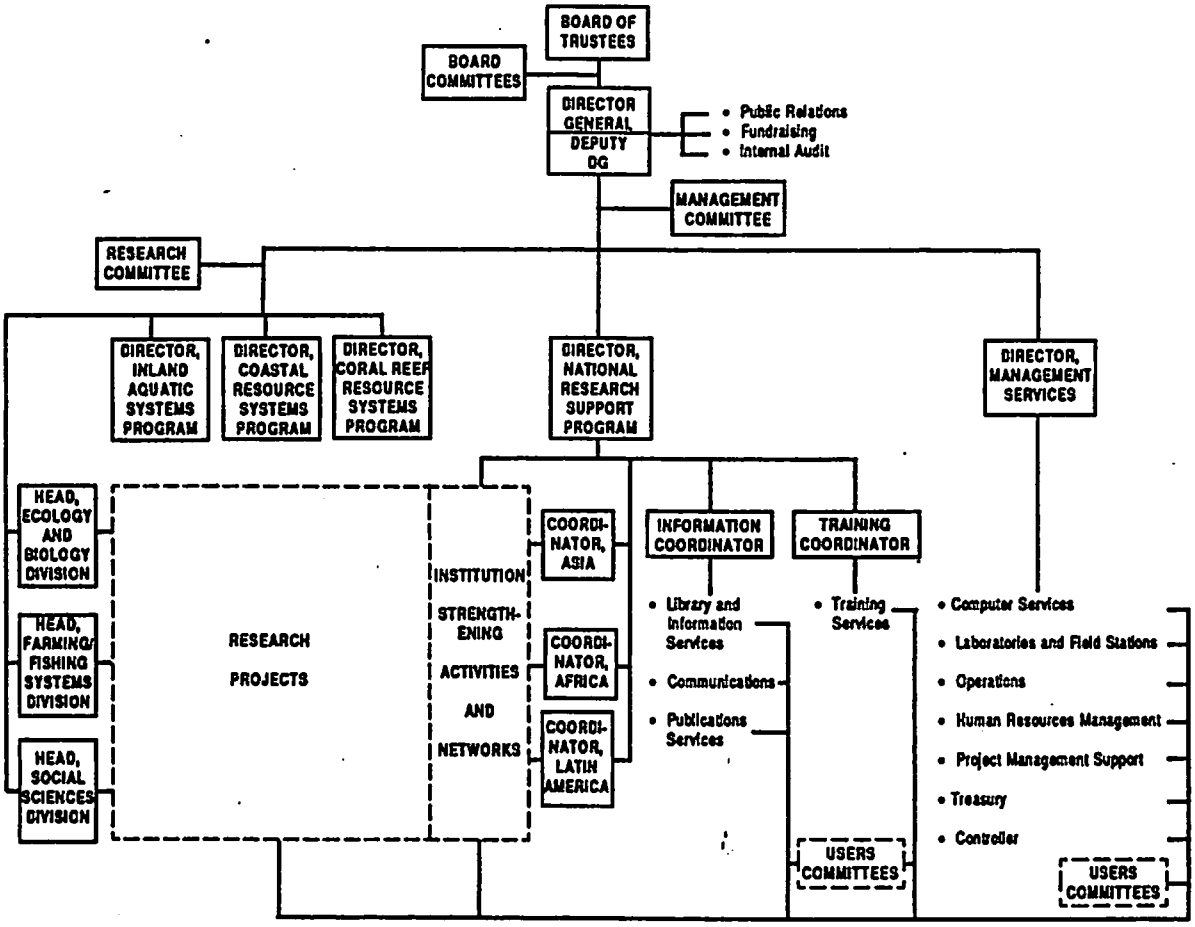


Fig. 4.2. Proposed organizational structure of the future ICLARM.

structure which gives them only a program identity. The Panel has, however, several questions on the viability of the specific proposal offered by ICLARM at this stage of its development. First of all, discipline based groups tend to work well only when the staff belong to fairly homogeneous disciplines, and share a common vocabulary and interest in similar research and methodological issues. This is most likely true of the first group (ecology/biology). Whether the other two groups meet these criteria is a moot point. The composition of the fishing/farming system group, for example, is not spelled out. If economists are found in both these groups, or if economists do not have much in common with anthropologists or sociologists in the third group (social sciences), the proposed groups may not remain cohesive. Perhaps the proposed divisions will work as interdisciplinary groups that provide inputs into different programs. Such groups could work cohesively because they share enough common interest in certain broad problem areas. A case is yet to be made on the justification for the specific groups being proposed.

The second issue has to do with the critical mass required to make discipline based groups viable. Any group that is smaller than four to six international staff does not justify the creation of an administrative head and the formal systems it is likely to generate. An option that ICLARM might consider is to wait until reasonable sized groups emerge. Meanwhile, discipline based groups might be initiated less formally if staff interest in the proposal is high. In either case, it is important to be clear also about the functions/activities of the new groups. The primary identity of staff should continue to be with programs which in turn will plan and control most of the research funds.. The new divisions should not compete with them as alternate power centers. Discipline based groups can be a forum for seminars on specialized topics and methodologies, quality control through peer reviews, advice on recruitment, promotions and career development in their respective subjects, and a limited range of discipline oriented research by members. These groups should be lean in terms of their administrative loads.

4.7.2 Management of Outreach Activities

The new organization chart is silent on how the regional/outreach activities of the Center fit into the structure. The Panel assumes that the existing reporting relationships and authority structure will continue.

In the Panel's view, continuation of the existing organizational arrangements and reporting relationships for ICLARM's offices abroad will not be adequate given the implications of the new strategy for their work. For example, working with NARS through outreach offices is envisaged. The National Research Support Program (NRSP) may then directly deal with outreach offices. The Management Services Director (MSD) is expected to deal directly with the admin/accounts group in these offices. There will be multiple bosses in headquarters who will be dealing with and supervising these offices (technical, NRSP, MSD). It is not clear to the Panel whether the different patterns of reporting from outreach offices that exist presently will continue in the future. One option to consider is to make the Deputy DG the focal point for resolving conflicts between the multiple bosses who will deal with the outreach offices. As the Center expands, the DG will find it increasingly difficult to cope with this set of issues. Hence the need to get his Deputy to take on a part of this load so that the DG's time can be spared for attending

to other critical issues. The main point to note is that the proposed strategy will call for a change in existing headquarters-field office relationships, a point not covered in the strategy implementation section of ICLARM's Plan.

4.7.3 Research Management

The strengthening of the Research Committee to approve new research projects and project plans and budgets is a step in the right direction. The appointment of a Deputy DG to assist the DG and the creation of a Management Committee, publications committee and users' committees for the key support functions under management services are also promising ways to bring about greater institution wide integration and more uniform practices in major activities.

The organization chart and the discussion on structure are ambiguous on the role and functions of the proposed DDG. The Panel feels that it is important to carefully define the role of the DDG and to assure that his presence does not block the directors' access to the DG.

The Research Committee provides a forum for the DDG to facilitate inter-program integration. Since committees are a poor device to manage activities such as research and to take quick decisions, it will be unrealistic to expect the Research Committee to "undertake overall research management". By taking on management functions, a committee could make it difficult for a program director to move ahead and might encourage weak accountability at the program level. Instead, each program director should be accountable for his program and the DG of course is accountable for the Center's overall program performance. The Committee should review research proposals, program implementation, quality, etc., and recommend to the DG on matters of resource allocation, midcourse corrections and other actions to be taken.

4.7.4 Other Management Systems and Practices

One of ICLARM's current weaknesses is in the area of support systems that research managers require in order to perform their tasks effectively. In the Panel's view, the Research Committee's ability to monitor and review the progress of projects and the DG's ability to plan and monitor the overall activities of the Center are conditional on the timeliness and adequacy of the information and support services available to them. The Panel has commented on this subject in some detail in Chapter 3. It is not enough, however, to create new systems; it is equally important to attract and retain well qualified personnel to make these systems work. Funding strategies need to be devised to generate adequate resources to expand the staff complements in essential administrative and financial units.

As ICLARM expands its activities and staff and increases its use of formal management systems, it will be necessary to expose its senior staff who come from research backgrounds to concepts and tools of management that they are unfamiliar with. Short term management training course/seminars including those offered by CGIAR are available to meet these needs. Introduction of new management practices or other formal systems in ICLARM must follow a proper

orientation of its managers to their implications for managerial functions and behavior.

4.7.5 Permanent Facilities

ICLARM's Strategic Plan proposes that headquarters facilities for offices and laboratories for biotechnical research be built adjacent to a large Asian city. Based on the costs of construction in Manila, the cost of buildings and equipment for headquarters is estimated at $11 million over the next four years. The creation of similar facilities in Africa and Solomon Islands is expected to cost an additional $4 million over the same period.

Given the nature and scope of ICLARM's programs, the Panel is convinced that ICLARM needs permanent headquarters facilities by way of offices, laboratories and equipment. Its present rented facilities are inadequate and it has no laboratory facilities at all at headquarters. However, the nature and extent of facilities required by ICLARM at headquarters need to be reviewed in light of the Panel's recommendations on the specific programs.

