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PROJECT PLAN FOR THE FISH STOCK ASSESSMENT/PILOT FISHERY MANAGEMENT COMPONENT OF THE RAINFED RESOURCES DEVELOPMENT PROJECT

by

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EXECUTIVE SUMMARY

Introduction

Natural capture fisheries are the single most important source of animal protein in the Philippines, contributing over 60% of the total production and consumption of fish and livestock. To date, most of the countries fisheries policies have been formulated in the manner of crisis management, usually in answer to critical socio-political issues. According to research workers, a number of major fishing areas are now fished beyond their maximum yielding potential while others are probably under-exploited.

It is these considerations that have led the Philippines' Ministries of Agriculture and Food (MAF) and Natural Resources (MNR), through the Rainfed Resources Development Project (RRDP), to include fish stock assessment as one of the essential components for integrated planning for coastal and rural resources. To meet these wider requirements, the fish stock assessment component of the project involves two complimentary studies in fishery evaluation and a pilot study of fishery management schemes.

The following project preparation study considers the process of stock assessment, policy formulation and management as a complete functional system. It therefore recommends an overall administrative and operational framework which is both sensitive to incoming information on fishery problems, and also has well defined communication channels for translation of actual information into policy and then community management action.

The following project preparation study presents an operational work plan inclusive of training for BFAR staff in specialized data processing routines. A fish stock assessment Consultant (Dr. Peter Fox) was assigned to undertake this task with the assistance of Dr. Daniel Pauly (ICLARM) during August - November 1985. The Consultant's terms of reference was to prepare a detailed proposal for a two-year research program, giving emphasis to further data acquisition in other target areas under the RRDP, and to the formulation and implementation of fish resource management schemes. The project site selected using criteria discussed in this report (see Chapter 1 Section 3), is the southern Samar Sea, and more specifically Carigara and Maqueda Bays.

Effective management requires infomation not only on fish stocks and how best to maximize yields, but also on their relative economic importance to different components of the dependent community. Thus, the full economic and sociological impact of scientifically based management alternatives need to be realistically evaluated, and best compromises sought regarding allocation of resources.

To meet this need, Consultants from ICLARM (Dr. Ian Smith and Emma Escover) were commissioned to prepare a companion study for the formulation of a plan for community based management in the area also covered by the stock assessment activities.

Among the recommendations included in the body of this report is that a mechanism be set up within BFAR to bridge the existing gap between researchers and policy makers. It is recommended that BFAR should become the national fisheries policy making authority and the policy review mechanism might take the form of a committee consisting of heads of various BFAR divisions (i.e. research, planning, legal enforcement, economic) and senior representatives of various agencies involved in fisheries (PFDA, LLDA, SEAFDEC, UPCF, PCARRD, etc.).

A vital function of the team would be to monitor and evaluate incoming information on fishery problems, and to keep abreast of the findings of resurce assessment studies for immediate access by policy makers. At times there will also be a need for ad hoc research and preparation of discussion documents. It is therefore recommended that the mechanism be supported by a full time secretariat to maintain day to day continuity.

Fisheries Stock Assessment

The scientific objective of stock assessment is to establish the relationship between the amount and selectivity of fishing and the resulting catch that is sustainable in the long term. That is, to maximize the quantity that can be taken year after year without risking the biological or economic viability of the fishery. In long lived species with progressive growth over the life span, the sustainable yield is likely to reach a pronounced maximum at a relatively low intensity of fishing, and to decline sharply with heavier fishing. These species are also susceptible to being overfished by fishing gears which catch them at small sizes while still immature. In contrast, short lived species which mature early and produce large numbers of eggs may well be able to sustain heavy fishing without risk of serious decline.

In tropical multispecies fisheries it is rarely possible to manage for a single species, especially where fine meshed gears (e.g. baby trawl) capture a wide range of species with different management requirements. In the absence of practical models for multispecies stock management, it is necessary to aim the management process towards major yielding species, and accept some inevitable overfishing of minor species. Methods of assessment can be grouped into two approaches:

- Analysis of catch and corresponding effort over a number of years or in different areas which show a wide range of fishing pressures. This "trial and error" approach compares the

actual response of the stocks under differing levels of fishing then interprets the appropriate optimum.

- The second approach is more elaborate , and is based upon the study of the population which are dynamics of single fish species (i.e. their growth and mortality) which are used to predict the effort level and gear characteristics (e.g. mesh sizes) generating optimum yields.

The in-house capabilities within BFAR are currently being strengthened to accommodate stock assessment activities, and as explained in Chapter 4, field sampling teams have been trained and located in the project areas. These will form the technical backbone of the project and together with appropriate Technical Assistance (see Chapter 3.3) will assess the status of the resource base with respect to present levels of fishing. Data analysis procedures to be undertaken by a central support team (see Chapter 5) are designed to provide management guidelines on the most desirable patterns of fishery zonation, numbers of vessels and appropriate gear restrictions.

As the fish stock assessment activities are underway at the time of writing (Nov. '85), the exact timing of the synthesis reports will therefore depend on how soon the pilot fishery management study can be started, and also when the proposed T.A. package can be commissioned (tentatively assumed to be August 1986 in Fig. 2, see Chapter 3.3). There are, however, important preparatory activities that should be undertaken by BFAR in early 1986, particularly with respect to gear inventories and preparations for the economic record keeping activity (see Chapter 4 and 9).

Therefore, it is strongly recommended that financial provision be made for short term bridging inputs of Technical Assistance, to assist with the above preparations and to ensure continuity in the stock assessment data analysis already underway. The Fish Stock Assessment activity will require quarterly T.A. inputs of one month each until commissioning, (March and June 1986) and the socio-economic survey will require a minimum of 1 month T.A. during the setting up period (April 1986).

Assuming that the long term T.A. package is commissioned from August 1986, the integrated pilot program would run for two years until August 1988. A critical period in the pilot programme would start twelve months after commissioning, when a management feasibility study would be undertaken by a special studies task force. The structure of the task force is outlined in the community management study, (Part III of the report), and would aim to synthesize all available information at that stage to develop a community-based fishery management plan for implementation.

The expansion phase would start at the beginning of year (3) when specific problem areas would be identified elsewhere, and the Fish Stock Assessment sampling teams relocated to establish baseline criteria in the new sites.

A special contingency fund is written into the proposed budget for two months per year of additional consultancy time. In the first year it is envisaged that this may be used for the quarterly bridging inputs explained above. A visiting lecturer would be highly desirable during the annual FSA coordination seminar. A need for new ideas and approaches from a visiting consultant would also arise at the start of the expansion phase when sampling strategies are being re-aligned for new problem areas.

In view of the general use of IBM personal computers in various government departments in the Philippines (including the proposed fisheries statistics data logging on IBM main frame), it is strongly recommended that BFAR rely on IBM PC (or another computer wholly compatible with IBM PC) to meet its hardware requirements. There is also the advantage that any data logging requirements of the Fish Stock Assessment project using compatible hard disc facilities could use virtually the same programme as planned for the national catch enumeration scheme.

Pilot Management Study

The Pilot Management Study consist of two two phases each of two years duration. The first pre-management phase would be an information collection and analysis activity during which the status of the fishery and management problems and opportunities would be identified and evaluated. The second pre-management phase would consist of the development of appropriate management systems, including (1) information for decision-making (eg., system modelling, fishery monitoring) and (2) institutional development.

Phase I should last for approximately 2 years and would consist primarily of (1) a record-keeping activity in selected fishing communities covering the major gear types of the Samar Sea; (2) special selected studies; and (3) project task force to evaluate management options for the area and develop an implementable management plan.

The purpose of the record-keeping activity will be to determine the economic and relative profitability of the major gear types operating in the area and the income of the various groups of fishermen, and from this the allocation of benefits from the Maqueda and Carigara Bay fisheries. Selected special studies should be conducted simultaneously to the record-keeping and would be needed to evaluate the areas other than the fish producing activity. The special studies would include the following:

(1) An assessment of the role and power of input supply and marketing intermediaries (the ubiquitous "middlemen") who control much of the informal credit into these fisheries and the disposition of products out of them;

(2) An assessment of the dependence of fishing households upon fishing income and the extent to which supplementary and alternative income sources other than capture fishing are available to them or can be developed; and

(3) An evaluation of fisheries management institutions and leaders (governmental and non-governmental, formal and informal, and community-based) that influence access to fishing (and fishing inputs and markets) by individuals or groups that provide opportunities for participation by fishermen and their families in decision-making regarding resource use. Particularly important in this context are fishermen 's own perceptions of fisheries management problems and solutions.

The product (output) of Phase I would be: (a) information on the current structure and performance of the fisheries and fishing communities; (b) assessment of institutional strengths and constraints for management; (c) a recommended methodology for continuing evaluation of management options (i.e., costs/benefits of alternative interventions, winners/losers) for the fisheries of Maqueda and Carigara Bays; and (d) a recommended management infrastructure (institutional framework) for decision-making and management implementation.

Phase II would be primarily an institutional development and monitoring phase (also undertaken in the Samar Sea area) when an effective and viable mix of the various interested parties to fisheries management (fishermen, communities, municipalities, provinces, regional and national government offices and non-government organizations) would be developed into an effective mechanism and framework for evaluating management options and implementing and enforcing management mechanisms. Continued monitoring of the key biological, economic and sociological parameters of the fisheries and communities as identified in Phase I would be undertaken in this later phase, as would the further development of the analytical framework for evaluating management options (eg., modelling) that is recommended at the end of Phase I, and a public education program on the need for fisheries management.

The implementation of Phase I of the Pilot Study of Fishery Management Schemes in Carigara and Maqueda Bay will directly involve the participation of the research, statistics and extension departments of the Bureau of Fisheries and Aquatic Resources, the research department of the Bureau of Agricultural Economics, and one

other research institutions which will be identified at the beginning of Phase I. (The U.P. Institute of Social Work and Community Development is recommended).

BFAR and BAEcon will work hand in hand in the record-keeping activity. The presence of BAEcon's staff in the municipal level and the experience in similar activities will support BFAR. Likewise, BFAR's familiarity with the fishing activities in the different communities will support BAEcon staff.

The special studies will be contracted to an outside research organization such as the U.P. Institute of Social Work and Community Development. The Special Studies will be headed by a highly qualified senior researher who will also participate in the development of the fishery management sheme. Preferably all the special studies will be awarded to only one research institution for easier coordination and management.

Integration in concept and output will be the responsibility of a project task force established for this purpose. At the initial stage of Phase I, this team will consist of

- One project co-leader from BFAR
- One project co-leader from BAEcon
- One consultant (externally recruited)

By the end of year 1 of Phase I, the group/institution which will implement the special studies will have been identified. The Special Studies leader will become the fourth member of the project task force at that time.

The goals of this project task force will be the following:

1) Develop the conceptual framework for the record-keeping along the lines suggested in this document (see Section 9.1, Chapter 9);

2) Develop the conceptual framework for the special studies (see Section 9.2);

3) Implement both the record-keeping and special studies;

4) Based on these results and other investigations of the RRDP (i.e., agricultural sector studies), develop a methodology for evaluation of management options under an on-going management scheme; and

5) Recommend an appropriate management infrastructure (institutional framework, staffing, information needs) for decision making and management implementation in Phase II (see

Chapter 12 of this report for more details) and to prepare a preliminary budget for Phase II. This last goal is particularly important to assure continuity from Phase I to Phase II.

A short-term input of one man-month Technical Assistance (TA) is recommended in April 1986 to assist in setting up the record-keeping activity and in training researchers and barrio assistants. An additional 1 one-month technical service is also recommended in order to solicit participation from other socioeconomists who have been exposed to similar fisheries management activities elsewhere. Their inputs would be very beneficial during workshops, particularly in the preparation of the management schemes for Carigara and Maqueda Bays.

It is desirable that the staff of the BFAR be strengthened with the addition of a trained fisheries economist who can participate in the activities in Phase I. If an appropriate individual is not available from the current staff, it is recommended that 2 new positions be created within BFAR Research Division for individuals with training to the Masters Degree level. If no trained individuals can be found for these positions, it is recommended that two be sent to the Masters degree program (Resource Economics, Fisheries Specialization of the Universiti Pertanian Malaysia, Serdang, Selangor, Malaysia (see Appendix B). A short training on participatory research is also recommended for the project staff.

Conclusion

It is not possible at this point in time to predict what form of management infrastructure and associated tools for management will be required to implement a community based management scheme. Nor, therefore, can the likely costs of such an approach be estimated at this time.

However, the major components of a management approach can be identified and these are briefly discussed here so that the likely direction of evolution of this pilot study can be appreciated.

A management program for Carigara and Maqueda Bays should address the following major tasks:

1) Setting of objectives: Alternative goals of management could be maximizing yield or catch, maximizing net economic returns or resource rents from the fishery, maximizing employment, or equitable distribution of benefits from the fishery. These goals cannot be achieved simultaneously. For example, achieving the goal of equitable distribution of benefits may be at the expense of economic efficiency.

2) Selecting a mechanism for controlling access and use rights: Alternatives include licenses, quotas, taxes, restrictions on certain gear types or on vessel sizes or power, closed seasons or closed areas. The choice of the most appropriate mechanism would depend upon the characteristics of the fishery in question and the management objectives to be achieved.

3) Establishing a system for transfer of use rights such as an open market or bidding for licenses, for example.

Finally, a second element of Phase II could be the initiation of Phase I-type activities in another location, taking into account the success of this effort in Maqueda and Carigara Bays and opportunities for producing the costs of such pilot studies.

In conclusion, the initiation of community management approaches and other forms of more localized control over use of coastal resources requires the socio-economic and other non-technical aspects, be institutionalized throughout the fisheries infrastructure up to national levels. Hopefully, this pilot study will provide sufficient rationale and evidence of success with the approach for such institutionalization - and the attendant staff and budget commitments - to be made. In that way, fisheries management could move beyond its present project-by-project approach with stronger institutional support.

Budget and Terms of Reference for Project Personnel

Stock Assessment Specialist's Terms of Reference:

1. To help develop within BFAR, for a period of three years, the necessary skills for collection, processing and interpretation of fish population data.

2. The specialist will work closely with the project director, to assist in formulating a departmental working plan which satisfies the scientific requirements for stock assessment, and fits into the short and longer term administrative objective of BFAR.

Fisheries Management Consultant's Terms of Reference:

1. Develop the conceptual framework of the record-keeping and special studies along the lines suggested in this document;

2. Participate in the training of BFAR/BAEcon research and barrio assistants involve in the pilot management study; and

3. Synthesize the information generated by the different activities, i.e., record-keeping, special studies and fish

stock assessment; develop a methodology for evaluation of management options under an on-going management; and develop an institutional framework for the management schemes for Carigara and Maqueda Bays.

Special Studies Leader's Terms of Reference:

1. Develop the conceptual framework for the special studies together with the fisheries management consultant;

2. Plan and implement the special studies;

3. Prepare the technical reports of the special studies;

4. Serve as resource person during the training on participatory research to be conducted for the project staff;

5. Participate in community meetings, workshops and seminars to be conducted in the study areas; and

6. Assist in the preparation of the synthesis report and management plans for the Carigara and Maqueda Bays.

The project costs of the Fish Stock Assessment (FSA) and Pilot Management Schemes for Carigara and Maqueda Bays are shown below.

Summary of project costs (Phase I)

	Year I		Year 2	
	FSA component	Community Management component	FSA component	Community Management component
Personnel/salaries	1,067,000	118,000	1,280,400	86,000
Maintenance and operating costs	1,228,000	155,400	1,293,600	384,600
Equipment	1,195,985	4,900	30,000	-
Special survey costs	522,000	82,000	626,400	410,200
Technical Assistance	3,036,200	1159,400	3,106,440	2600,400
Training	1,702,950	21,000	2,251,250	500,000
	8,752,135	1540,700	8,588,090	3510,600
	10,292,835		12,098,690	

The estimated total project costs are P10.3M for year 1 and P12.1M for year 2. Excluding costs for Technical assistance and training, the actual project budget runs at P4.4M in year 1 and P3.6M in year 2. This is in line with current allocations by the Office of the Ministry of Budget (OBM).