In the Panel's view, the required facilities for the aquaculture program can be kept relatively modest. A maximum of four hectares of land for ponds, some indoor aquaria rooms with adjacent laboratories for genetic bench work, biochemistry, water chemistry, fish wet laboratory, etc., will be adequate for this work. Facilities planning for the coral reef program should await the preparation of a more detailed work plan as suggested by the Panel. Meanwhile, the existing facilities at Honaria should be adequate, with marginal additions to reduce overcrowding. The Africa project is still evolving and hence it is premature to plan for a permanent facility for ICLARM in that region.

The CGIAR donors have stated that ICLARM should remain a lean, service oriented enterprise with less hands-on applied research facilities than at the older international centers. After its headquarters location decision is finalized, ICLARM should carefully review its capital requirements to assure that they are the critical minimum required to sustain its revised and expanded program of work. The resulting facilities proposal and capital budget should be presented to TAC as part of the Center's Medium Term Plan.

4.7.6 Staffing Requirements

The ICLARM Plan estimates that to implement the strategy, 33 and 40 core senior staff years (SSY) will be required in 1996 and 2000, a significant increase from the 15 SSYs in 1991. The detailed staff requirements worked out by program shows that core staff of 14 in biology/ecology, 7 in farming systems and 5 in social sciences will be required. In addition, 7 SSYs are required for the NARS Support Program.

In the absence of detailed research program plans, these estimates must be treated as tentative. The Panel recognizes that a more detailed estimation of staffing requirements will be part of the Medium-Term Planning process of ICLARM.

4.7.7. Conclusions and Recommendations

ICLARM's implementation plan contains most of the structural and operational concerns pertinent to its proposed strategy. Unfortunately, inadequacy of the supporting data makes it difficult to offer a full assessment of all the proposals presented in the Plan. The major conclusions of the Panel on the implementation plan are summarized below:

1. The matrix organizational structure proposed in the plan is an improvement on the existing structure. However, its proposal to create discipline based divisions needs to be carefully thought through in terms of the composition and viability of the groups.

2. The organizational arrangements to manage the outreach offices with their expanded scope of work need to be made explicit. The consistency of the new arrangements with the rest of the structure should be carefully reviewed.

3. The rationale for and the role and functions of the proposed DDG should be made clear. The creation of new administrative systems and practices to make research management more effective must receive priority attention before expansion plans get under way.

4. ICLARM needs permanent headquarters facilities in terms of offices and laboratories. The Center should review its capital requirements carefully to assure that they are the critical minimum needed to carry out its approved programs.

4.8 Overall Assessment of the ICLARM Strategy.

The Panel considers the 18 January 1992 draft of the ICLARM Strategic Plan to be a noticeable improvement over the draft that was presented to TAC in June 1991 and the subsequent modifications reviewed by TAC in October 1991. With the modifications introduced to the latest draft, the role ICLARM could play as an international center under the CGIAR umbrella is made much clearer.

The following comments illustrate the nature of the improvements made, along with the Panel's views on some of the remaining tasks:

- ICLARM's main clients are more clearly and explicitly defined as NARS, but ICLARM does not present an analysis of the needs of NARS that can be met by an international research institute.

- The external environment faced by ICLARM is defined well, relying on SIFR and other studies. It is clear to the Panel that ICLARM's consultations with a wide range of partners/collaborators has helped refine its appreciation of the institutional setting the center is working in.

- ICLARM has carried out several studies on its internal environment. Some of these are reflected in the Strategic Plan. There is a general appreciation within the institute of its strengths and weaknesses. This is particularly so in the organization and management area.

- The Plan includes a mission statement which clarifies ICLARM's role. However, the statement does not easily follow from (and encapsulate the main elements of) the proposed strategy.

- Perhaps the greatest improvement in the Plan is in the area of priority setting. Although the validity of some of the assumptions made can be questioned, the exercise was well worth ICLARM's effort and brings much needed transparency to the selection of the major resource systems ICLARM proposes to work on.

- Values proposed as major criteria to guide ICLARM's operations are mentioned in several places in the Plan. These statements appear to have been placed in the Plan more as "form" than "substance". To the extent that guiding values often serve as criteria in making crucial institutional choices, the links between ICLARM's stated or aspired values and the choices made are not clear.

4.8.1. ICLARM's Role in the Future.

In the Strategic Plan "research" is the main theme of ICLARM's future activities. The mission statement defines three roles for ICLARM: (1) filling gaps in strategic research; (2) catalyzing research and other activities that support ICLARM's strategic research; and (3) strengthening the capacities of national research institutions. Thus, the future ICLARM would be primarily a research-dominated institution. The Panel endorses this emphasis.

There is a common research theme that runs through the ICLARM strategy. ICLARM intends to work on specific aquatic resource systems, and to approach the study of each aquatic system from a holistic, systems perspective. ICLARM intends to work on the aquatic elements of each resource system, with equal emphasis on the the social and institutional dimensions of these resource systems. For example, among others, the aquaculture program would emphasize research on integrated agriculture-aquaculture systems, the coral reef program would examine the interaction of coastal communities with the reef resources, and the coastal resources program would approach resource management issues from both physical as well as institional and social dimensions. This overarching theme elevates the importance of social science research in the future work of ICLARM.

This, in the Panel's opinion, is an important institutional focus which could enable ICLARM to build a global pre-eminence and comparative advantage in the management of aquatic resources.

Having said this, the Panel is aware that adoption of such a systems perspective could steer ICLARM into some activities which would normally be classified as "technical assistance." In the Panel's view, some catalytic activities of a technical assistance nature can be justified so long as ICLARM's involvement relates to the research elements of a specific activity and the activity represents an integral component of a global research program.

4.8.2 Program Balance and Strategies.

ICLARM proposes to organize its work around four programs. Three of these relate to the priority resource systems: inland aquatic, coral reef and coastal, and the fourth to providing support to national programs. The Panel considers this grouping of programs an improvement over the previous drafts of the Plan.

Of these four programs, the strongest (and clearest) case is made in the Plan for the Inland Aquatic Resources Program. The Panel is in broad agreement with the thrusts proposed and enthusiasticly supports the innovative thrust on new entrants and suggests that ICLARM consider the issues on the sequencying of activities raised by the Panel in Section 8.2, above.

The Coral Reef Resources Program is also highly innovative. This program gets its impetus from the Giant Clam Project but is much wider in scope. Most of the activities presented are new for ICLARM. There are also several possibilities for collaboration with advanced research institutions which have not been fully explored. There is, therefore, need for further strategic analysis and consultation before the thrusts of the program can be defined and justified clearly. The Panel is convinced, though, that ICLARM should have an involvement in international research on coral reefs.

The Coastal Resource Systems Program represents a merger of two separate strands of successful work by ICLARM: capture fisheries and coastal area management. The Panel is convinced that this resource system should have a prominent position in ICLARM's portfolio of activities. However, the amalgamation of the two previous programs as described in the Strategic Plan is "additive," instead of "interactive." This might be partly because the design of the new program appears to have been approached by starting from the existing activities and looking for ways of extending them. Instead, an approach emphasizing the holistic nature of the problems faced might generate a more justified program structure.

The National Research Support Program integrates ICLARM's information and training activities and proposes the start of a thrust on strengthening (aquatic) NARS. The Plan is not clear on goals and strategies in these areas. This gives the impression to the Panel that ICLARM's thinking on this has not progressed much beyond the need to integrate these three related activities. Nevertheless, the Panel endorses a program with a focus on these three thrusts. Specific thrust strategies and resource requirements will need to be spelled out more clearly before ICLARM can estimate the resource requirements. Several implementation and sequencing suggestions are made in the Structural and Operational Concerns section above.

One of the three thrusts in this program is concerned with NARS research policy and research management. The Panel endorses ICLARM's entry into this field only on an experimental basis and in collaboration with institutions with greater capacity in the organization and management area (such as ISNAR).

4.8.3 Operational and Transitional Issues.

Given the needs for reformulation of several aspects of the ICLARM strategy described above, the resource requirements and transition issues cannot be addressed accurately. ICLARM's analysis of these can therefore be considered as an initial approximation in an iterative process. Nevertheless, the Panel has examined the sections of the Strategic Plan dealing with operational and transition issues and its views are summarized in Section 4.7, above.

It is clear to the Panel that ICLARM needs to strengthen both its physical and institutional infrastructure before much progress can be made in initiating or expanding its programs. The former requires the settlement of host country and headquarters location issues and the building of the facilities. The second calls for introducing improvements to the administrative systems and practices. These considerations will necessarily introduce delays in starting new activities. As further analysis, consultation and planning are recommended for most of the new activities, if administrative improvements were to be started right away, they would not be in the way of progress in implementing the new programs.

4.8.4 Planning "Fatigue"

The Panel was genuinely impressed with the spirit in which ICLARM's key staff approached definition of the institution's (and their own) future. It also sensed a level of "strategic planning fatigue" in the entire organization. It appears that successive changes in the plan were being made to satisfy some requirements of "form," rather than because of a clear need (or desire) to improve its "substance."

The Panel hopes that ICLARM considers the major recommendation of this Panel on ICLARM's entry into the CGIAR as a new beginning. This might bring a new vigor into the exercise and, hopefully, help focus the energies of the staff on "the strategy" instead of "the plan."

Recommendations.

Regarding the ICLARM Strategic Plan, the Panel recommends that ICLARM:

1. Reassess its stated goals and objectives to give more emphasis to research and make them more consistent with those of the CGIAR.

2. Place greater emphasis in the short-run on improvement in breeding and husbandry practice than genetic manipulation in its proposed Inland Aquatic Systems Program.

3. Develop a revised research plan for the proposed Coral Reef Systems Program clearly justifying any large expansion, taking advantage of opportunities for collaboration with advanced scientific institutions, and present it to TAC for approval, either as a part of ICLARM's presentation of its Medium-Term Plan, or, if ICLARM requires more time, on the occasion of the interim external review recomended in Chapter 5.

4. Revise the strategy for its proposed Coastal Resource Systems Program to reflect the nature of the problems faced in the coastal zone and present it to TAC as part of the Center's response to this review.

5. Recruit a training specialist and with her/his guidance carry out an assessment of training needs in client developing countries in order to formulate strategies and plans on training.

6. Spell out its strategies and plans in the information area clearly, and not expand its staffing and expenditures in this area before completing such an effort.

7. Ensure that its capital requirements, including permanent headquarters facilities in terms of offices and laboratories, are the critical minimum needed to carry out its programs.

8. Clarify the rationale for, and the role of, the proposed Deputy Director General.

CHAPTER 5 OVERALL CONCLUSIONS

The focal point of this review has been the assessment of ICLARM's ability to transform itself from a small project-driven organization into an international center with the standards of excellence expected in the CGIAR and the capacity to provide leadership in international fisheries research. This focus has been in response to the special Terms of Reference provided by TAC for this review:

- To assess whether ICLARM's Strategic Plan addresses the priorities for international research on fisheries and identifies a set of activities suitable for implementation by a CGIAR supported institute.

- To assess whether ICLARM is likely to have the institutional capacity to realize its stated objectives.

- To recommend whether ICLARM, or some modified version of ICLARM, should join the CGIAR.

The general conclusion of the Panel is that ICLARM is a dynamic organization with outstanding scientific leadership and a solid record of research accomplishments, that its revised Strategic Plan is a substantial improvement over the draft Plan and modifications reviewed earlier by TAC, and that the institution has been resilient and innovative in maintaining the integrity of its research programs during periods of severe stress. The Panel believes that ICLARM has the potential to serve as the international center for fisheries research in the CGIAR, but the detailed review of the Center indicated that much still remains to be done to strengthen aspects of its management and the conceptualization and integration of its programs.

Given this assessment of ICLARM's potential, the Panel considered two options: (1) to recommend delaying ICLARM's admission to the CGIAR until explicit management and programmatic conditions had been satisfied, or (2) to recommend immediate admission to the CGIAR with the understanding that certain if the recommendations, criticisms and conditions would be met. Given the Panel's overall positive assessment of ICLARM's potential as a CGIAR institute, it recommends immediate admission because of its full confidence in the capacity of ICLARM to respond effectively to the points raised in this report.

ICLARM'S Strengths

ICLARM's research record is sound and the quality of its program leadership is outstanding. Despite the collapse of core funding in 1984, ICLARM has been remarkably successful in sustaining its scientific momentum and quality. It has a small but substantive base for building an international fisheries research program.

In its revised Strategic Plan ICLARM has been responsive to TAC's request for clearer explanation of the organization and focus of its research. The Panel commends ICLARM for a comprehensive, transparent and consultative priority-setting process that led to the decision to structure research programs on the basis of carefully selected resource systems. The Panel

believe this will facilitate interdisciplinary effort to improve the management of aquatic systems. Since its meeting with TAC in October, ICLARM has also restructured its research programs and defined major thrusts to realize their objectives. The Plan includes exciting new dimensions such as the focus on new entrants in aquaculture, the integration of program strengths in coastal area management and capture fisheries, and understanding the ecology of coral reefs.

ICLARM intends to approach the study of each aquatic resource system from a broader systems perspective. Thus ICLARM intends to work on the social and institutional dimension of these resource systems and their interactions with the aquatic dimension. The aquaculture program for example, would emphasize research on integrated agriculture-aquaculture systems and the coral reefs program would examine the interaction of coastal communities with the reef resources. This over arching theme elevates the importance of social science research in the future work of ICLARM. To the extent that this approach is successful, it could represent a new research paradim in the management of aquatic resources that would establish ICLARM's global leadership in fisheries research.

ICLARM's emphasis upon promoting research through networking, training and information has created positive linkages with a large number of resource management and fishery institutions, NGOs and other agencies that constitute an important foundation for future collaboration.

ICLARM enjoys the good will of its donors who express respect for its scientific leadership and cost-effective accomplishments. In 1991, ICLARM had over 20 donors and received 99% of its contributions from members of the CGIAR.

Remaining Challenges

The draft Strategic Plan reviewed by the Panel does not describe all of the new program objectives, activities and strategies, and their implications with sufficient clarity and coherence. In some cases deficiencies may be attributable to hasty editing, to incomplete analysis of the issues or to judgements on program concerns that are not clearly articulated or justified because of lack of sufficient information.

The Panel's most serious program reservations concerned the Coastal Resource Systems Program and the Coral Reefs Resources System Program. ICLARM's decision to establish a new research program on coastal resource systems by integrating previous program strengths on capture fisheries and coastal area management was applauded because it builds upon ICLARM's comparative advantage and has potentially synergistic benefits for ICLARM and fishery research more generally. The Panel concluded, however, that the proposal in the Strategic Plan to launch this new program failed to convey how the research thrusts would be integrated to realize its stated objectives. The Panel believes that ICLARM's Board and Management can improve the conceptualization of this program, and urges the Center to consider the suggestion made in Chapter 4 and to reformulate the research plan for discussion with TAC.

The Panel concluded that wider consultations and further strategic analysis were required before the large increase in funding for the Coral Reef Resource Systems program could be approved. Although the Program builds upon promising work already under way in the Solomon Islands, it entails major expansion into critical new areas relating to reef ecology and management where ICLARM has less experience, and consultations with ASI's are essential. While acknowledging the importance of this resource system, the Panel concluded that approval of the new program was premature, and it urged ICLARM to continue discussions to define its comparative advantage in international research on coral reefs in order to prepare a revised proposal for TAC.

The Panel also focused on ICLARM's needs to strengthen its institutional infrastructure before much progress can be made in initiating or expanding its program. For example, implementation of an expanded international research program is critically dependent upon resolving long-standing issues concerning ICLARM's legal status in the Philippines and the availability of land for its headquarters site. CGIAR donors would be reluctant to invest in construction of facilities until ICLARM has the security of international status. It may be necessary for ICLARM to start considering alternative locations, even though moving to another country could be disruptive and expensive.

The report also describes the need for introducing improvements in administrative systems and practices, internal communication, and financial and program management. ICLARM should examine the composition of its international professional staff and establish a recruitment procedure to assure that it takes advantage of the opportunity a CGIAR center has to attract international scientists of the highest caliber since they over time will determine the success of ICLARM's work.

Recommendations to the CGIAR

After carefully weighing ICLARM strengths and its remaining challenges, the Panel recommends that ICLARM be admitted into the CGIAR at the May 1992 meeting of the Group subject to two conditions:

1. An interim external program and management review should be conducted in about 3 years to monitor ICLARM's progress in implementing the range of program and management recommendations made in this report.

2. ICLARM's admission into the CGIAR should be for an initial period ending with the 5th year of its Mid-Term Plan, by which time TAC will have deepened its understanding of the special problems of international fisheries research. At that time another External Review Panel should be constituted to review ICLARM's effectiveness in providing strategic leadership in international fisheries research and to make a recommendation concerning continuing support from the CGIAR.

In conclusion, the Panel wishes to express its admiration for the spirit of ICLARM staff, at all levels, and their dedication to ICLARM's goal of improving the welfare of low-income producers and consumers of aquatic products. The Panel hopes that this report will contribute to ICLARM's ability to meet this admirable social objective.

ACKNOWLEDGEMENTS

The External Review Panel wishes to express their sincere appreciation to the management and staff of ICLARM for the support they have given to the Members of the Panel throughout the course of the review. The Panel was particularly grateful for the open and constructive spirit of the discussions, and the generous help given whenever needed.

The Panel wishes especially to thank Dr. Kenneth T. MacKay for ensuring that their work could be done under optimal conditions at all times. We also gratefully acknowledge the efforts of ICLARM staff to make our stay in Manila, Philippines so comfortable. Thanks are due to the ICLARM management and staff of the regional centers for their support and hospitality during our country visits. The panel also much appreciated the opportunity to meet their collaborators in national programs during these visits.

Finally the Panel wishes to thank Ms. Zewdnesh Abegaz of the CGIAR Secretariat, Ms. Remedios Ugalde and Mr. Deo Resurreccion of ICLARM, for the excellent work they did in preparing this report. the contribution of Mr. J. Maclean and his team in printing it is also gratefully acknowledged.