PART I: INTRODUCTION AND TERMS OF REFERENCE

CHAPTER 1. Background and Objectives

CHAPTER 2. Scientific and Management Objectives and Project Costs

CHAPTER I : BACKGROUND AND OBJECTIVES

1.1 GENERAL BACKGROUND

Natural capture fisheries are the single most important source of animal protein in the Philippines, contributing over 60% of the total production and consumption of fish and livestock. To date, most of the countries fisheries policies have been formulated in the manner of crisis management, usually in answer to critical socio-political issues. According to research workers, certain areas are now fished beyond their maximum yielding potential while others are probably under-exploited.

This uncertain state of affairs in the country's most important livestock industry has prompted the Bureau of Fisheries, under the USAID-Rainfed Resources Development Project, to introduce advanced methods of predictive fish stock assessment. This is a specialized analytical branch of fisheries science, designed to provide policy information on the status of fish stocks, optimum levels for exploitation and appropriate patterns of fishery management. The necessary methods of population analysis have only recently become adapted for use in tropical waters and have never been applied systematically in the Philippines.

Fishery administrators in the Philippines, in common with many other parts of the world, are now facing problems that differ fundamentally from those faced by administrators in the past. The conventional approach to improving the socio-economic conditions for fishing communities is to provide various forms of assistance, boats, loans and technical training as a means to improve the catching capability of fishermen. Such an approach is, according to research workers, now only applicable in certain areas, and if applied generally, is likely to cause further depletion of resources with subsequent compounding of socio-economic problems. A new approach is now called for, in which a balance between development and controlled management is based on rational assessments of the maximum sustainable yield, the number of vessels required to achieve it, and suitable patterns of protective legislation.

The other area of changing ideas lies in the manner of implementation of fishery management. Centralized fishery administration in the Philippines is considered essential for national policy coordination but the most acute fishery problems are often highly localized, far removed from the central administration, and difficult to deal with logistically in a national context. In many situations BFAR has found itself hard pressed to respond quickly and effectively to such localized management needs, and when it does, often meets with a natural resistance to "official" plans and procedures. Consequently, there is a growing body of opinion within BFAR that new appoaches should now be tested which confer greater responsibility on the fishing communities themselves to plan a role in managing their own future.

The following project preparation study therefore considers the process of stock assessment, policy formulation and management as a

complete functional system. It therefore recommends an overall administrative and operational framework which is both sensitive to incoming information on fishery problems, and also has well defined communication channels for translation of factual information into policy and then community management action.

Stock assessment is the first link in the chain towards achieving these objectives and while it may provide the technical ammunition to validate a management programme, inputs from a wider perspective are required to formulate a workable scheme of implementation. Municipal fishermen throughout the Philippines derive part of their income from other rural activities, and the balance between alternative income sources is determined by relative profitabilities, resource availability and a whole range of social interactions. Thus, a workable scheme for fishery management must also consider other localized rural activities that may need to be developed and integrated to accommodate fishery changes. Similarly, fishing gear legislation or fishery zonation has a selective effect on certain fishing groups. The full socio-economic impact of alternative management schemes must therefore be adequately evaluated in the final policy decision.

It is these considerations that have led the Philippines' Ministries of Agriculture and Food (MAF) and Natural Resources (MNR), through the Rainfed Resources Development Project (RRDP), to include fish stock asresponsibility for supervision of rural and coastntegrated planning of coastal and rural resources. To meet these wider requirements, the fish stock assessment component of the project involves two complimentary studies in fishery evaluation and a pilot study of fishery management schemes.

1.2 PREPARATORY STUDIES AND TERMS OF REFERENCE

A previous short consultancy study was commissioned by USAID in 1983 under the Ministry of Natural Resources, to review the fishery information requirements of policy makers in the Philippines, and the capability of the Bureau of Fisheries and Aquatic Resources for producing such information. (Skillman and Wheeland, 1983). Amongst the wide ranging and valuable recommendations made by the study, a particular need was identified to strengthen BFAR's capabilities in analytical methods of stock assessment. Suitable pilot project sites were also identified in areas suspected to be heavily overfished, and in which there are serious conflicts between different groups of fishermen.

The following project preparation study was therefore required to develop those preliminary recommendations into an operational work plan and to provide training for BFAR staff in specialized data processing routines. A fish stock assessment Consultant (Dr. Peter Fox) was assigned to undertake this task with the assistance of Dr. D. Pauly (ICLARM) during August-November 1985.

The Consultant's terms of reference were as follows:

1. Prepare a detailed proposal for a two-year research program

employing the same approach as in item 2 below, but giving emphasis to further data acquisition in other target areas under the RRDP, and to the formulation and implementation of fish resource management schemes.

2. Review and analyze existing studies and data as background to formulation of a detailed work plan for fish stock assessment in consultation with BFAR's central office staff, and prepare a preliminary report at the end of the three-month period.

3. Design and conduct training of selected BFAR technicians who will be the instructors for a BFAR on-the-job training program for technicians and biologists in the following areas:

   - Methods of data collection;
   - Estimation of population parameters; and
   - Interpretation and analysis of available length-frequency data on the commercially important fishes of the target areas using the Electronic Length Frequency Analysis (ELEFAN) method developed at ICLARM.

As outlined above, effective management requires information not only on fish stocks and how best to maximize yields, but also on their relative economic importance to different components of the dependent community. Thus, the full sociological impact of scientifically based management alternatives can be realistically evaluated, and best compromises sought regarding allocation of resources.

To meet this need, Consultants from ICLARM (Dr. Ian Smith and Emma Escover) were commissioned to prepare a study for the formulation of a plan for community based management, with the following items of reference:

1. Prepare a research design for a pilot study of fishery management schemes in Sorsogon Bay, specifically including the design of a socio-economic study of the communities surrounding the bay. The consultants will collaborate with the Fish Stock Assessment Specialists in preparing the research design.

2. Prepare pre-design recommendations for the Terms of Reference for an applied research component of a long-term fisheries development project. The purpose of the applied research will be to assess the development potential of various project interventions (i.e. fishery regulations, training, infrastructure investment) and the socio-cultural implications.

3. Assist BFAR with recommendations for the long-term project design in the area/data collection and analysis for policy formulation and program development.

4. The consultants will work cooperatively with the staff assigned by the BFAR Research Divisions, and will coordinate with the BFAR Regional Offices, the RRDP Resource Assessment and Policy Analysis Task Force, and will cooperate with the Office of Rural and Agricultural Development, USAID-Philippines.

1.3 CONSULTANTS INTERPRETATION OF THE TERMS OF REFERENCE

The original terms of reference cite separate locations for the fish stock assessment and community management studies. However, it was recommended by the Consultants that the two studies be integrated at the same site during the initial pilot phase, in order to develop compatible and complimentary sampling routines.

Of the three areas selected in the terms of reference for intensive fishery monitoring, the Carigara/Maqueda Bay area in Samar/Leyte offers the most advantages for the integrated core study. It is a significant yet relatively enclosed fishery which experiences the usual conflicts between small and larger fishermen.

It is particularly significant because it was one of the first areas identified as overfished in the late 1970's, and the first in which the 7 km trawl ban was imposed in 1978 on vessels exceeding 3 tonnes. Furthermore, as quantitative data are available on stocks prior to the escalation of fishing activity (Warfel and Manacop 1950), and from the period after trawl bans were imposed (Armada and Silvestre 1981), the present time is particularly appropriate for an evaluation of benefits to municipal fisheries of the 7 km. trawl ban.

These considerations led to the discussion and approval for a two-year pilot scheme involving simultaneous fishery monitoring studies in the three specified sampling areas, with the integrated core study located at Carigara/Maqueda Bay. The pilot-scheme would then roll out in the third year to include specific community oriented programmes such as that envisaged for Sorsogon Bay.

At that stage, specific budget could be incorporated to permit participation by regional schools of fisheries and potential management groups within the target community. Ultimately it is anticipated that the core system can be expanded nationwide, using standardized sampling procedures and a common central data bank/processing facilities. This activity would be closely linked to a centralized mechanism for policy review and formulation, which could provide direct recommendations for management and legislation on both regional and national levels.

CHAPTER 2. SCIENTIFIC AND MANAGEMENT OBJECTIVES

2.1 INFORMATIONAL NEEDS

It is now relevant to consider in more depth, the objectives of the information gathering process, policy formulation, and the perceived avenues for implementation of management. In the first instance, informational needs are best brought into perspective by considering the principal requirements of the policy making process.

First, policy makers require simple, factual information on whether a particular fishery would benefit from development or controlled management, or in other words, whether it is underfished or overfished. Having established this as a first priority, it is then necessary to have scientific evidence that certain practical changes could bring about improvements. These might involve changes in the type or numbers of fishing gears, net mesh sizes, fishing zonation, close seasons or other legislative measures. Finally, in order to decide which of the above "scientific" formulae would be acceptable in the final policy analysis, it is necessary to have information on the relative economic importance of fishing to different components of the dependent community. Thus we have identified three primary information needs that form the basis of a rational management decision.

1. State of exploitation and status of the fisheries.

2. Alternative patterns for improvement.

3. The likely socioeconomic impact of interventions.

With regard to the methods of data collection, there is also the obvious overriding objective that the project can be continued by BFAR after the cessation of RRDP funding. It is also essential that the programme can be managed on a routine basis by the BFAR administration, alongside the many other day to day responsibilities of the department.

This calls for a more critical and systematic approach than would normally be acceptable in a conventional research programme. Accordingly, the stock assessment activities for the project have been designed on the basis of data processing "avenues" in which the key data requirements are clearly identified, and the sequence of collection, analysis and interpretation fit into a professional rather than an exploratory mould. This approach separates the more functional and problem oriented role of BFAR as a "user", from the more flexible and innovative role of universities and research groups currently involved in the development of new working routines. Altogether this will place a new and demanding emphasis on feedback between BFAR and the latter groups to refine the actual working efficiency and objectivity of the various analyses. In this context, both parties stand to benefit from close liaison and a continuing exchange of new ideas and operational problems.

Similar priorities form the basis of the proposed socio-economic activities. It is anticipated that in future such studies may need to be undertaken in cooperation with an appropriate body, familiar with the application of community management surveys. However, there is a clear responsibility for BFAR to take the lead, possibly through hiring of socioeconomists within the central office, and to specify critical informational requirements for policy making. These can be crystalized quite simply into four main areas:

a) evaluation of the community impact of different management alternatives.

b) assessment of the alternative employment and other rural activities that may require development and integration before a specific fisheries management plan can be implemented.

c) to identify practical means by which credit can be administered and recovered should a fishery be deemed suitable for development.

d) to identify a workable formula for community based management.

2.2 THE FORMULATION OF MANAGEMENT POLICY

The above information does not in itself constitute a complete basis for the preparation of management policy. Quite often the "ideal" formula requires extensive modification to allow for technical, administrative and institutional practicalities. First there will be political and socioeconomic considerations that may require for instance, the development of a labour intensive fishery even at the expense of technical efficiency. Second, there is the problem of how best to develop alternative or supplementary income sources in an overfished area. Finally there are a host of practical considerations including the administration of loans, legislation, enforcement, and the legal implications of existing commercial agreements or traditional rights.

To be effective, the studies outlined in the following report therefore need to be integrated within an overall policy making framework, which is both sensitive to incoming information on fishery problems, and also has a communication channel for translation of results into policy and then community management action.

In the preparation of this project it has become evident that the present fisheries institutional organization in the Philippines offers no such channels for synthesis of recommendations from various sources into workable management policies.

2.3 MECHANISMS FOR DETECTING PROBLEMS

There are usually two different scenarios by which a specific problem can reach the policy making stage. First, the fisheries administration or a research group might foresee a potential resource problem developing, initiate studies on its own accord and make remedial recommendations. For these to be effective however, there must be well defined communication pathways upwards from the research group, via a credible negotiating authority to ministerial level, or directly to the relevant local management group (Fig. 1). This is normally the route for national or international protective legislation on wide ranging or strongly migratory species such as tunas, where large scale action is called for. It may also be the route through which universities, independent research projects, the private sector and fishing communities can penetrate the policy making chain.

The second and more usual scenario arises from specific complaints detected by a regional office, or perhaps recieved directly at Ministerial or Presidential level. Here there is need for an organized pathway downwards, again through a recognized funnelling authority, which will feed the information to an appropriate research group for qualification and recommendations.

Clearly, both avenues of flow require a recognized intermediate authority which is accountable, impartial and has sufficient seniority and technical credibility to negotiate at any level.

Recommendation

It is therefore recommended that a mechanism be set up within BFAR to bridge the existing gap between researchers and policy makers. It is recommended that BFAR should become the national fisheries policy making authority and the policy review mechanism might take the form of a committee consisting of heads of various BFAR divisions (i.e. research, planning, legal, enforcement, economic) and senior representatives of various agencies involved in fisheries (PFDA, LLDA, SEAFDEC, UPCF, PCARRD, etc.)

The committee should be constituted to meet on a regular basis, and its functions would be two-fold.

1. To review and synthesize for discussion, the policy recommendations of completed studies, and to formulate balanced legislative guidelines for ministerial action. In cases where local or regional bodies have been empowered with management responsibilities, the team could provide direct recommendations for implementation.

2. To act as a recognized funnelling mechanism for incoming information on critical policy issues, problems perceived by the fishing industry and the findings of independent research groups. In this capacity the team would act as a

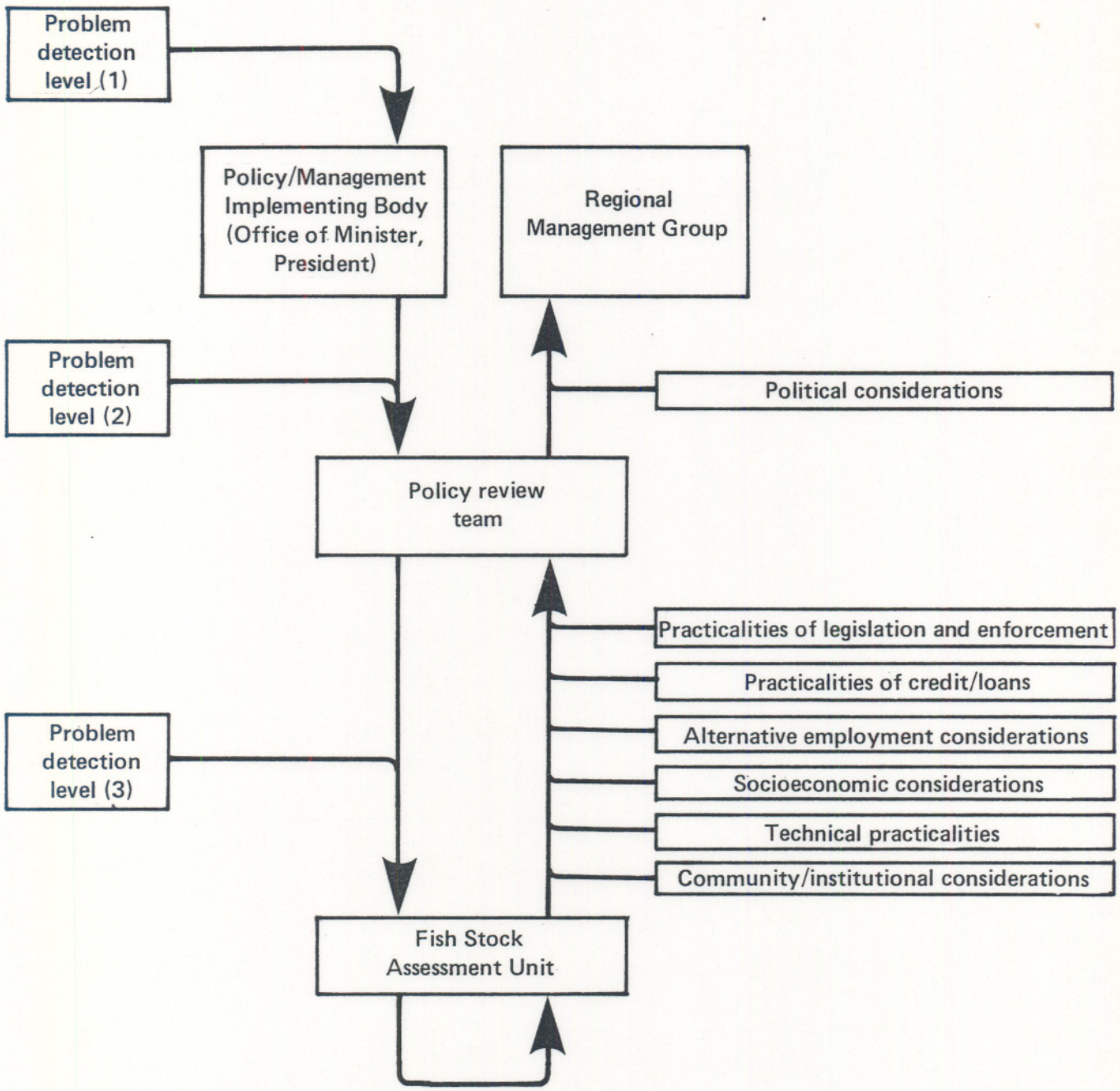


Fig. 1. Recommended sequence in the formulation of fisheries management policy.

forum for evaluating National priority areas and to identify key question for future research programmes.