ANNEX 1

COMPOSITION OF THE EXTERNAL REVIEW PANEL

Chairman

Dr. Laurence D. Stifel
Visiting Fellow
Cornell International Institute of Food,
Agriculture and Development
Box 14, Kennedy Hall
Cornell University
Ithaca, NY 14850-4203

Members

Dr. John F. Caddy
Chief, Marine Resources Service,
Fishery Resource and Environment
Division, FAO.
Via delle Terme di Caracalla
00100 Rome, Italy

Dr. Harald Rosenthal
Professor
Institut fur Meereskunde an der
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Dusternbrocker Weg 20
D-2300 Kiel 1
Germany

Dr. Peter R. Burbridge
House of Ross
Comrie
Perthshire PH6 2JS
Scotland
United Kingdom

Dr. Samuel Paul
11144 Featherwood Drive
Rockville, MD 20852
U.S.A.
(Until January, 1992)

Resource Person & Panel Secretary.

Dr. M.P. Collinson,
Science Advisor,
CGIAR Secretariat,
World Bank, 1818, H St NW.
Washington DC 20433, USA.

Resource Person.

Dr. Selcuk Ozgediz
Management Adviser,
CGIAR Secretariat,
World Bank, 1818, H St NW
Washington DC 20433, USA

ANNEX 2

TECHNICAL ADVISORY COMMITTEE

COMMENTARY ON ICLARM

TAC appreciated the efforts made by ICLARM to respond to the concerns of the Committee on the draft strategic plan for international fisheries research discussed at TAC 55. It was particularly pleased with the wide process of consultation the Centre had initiated to solicit comments on the draft plan from national research systems and other stakeholders. It also welcomed the elaboration of its proposals on the fishery research activities which should be supported by the CGIAR, and ICLARM's efforts to develop collaboration with other CGIAR institutes.

TAC appreciates the further progress made by ICLARM in its strategic planning exercise and the general concordance of the present draft with the SIFR report. Nevertheless, several issues need to be considered in greater depth in a further revision of the draft strategic plan. These issues are addressed in the following sections:

As indicated at TAC 55, the Committee is concerned that the focus of the proposed new Institute may be too broad. ICLARM's current proposal focuses on three research areas (resource conservation and management, fish productivity and social science) which were arrived at largely by combining the previously proposed list of activities; the reduction in scope is not apparent. Further, while TAC welcomes ICLARM's intent to focus its activities on a set of resource systems, in particular ponds and coastal waters (including estuaries and lagoons, coral reefs and soft-bottom shelves), the rationale for the choices made is not clear.

TAC would also welcome an elaboration of the comparative advantage of the proposed new Institute in addressing fishery research needs, and of a strategy for its linkages with advanced research institutes, and with national research systems, recognizing heterogeneity of their strengths, as well as with other relevant research agencies. Greater attention is also needed as to the intended activities of collaborative research networks.

Further elaboration also is required as to how the intended beneficiaries of the new Institute will benefit from its activities, in particular of the links between proposed activities and proposed goals. This would also require more attention as to the intended measure of achievement and likely impact.

With respect to the proposed staffing of the new Institute, TAC would welcome clarification of the disciplines that need to be represented. The Committee notes that adequate attention will need to be given to the biological and technical basis required to address fishery research needs effectively. In view of the proposed collaboration with FAO, IFPRI, and other CGIAR Institutes, the magnitude of the proposed programme in social science research should, perhaps, be reconsidered. In this connection, ICLARM might seek the assistance of an outside expert in developing the social sciences programme thrust including impact assessment.

With respect to the proposed activities in resource conservation and management, TAC notes that the new Institute will focus particularly on management issues. While TAC appreciates ICLARM's attempts to focus activities, the Committee hopes that conservation activities can be phased into the Centre's planning process over the longer term.

TAC would welcome greater clarity with respect to transitional arrangements if ICLARM were to become a CGIAR Centre. In particular an elaboration is needed as to the facilities required to function effectively during the transition period and how it intends to access such facilities. Greater clarity is also needed as to the intended size of the new Institute, and the balance of its programme across regions, commodities and activities.

TAC expects that ICLARM will prepare a revised strategic plan which takes account of the Committee's concerns, in time for consideration by the external review panel. This plan together with the report of the external review panel will then be considered at TAC 57 in March 1992.

ANNEX 3

TERMS OF REFERENCE FOR EXTERNAL REVIEWS OF CGIAR CENTRES

BACKGROUND

The Consultative Group on International Agricultural Research (CGIAR) has charged its Technical Advisory Committee (TAC) with the responsibility of conducting External Programme Reviews (EPRs) of those International Agricultural Research Centres (Centres) that it supports financially. The CGIAR has assigned a similar responsibility to its Secretariat for External Management Reviews (EMRs).

TAC and the CGIAR Secretariat normally discharge these responsibilities by commissioning either separate panels or a joint panel to conduct the reviews. In commissioning panels, neither TAC nor the CGIAR Secretariat delegates its responsibility for reviews, but both use panels to facilitate the process. Panels submit their reports for consideration by TAC and the CGIAR Secretariat before they are transmitted to the CGIAR. While the main recommendations made by panels are normally endorsed both by TAC and the recommendations made by panels are normally endorsed both by TAC and the CGIAR, such endorsement cannot be presumed by either the panels or the Centre under review. Equally, as autonomous institutions, Centres are not obliged to implement the endorsed recommendations. In practice, however, they usually implement most, if not all of them.

PURPOSE

Through its support of International Centres, the CGIAR aims to contribute to increasing sustainable crop, livestock, fish and tree production in developing countries in ways that improve the nutritional level and general economic well-being of low-income people. The purpose of external reviews is to help to ensure that the Centres continue to implement strategies and programmes that are relevant to these goals; that they maintain or enhance their record of achievement; and that they are efficiently managed. In these ways, external reviews reinforce mechanisms of accountability within the System.

EPRs and EMRs are also essential components of the CGIAR's integrated planning process. The context in which they are undertaken is to be found in the document "Review Processes in the CGIAR".

THE REVIEW

Against this background, the panel is requested to make a thorough and independent appraisal of the Centre and all its activities, following the broad topics below, as well as the

appended list of questions and guidelines. Panels are encouraged to set their findings in the broader context of the CGIAR System, where this is relevant to the activity or programme under review.

A. Recent Evolution of the Centre

Important changes affecting the Centre since the previous external review.

B. Mandate

The continuing appropriateness of the Centre's mandate in relation to the mission and goals of the CGIAR.

C. Strategy and Programmes

The policies and strategies of the Centre, their coherence with CGIAR strategies, and the mechanisms used for monitoring and revising them.

The extent to which the Centre's strategy is reflected in its current programmes; the rationale for any proposed changes by the Centre and their implications for future activities.

The quality of current programmes and activities.

D. Centre Guidance, Values and Culture

The overall effectiveness of the Centre's Board of Trustees in governing the Centre, and the effectiveness of leadership throughout the Centre.

The Centre's guiding values and culture, and their influence on the Centre's performance.

E. Programme Organization and Management

The mechanisms in place at the Centre to ensure the excellence of the programmes and cost-effective use of resources.

The adequacy of the Centre's organizational structure, and the mechanisms it uses to manage and coordinate its research programmes and related activities.

F. Resources and Facilities, and their Management

The financial resources available to the Centre in relation to its present and future programmes.

The land, laboratories and services available for supporting the programmes.

The Centre's human resources.

The Centre's information resources and facilities.

G. External Relationships

The Centre's relationships with national research systems[1/] in developing countries.

Collaboration with advanced institutions in research and training, in both the public and private sectors.

Collaboration with other CGIAR Centres and international agricultural research institutions, and undesirable overlap of activities.

The Centre's relationships with the government of its host country or countries and with institutions therein.

H. Achievements and Impact

The Centre's overall impact, its contribution to the achievement of the mission and goals of the CGIAR, and the methods used for making such assessments.

Recent achievements of the Centre in research and other activities.

The potential of the Centre's current and planned activities for future impact.

THE REPORT AND RECOMMENDATIONS

Panels are requested to prepare succinct reports in plain language (understandable to non-technical readers), in which factual material is kept to the minimum necessary to set the conclusions in context. Reports should include clear endorsements of the Centre's activities where appropriate, as well as recommendations and suggestions for changes.

Recommendations should be justified by the analysis and approved by panel members. Recommendations for increases in staff or activities should be accompanied by analyses of their resource implications. Reports should be formally transmitted to the Chairman of TAC and the Executive Secretary of the CGIAR by panel Chairs.

[1/] National research systems include all those institutions in the public and private sectors, including universities, that are potentially capable of contributing to research related to the development of agriculture, forestry and fisheries.

LIST OF QUESTIONS FOR EXTERNAL REVIEWS

These questions supplement the Terms of Reference and illustrate the types of question the panel should consider in each category. They apply to most, but not necessarily to all CGIAR Centres. In addition, TAC and the CGIAR Secretariat usually compile a short list of questions that are specific to the Centre under review. In preparation for each review, the questions are circulated to the members of the CGIAR and the Centre inviting them to comment and, if considered essential, to add supplementary questions. The panel is not required to answer all questions explicitly, but to take them into account in making its own assessment of the most important ones.

A. Recent Evolution of the Centre

1. What important changes have taken place in the Centre since the previous external review? What were the principal reasons for change? What are the likely effects of these changes on the future performance of the Centre?