The committee would thus serve to pull together the various disparate and often conflicting regulations that currently exist amonst the many autonomous fishery agencies in the Philippines.

In the early stages it is felt that a working group incorporating all agencies would probably be unwieldy. It is therefore recommended that in the first instance the policy review team be set up to focus on municipal fisheries, with a view to incorporating commercial fisheries and possibly the private sector as the policy working pattern becomes strengthened and recognized.

Continuity and coordination

A vital function of the team would be to monitor and evaluate incoming information on fishery problems, and to keep abreast of the findings of resource assessment studies for immediate access by policy makers. At times there will also be a need for ad hoc research and preparation of discussion documents. It is therefore recommended that the mechanism be supported by a full time secretariat to maintain day to day continuity.

2.4 PERCEIVED IMPLEMENTATION OF MANAGEMENT

For some time now, BFAR has viewed community based management as the only practical means by which fisheries can be protected and laws enforced in remote areas. On the face of it, the organizational objectives seem fairly straightforward for there is a well established system of Barangay representation through elected captains, and each municipality supports a council and mayor. Furthermore, there are established precedents for local management, as the municipalities currently control concessions for milkfish fry collecting, oyster beds and the construction of fish corrals.

In practice however, the situation is far from satisfactory. Municipal fishermen represent a majority of all fishermen and yet claim that their real interests are overwhelmed by commercial operators. In many cases the elected representatives have vested interests themselves, and therefore cannot exercise impartial judgement in jurisdiction. Interviews with fishermen in the project areas indicate that barangay captains are usually voted into office because of their high profile, personal motivation and contacts. Whereas these qualities enable them to negotiate effectively, most fishermen claim that fishery management would require a different type of person to fairly represent their interests on a fishing level.

The problem of fair representation is further complicated by the personal qualities of different types of fishermen. On the one hand, there is the commercial entrepreneur, who is usually articulate, sociable, well organized and opportunistic. On the other hand, municipal fishermen tend to operate in a solitary manner or in small social groups. Thus the very nature and socioeconomic background of the latter often make it difficult for them to become readily organized into an influencial voice.

Such feelings and undertones perpetrate throughout the Philippines fishing industry and have resulted in a marked polarization of different fishing "types", often in adjacent barangays of the same municipality. While the problems and conflicts are immediately apparent, and easily quantifiable in standard surveys, the identification of a workable solution requires insight and understanding that extends far beyond a superficial questionnaire survey. Ultimately, the main rationale for local management must lie in the strong motivation amongst fishing communities to protect their own future interests. Such motives should in theory, provide a secure and practical basis for enforcement, especially if tangible benefits can be scientifically proven, and a workable relationship developed between fishing communities and their respective units of national police and coastguards.

At this early stage it is impossible to speculate on the likely or most desirable outcome of the investigation with respect to these community management issues. However, it is possible to specify the following key areas that require resolving in the final analysis.

a) who represents and how elected

b) who enforces and legislates

c) who monitors, reevaluates and modifies

d) who investigates the validity of complaints

e) who administers loans and credit

f) who controls entry to the fishery

g) how can the rights of minority fishermen be ensured

2.5 OVERVIEW OF PROJECT DESIGN AND INTEGRATION OF ACTIVITIES.

The objectives outlined above demonstrate the need for a multidisciplinary team approach, in order to develop both the technical and economic basis for management, and also to identify practical mechanisms for implementation at the community level. An overview of the proposed project activities is given in Fig. 2.

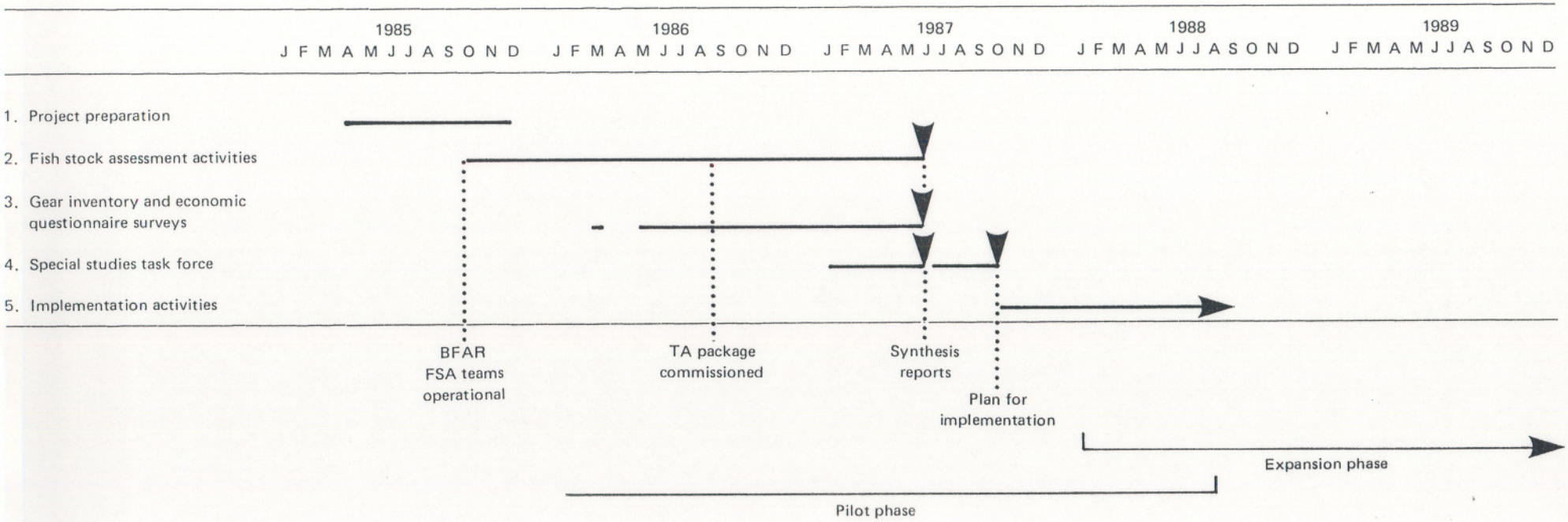
The in-house capabilities within BFAR are currently being strengthened to accommodate the stock assessment activities, and as explained in Chapter 4, field sampling teams have been trained and located in the project areas. These will form the technical backbone of the project and together with appropriate Technical Assistance (see Chapter 3.3) will assess the status of the resource base with respect to present levels of fishing. Data analysis procedures to be undertaken by a central office support team (Chapter 5) are designed to provide management guidelines on the most desirable patterns of fishery zonation, numbers of vessels and appropriate gear restrictions.

In conjunction with the stock assessment activities it is recommended that respondent fishermen be identified from amongst the fishing communities to participate in a continuous record keeping activity, to ascertain the economics and profitability of major fishing gears. Whereas the stock monitoring would be undertaken using landed catches, the latter activity would be based on record forms left with the fishermen to record their daily income and expenses. In view of the extensive experience of the Bureau of Agricultural Economics (BAECON) in the design and execution of such surveys in other rural communities, it is recommended that they be brought into the pilot project under a Technical Assistance arrangement to supervise distribution, collection and analysis of the record sheets. Ultimately it is envisaged that BFAR would recruit a full time fishery economist to supervise work of this nature in future projects.

The fact finding activities should last for twelve months, towards the end of which a special studies task force would be set up to evaluate several important aspects other than fish production (e.g. credit, marketing, alternative incomes, role of community institutions etc.). The synthesis report of the task force would then be timed to coincide with those of the stock and economic assessment activities, and thereby form a basis for the formulation of a management concept and plan for implementation. (See Fig. 2).

Figure 2

Summary Phasing Schedule For Fish Stock Assessment and Associated Activities



At that point the main project emphasis would change from fact finding to implementation. While it is anticipated that certain aspects of the data collection activities will need to re-focus on specific problem areas in the database, a major part of the workload would re-orientate towards community liaison. It should be noted that the cadre of field staff involved in the first years data collection would have been recruited from the project region, and many from fishing families. Thus there will be strong social links between the project and community, which will greatly assist during the implementation phase. It is therefore proposed that individuals should be identified who show particular aptitude for social communication, and who will be re-oriented to form a special community liaison team. Their work program would then be re-scheduled for the implementation activities according to guidelines laid down by the task force. As the remainder of the team complete their data collection activities they would be moved into a new project area to start the expansion Phase II. Table 1 gives a budget for the fish stock assessment (FSA) and community management activities for Phase I.

Timing and preparatory activities

As the fish stock assessment activities are underway at the time of writing (Nov.'85), the exact timing of the synthesis reports will therefore depend on how soon the economic monitoring can be started, and also when the proposed T.A. package can be commissioned (tentatively assumed to be August 1986 in Fig. 2, see Chapter 3.3). There are however important preparatory activities that should be undertaken by BFAR in early 1986, particularly with respect to gear inventories and preparation for the economic record keeping activity (see Chapter 4 and 9)

There will probably be a time lag of at least six months between presentation of this report and commissioning of the T.A. package. It is therefore strongly recommended that financial provision be made for short term bridging inputs of Technical Assistance, to assist with the above preparations and to ensure continuity in the stock assessment data analysis already underway. The FSA activity will require quarterly T.A. inputs of one month each until commissioning, (March and June) and the socio-economic survey will require a minimum of 1 month TA during the setting up period (April).

Table 1. Summary of project costs (Phase I)

	Year I		Year 2	
	FSA component	Community Management component	FSA component	Community Management component
Personnel/salaries	1,067,000	118,000	1,280,400	86,000
Maintenance and operating costs	1,228,000	155,400	1,293,600	384,600
Equipment	1,195,985	4,900	30,000	-
Special survey costs	522,000	82,000	626,400	410,200
Technical Assistance	3,036,200	1159,400	3,106,440	2600,400
Training	1,702,950	21,000	2,251,250	500,000
	8,752,135	1540,700	8,588,090	3510,600
	10,292,835		12,098,690	

The estimated total project costs are P10.3M for year 1 and P12.1M for year 2. Excluding costs for Technical assistance and training, the actual project budget runs at P4.4M in year 1 and P3.6M in year 2. This is in line with current allocations by the Office of the Ministry of Budget (OBM).

PART II: THE FISH STOCK ASSESSMENT COMPONENT

CHAPTER 3. THE AIMS OF STOCK ASSESSMENT

3.1 THE REACTION OF STOCKS TO FISHING

The scientific objective of predictive stock assessment is to establish the relationship between the amount and selectivity of fishing and the resulting catch that is sustainable in the long term. That is, to maximize the quantity that can be taken year after year without risking the biological or economic viability of the fishery. In long lived species with progressive growth over the life span, the sustainable yield is likely to reach a pronounced maximum at a relatively low intensity of fishing, and to decline sharply with heavier fishing. These species are also susceptible to being overfished by fishing gears which catch them at small sizes while still immature. In contrast, short lived species which mature early and produce large numbers of eggs may well be able to sustain heavy fishing without risk of serious decline.

In tropical multispecies fisheries it is rarely possible to manage for a single species, especially where fine meshed gears (e.g. baby trawl) capture a wide range of species with differing management requirements. In the absence of practical models for multispecies stock management, it is necessary to aim the management process towards major yielding species, and accept some inevitable overfishing of minor species.

3.2 METHODS OF FISH STOCK ASSESSMENT AND RECOMMENDED APPROACH

Methods of assessment can be grouped into two broad approaches

a) Analysis of catch and corresponding effort over a number of years or in different areas which show a wide range of fishing pressures. This "trial and error" approach compares the actual response of the stocks under differing levels of fishing then interprets the appropriate optimum.

b) The second approach is more elaborate, and is based upon the study of the population which are dynamics of single fish species (i.e.their growth and mortality) which are used to predict the effort level and gear characteristics (e.g. mesh sizes) generating optimum yields.

It is therefore proposed that the data collection/analysis routines within BFAR be functionally aligned to deal with two main processing "avenues" (see Figure 3). The first dealing with catch and effort, i.e. type (a) above and receiving its raw data mainly from the National catch enumeration scheme. The second, type (b) above, deals with growth and mortality parameters of important species and will recieve its raw data from specialized sampling teams in project locations.

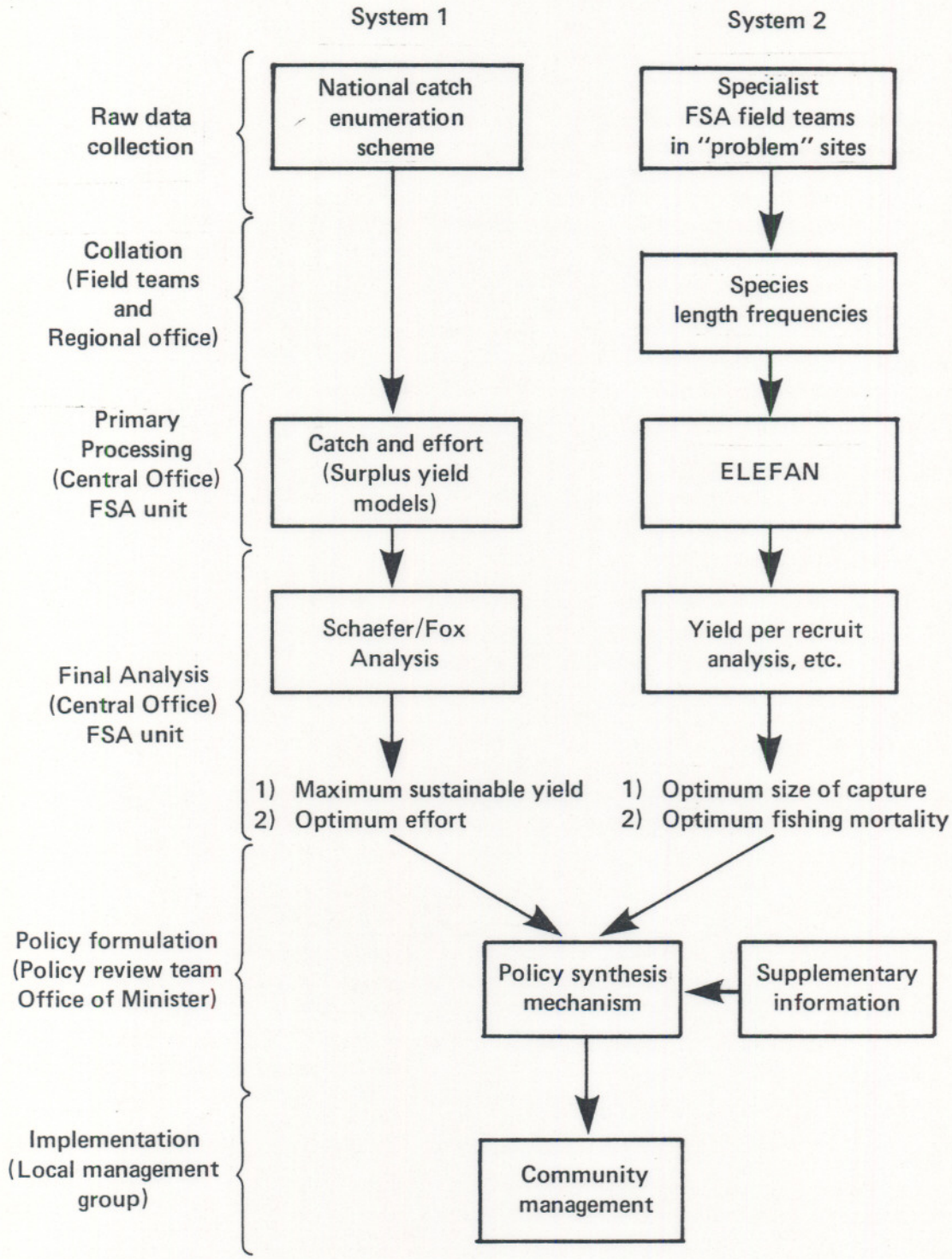


Fig. 3. Recommended avenues of data processing for fish stock assessment.

It should be noted that several alternative methods are available for certain links in the chain, depending on the amount of reliable data available. Each has its strengths and weakneses; the ideal is to use more than one method so that cross checks can be made. To avoid confusion of this early stage however, a baseline sequence has been introduced in the Consultant's training programme which focusses on the most practical methods available, and provides information on exactly what needs to be done in terms of management. As the FSA Team becomes progressivley more familiar with analytical procedures, new methods can then be conveniently substituted into appropriate sections of the two routines. This approach therefore provides a logical framework to which the FSA Team can relate and progressively strengthen through various training programmes planned for the project (see Chapter 6). (This effectively overcomes the problems encountered during previous training courses, attended by the BFAR staff, e.g. FAO-DANIDA and Thailand, when the sheer volume of new information apparently proved too much to absorb in a single course).

The training given to field staff and team members during this three month project preparation study is outlined in a special supplement presented with this report, and can therefore be referred to by future consultants who may be required to strengthen specific sections of the routine. As the BFAR needs are primarily those of a "user", it will be noted that the training has focussed more on underlying concepts and functional application of the techniques rather than on the complex and often confusing mathematical derivations. These are available in standard texts and for this study only the essential formulae have been broken down into conceptual components for easy understanding.

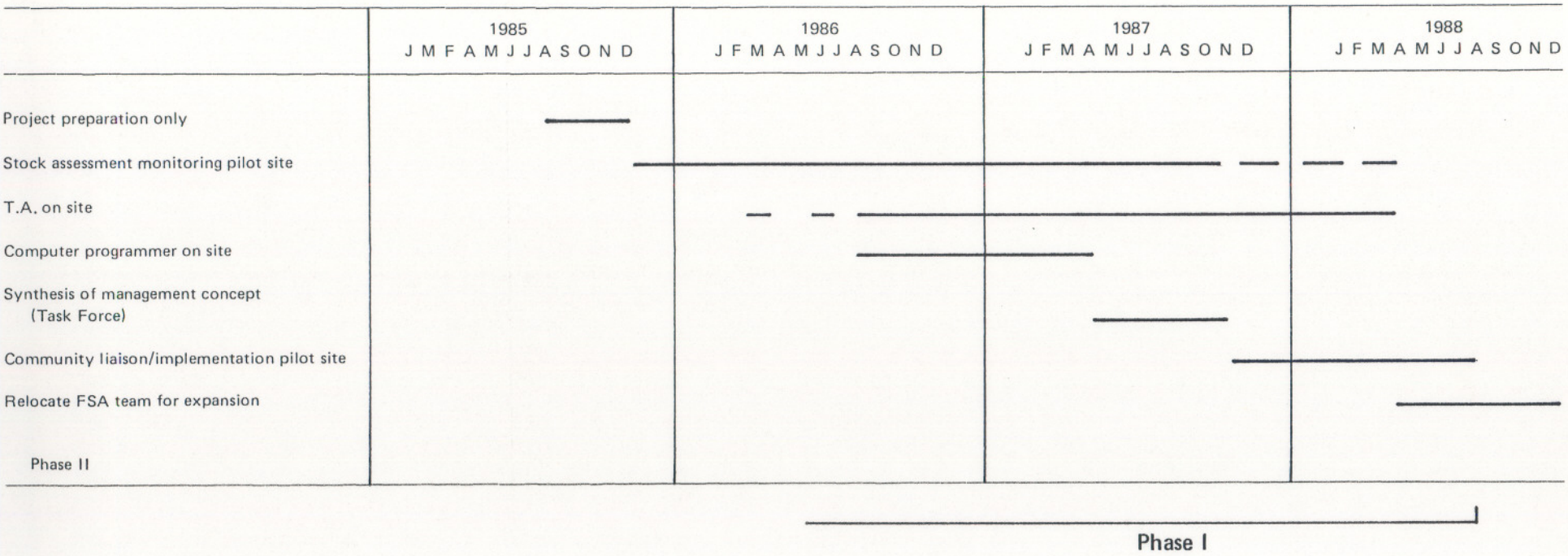
3.3 PROJECT PHASING, PREPARATORY TRAINING, AND TECHNICAL ASSISTANCE

An implicit requirement of the overall programme is that a practical system can be developed for data acquisition and policy formulation which can be expanded in the longer term to accommodate other areas. This suggests a natural division of the programme into 1) a two-year core development phase and 2) a third year expansion phase. The initial phase would be considered as a test bed for examining the cost and policy effectiveness of various sampling routines, the most productive of which would be picked-out in the third year for other specified "problem" areas.

The proposed phasing plan for the stock assessment is outlined in Fig. 4. At the time of writing (November 1985), field sampling teams for fish stock assessment have been recruited and sited in the core project area (Carigara/Maqueda Bays) and in one of the ancillary project areas, Guimaras Strait. A third team is shortly to be recruited and will most probably be sited in Asid Gulf. (See Fig. 5). These areas were discussed by Skillman and Wheeland (1983) as being most suitable for pilot studies as they are all important municipal fishing areas, all are probably overfished and gear conflicts are a problem.

Figure 4

Phasing Schedule of Fish Stock Assessment Activities



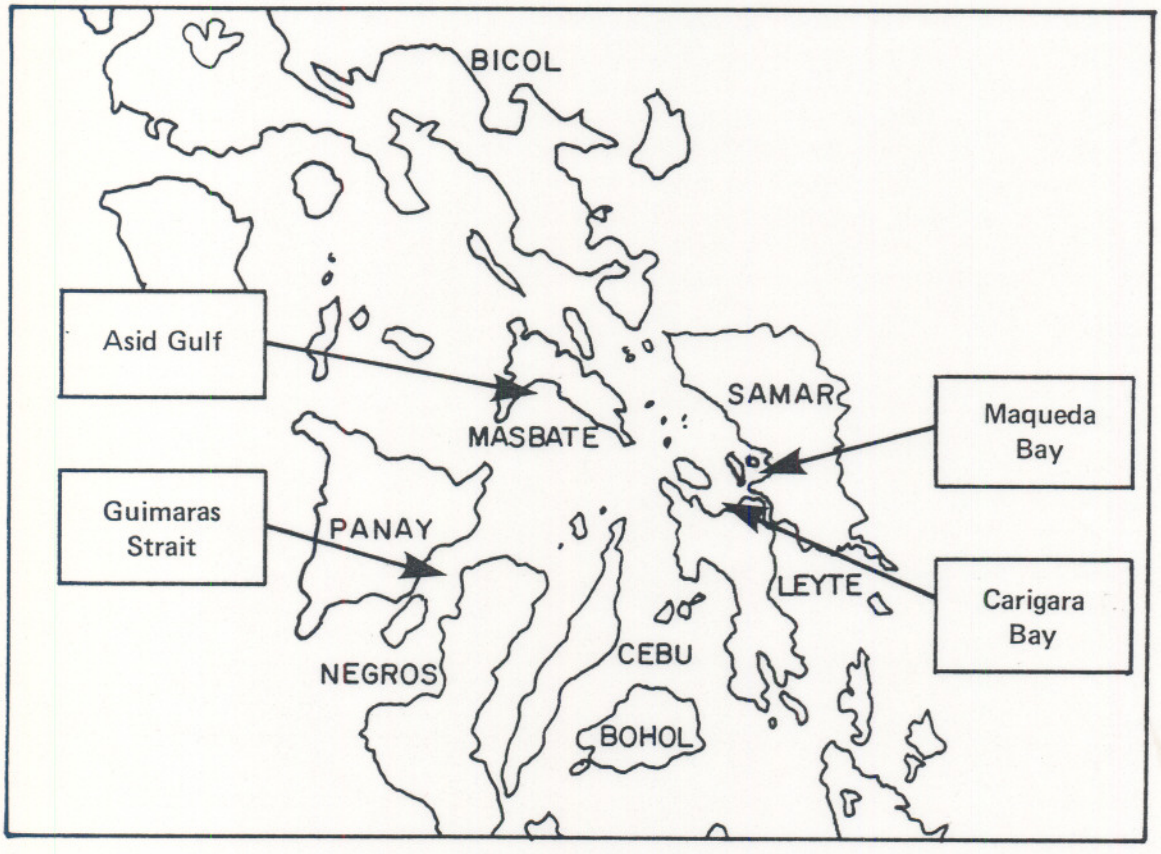


Fig. 5. Map showing the Maqueda/Carigara Bays, Guimaras Strait and Asid Gulf.

As outlined in more detail below, the current project preparation period (Aug.-Nov. 1985) has provided training both for the field team and co-ordinating staff and has introduced a systematic approach to the collection and processing of data. However, the analytical procedures are fairly complex and the data requirements highly specific. Furthermore, new methods will need to be introduced into the working routine throughout the pilot programme. It is therefore envisaged that a full time stock assessment specialist will be required for two years to help develop the necessary skills within BFAR for routine processing and interpretation and to assist in re-alignment of sampling routines in the initial expansion phase.

The counterpart programme is now in motion and in view of the probable time lag for tendering and commissioning of the T.A. package it is recommended that provision be made for quarterly bridging inputs from a stock assessment specialist, to ensure continuity in the programme now under way. This would give the added advantage that the FSA programme would be six months ahead of the socioeconomic studies, and would therefore be able to provide advance indications of the most likely management needs to be investigated by the latter.

Assuming that the long term T.A. package is commisioned from August 1986, the integrated pilot programme would run for two years until August 1988. A critical period in the pilot programme would start twelve months after commissioning, when a management feasibility study would be undertaken by a special studies task force. The structure of the task force is outlined in the community management study, Part III below, and would aim to synthesize all available information at that stage to develop a community management plan for implementation.

The expansion phase would start at the beginning of year (3) when specific problem areas would be identified elsewhere, and the FSA sampling teams relocated to establish baseline criteria in the new sites.

A special contingency fund is written into the proposed budget for two months per year of additional consultancy time. In the first year it is envisaged that this may be used for the quarterly bridging inputs explained above. A visiting lecturer would be highly desirable during the annual FSA coordination seminar. A need for new ideas and approaches from a visiting consultant would also arise at the start of the expansion phase when sampling strategies are being re-aligned for new problem areas.

CHAPTER 4: THE FIELD SAMPLING PROGRAMME

4.1 THE FIELD TEAMS

Three teams have been specially recruited for the project and have received intensive initial training in fish sampling and identification. All members are recent fisheries graduates, and as the teams were carefully selected from applicants on a regional basis, they are fully conversant with local dialects and customs in their own respective sampling areas.

The teams are seen as a crucial element in the overall framework of stock assessment and management planning. Ultimately, it is they who will be called upon to move into new "problem" areas, and to validate the factual basis of received complaints. They will be required to develop abilities to quickly modify their sampling routine in new fishery situations, and to establish a close working relationship with the fishermen themselves. The training given to the field teams during this project preparation therefore focussed on

1) An understanding of the key data requirements and how these fit into the final analysis.

2) The development of a priority sequence in the sampling approach, to ensure that key data are always recorded at peak landing times, and that there is a statistically acceptable spread of sample data.

3) Development of interviewing technique in order to overcome subsampling barriers and to obtain accurate and honest information from fishermen.

The field teams will be expected to undertake the initial collation of data, to arrange size frequency information, and to caculate and compare catch per unit effort values from different areas.

It is strongly recommended that the field teams are periodically able to participate in the final processing of their data, possibly through workshops and regular feedback of results to the field.

4.2 SAMPLING STRATEGY

On the basis of preliminary assessments of the general composition of fishing gears throughout each fishery in the project areas, strategic sample landing sites have been selected for intensive population analyses (4 in Carigara Bay, 4 in. Maqueda Bay, and 4 in. Guimaras Strait, see map). The sites show a representative cross section of major fishing gears, and have been spread out to accommodate regional variations in the density and types of fishing vessels (fishing effort). These sites will act as "sensing organs" for assessment of key population characteristics in each fishery as a whole. It is anticipated that supplementary but less detailed information on catch per unit of

effort will also be obtained from the National statistics enumerating scheme, which covers most of the adjacent sites in the project areas.

In order to obtain the correct data to achieve desired objectives, several different but related activity schedules are being coordinated within the overall sampling programme. Each activity is designed to generate a specific set of data and the supervision/coordinating personnel should keep in close touch with the data gathering process to ensure accumulation of complete data within each activity. "Bottleneck"situations occur regularly in sampling programmes of this type, particularly at peak landing times. It is therefore essential that the field teams have a clear work priority sequence to ensure that key data are always recorded and to help them rapidly regain control of the sampling area in a crisis situation.

In practice, the following activity schedules will be necessary in each of the three sampling areas.

1) Total Fishery Description - complete enumeration once every six months, of all landing centres, vessel types, size and if possible, gear composition. Survey to be undertaken when fleets are inactive (e.g. public holidays or preceding a monsoon).
   These surveys are designated to provide a rational basis for selection of representative sampling sites, and to assess seasonal migration of fishermen from their home base.

2) Regional analysis of catch/effort for species - Daily monitoring of selected sites covering a wide range of gear types to assess numbers active, proportion of active days, fishing type, depth, etc., average yields and subsampling for species composition. (Will dovetail into surveys by national enumeration scheme which covers more sites but does not record to species level).
   This activity is designed to provide raw data inputs to the Avenue "A" type analysis, to indicate maximum sustainable yield and optimum fishing effort.

3) Population parameters - Fortnightly collection of length frequency data from selected (10-15) important species.
   This activity provides raw data for the analysis of approach on the right side of Fig. 3. to indicate optimum fishing mortality for maximum yield, and optimum size of capture.

4) "Fine grain data" - Brief, six monthly collections of data on age of maturity and ageing checks to verify and strengthen (3) above.

5) Special "mini" projects to fill in gaps in data

   - Quarterly fishing trips using quantitative methods to assess densities, standing biomass and zonation.

- Sampling of push nets for juvenile length frequency to strengthen ELEFAN analysis.

- Desk study of relevant information on migratory pelagic species (possibly up to 50% of catch) for which incomplete data will be available inside the sampling area (i.e. links with oceanographic department over pelagic/plankton surveys for spawning areas, interpretation of migratory routes and fishing pressure outside area, links with statistics department over analysis of migration by seasonal/regional changes in catch per unit effort.

Operational logistics of the above are explained more fully in the training supplement of this report.

4.3 FISHING GEAR INVENTORY SURVEYS

It is recommended in Chapter 2.5 that a gear inventory of the sampling area be undertaken by BFAR in early 1986. The usual house to house questionnaire approach is expensive and greatly overestimates the amount of active fishing effort (i.e. a fisherman will list all gears he owns even though he may use only a few). A more useful approach from a statistical point of view would be to use or strengthen the core of statistical enumerators in the project area for 1-2 months, and ensure that they systematically sample all landing sites in rotation. In this way the landing records would give a more useful indication of the composition, distribution and density of active gears in different areas. If possible the survey should be timed to coincide with the first bridging input of the FSA consultant, and should be planned to cover all remote areas including the islands.

4.4 DEEP WATER SURVEYS

Deep water trawl surveys have not been included as a regular feature of the above activities for several reasons. First, a series of trawl surveys were undertaken by the University of the Philippines in 1979-81, which led to estimates of demersal (bottom living) biomass by depth (Arnold et al 1983). Additional trawling surveys at this point would be expensive and probably not provide much new information. Second, unless undertaken on a regular basis, experimental trawls tell us little about growth and mortality coefficients, and give only a rough estimate of sustainable yield. The cost/benefits ratio was therefore not considered strong enough for inclusion of a trawl survey in the pilot study.

It is felt that a more practical approach would be to charter selected fishing gears from the community for experimental surveys, should the need for biomass estimation arises.