2. How responsive was the Centre to the previous review?

6. Mandate

3. How appropriate are the Centre's operational mandate and mission statement in relation to the changing mission and goals of the CGIAR?

4. How well do the present and planned activities of the Centre relate to the mandate and the mission of the Centre?

C. Strategy and Programmes

5. Does the Centre have an up-to-date and well-reasoned strategy statement? In particular, does it:

   (a) reflect a thorough understanding of the needs of the Centre's principal clients and of the relevant activities of its partners and collaborators?

   (b) take into account the major changes expected to occur in the Centre's external environment?

   (c) spell out the Centre's aims and objectives in different programme areas and provide a clear justification for them?

   (d) take into account the Centre's internal strengths and weaknesses and the financial constraints likely to be faced?

   (e) provide a clear justification for the future scale of the Centre's operations?

6. Are national authorities satisfied with the Centre's strategy and did they have adequate opportunity to contribute to its formulation?

7. Does the Centre's allocation of resources to its programmes reflect the priorities appropriately? Are the planned directions and priorities within programmes appropriate?

8. Does the Centre's strategy sufficiently take into account the determinants of sustainable food production, the alleviation of poverty and preservation of the quality of the environment?

9. Has the Centre analyzed the operational implications of its future strategy and priorities in terms of finance, staff and other aspects?

10. How well is the Centre's current strategy reflected in its programmes and activities?

11. How successful has the Centre been in reaching its major objectives in each major programme area since the previous external review? Have the approaches adopted been the most appropriate for the problems to be solved? What has been the quality of the Centre's work in each programme area?

12. How effectively does the Centre's training programme meet the needs of national research systems?

13. How much attention has the Centre paid to gender considerations in planning and implementing its programme activities? Is this adequate?

14. Does the Centre give appropriate attention to post-harvest technology?

15. Has the Centre made adequate provisions from its core funds for work on genetic resources? How effectively is this work exploited for the benefit of developing countries?

D. <u>Centre Guidance, Values and Culture</u>

16. Is the Centre's legal status appropriate for fulfilling its mission?

17. How effective has the Centre's board been in determining policy and providing oversight? How effective has it been in managing its internal affairs (e.g., planning, internal board structure, member selection and development, managing meetings, etc.)?

18. Are board-management relationships based on openness, respect for each other's roles, and mutual trust? Does the board regularly assess and provide feedback on the performance of the director general on the basis of explicit and objective criteria?

19. How effectively has the Centre been led by the director general and the management team since the previous external review? How well do senior managers work as a team?

20. What principal guiding philosophies appear to shape the action of the board, management and staff? Are they conducive to high performance? (Among others, consider attitudes towards creativity, accountability, efficiency, and organizational change.)

21. What are the main features of the Centre's current organizational culture? Do aspects of this culture serve as barriers to performance? Is the Centre's organizational culture in harmony with its strategy, structure and management practices?

E. **Programme Organization and Management**

22. Has the Centre developed an organizational structure suited to good programme performance? What coordination mechanisms are in place? Are they effective? Are there alternative structures that could serve the Centre better in the future in the light of the Centre's strategy?

23. How effectively are the Centre's decentralized activities linked with those at the headquarters? Do the staff outside the headquarters have adequate

opportunities to contribute to overall planning and decision making?

24. How effective are the Centre's strategic and operational (i.e. medium term and annual) planning processes? How well are they linked to budgeting? Do these processes ensure sufficient consideration of the views of the Centre's clients and other key stakeholders?

25. Does the Centre have an effective planning and management system for projects or activities?

26. How effective are the Centre's programme monitoring and internal review systems and processes? Does the Centre have an effective peer review or a similar quality control process?

27. Do staff work effectively in teams? Do the structure and operating procedures of work-groups facilitate cooperation and teamwork?

28. Do the Centre's programme organization and management processes ensure efficiency and internal accountability? Are they conducive to innovation?

F. Resources and Facilities

29. How effective has the Centre been in organizing, staffing and managing its human, financial, administrative and information resources?

Human Resources

30. Has the Centre been able to attract and retain international and local staff of the highest calibre? Is the turnover rate one that ensures programme continuity as well as healthy infusion of new staff into programmes?

31. Does the Centre have appropriate personnel policies for international and local staff stationed at the headquarters and outside it? Are they seen to be fair and consistent? (Consider policies for staff recruitment, orientation, compensation, performance planning and assessment, career development, tenure, spouse employment, retirement, etc.)

32. Does the Centre actively promote recruitment, retention and career development of women? Are there barriers to women's advancement in the Centre?

33. How successful are managers and supervisors in managing people? In particular, how skillful are they in planning, coordinating and delegating work, communicating effectively, and motivating, developing and rewarding staff?

34. How satisfied are staff at all levels with their jobs? How are morale, trust, communication and teamwork perceived among the staff?

Finance

35. How successful has the Centre been in securing funds for its activities? How stable is the Centre's funding? Does the Centre have a fund-raising strategy, and how effectively is fund-raising managed?

36. Does the proportion of the Centre's budget received as restricted funding distort the Centre's strategy and the priorities accorded to its various activities?

37. How effective are the systems and processes used for financial management of headquarters and field operations? (Consider financial planning, analysis, reporting and control, accounting, budgeting, internal and external auditing, and cash and currency management.)

38. How strongly is financial management linked with programme management? How much financial responsibility do the programme staff have?

Administration

39. How successful has the Centre been in establishing an administrative infrastructure that meets the needs of staff in an efficient manner?

40. How cost-effective are the systems and policies used for managing the Centre's:

- property (e.g., maintenance, development, construction, rental);
- general services (e.g., security, housing and dormitories, food services, transport, travel services);
- procurement operations (e.g., foreign and local purchasing, receiving, stores)?

Information

41. How successful is the Centre in acquiring, generating and managing the information it needs for decision-making, communication and integration of activities?

42. How effectively are information services and technology managed? (Consider computerization, telecommunications, records management, archives, library, and documentation.)

G. External Relationships

43. How successful has the Centre been in managing its relations with:

- clients in developing countries;
- institutions in the host country of its headquarters and of its substations in other countries;
- public and private sector institutions in developed and developing countries (including other CGIR centres);

- donors, the CGIAR and TAC;

- the media and the general public?

44. Is the Centre's strategy for collaboration with national research systems appropriate considering the sizes and stages of development of these systems? Are the priorities for collaborative work accorded to individual countries (in particular, the host country) appropriate? Does the Centre actively promote a strategy of collaboration in international research with national systems and regional research organizations?

H. Achievements and Impact

45. What mechanisms does the Centre have in place to monitor its achievements and impact? Are these adequate?

46. How does the need to demonstrate impact influence the Centre's priorities and strategies? Is there a tendency for long-term consideration to be sacrificed for short-term gains?

47. What have been the most notable achievements of the Centre since the previous external review?

48. What benefits have developing countries derived from the Centre's work since the previous review? What contributions has the Centre made to strengthening national research systems through training, institution building, collaborative research and technical assistance?

49. What is the Centre's potential for further impact, given its planned activities? Do these justify continued donor support for the Centre? Is there a case for increasing the Centre's funding level? Could funding be reduced without seriously affecting the Centre's potential for further impact?

The Conduct of the ICLARM External Review

The Panel Chairman and one member attended the Executive Committee meeting of the ICLARM Board held in October, prior to ICW 1991. At the meeting questionnaires were distributed to Board members and the tabulated and analyzed responses were made available to the Panel. Following the meeting the Chairman interviewed several Board members individually. One Panel member attended the meeting of the Donor Support Group of ICLARM during ICW 1991, and the Chairman subsequently interviewed most ICLARM donors individually during the week.

The initial visit to the Center was made in the first week of December 1991. While in the Philippines, some panel members visited ICLARM collaborators at Central Luzon State University. From the Philippines the panel members dispersed for country visits. One group visited the Coastal Aquaculture Center in the Solomon Islands and the FFA - the regional grouping of seventeen Pacific nations. Another group visited the ICLARM program in Malawi. The Chairman also visited ICLARM projects in Thailand and the Fisheries Department at FAO. Other members visited the CSIRO fishery laboratory in Brisbane, the Australian Institute of Marine Science and the Great Barrier Reef Marine Park Authority, all in tropical Australia. Prior to the main phase of the review in January, a survey was mounted of collaborators in six countries not visited by Panel members; Bangladesh, Chile, China, Ghana and Malaysia. The Chairman and a Panel member also visited the SEAFDEC Aquaculture Department at Iloilo in the Philippines and the University of the Philippines in the Visayas.

The main phase of the review commenced on January 13, 1992 in Manila. The completed report was discussed with the Board, and the main findings presented to the senior staff, on January 29, 1992. The people met by the Panel in the course of the review are listed below.

List of Institutions Visited and Persons met by Panel members.