In particular, the so-called "Hulbot Hulbot" is a relatively new demersal fishing gear which is currently being used at depths ranging from 10-150m. Preliminary examination of the gear during the study

indicated that it can be used quantitatively and is in fact more efficient than trawls (which may lose 50% of fish in their towing path), Hulbots should therefore be used to assess species zonation and relative biomass of bottom living fish, and a budget allocation is made for materials to construct "standard" nets.

The main shortfall in the routine sampling programme lies in the assessment of pelagic on open water stocks. For effective assessment of biomass, these require acoustic integrating equipment and a suitable research vessel. As no such equipment exist within BFAR, it is strongly recommended that the stock assessment project currently being planned for submission to the World Bank (on small pelagic fishes) consider this as a priority. A suitable vessel exists in the R.V. Researcher, and the equipment is seen as essential in the longer term stock assessment objectives of the BFAR. In the meantime, catches from pelagic ring nets should be closely monitored to assess relative abundance and distribution of species.

4.5 ASSESSMENT OF BOAT DENSITY

In this project it is planned to test out a new idea for assessing the density and distribution of boats in each fishing zone for the catch per unit effort analysis. This will involve either purchasing or hiring once a month, two small bancas to traverse the whole sampling area in a zig zag or linear transect pattern. On board, enumerators, equipped with binoculars, would make a visual count of the actual numbers of boats and crews actually fishing in each zone. Night time fishing can easily be assessed in the same way by counting numbers of lights. These data would then be used in the catch and effort analysis to identify regions of high and low fishing pressure (see 5.2 below).

4.6 TEAM MOBILITY

Each team is required to sample three sites a week up to 20 km from their home base and are required to arrive at sampling sites at 4 a.m. Most of the sample sites are in remote areas, without regular public transport, and often without good roads. Because of present transport problems. The teams are frequently unable to arrive on site early enough to monitor the main landing period (4 a.m.-7 a.m.)

The teams must also be fully mobile in order to accurately maintain the fleet inventory.

A fundamental principle of the catch and effort analysis is that data from the sample sites can be raised (i.e. multiplied up) to indicate total fishing effort for the whole project area. This requires an accurate picture of the numbers of landing sites, boats and composition of fishing gears along stretches of coastline up to 400 km in length. As there are no continuous coast roads it is planned to enumerate from the beach, and at times of the year when all boats are ashore. (Preceding monsoons and/or public holidays). Without motorcycles this would be impractical over the distances involved.

CHAPTER 5. DATA PROCESSING AND INTERPRETATION

5.1 RECOMMENDED APPROACH

As outlined above, the field sampling programme is designed to produce key data for two fundamentally different types of stock assessment. We can now discuss in more depth how the data processing "avenues" can be organized logistically by the BFAR Team coordinators.

5.2 ANALYSIS OF CATCH AND EFFORT DATA

In principle, it is necessary to plot the total catch and corresponding effort in a fishery, over a wide range of different levels of fishing pressure and hence determine the relevant effort required for maximum yield. In practice, the quantity caught per boat per hour is much easier to estimate and more useful than the total catch from the fishery, so the analytical process is based on this (known as catch per unit of effort or CPUE). In favourable circumstances and with reliable catch and effort data, this can sometimes be done by plotting annual data from a number of years which have shown increasing levels of exploitation. Simpson (1964) adopted this approach for commercial catches in the Philippines but he experienced problems in quantifying fishing effort from incomplete records, and in certain cases he suspected that catches may not have been accurately declared.

As the national system for enumeration of fisheries statistics has only recently started to monitor effort for Philippines municipal fisheries it will be some years yet before meaningful analyses can be carried of annual data series. However, an alternative approach which would be more applicable to the present study of municipal fisheries, is to use simultaneous data from a number of comparable project areas which show differing intensities of fishing. This approach has been used successfully for small scale fisheries in Jamaica, Tanzania and the Western Mediterrenean and assumes that in a fast growing and heavily fished population, the mixing effects of migration are small by comparison with the effects of localized fishing.

Preliminary analyses of the fisheries pilot project have verified this, and have shown that heavily fished areas produce proportionally lower CPUE values than lightly fished areas. This effect is also conveniently localized because municipal fishermen in the Philippines tend to operate within a limited radius of approximately 1-2 hours travelling time (i.e. up to 20 km) from their home base. The density of boats operating in any area therefore depends mainly on the population density of fishermen. By comparison of different project areas it is thus possible to show a range of different stock responses according to their respective levels of fishing effort. For example preliminary CPUE analysis carried out on four-years data for the core project area indicate that the fisheries of E. Biliran, and Carigara Bay are slightly underfished while those around Catbalogan and W. Samar are overfished (see Appendix A).

5.3 ENUMERATION OF ACTIVE EFFORT

Accurate estimates of the densities of active fishing vessels in each area are crucial for CPUE analysis, and it is recommended that the following census methods would be appropriate for the field teams

a) Visual enumeration using binoculars/telescope from a suitable vantage point. The area enumerated and hence boat density can then be calculated using maps.

b) Visual enumeration from ground level and using the calculated distance to horizon to estimate boat density.

c) Enumeration from a moving boat by transecting a defined sample area.

d) By assessing numbers of active boats from sample sites, and then raising to give total boats for all sites in area.

The first three methods are the most accurate and should be used in areas manned by the FSA team members. The latter method however is appropriate for obtaining effort information from the national enumeration scheme.

5.4 INTEGRATION WITH THE NATIONAL CATCH ENUMERATION SCHEME

This scheme has been in existence since 1978, and aims to record catches in some 5,200 landing sites nationwide, approximately once every 2-3 months. There is a considerable volume of data recorded by the scheme which could, with minor modifications to the field data sheets and raising programmes, provide valuable CPUE information for stock assessment.

Although coverage is thin and catches are recorded only to species groups, the scheme has the great advantage of simultaneous nationwide coverage. The average catches per boat are recorded with acceptable accuracy and therefore could provide useful data for stock assessments. Thus, by combining the advantages of wide but superficial coverage of the national scheme, with the more intensive but localized studies of the stock assessment team, the inherent problems and short falls of each could be effectively overcome.

Essentially the system is based on daily record sheets from field enumerators who monitor total number of landings by gear type, and their caqches by species group. The enumerators move to a new landing site each day, and in principle, the scheme is intended to cover all landing sites at least once every few months. The enumerators work to a pre-arranged timetable and although the coverage is thin, the monthly averages for daily yield are based on very large numbers of major and minor landing sites. Thus a more accurate description of sampling error is obtained than would be obtained through using selected sites only.

At present only the catches are raised to give annual totals for the Philippines as a whole. By using the original data sheets submitted by statistical enumerators in the project areas it has proved possible also to raise the numbers of fishing units landing per day and their fishing times in exactly the same way as is being done for catches. Ultimately, this is far more meaningful than ground census of total gears/boats which gives no real indication of active fishing effort.

It is therefore recommended that this second raising process be incorporated into the planned computerization of the statistics department. In the meantime, however, three staff members have been recruited into the statistics department specifically for stock assessment purposes and these can be immediately deployed on the recovery of CPUE data.

5.5 RECOMMENDATIONS FOR STATISTICS DATA RECORDING AND COOPERATION BETWEEN THE TWO COMPONENTS OF THE PROJECT

Recording of Gear Size

A critical element of the analysis requires that fishing gears can be separated according to size, this allowing CPUE values to be used as a direct index of fish density.

It is therefore recommended that revised Fishery Survey Form (1) should include an extra column to accommodate critical gear dimensions (i.e. whether the data has come from say, a gill net of 50 m or 2000m length). This can be done easily if the enumerators are familiarized with the following key of critical dimensions for each gear type.

Baby trawls - head rope length (not towing warp)

Hulbot-Hulbot - length of head rope and scarelines (expressed as e.g. 200 m X 2)

Hook & Line - number of hooks

Seines, ring nets, etc. - length

Gill nets - total length of all kabanatas added together

Lift nets - length X width

The relevant dimension should be given in meters, and to avoid confusion should be preceded by initials to signify what the measurement refers to (e.g. HR for headrope, SL for scareline, H for hooks, L for length, etc.).

In the final analysis, gears can be easily accessed in the databank and separated according to size.

Description of Fishing Gears

The CPUE analysis, will look in detail at particular gears, and the relative catches by that same gear in different areas. Through experimental calibration it is planned to use these to assess the actual quantities of fishable stocks in any chosen area. However, CPUE-based analyses are extremely sensitive to errors, i.e. "wrong" averages becoming accidentally incorporated in a data base.

In the trial analyses performance so far, the following problems have become apparent which do not affect the raised catch estimates for statistical purposes, but seriously throw out the CPUE analysis:

1) "Carrier" vessels which have purchased fish from other boats, and therefore have additional quantities of fish, are not usually identified on the data sheet.
It is therefore recommended that the "vessel/carrier" description box on Form I be made into a column suitable for entry of all boats and the enumerators specifically instructed to ask the boat owner whether the catch has been combined with that of another boat.

2) New gears (e.g. Hulbot-Hulbot) tend to be listed under an existing heading (i.e. gill nets or seines). Enumerators should therefore be encouraged to report back to their regional supervisor for clarification on any new gear.

3) Gill nets are one of the most widely used gears and it is planned to make a special analyses for these. It would therefore be helpful if the Regional supervisors could ensure that all enumerators have a clear idea about the different types of gill nets and to check incoming data sheets to ensure correct titling (i.e. bottom set, drift, sardine, encircling, etc.).

4) Many gears are now used in conjunction with an aggregating device or shelter. This can affect the CPUE considerably and it is recommended that a column be included on Form (1) entitled "use of aggregating device".

Cooperation at the Field Sampling Level

The FSA sampling teams are presently located in pilot study areas in Guimaras Strait (Panay), Carigara Bay (Leyte II) and on N. Maqueda Bay (W. Samar). Due to the heavy workload involved in estimating fish population parameters at the species level, the teams are only able to cover a small number of sites in each area. However, the predictive analysis also requires information on the composition and numbers of active fishing gears over the area as a whole and the National enumeration scheme could provide this though the second raising process described above.

It is therefore recommended that whenever the two programmes are operating in the same area, they liaise closely to ensure that the landing site listings are updated and all are covered at least 3-4 times a year. A total enumeration sites and gears in each project area is planned twice a year using motorcycles (the surveys will be done using motorcycles when boats are inactive either before monsoon, or public holidays, see above). In view of the wider working knowledge of the statistics enumerators it would be mutually benficial for the two groups to cooperate in this activity.

This cooperation will in fact assist the statistics department to keep abreast of changes in the number of landing sites, and of any major changes in fishing trends that would normally not become apparent until the next National census.

It is recommended that a budgetary allocation be made through the RRDP-FSA Component, to allow the statistics department to make-up the correct complement of enumerators in special project areas for the duration of each study.

Recommendations for consideration in the planned computerization of the statistics department:

At present the department employs some 200 administrative staff involved in raising catches to give annual national statistics, and the Bureau of Agricultural Economics is currently planning for computerization of the scheme. In view of the heavy reliance that the FSA project will be placing on CPUE data recorded through the scheme it is recommended that a portion of the component proramming time be allocated to assist BAECON with the preparation of the statistics data logging system.

The following recommendations summarize the FSA needs from the system:

1) That in addition to the existing raising process for catches, similar raising routines be built in for fishing effort(i.e. total number of fishing units landing per day for each gear type), and fishing time (i.e. total numbers of fishing hours for each gear). These sequences would be operated on a routine monthly basis.

2) To be useful on a project by project basis, it should be possible to retrieve this information for specified areas, and for specified periods during each year (e.g. monthly).

3) In addition to the regular monthly processing of above, special accessing routines will be necessary for ad-hoc projects. These will need to retrieve data from individual boats and to separate the data according to specified criteria (e.g. stock analysis requires average catch per hour or man hour, by municipality gear type, critical gear dimension groups, species groups, depth zone and fishing distance. Socio-economic studies require information on total catch per boat, trip frequency and numbers of operators).

5.6 ANALYSIS OF FISH POPULATION DYNAMICS

While the National catch recording scheme can provide wide coverage of catches and effort for the first type of stock assessment analysis (see Section 5.2), a fundamentally different type of population monitoring is described here. Here we refer to key information on accurately identified species, on their growth and mortality rates, and where possible on actual population densities.

Data processing is undertaken in two stages (Fig. 3). In the first instance, suitable raw population data are fed into a primary processing routine to ascertain coefficients for growth and mortality. Thereafter, one of several types of final analysis can be applied to the population coefficients to predict best levels of exploitation. Most final methods involve models concerning the optimum level of fishing relative to natural mortality. Some involve cohort analyses to assess numbers of recruits prior to fishing . For one type of final analyses it is not necessary to know the total population and yield. Rather, the method uses relative ratios derived from length frequencies to devise optimum patterns of fishing effort, and mesh regulations. However, it has proved extremely difficult for a new "user" team to fully absorb all methods simultaneously. The training given during this project preparation study (see Fox, "Recommended Procedures for Collection and Processing of Raw Data for Fish Stock Assessment. Lecture Notes for Training BFAR Personnel, RRDP/FSA, Manila 1985) therefore focussed on the development of an apprpriate processing sequence. Ending with the most widely used form of final analysis. (see Fig.3). This working scheme will therefore form a convenient introduction to the forthcoming FAO-DANIDA stock assessment training course in Manila, to be held in January/February 1986 in Quezon City for BFAR and other fishery research personnel.

5.7 RECOMMENDED PROCEDURES

As explained in the document mentioned above, growth and mortality coefficients for the final analysis have traditionally been obtained through laboratory procedures. In particular, daily or annual growth rings can sometimes be read from fish scales or bony structures in the same way as can growth rings across a tree trunk. However, the preparation of large numbers of samples for microscopic analysis is labour intensive, and the subsequent interpretation of growth coefficients often highly subjective.

The approach recommended for growth assessment in this study is now generally held as more appropriate for fast growing tropical species, and is based on the progression of discernable size modes (cohorts) through a population. A computer programme known as ELEFAN I developed at ICLARM is available for this type of analysis which fits a growth curve through peaks in sets of monthly length measurements.

A second programme (ELEFAN II) assesses the mortality rates from the decline in numbers with increasing length, assuming that the size structure of the sample reflects that of the true population. It is therefore essential that all available sampling methods are first compared with respect to their catch composition, and the sampling programme based on fishing methods that capture a representative size range of fish. Working procedures for this and the ELEFAN analysis are given in Appendix A.

For the final stage analysis, the team has been familiarized with a particularly useful routine, known as yield per recruit analysis. Essentially, this defines the extent to which catches can be increased either by adjusting the level of fishing effort (i.e. number of boats), or by changing the size of capture through net mesh regulation. In other words, it decribes what needs to be done in terms of management for the fish population to approach its optimum sustainable yield.

Through the above-mentioned FAO-DANIDA course, the team will become familiar with several other types of final analysis, usually used in combination for the purpose of cross checking and strengthening the management recommendation. It is important that this final stage can be done at "desk level". A complete suite of programme cards is available through ICLARM for use with Hewlett Packard programmable desk calculators (HP 67/97 and HP 41 series). During this project preparation study, the team has been familiarized with the application of relevant parts of that suite for the final stages of various approaches to stock assessment. Programmable calculators will therefore be necessary for each of three team coordinators in central office.

5.8 COMPUTERIZED DATA STORAGE AND PROCESSING

At this stage it is necessary to give some thought to the desirability and extent of computerization within the scheme. For obvious reasons, manual checks are essential at strategic points in the processing sequence. Furthermore, for certain data pathways (e.g. those leading through length frequency analysis for growth and mortality) it is essential to "see and believe" the data as they accumulates, and to be able to modify the sampling programme to ensure continuous and adequate coverage. (e.g. most fishing gears, including trawls are selective against smallest and largest fish and the catch composition rarely reflects true population structure, thus some degree of choice must be exercised over the gear types used for sampling). For these reasons it is recommended that items length-frequency data be collated manually throughout the primary processing and rigorous rejection

criteria applied prior to final analysis using ELEFAN).

There is however a need for computerization of catch and effort data. The relevant surveys are extremely data intensive, and several different analyses will need to access different data from individual boats (e.g. average catch per hour by species, fishing area and depth zone. The socioeconomic studies will also need to access information on average total catch, trip frequency and numbers of operators).