ICLARM.
Dr. Kenneth Mackay, Director General.
Mr. Jay Maclean, Director, Information Program,
Dr. Roger S. V. Pullin, Director, Aquaculture Program,
Dr. Daniel Pauly, Director, Capture Fisheries Management Program,
Dr. Chua Thia-Eng, Director, Coastal Area Management Program,
Dr. Clive Lightfoot, Farming Systems Specialist.
Dr. Catalino R. dela Cruz, Leader, Rice-Fish Project,
Dr. Robert Pomeroy, Fisheries Economist,
Mr. Geronimo T. Silvestre, Fisheries Resource Expert,
Mr. Villy Christensen, Associate Scientist,
Mr. Rainer Froese, Associate Scientist,
Mr. Herminigildo M Montalvo, Research Associate - Economist,
Dr. E. Padilla, Post-Doctoral Fellow

Phillipines.

National Freshwater Fisheries Technology Research Center, NFTRC
Bureau of Fisheries and Aquatic Resources, BFAR
Mr. Melchor Tayamen, Director
Mr. Rubin Reyes
Ms. Jodecel Danting
Ms. Edna Dionisio
Ms. Felicisima Longalong
Ms. Feresita Gonzales
Mr. Mac Dashing

Marine Science Institute, the University of Philippines, UPMSI
Dr. Julie M. Macaranas
Ms. Maria-Josefa R. Pante
Ms. Carmen Ablan
Ms. Liza Agustin
Dr. Flor Lacanilao, Professor of Marine Science
Dr. Rogelio O. Juliano, Consultant

Freshwater Aquaculture Center of Central Luzon State University
Prof. Ruben C. Sevilleja (officer in charge)
Prof. Arsenia G. Cagauan
Dr. Ambekar E. Eknate, ICLARM
Ms. Ravelina R. Velasco, ICLARM
Ms. Marietta P. de Vera, ICLARM
Dr. Josephine B. Capil, ICLARM
Dr. Catalino R. de la Cruz, ICLARM

SEAFDEC, Aquaculture Department, Iloilo
Mr. Soichoiro Shirahata, Deputy Chief
Dr. Clarissa Marte, Director of Research
Dr. Marietta Duray, Assoc. Scientist
Ms. Julia C. Lagoc, Head, Audiovisual Section
Ms. C. Ortega, Head, Library Section
Mr. R.B. Lacierda, Head, Techno-Transfer Section
Mr. C.T. Villegas, Head, Training and Information
Mr. W.G. Gallardo, Research Associate
Mr. O.M. Millamena, Head, Feed Devision Section
Mr. R.F. Agbani, Research Associate (Economics)
Ms. C.L. Pitogo, Head, Fish Health Section
Mr. I.F. Quinitio, Head, Nursery Section

University of the Philippines, Visayas, Iloilo
Dr. Nygiel Armada , Vice-Chancellor, Administation
Dr. Efren Flores, Dean College of Fisheries
Dr. Jose P. Peralta, Food Engineer,

Australia
Dr. Ian Somers, Fisheries Researcher, CSIRO, Queensland.
Dr. J.T. Baker, Director, Australian Institute of Marine Research

Dr. A. Robertson, Australian Institute of Marine Research
Dr. Don Kinsey, Great Barrier Reef Marine Park Authority.
Dr. Bruce Mapstone, Great Barrier Reef Marine Park Authority

USA
Dr. J. Polovina, NMFS (NOAA) Laboratory, Honolulu, Hawaii
Prof. V. Gallucci, University of Washington, Seattle
Dr. Lamarr B. Trott, Senior Fisheries Advisor

Malawi

Ministry of Forestry and Natural Resources
Mr. B. Ndisale, Principal Secretary
Mr. J. Mkandawire, Administrtive Officer

University of Malawi, Centeral Administration
Prof. B. Chimphamba, Vice Chancellor
Mr. G. Chipungo, Registrar
Ms. F. Msonthi, Senior Assistant Registrar (Academic)
Dr. S. Chiotha, Research Coordinator

University of Malawi, Chancellor College
Dr. P. Chikhula, Principal
Dr. J. Msonthi, Dean of Science
Dr. J. Seyani, Director, National Herbarium
Dr. E. Khonga, Head of Biology Department
Dr. E. Fabioano, Head of Chemistry Department

Bunda College of Agriculture, University of Malawi
Prof. Z. Kadzamira, Principal and Member, ICLARM Board
Prof. T. Makhambera, Dean of Agriculture
Dr. L. Kamwanja, Head of Animal Science
Dr. D. Ng'ong'ola, Head of Rural Development
Mr. J. Likongwe, Lecturer, Animal Science

Department of Research and Environmental Affairs
Mr. O. Msiska, Principal Scientific Officer

Department of Fisheries
Mr. B. Mkoko, Chief Fisheries Officer
Mr. G. Mongwa, Assistant Cheif Fiesheries Officer
Mr. M. Chiumia, Senior Fisheries Officer
Mr. S. Mapila, Principal Fisheries Officer
Mr. E. Ng'ombe, Principal Fisheries Officer
Mr. B. Rashidi, Senior Fisheries Officer
Ms. M. Kapalamula, Officer-in-charge, Domasi
Mr. S. Chimatrio, Fisheries Research Officer

ICLARM.
Dr Barry Costa-Pierce, Project Director,
Dr Reg Noble, Ecologist.
Mr A. A. van Dam, Associate Expert.
Mr Fredson Chikafumba, Research Assistant,
Mr Daniel Jamu, Research Assistant,
Mr Winston Kadongola, Research Assistant,
Mr Chipo Jenya, Assistant Librarian,
Mr Sylvester Chitenga, Accounts Clerk.

Thailand

Asian Institute of Technology
Dr. P. Edwards, Professor of Aquaculture
Dr. C. Kwei Lin, Associate Professor
Dr.D. C. Little, Assistant Professor
Dr. Donald J. Macintosh, Associate Professor
Dr. C.F. Knud-Hansen, Affiliated Faculty

National Aquaculture Genetics Research Institute
Dr. Supattra Uraiwan, Aquaculture Geneticist

Network of Aquaculture Centers in Asia
Mr. P. Bueno, Information Specialist

Kaesetsart University.
Dr. Ruangrai Tokrisna, Assoc. Prof., Agricultural Economics

National Environment Board.
Mr. Arthorn Suphapduk, Secretary General,
Dr. Saksit Tridech, Director, Natural Resources and Environmental Management Coordination Division

USAID. Bangkok.
Mr. Robert Dakan, Deputy USAID Representative to ASEAN

Solomon Islands
Dr. J.L. Munro, Director, Coastal Aquaculture Center
Dr. J.B. Hambrey, Affiliate Research Scientist
Mr. G.F. Usher, Affiliate Research Scientist
Mrs P. E. Munro, Affiliate Research Scientist
Mr. M.H. Gervis, Affiliate Research Scientist
Mr. H. Govan, Assistant Research Scientist
Ms. L. Gilkes, Affiliate Assistant Research Scientist
Mr. I. Lane, Scientific Assistant
Mr. T. Molea, Scientific Assistnat
Mr. C. Oengpepa, Scientific Assistant
Ms. C. M.T. Gervis, Scientific Assistant
Mr. T. Shearer, Affiliate Scientific Assistant

Mr. H. Tafea, Fisheries Officer, Fisheries Division, GSI
Mr. F. Tafuoklo, Fisheries Officer, Fisheries Division, GSI

Government of Solomon Islands
Mr. H. Saeve, Principal Fisheries Officer, Min. Nat. Res.

Forum Fisheries Agency
Mr. K. Smithson, Executive Officer

FAO, Rome.
Dr. M.S. Zehni, Director, Research and Technology Development Division
Dr. H. Gunawardena, Senior Fisheries Expert, FAO/World Bank Cooperative Programme Investment Centre
Dr. S.M. Garcia, Director, Fishery Resources and Environment Division
Dr. D.G. James, Senior Fishery Industry Officer (Utilization), Fish Utilization and Marketing Service,
Dr.S.C. Venema, Project Manager, Fishery Operations Service,
Dr. C.H. Newton, Chief, Fishery Information, Data and Statistics Service,
Dr. J. Kapetsky, Senior Fishery Resources Officer, Inland Fisheries Resources and Aquaculture Services,
Dr. M. New, Senior Aquaculture Officer, Inland Water Resources and Aquaculture Services,
Dr. G. Everett, Senior Fishery Planning Officer, Fishery Development Planning Service,
Dr. Bal Godbole, Chief, Asia and Pacific Service, FAO/World Bank Cooperative Programme Investment Centre

Donor Representatives from:

DANIDA, Denmark
Ford Foundation, USA
GTZ, Germany
ODI, United Kingdom
Rockefeller Foundation, USA
SIDA, Sweden
UNDP, USA
USAID, USA
World Bank, USA

Others

Mr. Curtis Farrar

ANNEX V

DOCUMENTATION PREPARED FOR REVIEW PANELS

A. Documentation provided by TAC Secretariat

1. Most recent External Program Review report of the Center, and a sample of a recent External Review report of another CGIAR center.

2. "The Role of Biotechnology in the CGIAR", 1989.

B. Documentation provided by CGIAR Secretariat

1. Most recent CGIAR Directory

2. Most recent CGIAR Financial Guidelines and related documents:

- Financial Management
- Accounting Policies and Reporting Practices Manual
- Audit Policies and Procedures
- Review of the Resource Allocation Process
- Annual Resource Allocation Guidelines
- CGIAR Funding and Expenditures, 1983-88
- Approval of Medium-Term Programs (CGIAR)

C. Documentation provided by ICLARM

- A list of staff publications during the period under review, 1988-1991.

- Reports of major planning conferences, internal reviews, expert meetings, etc., which have had a major influence on the direction of the specific programmes of the Centre.

- Charter and other basic documents establishing the Center, along with subsequent amendments, dated February 9, 1979.

- Table showing composition of the Board over the last five years, along with an indication of the term of office of current members and their roles on the Board.

- Set of minutes covering Board and Board committee meetings since the last External Review (and reports of Board committees to the full Board if not included in the minutes).

- Staff manual or a description of current personnel procedures for international and locally-recruited staff.

- Table showing allowances, benefits, and salary ranges for each category of staff, 1986-1991.

- Table showing personal data on internationally recruited staff by program, including each job title, incumbent's location, period of tenure, gender, nationality, age, salary over the last three years, and source of funding. (Names to be excluded.)

- Table summarizing turnover of staff over the last five years by staff category.

- List of international staff vacancies and how long positions have been vacant.

- Reports of external auditors, including management letters, and financial officer's reports to the Board since the last External Review, December 31, 1990 and 1989.

- Most recent internal audit reports.

- A Strategic Plan for International Fisheries Research Board - Approved Draft for TAC Evaluation, May 1991.

- List of Ongoing and Recently Completed Contracted Projects, as of November 1991.

- List of Agreements with other Centers and Institutions on cooperatives activities, as of November 1991.

- Most recent Annual Report of the Center.

- ICLARM 1991 core program and budgets.

- Charter and other basic document establishing the Center, along with subsequent amendments.

- The Coastal Environmental Profile of Brunei Darussalam Resource Assessment and Management Issues, 1987

- The Coastal Environmental Profile of Singapore, 1988

- ASEAN/US Cooperative Programme on Marine Sciences: Coastal Resources Management Project (CRMP_ - Report of the First Project Steering Committee Meeting 21-23 May 1086 - Manila, Philippines.

- The Coastal Environmental Profile of Bon Don Bay and Phangnga Bay, Thailand, 1989.

- The Coastal Environmental profile of Segara Anakan - Cilacap, South Java, Indonesia.

- The Coastal Environmental Profile of Lingayen Gulf, Philippines, 1990.

- Towards Sustainable Development of the Coastal Resources of Lingayen Gulf Philippines, 25-27 May 1988.

- Biology, Epidemiology and Management of Pyrodinuim Red Tides, 1989.

- Urban Coastal Area Management: The Experience of Singapore, 9-10 Nov. 1989.

- Singapore Resolution on Waste Management in the Coastal Areas of the ASEAN Region, 28-30 June 1991.

- Length-Based Methods in Fisheries Research, 1987.

- FAO - Indo-Pacific Fishery Commission (IPFC) - Papers presented at the Symposium on the Exploitation and Management of Marine Fishery Resources in Southeast Asia, 16-19 February 1987.

- Intergovernmental Oceanographic Commission (of UNESCO) - Second Session of the IOC/FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resource (OSLR) - FAO, Rome, 8-12 June 1987.

- UNESCO Reports in Marine Science - year 2000 challenges for marine science training and education World-wide, 1988.

- Training Resource Book for Participatory Experimental Design, 13-17 February 1990.

- Aquaculture Research and Development in Rural Africa. 2-6 April 1990.

- Genetic Improvement of Farmed Tilapias tripartite review, 26 January 1991.

- Tilapia Genetic Resources for Aquaculture, 23-24 March 1987.

- A Strategic Plan for International Fisheries Research for ICLARM. Draft, 18 January 1992.

GLOSSARY OF ACRONYMS

ACIAR	Australian Center for International Agricultural Research
ADB	Asian Development Bank
ADAB	Australian Development Assistance Bureau
AFSSRN	Asian Fisheries Social Science Research Network
AGNA	Aquaculture Geneticists Network of Asia
AGRD	Agriculture and Rural Development
AID	Agency for International Development
AIDAB	Australian International Development Assistance Bureau
AIMS	Australia Institute of Marine Science
AIT	Asian Institute of Technology
AKVAFORSK	Institute of Aquaculture Research in Norway
ASEAN	Association of Southeast Asian Nations
ASI's	Advanced Scientific Institution
CAMP	Coastal Area Management Program
CAN	Coastal Aquaculture Network
CDS	Center for Development Studies
CFTC	Commonwealth Fund for Technical Cooperation
CGIAR	Consultative Group on International Agricultural Research
CLSU	Central Luzon State University
CRMP	Coastal Resource Management Plan
CRSP	Collaborative Research Support Program
CSIRO	Commonwealth Scientific and Industrial Research Organization
DANIDA	Danish International Development Agency
DG	Director General
EEC	European Economic Community
EEZ's	Exclusive Economic Zones
EIFAC	European Inland Fisheries Advisory Committee of FAO
ENSAT	Ecole Nationale Superieure Agronomique de Toulouse
FAO	Food and Agriculture Organization
FFA	Forum Fisheries Agency
GBRMPA	Great Barrier Reef Management Park Authority
GCP	Giant Clam Project
GIS	Geographic Information System
GTZ	Deusche Gesellschaft fur Technische
IARC	International Agricultural Research Center
IBPGR	International Board of Plant Genetic Resource
ICES	International Council for Exploration of the Sea
ICLARM	International Center for Living Aquatic Resources
ICOD	International Center for Ocean Development
ICW	International Centers Week
IDRC	International Development Research Centre
IFAS	Institute for Advanced Studies
IFPRI	International Food Policy Research Institute

IIE	Institute of International Education
IIRR	International Institute of Rural Reconstruction
IITA	International Institute of Tropical Agriculture
IMARPE	Instituto Del Mar Peru
INIBAP	International Network for the Improvement of Banana and Plantain
INTROMAC	International Tropical Marine Resource Center
IOC	Inter-Governmental Oceanographic Commission
IPFC	Indo-China Fishery Commission
IPGRI	International Plant Genetic Resources Institute
IRRI	International Rice Research Institute
ISI	Institute for Scientific Information
ISNAR	International Service for National Agricultural Research
MOU	Memorandum of Understanding
MTP	Medium Term Plan
NACA	Network of Aquaculture Centers in Asia
NAGNA	Network Aquaculture Geneticists Network and Asia
NARs	National Agricultural Research Centers
NGO's	Non-Governmental Agencies
NMFS-HA	National Marine Fisheries Service Hawaii
NTAS	Network of Tropical Aquaculture Scientist
NTFS	Network of Tropical Fisheries Scientist
ODA	Overseas Development Administration
PNG	Papua New Guinea
SADCC	Southern Africa Development Coordination Conference
SCI	Science Citation Index
SEAFDEC	Southeast Asian Fisheries Development Center
SIFR	Study on International Fisheries Research
SPFC	South Pacific Fisheries Commission
SPREP	South Pacific Regional Environment Program
TAC	Technical Advisory Committee
TOR	Terms of Reference
TURF's	Territorial User Rights in Fisheries
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Conference on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United National Educational, Scientific and Cultural Organization
UPV	University of the Philippine in the Visayas
US	United States
USAID	United States Agency for International Development
VSO	Voluntary Service Overseas
WARDA	West African Rice Development Association

Contributions to ICLARM, 1977-1991 (US$1,000)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Unrestricted Grants															
Rockefeller Foundation	454	600	700	750	812	850	850	720							
USAID			300	200	300	320	320		300	523	482	182	200	200	200
AIDAB						21	30	83	46	105	103	144	199	194	180
World Bank												300	500	500	500
BMZ												174	187	151	154
DANIDA													89	120	172
Norwegian Ministry										53					
Others								1	2		62	78			25
Total	454	600	1000	950	1112	1191	1200	804	348	681	647	878	1175	1165	1231
Restricted/Special Project Grants															
USAID					6					433	1118	1056	984	883	744
GTZ					55	270	231	192	292	312	301	369	496	595	548
IDRC							117	201	226	131	100	129	93	146	367
ADB											75	218	169	223	236
IBRD										90	203	252	115		
FORD FOUNDATION									165	51	210	252		132	
UNDP										60				142	321
DANIDA														256	442
Others	3			111	78	117	105	122	147	210	292	294	497	584	386
Total	3	0	0	111	139	387	453	515	830	1287	2299	2570	2354	2961	3044
Number of Donors	(1)			(4)	(7)	(5)	(6)	(5)	(8)	(14)	(21)	(18)	(15)	(18)	(21)
Other Income	8	8	17	74	109	34	112	149	141	256	187	166	278	143	221
Grand Total	465	608	1017	1135	1360	1612	1765	1468	1319	2224	3133	3614	3807	4269	4496
Unrestricted Grants as % of Grand Total	98%	99%	98%	84%	82%	74%	68%	55%	26%	31%	21%	24%	31%	27%	27%

ICLARM's Priority Setting

Table 1. Priority setting for the balance of effort of the future ICLARM, by aquatic resource system, based on fish production, potential for increase, threats to sustainability and equity.