Altogether, the existing data recording forms incorporate approximately 30 information "bits" in the primary interview, plus a further 60 "bits" for the catch subsample (aimed at 1 in 5 boats). Thus, the present sampling programme covering twelve selected stations will provide about 5 million "bits" of information per year. Allowing for labelling and accessing routines this could be accommodated on a micro-computer with compatible hard disc storage facilities.

Choice of computer

The type of computer chosen should be able to use existing software for ELEFAN as this is at present the best programme available for converted length frequency analysis. Of the various version of the ELEFAN program available, the one currently used by U.P.Department of Fisheries on a Hewlett-Packard (86B) is the fastest. It also allows simultaneous plotting of both the size frequencies and derived growth curves. Even more important, it allows some leeway for visual fitting of parameters and so corrects the tendency of earlier version of the programs to under-estimate growth.

However, there are likely to be several good IBM version of these programs shortly available. In view of the general use of IBMs in various government departments in the Philippines (including the proposed Fisheries statistics data logging on IBM main frame), it is strongly recommended that BFAR rely on IBM PC (or another computer wholly compatible with IBM PC) to meet its hardware requirements. There is also the advantage that any data logging requirements of the FSA project using compatible hard disc facilities could use virtually the same programme as planned for the national catch enumeration scheme.

CHAPTER 6. STAFFING AND TRAINING

6.1 BFAR STAFF REQUIREMENTS

The proposed staff structure of the programme and its administrative links within BFAR are outlined in Figure 6.

Leadership of the programme

The Officer-in-Charge of BFAR Research would take on the role of Project Director and assume responsibility for supervision and coordination of all project activities. In the absence of clear-overall leadership the essential coherence and objectives of programme would be difficult to maintain. This is especially so as the socioeconomic surveys will need to be undertaken in cooperation with other specialist departments or outside agencies, who will require clear directives on the key information required for fisheries policy making. Much of the day to day coordination of stock assessment activities however can be delegated internally, through the central office team leaders and the T.A.fish stock assessment specialist defined below.

Team coordination

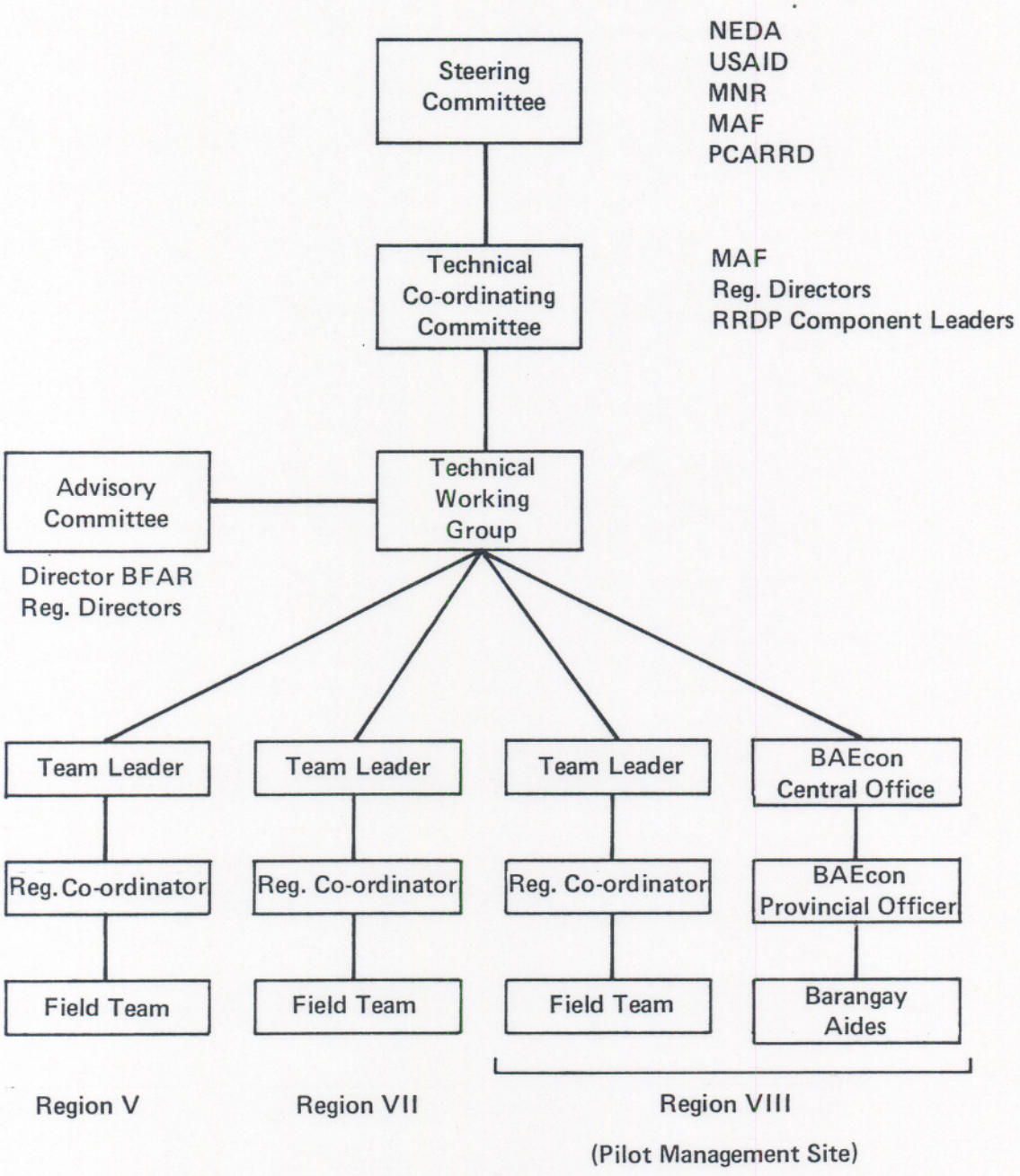
Two stock assessment sampling teams are presently located in Guimaras Strait, and Carigara/Maqueda Bays and the third team shortly to be recruited and trained will be located in Asid Gulf. The teams are each designated a field coordinator from their respective Regional Offices, who make weekly visit to the project areas for liaison, and to give assistance with primary collation of data. Datapacs are then transferred once a month to central office, for processing by three team leaders.

It is essential to maintain a coordinated team approach at all stages of sampling, data procesing and interpretation, and to achieve this it will be necessary for the team leaders from central office to visit the project areas once every two months. This is seen as a forum for two way exchange; first to resolve specific analytical problems arising in the data collection approach. Second, to allow the teams to see, discuss and contribute to the results. (Visits should place emphasis on the teams role in sensing complaints and problems as perceived by fishermen).

In addition to the core team and data processing personnel, support is also required in the following areas:

1) Secretariat - Stock assessment projects generate an enormous amount of raw data which requires thorough checking before entry into the data logging system. After analysis by the team leaders there must be regular synthesis of results and reporting back of problems to the field teams, and preparation of reports for the policy review panel. The three team leaders in central office therefore require

Figure 6
Administrative Structure of RRDP
Fish Stock Assessment Activities



secretarial and office facilities, and need assistance for routine data checking and entry.

2) Statistics enumerators - As outlined in section 5.4, supplementary information is required from landing sites adjacent to those selected for intensive study. To assist the nation enumeration scheme to cover all sites regularly and methodically, provision should be made to allow the Statistics Department to take on additional enumerators for the project areas. This would be a floating fund for limited duration contracts of casual labour, and would re-employ new enumerators when the project moves to other areas.

3) Socioeconomics counterpart staff - in view of the likely key role of community management in the future objectives of BFAR, suitably qualified counterpart staff will be required in sociology and economics. Their salary should be adequate to attract candidates of high calibre, and who would ultimately be able to design and manage project implementation.

6.2 TECHNICAL ASSISTANCE

Advanced methods of predictive stock assessment have only recently been adapted for use in tropical fisheries and have never been applied systematically in the Philippines. Furthermore, the concept of community management is innovative and will require inputs from experience gained in other similar projects elsewhere in Southeast Asia. It is therefore recommended that during the pilot and initial expansion phases, the programme be undertaken jointly with a consulting organization experienced in the implementation of stock assessment and relevant socioeconomic studies.

The functional role of the consulting package would be:

1) to provide the full time services of a stock assessment specialist for three years, to help develop the necessary skills within BFAR for collection, processing and interpretations of relevant population data. The specialist would work closely with the project director, to assist in formulating a departmental working plan which satisfies the scientific objectives for stock assessment, and fits into the short and longer term administrative objectives of BFAR.

2) to provide the services of a specialist socioeconomic consultant for block inputs. The first would be at the start of the project to set up the questionnaire surveys and to brief the BFAR economist and BAECON staff on sampling procedures. The second and most important input would be the end of the first year, to organize and lead the special task force study outlined in above, and to formulate a workable scheme for implementation of a community based fishery

management.

3) The Agency contracted to provide the above specialists should be fully qualified to ratify and give guidance on all project activities, and to provide the necessary technical and informational back-up. The Agency would also be ultimately responsible for the timely preparation of reports and recommendations by the specialists.

Both of the specialists should have an established international reputation in their respective fields, with a proven track record of similar previous projects in the Tropics. The fish stock assessment specialist must have a thorough working knowledge of all standard analytical procedures, together with ability to work harmoniously and productively alongside colleagues and counterpart staff. The socioeconomist should have project experience in the planning and setting up of rural community management groups elsewhere in S.E. Asia, and in the synthesis of relevant economics impact studies for policy formulation. Most important is that both specialists have ability to plan, lead and manage multi-disciplinary team studies involving a considerable amount of field work.

Additional specialist inputs

A block input of eight months will be required from a computer programmer to develop data logging and accessing routines, and to translate the latest version of ELEFAN from the Hewlett Packard system to IBM. A suitable programmer should be located in the Philippines, and could also give assistance to BAECON in developing programmes for the National Catch enumeration scheme.

6.3 TRAINING

The training needs of the stock assessment programme fall into three categories; (see Table 2).

1) Induction of the field teams and regional coordinators (33) into the general concepts of stock assessment and the data processing routines undertaken in central office. This should take the form of an annual workshop in Manila, run by the team leaders, and stock assessment specialist, and possibly bringing in a visiting lecturer through ICLARM. Regional seminars should be organized two or thre times a year.

2) Progressive development of the resource management capability within BFAR and introduction of new analytical methods into the FSA central office working portfolio. This will start with the FAO-DANIDA stock assessment course in Manila in January 1986, and will be continued on the basis of working seminars prepared by the resident fish stock assessment specialist.

Table 2. Summary of information on project (FSA) training requirements.

Subject Area	Type of Training	Number of Participants	Duration	Anticipated Training Facility	Location (US/Third Country/In-Country)	Cost
A. Non-Degree						
1. Tropical Fish Stock Assessment	short-term	10	Jan-Feb 1986 (5 weeks)	FAO/DANIDA	in-country	P 46,250
2. Computer programming	short-term	2	3 mos.	Nat'l. Computer Inst.	in-country	P 3,700
3. Fish Stock Assessment Data Analysis	Seminar/ Workshop	20	16 days	BFAR Research Division	in-country	P 110,000
4. Fisheries Planning & Management	short-term	2	April 7 - June 27 1986 (11 weeks)	Humberside College of Higher Education, U. K.	U. K.	$ 18,000
5. Fish Population Dynamics & Data Management	short-term	2	May 12 - Aug. 20 1986 (13 weeks)	CIFAD, Oregon State University, U. S. A.	U. S. A.	$ 40,000
6. Fishery Economics	short-term	2	Aug. 25 - Sept. 26 1986 (4 weeks)	CIFAD, Oregon State University, U. S. A.	U. S. A.	$ 18,000
7. Taxonomy, Biology & Culture of Molluscs	short-term	1	Feb-March 1986 (6 weeks)	Phuket Marine Biological Laboratory	Thailand	$ 2,000
						$ 78,000
						P 159,950
B. Degree						
1. Resource Management	MS	1	2 yrs.	Oregon State University	U. S. A.	$ 40,000
2. Fish Population Dynamics	PhD	1	3 yrs.	Univeristy of Washington	U. S. A.	$ 60,000
				PCCARD funded		$ 100,000

Several overseas training courses are also recommended to strengthen the analytical and management capabilities of the Departmental staff. The Oregon State University (USA) course on fish population dynamics has a strong data management basis which would be highly relevant to the development of stock analysis systems within BFAR.

The Humberside (U.K.) course is oriented towards both tropical and temperate fishery management, with most of its students coming from Africa and Asia. It is recommended for its practical content aimed at fishery administrators in Government departments. In addition there are two long standing government fish stock assessment units in the UK, which process international fishery statistics from the W. Atlantic. It would be particularly valuable for the project coordinating staff to see the mechanics of data collection and synthesis in such large scale programmes. Efforts should be made to link with other stock assessment groups elsewhere in the tropics to develop a feel for different types of problems and solutions. Suitable short term courses for strengthening the capabilities of senior project staff are listed. Periodic inputs from visiting consultants (see 3.3) should be directed towards training.

3) Identification of potential future project leaders (e.g. amongst current field teams and other fisheries graduates) suitable for longer term advanced post graduate training in fish population dynamics. It is recommended that two studentships be made available for MS and Ph.D. training for suitable candidates, possibly at the Universities of Oregon or Washington, U.S.A. (Items 1 and 2).

CHAPTER 7. PROJECT COSTS

For convenience, the project costs have been estimated on the basis of complete financial years, and assume that there have been no prior allocations for essential items. Allowance has also been made for an inflationary increment of 20% on recurrent costs.

Excluding the costs of Technical Assistance and overseas training, the actual project costs for 1986 are estimated at P4.27M. The estimated costs are therefore lower than the P4.8M approved for the project by the Ministry of Budget, which included additional allowances for resource related socioeconomic studies and for various administrative charges. It should also be noted that the budget excludes estimates for overseas degree level training ($100,000) currently under consideration for PCARRD funding.

The following items in the budget require additional explanation:

B 6) Data processing services: as the BFAR computer will not be fully programmed until early 1986, the first years data will be procesed at UP College of Fisheries under rental agreement.

C 3) IBM PC: Although there are two IBM PCs in BFAR, both are deployed elsewhere in the Bureau and are unavailable for use by the stock assessment unit. Neither have hard disc or plotter facilities.

D) Special survey costs: Monthly counts of number of active fishing boats are to be undertaken by traversing the entire project area in light, high speed vessels and counting visually. There are no suitable small launches in BFAR, so it will be necessary to either purchase or hire bancas from the project area. There would be a 30% saving on quoted estimates if vessels were purchased rather than hired. The pelagic/demersal surveys will use either the smallest BFAR research vessel (Peneaeus monodon, 50 m, 80 Hp) or hired craft from the project area. The overall costs would be about equal, the fuel, areas and maintenance costs for Peneaeus running at around P300,000/year. The main disadvantage in the latter option is that the vessel would need to operate continuously to cover all three project areas, and it is felt that the project would greatly benefit from the involvement of local fishermen.

Table 3. SUMMARY OF ESTIMATED COSTS: FISH STOCK ASSESSMENT ACTIVITY
(P E S O S)

		Year I	Year 2	TOTAL
A)	Personnel	1,067,000	1,280,400	2,347,000
B)	Maintenance and operating costs	1,228,000	1,293,600	2,521,600
C)	Equipment	1,195,985	30,000	1,225,985
D)	Special survey costs	522,000	626,400	1,148,400
E)	Technical Assistance	3,036,200	3,106,440	6,142,640
F)	Training in country	259,950	519,650	779,600
G)	Training overseas	1,443,000	1,731,600	3,174,600
		8,752,135	8,588,090	17,340,225

Table 4. Breakdown of Estimated Costs: Fish Stock Assessment Activity

	Year I	Year 2	TOTAL
1) Personnel Services			
1) 30 contractual biologists	540,000	648,000	1,188,000
2) 16 statistical aides	192,000	230,400	422,400
3) 3 Clerical	54,000	64,800	118,800
4) COLA	281,000	337,200	618,200
	1,067,000	1,280,400	2,347,400
B) Maintenance and operating expenses			
1) Travelling	210,000	252,000	462,000
2) Maintenance contracts/repairs	98,000	117,600	215,600
3) Gasoline	160,000	192,000	352,000
4) Field station fittings	50,000	20,000	70,000
5) Materials and supplies	210,000	492,000	702,000
6) Data processing services	400,000	100,000	500,000
7) Publication	40,000	48,000	88,000
8) Contingency	60,000	72,000	132,000
	1,228,000	1,293,600	2,521,600
C) Equipment			
1) Programmable calculators HP 41C (3)	26,985	-	26,985
2) Desk calculators (20)	9,000	-	9,000
3) IBM PC/H.Disc/plotter	150,000	-	150,000
4) Telescopes (4)	15,000	-	15,000
5) Binoculars (10)	15,000	-	15,000
6) Motorcycles (10)	150,000	-	150,000
7) Vehicle	280,000	-	280,000
8) Binocular microscopes (3)	120,000	-	120,000
9) Otolith cutter	15,000	-	15,000
10) Field equipment (balances, counters, measuring)	30,000	-	30,000
11) Freezer	10,000	-	10,000
12) Office furniture/cabinets/ desks	20,000	-	20,000
13) Typewriters (3)	45,000	-	45,000
14) Photocopies	120,000	-	120,000
15) Netting/gear materials	110,000	30,000	140,000
16) Contingency	80,000	-	80,000
	1,195,985	30,000	1,225,985

Table 4 (Cont.)

	Year I	Year 2	TOTAL
D) Special survey costs			
1) Monthly enumeration transects			
2) (Purchase or hire 3 x light bancas)	192,000	230,400	422,400
3) Quarterly pelagic surveys	180,000	216,000	396,000
4) Gear efficiency/demersal surveys	150,000	180,000	330,000
	522,000	626,000	1,148,400
E) Technical Assistance			
1) Fish stock assessment	1,998,000	2,397,000	4,395,000
2) 2 quarterly bridging inputs and air fairs	407,000		407,000
3) Technical services/ visiting lecturers	500,000	600,000	1,100,000
4) T.A. site travel	7,200	8,640	15,840
5) Programmer (8 months)	40,000		40,000
6) Professional fees	84,000	100,800	184,800
	3,036,200	3,106,440	6,142,640
F) Training in country			
1) Annual coordination (2 weeks whole team Manila)	110,000	132,000	242,000
2) Regional/Coordination meetings/publicity	100,000	300,000	400,000
3) Computer programming (in country 2)	3,700	4,400	8,100
4) Stock assessment FAO/ DANIDA (in country 10)	46,250	83,250	129,500
	259,950	519,650	779,600
G) Training overseas			
1) Short courses/study tours	1,443,000	1,731,600	3,174,600

PART III. PILOT STUDY OF FISHERY MANAGEMENT SCHEMES (Maqueda and Carigara Bays, Samar Sea)

CHAPTER 8. BACKGROUND AND OBJECTIVES

8.1 GENERAL BACKGROUND

Management of any fishery implies that the management body is either directly or indirectly addressing questions of allocation of resources and consequent distribution of income from the fisheries in any given area and related on-shore activities. Developing viable community-based fishery management and conservation systems is a necessary condition for dealing with these often sensitive issues. This recognition of the need for participation in fishery management by fishing communities is unique among fishery planning exercises and the consultants strongly endorse this decentralized approach. Such an approach is particularly appropriate in the Philippines where waters to 3 nautical miles from the coast are under the jurisdiction of coastal municipalities. This legal framework provides an opportunity to develop stronger and more effective information systems and management institutions to deal with fishery management issues which are so often location specific. However, community participation must be balanced with government guidance, information systems and participation in management decisions by all interested parties.

The extreme diversity and complexity of fisheries in the Philippines, as elsewhere in the tropics, provides strong scientific and practical rationale for the proposed pilot management study being location-specific, with subsequent adaptation and modification as necessary for other fisheries and locations in the country. Socio-cultural and institutional variation among coastal areas in the Philippines provides a further reason for management decision-making at the local municipality, provincial and regional level. In each fishery that is identified for potential management, the parallel development of information systems (biological, economic and sociological with appropriate integration of data and analysis) and institutional infrastructure for management decisions will be necessary. The consultants therefore strongly endorse the plan that socio-economic and policy planning activities are being proposed from the beginning of the fishery component of the Rainfed Resources Development Project (RRDP).

Location

It has been agreed during discussions with senior MAF officials that the pilot management study be undertaken in the Maqueda Bay and Carigara Bay areas of the Samar Sea, parallel with the stock assessment activities planned there. This area has the advantage over others of being reasonably identifiable as a large fishery (rather than simply a stretch of coastline) with strong interactions among various competing gear types. The area is also large enough to be considered a significant fishery.

As elsewhere in coastal waters of the Philippines, these fisheries are highly competitive with numerous gear types competing for a share of the benefits which can be derived from the aquatic

resources of Maqueda and Carigara Bays and the nearby Samar Sea. Major gear types include "baby" trawlers, gillnetters and "hulbot-hulbot" (a small modified Danish seine), and numerous artisanal gear types such as spear guns and handlines. Fixed gears, such as corals, and bamboo artificial reef structures are also found in the more protected waters of the two bays. A complete description of the fisheries in this area can be found in the earlier chapters on the Stock Assessment Component of the project.

The fisheries are one of the most important economic activities of the two provinces (Western Samar and Northern Leyte) and provide considerable full-time and part-time employment to coastal residents. Although no reliable comparative data appears to be available, the fisheries are probably second in importance only to agriculture (including forestry) as a source of income to local residents. Except for Tacloban City (see Fig.7) there is little to no economic activity outside of agriculture/fishing/forestry.

Western Samar and Northern Leyte are among the most depressed provinces of the country, with average per capita incomes well below the national average. A large proportion of the population exists at less than the various poverty thresholds established by the Development Academy of the Philippines and other organizations and government bodies.

Management Potential

Municipalities and local governments in the area are poor also with few resources available to allocate to the costs of any fishery management scheme and data collection/ analysis system for Maqueda and Carigara Bays. Most are classified as 4th or 5th class (low income) municipalities. Consequently, the costs for any management infrastructure and interventions that will be established for the fisheries must be heavily subsidized by the national government. Community participation therefore is most likely to be limited to the decision-making process and not include any local cash contributions to management costs.

The only potential source of income to meet management costs that can tentatively be identified at this time are the nominal license fees that can be collected from fishing vessels. Therefore to be sustainable, any management scheme devised for the area must not only be established with cost-saving as a primary objective (benefits from management should exceed costs in any case, including taking into account possible redistribution benefits), but must also be supported financially from national levels for the foreseeable future. This is likely to be a major constraint for successful fishery management throughout the country; consideration therefore probably needs to be given at some future date to the national fishery budget allocations between technical/biological research and extension on the other hand and management institutional development on the other hand.

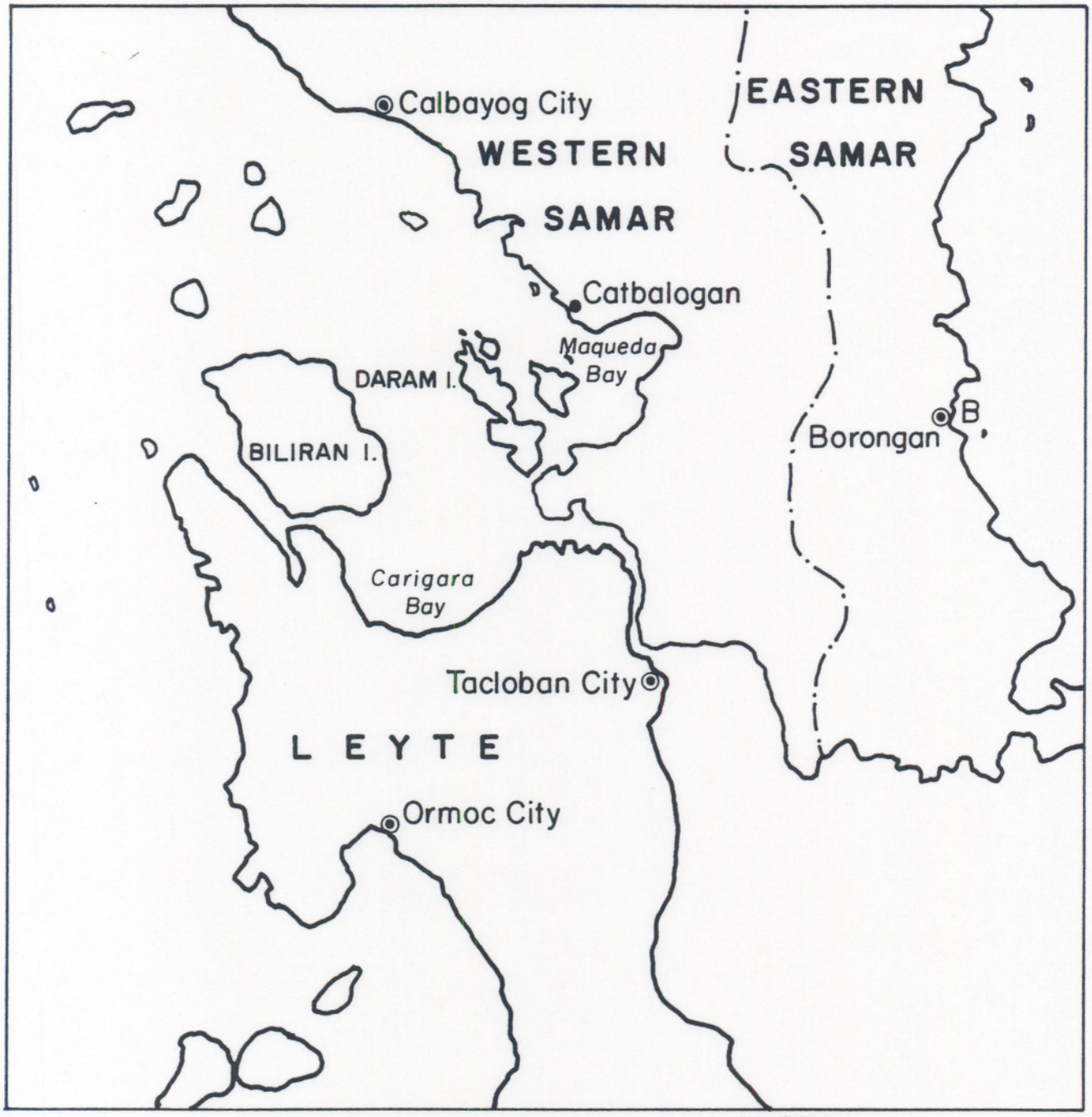


Fig. 7. Map of Samar and Leyte, Philippines showing Carigara Bay and Maqueda Bay.

Although this issue is a relevant fishery policy issue for the country, it is beyond the immediate scope of the proposed pilot management scheme for Maqueda and Carigara Bays. Nevertheless, the pilot scheme is likely to provide information that would be helpful when this issue is addressed as it soon will be, in upcoming phases of the Rainfed Resources Development Project (i.e., especially the policy component).

At the outset it must be appreciated that the complexities of management aspects of tropical multi-species multi-gear fisheries are considerable. Not only are the fish resource dimensions (stock assessment and status) difficult to ascertain, the economics of the fishery difficult to obtain (cooperation of fishermen is required), but predicting the likely effects of management interventions is particularly difficult. This is because so few coastal fishery management schemes or model approaches exist in the tropics. Most countries (including the Philippines), if they manage coastal fisheries at all, do so through gear and/or area restrictions with the idea of separating competitive gear types as much as possible to avoid potential for physical conflict. Often, as in Indonesia, the underlying rationale for extreme measures (e.g, trawler bans) is acknowledged to be primarily socio-political in nature.

Despite these complexities, management of coastal resources is necessary not only because of the competitive nature of the fishery and the poverty of most fishermen, but also to assure that the renewable resources (the fish) are not overfished or otherwise damaged to the detriment of future generations.

Links with Agriculture

The fisheries of Maqueda and Carigara Bays must also be examined and managed in a broad context that includes interactions between fisheries and other economic activities such as agriculture. These linkages not only exist in the marketing sector in that marketing infrastructure can to some extent be shared and demand for agriculture and fisheries products are complementary or competitive, but more importantly because the capital and labor that is applied for productive use in the fisheries can be put to alternative use, perhaps even more productively, in agricultural activities. It is highly likely that any successful fisheries management scheme for Maqueda and Carigara Bays will include efforts to diversify the sources of income of fishing households. The implication is that any investigation of the fisheries must also include an evaluation of the potential for income generation for fishermen from non-fishing activities.

Evolution of a Management Model and Infrastructure

A final introductory point is that a successful management scheme for the fisheries of Maqueda and Carigara Bays will take a number of years to evolve. Biological, economic, sociological, institutional and political dimensions must be understood and taken

into account at all stages in this process. For community participation to develop - and this is a stated objective of this RRDP project - the pilot study to be undertaken will of necessity be somewhat pioneering in nature. Previous research studies which have similarly taken a multidisciplinary perspective of coastal fisheries in the Philippines have seldom been undertaken with an explicit link to the development of a management model or infrastructure. Indeed, multidisciplinary research has been rare enough in its own right; what has been accomplished (e.g., the UPVCF-ICLARM San Miguel Bay study) does nevertheless offer extremely useful approaches valuable for the research component of this pilot management study.

8.2. OBJECTIVES OF THE PILOT STUDY

With the above introductory comments in mind, it is proposed that the pilot study be conducted in two phases spread over 4 years with subsequent monitoring of fishery management interventions in the area. Phase I is a pre-management phase concentrating on socioeconomic information, methodology developments, special studies and evaluation of management options and design of an appropriate management infrastructure. Phase II is a management implementation phase. After Phase I (2 years), the preliminary investigation approach could be extended to other fisheries in the country, funds permitting.

Overview of Study Methodology

It is recommended that the Pilot Management Study consist of two phases each of two years duration. The first pre-management phase would be an information collection and analysis activity during which the status of the fishery and management problems and opportunities would be identified and evaluated. The second management implementation phase would consist of the development of appropriate management systems, including (1) information for decision-making (e.g., system modeling, fishery monitoring) and (2) institutional development.

Phase I should last for approximately 2 years and would consist primarily of: (1) a record-keeping activity in selected fishing communities covering the major gear types of the Samar Sea; (2) selected special studies; and (3) a project task force to evaluate management options for the area and develop an implementable management plan.

The purpose of the record-keeping activity will be to determine the economic and relative profitability of the major gear types operating in the area and the income of the various groups of fishermen, and from this the allocation of benefits from the Maqueda and Carigara Bay fisheries. Selected special studies should be conducted simultaneously to the record-keeping and would be needed to evaluate the areas other than the fish producing activity (e.g., credit, other input supply, prevailing sharing systems, entry controls, marketing, role of community institutions, income from non-fishing activities) that must be understood before management options can be evaluated.

The product (output) of Phase One would be: (a) information on the current structure and performance of the fisheries and fishing communities; (b) assessment of institutional strengths and constraints for management; (c) a recommended methodology for continuing evaluation of management options (i.e., costs/benefits of alternative interventions, winners/losers) for the fisheries of Maqueda and Carigara Bays; and (d) a recommended management infrastructure (institutional framework) for decision-making and management implementation.

This first phase activity could be initiated in other areas of the country at the end of the 2 year period if it is deemed successful in the Samar Sea area and if financial resources of the project permit [the budget prepared at this time - see Chapter 11 - includes funds only for this first pilot study in Carigara and Maqueda Bays].

Phase II would be primarily an institutional development and monitoring phase (also undertaken in the Samar Sea area) when an effective and viable mix of the various interested parties to fisheries management (fishermen, communities, municipalities, provinces, regional and national government offices and non-government organizations) would be developed into an effective mechanism and framework for evaluating management options and implementing and enforcing management mechanisms. Continued monitoring of the key biological, economic and sociological parameters of the fisheries and communities as identified in phase one would be undertaken in this later phase, as would the further development of the analytical framework for evaluating management options (e.g., modelling) that is recommended at the end of Phase One, and a public education program on the need for fisheries management. The funding requirements for this Second Phase cannot be determined at this time, but a preliminary budgetary estimation will be made by the project team 18 months into Phase I. It will be necessary for the funding organizations supporting and implementing the RRDP to make a quick decision regarding this proposed budget in order to avoid lack of continuity between Phase I and Phase II.