Criteria	Resource systems						
	Ponds	Reservoirs, lakes	Streams, rivers, floodplains	Estuaries, lagoons	Coral reefs	Soft-bottom shelves	Upwelling shelves
Fish catch ($t \times 10^6$)[a]	-	1.8	3.5	5.1	6.0	11.1	14.0
Aquaculture production ($t \times 10^6$)[b]	5.0	0.2	0.1	3.0	0.5	0.0	0.0
Potential to increase production[c]							
Capture fisheries	0	2	0	1	3	1	1
Aquaculture	2	2	1	1	1	0	0
Combined	2	4	1	2	4	1	1
Index of potential gain[d]							
Fishery	0.0	3.6	0.0	5.1	18.0	11.1	14.0
Aquaculture	10.0	0.6	0.1	3.0	0.6	0.0	0.0
Combined	10.0	4.2	0.1	8.1	18.5	11.1	14.0
Combined priority[e]	4	2	1	3	7	5	6
Modifiers							
Threats to sustainability[f]	2	2	3	4	4	2	1.0
Equity[g]	4	3	4	3	4	2	1
Modified index	30.0	10.5	0.4	28.4	74.0	22.2	14
Modified priority[h]	6	2	1	5	7	4	3

[a]As derived from Appendix 1.
[b]Distribution of production as estimated by ICLARM from FAO aggregate data.
[c]Scale is 0-4. Estimate based on an analysis of potential, constraints and feasibility. Information for capture fisheries is summarized in Appendix 1. Aquaculture potential for ponds is based on early successes of expansion of semi-intensive aquaculture in SE Asia, Bangladesh and preliminary results from Malawi all with new entrants, for reservoirs and ponds, see Costa-Pierce and Soemarwoto 1990 (Reservoir Fisheries and Aquaculture Development for Resettlement in Indonesia, 378 pp. ICLARM, Manila). Estuaries and lagoons have recently shown considerable increase in aquaculture, however, these considerable socioeconomic constraints in addition to large pollution and equity issues which limit the potential.
[d]Derived by multiplying current fish catch/aquaculture production by potential.
[e]High number indicates high priority.
[f]This index acknowledges the downstream cumulative effect of unsustainable practices. Thus estuaries and lagoons and coral reefs receive the effect of all the unsustainable agriculture, and forestry practices plus the impact from industrialization and urbanization. In addition they are subject to conflicting resource use and habitat destruction (e.g., conversion of manpower and destructive fishing).
[g]This index interprets the contribution of the production to the livelihood of the poor and the availability of the production of food to the poor. For example in upwelling shelves, the fishery is carried out by industrialized fleets often from developed countries while the catch is converted to nonhuman food, contrasted to ponds where like production is carried out largely by small solo producers who either consume the products locally or sell them in local markets.
[h]Derived from combined index of potential gain modified by sustainability and equity, assuming equal weight. High number indicates high priority.

Source: ICLARM; Draft Strategic Plan, January 18, 1992, Chapter 2.

Table 2a. Values used in assessing regional priorities for international fisheries research.

	Weights	Asia/ Pacific	SubSaharan Africa	Latin America/ Caribbean	WANA
Quantity of production %[a]	(0.5)	62.5	5.0	28.4	4.0
No. of poor %[b]	(0.5)	72.1	16.2	6.3	5.4
Weighted baseline %		67.1	10.6	17.4	4.7
NARs strengthening needs %[c]	(0.25)	12.5	50.0	25.0	12.5
Final weighted baseline %		49	24	20	8
Priorities[d]		4	3	2	1

Table 2b. Values used in assessing regional priorities for international fisheries research with upwelling catches removed.

	Weights	Asia/ Pacific	SubSaharan Africa	Latin America/ Caribbean	WANA
Quantity of production %[a] (excluding upwelling)	(0.5)	82.3	3.7	10.3	3.7
No. of poor %[b]	(0.5)	72.1	16.2	6.3	5.4
Weighted baseline %		76.9	10.3	8.3	4.6
NARs strengthening needs %[c]	(0.25)	12.5	50.0	25.0	12.5
Final weighted baseline %		55	24	14	7
Priorities[d]		4	3	2	1

[a]Derived by ICLARM from FAO aggregate data.
[b]Based on TAC 1991 (A Review of CGIAR Priorities, Part I Advanced Working Draft), p. 133.
[c]Index derived from TAC 1991 (A Review of CGIAR Priorities, Part I Advanced Working Draft), p. 145-146.
[d]High number indicates high priority.

Source: ICLARM; Draft Strategic Plan, January 18, 1992, Chapter 2.

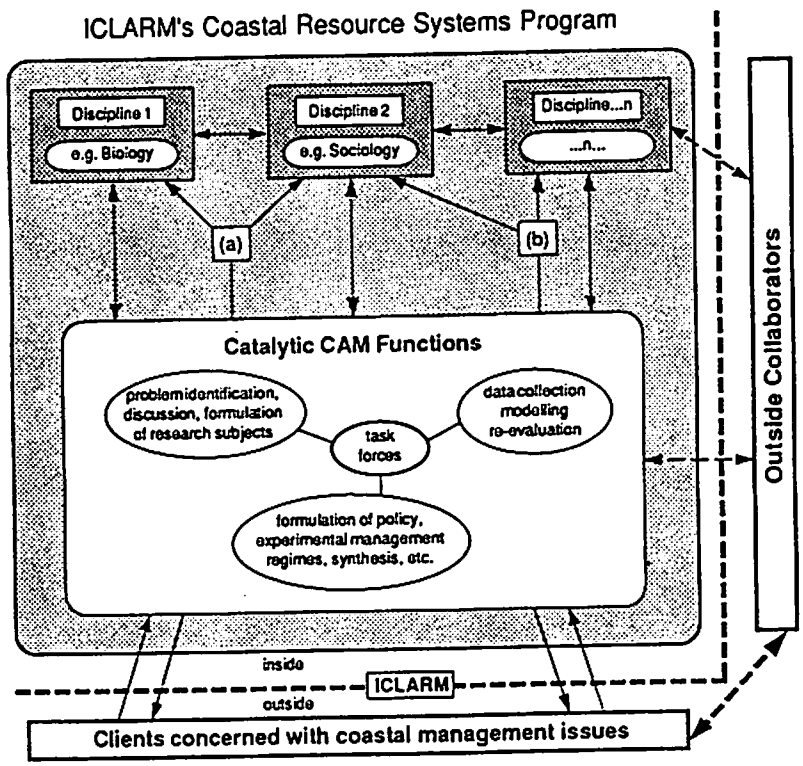
Table 3. Major issues to be addressed by ICLARM showing the research activities and resource systems by region in which the activities will take place.

Priority international research and related issues	Resource System	Region	Research Activity
• Improved management of coral reef fisheries	Coral Reefs	Asia LAC	Resource Conservation and Management Human Linkages
• Sustainability of coastal fisheries systems	Estuaries, Lagoons LAC	Asia	Resource Conservation and Management Human Linkages Socioeconomics and Policy
• Removal of socioeconomic and environmental constraints to aquaculture growth	Ponds	Asia SSA	Socioeconomics and Policy
• Improved fish productivity through genetics and husbandry	Ponds, Coral Reefs	Asia SSA, LAC	Fish Productivity
• Development of farming systems	Ponds, Coral Reefs, Estuaries, Lagoons	Asia SSA	Resource Conservation and Management Human Linkages
• Assessing and developing the potential for enhanced fisheries	Ponds, Estuaries, Lagoons, Coral Reefs	Asia, SSA, LAC	Fish Productivity
• Strengthening of national research systems	-	Asia, SSA LAC, WANA	Institution Building

Source: ICLARM; Draft Strategic Plan, January 18, 1992, Chapter 2

CRSP - An Organizational Mode

One possible organization of activities within a Coastal Resource Systems Program (CRSP) in response to client needs.



The panel recognized the difficulty of focussing interdisciplinary research within the coastal resource system, and formulating the key research issues. The CAMP has illustrated the need for a multidisciplinary and multi-agency interaction before research begins, as opposed to letting priorities by separate scientific discipline dominate the research agenda.

The diagram illustrates one approach to problem solving which may help overcome the need to reconcile inputs from ICLARM's key clients in coastal zone management with the requirement to carry out strategic research.

Stage 1: It is presumed that CRSP maintains regular contact with clients through seminars, workshops, networks and case studies, shown here as taking place beyond the boundaries of the Center. The main conclusions of these activities are followed up and synthesized by task forces which play a catalytic role, and consist of the staff of CRSP and technical colleagues from outside the Institute who may bring to bear skills not found within the program. These task forces, which may be temporary or long standing, correspond roughly to the thrusts chosen within the Strategic Plan.

Stage 2: A task force may at this stage have a predominantly methodological bias (e.g., in recommending on follow up data collection, appropriate case studies, or in selection of research priorities, scientific research design, of which scientific discipline to involve.

Stage 3: The research team is formed from appropriate combinations of the disciplinary groups in CRSP, with other ICLARM programs if appropriate, or with outside colleagues a research program, [e.g., (a), (b)] is carried out by disciplinary or interdisciplinary groups, formed as appropriate. If necessary, models are developed and tested.

Stage 4: The results of the research are discussed in another task force, synthesized, experimental management approaches discussed, and policy options formulated, as appropriate. These may be either published, or communicated to, and discussed with clients, and any follow up considered.