CHAPTER 9. THE PILOT STUDY (PHASE I)

In order to produce the output discussed above, Phase I will include both record-keeping and special studies coordinated by a team of individuals (see next Chapter 10).

9.1. RECORD-KEEPING

The primary purpose of the record-keeping activity will be to establish the economic structure (costs and earnings) of the most important gear types of Carigara and Maqueda Bays. Costs and earnings data and conclusions regarding relative profitabilities and efficiencies are essential information, on a par with stock assessment information, for determining the costs/benefits of alternative management schemes and interventions.

The record-keeping approach is recommended because a one-shot survey depends upon respondent recall and thus most often produces unreliable economic data on the fishing activity. It is certainly preferable to obtain more reliable data from a smaller sample of fishing units rather than less reliable data from a large number of respondents. Respondent-recall surveys will be useful tools for some of the special studies which are less dependent upon hard economic data and interpretation.

Sampling methodology to be followed for the record-keeping study is:

a) Inventory of vessel/gear types by location in the two Bays (as complete as possible, to be used for sample selection). This activity will be conducted in coordination with the Fish Stock Assessment (FSA) team.

b) Selection of major communities/landing places according to the following criteria:
   - number of active fishing units
   - diversity of types of fishing units
   - accessibility (to the research team)
   - degree of likely dependence on fishing and/or markets

Seven fishing communities should be selected in each of the two provinces; the object being to have a total of fourteen fishing communities in the sample that include the largest number of the major fishing unit/gear types in the two Bays. Of the 14 villages, 8 will be covered by the Barrio Assistants (BAs) and 6 by the BFAR extension workers assigned in the selected study areas. Minor gear types should not be included in the record-keeping component of Phase One though their total numbers and their profitability should still be determined. It would be useful if in each province two communities with major landing sites (and hence proximity to markets) could be selected and two communities somewhat more isolated be selected. This is recommended because the marketing arrangements between fishermen and first buyers (and hence prices and income received) are likely to be different between these two types of communities.

c) Community meetings to explain project objectives/data collection.

d) Complete the sampling frame (for record-keeping) of fishing boats in these selected communities.

e) Stratification of the sample fishing units
   - by vessel/gear type (include variation in size (hp) for single gear types, e.g., trawler)
   - by major sharing systems

f) Sample selection (Random)

g) Interview with selected respondents to assure cooperation; substitution as necessary

h) Training/orientation for respondents (establish incentives for participation)

Data Collection for Record-keeping

Data to be collected from the sample fishing units/boats (note that neither the household nor the fisherman should be the sampling unit), should deal primarily with catch, effort and economic parameters (see Table 5 following). Data collected from each fishing boat should include the following broad categories:

a) Inventory data: vessel size, engine size (hp), gear types owned, dates of purchase and costs. A sample form is shown on the following page (Table 6), from which annual depreciation can be calculated.

b) Costs/earnings data: daily records of effort (hours fished) and gear description/length), operating costs (fuel, ice, etc.), catch (if obtainable, including species breakdown) and value of catch (individual species prices are not necessary). Sample forms that have already been pre-tested in Maqueda and Carigara Bays is shown on the following pages.

The expected outcome of the record-keeping study will be:

a) the costs/earnings (including profitability) of major types of fishing boats in the two bays (see Table 7 for sample);

b) seasonality of use of various gear types by the major types of fishing units (Figure 8 for sample);

c) seasonality of catch, values of catch, fishing effort (days fished) by month for major fishing boat types;

d) earnings of crewmen and owners of these major types (Figures 9 and 10 for sample);

Table 5. Proposed data sources and sampling methodology.

Activity	Duration	Data collected	Frequency	Sampling methodology	Sample size
1. Community inventory		Number of fishing units and gear	Single visit per community	Census of all fishing communities	Census
2. Costs and returns record-keeping	One year	#of fishing trips and fishing days per month Catch, operating costs, value of catch per trip per fishing day	Daily records	Purposive sample of major fishing units from communities with selection of respondents primarily on willingness to cooperate in the daily record-keeping activity. The sampling unit should be the fishing unit, rather than the individual fisherman or household	Minimum 20% sample in each of 8 fishing communities, but not to exceed 20 respondents
3. Inventory of fishing assets		Fishing assets, fixed costs, estimated life of assets, acquisition date	Single visit per respondent	Same as above	Same as above

Table 6. Sample data collection forms to be used in record-keeping.

Questionnaire A: Costs and returns (fishing assets)

A. Capital assets	Specification	No. owned	Whether for personal use/ rented out	How acquired (own finances DBP loan, etc.)	Year acquired	Acquisition cost	Expected life (no. yrs. from acquisition to discard)	Annual depreciation (cost ÷ life)
1. *Banca*								
Motorized *banca* (length and size of motor)								
Non-motor *banca* (length of *banca*)								
2. Gear								
Drift gill-net								
Set gill-net								
Baby trawl								
Fish corral *(baklad)*								
Others _____								
_____								
_____								
3. Other items								
Containers								
Tub (galvanized)								
Storage shed								
Others								

B. Other annual fixed costs

1. License : ₱ _____
2. Others : ₱ _____ = ₱ _____
   ₱ _____

Total capital cost Σ = ₱ _____

Total annual depreciation Σ = ₱ _____

Table 6. (Cont.)

Questionnaire B: Costs and returns record-keeping (daily trip records).

(a) Owner (b) Borrower/renters (c) Fishing unit type _____ (d) Fishing unit code no. _____

(circle category)

(Month)	Fishing		Hours spent fishing		Expenses						Catch			Disposal of catch						Total value (₱)	Marketi costs
	Yes–1 No –0 Remarks	Fishing area	Traveling (hrs)	Actual fishing (hrs)	Gasoline	Oil	Repair parts	Ice	Food	Others	Species code	Volume Kg	Volume Other units (kg)	Consumed at home (kg)	Given away (kg)	Processed (kg)	Sold Market (kg)	Sold Share (kg)	Price		
1																					
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
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30																					
31																					
Monthly totals (Σ) = trips																					
Average per day (Σ / # days in month) =																					
Average per trip (Σ / # of trips) =																					

Total monthly expenses = ₱ _____ Total monthly value = ₱ _____

Monthly net revenue = total monthly value minus total expenses = ₱ _____
(before sharing)

Table 7. Sample annual costs/returns and estimate of owner's pure profit from various gill-netters (in San Miguel Bay).

		Sharing System A *without* incentive for boat pilot (n = 11)	Sharing System B *with* incentive for boat pilot (n = 9)	All gill-netters (n = 20)
No. of fishing days per year		217	220	219
Daily net income of boat owners		38.11	29.77	34.36
Annual net income of boat owners		8,270	6,549	7,524
Annual costs of owner				
Fixed costs				
mayor's fee	20			
license fee	40			
depreciation[2]	3,549			
Total fixed costs	3,609			
Variable costs				
repair and maintenance	664			
Total variable costs	664			
Total fixed and variable costs	4,273	4,273	4,273	4,273
Residual return to owner's capital, labor and management		3,997	2,276	3,251
Less opportunity costs				
of investment capital[3]	947			
of own labor[4]	2,400			
Total opportunity costs	3,347			
Owner's pure profit (loss)		650	(1,071)	(96)

[1] From Figs. 4 and 5.

[2] Based on current replacement costs (Table 2), because it is assumed the owner will need to set aside this amount annually to replace his fishing unit or parts thereof as they wear out.

[3] Based on 9% of acquisition cost (Table 2).

[4] Valued at ₱40/man-day, and 5 days/month, and representing work performed by the owner related to purchase of inputs, repair and maintenance.

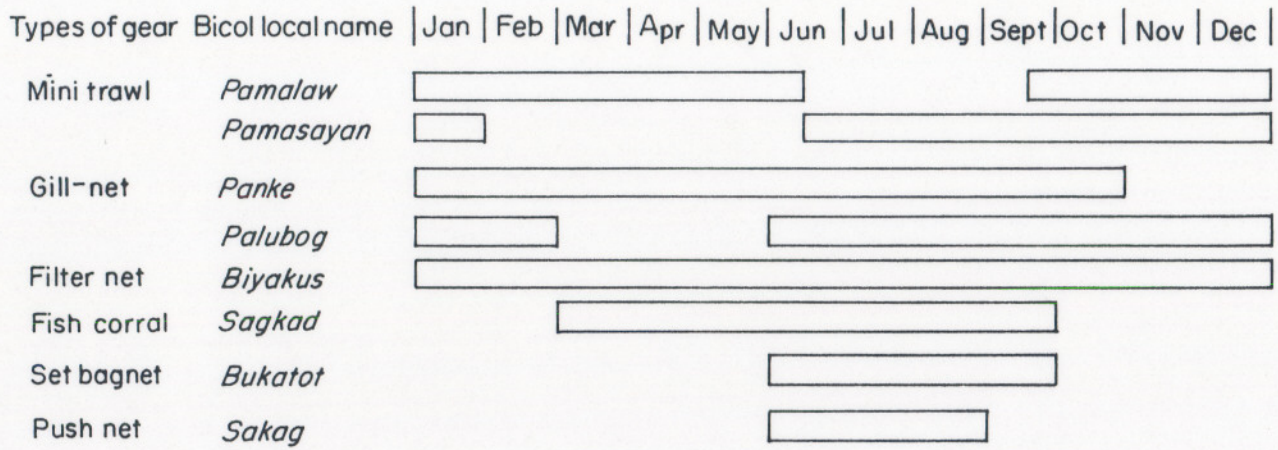

Fig. 8. Seasonality of gear used in a Philippine Fishery (San Miguel Bay). Data from a record-keeping activity.

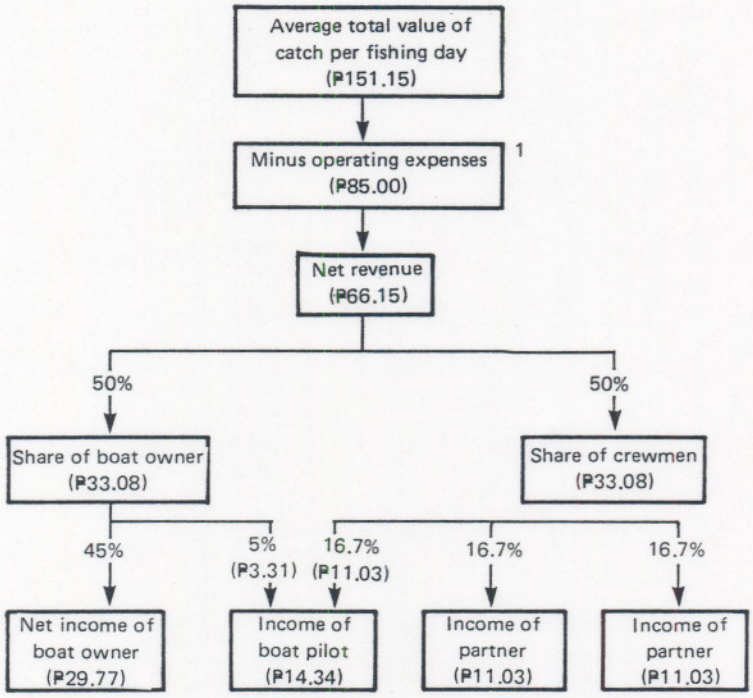

Fig. 9. Sample sharing system and daily crewman/owner income for a gill-netter. Data can be derived from a record-keeping activity. Annual data obtainable when number of days fished per year are known.

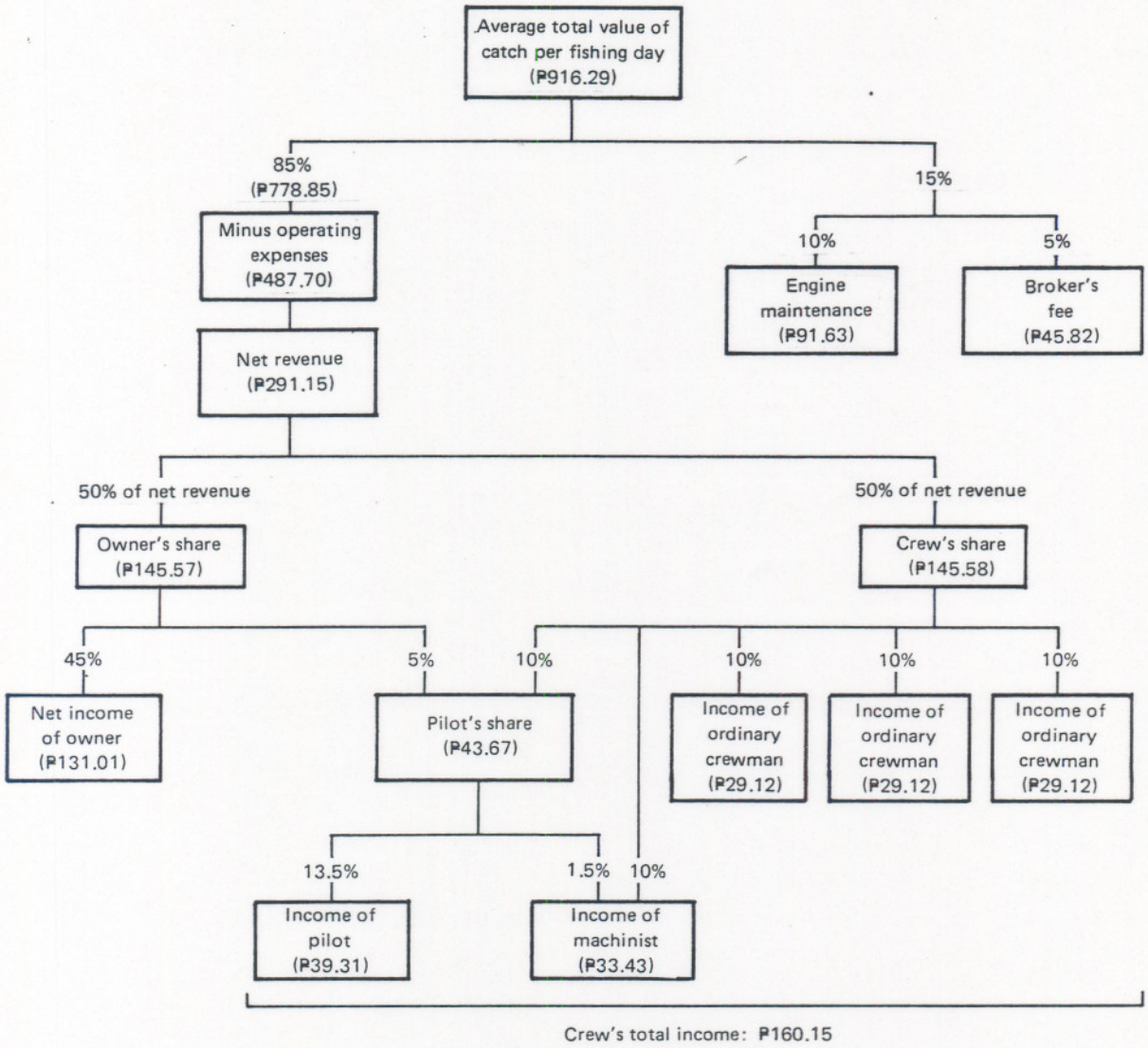

Fig. 10. Sample sharing system and daily income derived for a "baby" trawler.

e) returns to investment of owners;

f) estimates of pure profits (if any) above all costs in the fisheries;

g) distribution of benefits (catch, value of catch and pure profits) from the fisheries among the major types of fishing units (Figure 11 for sample);

It is important to stress that only a record-keeping activity that monitors daily fishing can collect reliable data on annual levels of fishing effort and costs/returns. Monitoring vessels only at landing sites most often fails to uncover variations in fishing patterns, such as selling at sea or landing elsewhere, both common occurrences in most fisheries. To be effective, the record-keeping activity thus needs to collect daily data from fishermen (and/or their wives or other household members) after the daily fishing activity. Cooperation of fishermen is also more likely to be asssured if their selling activities at the landing are not interrupted by researchers and data collectors.

9.2. SPECIAL STUDIES.

Introduction

Municipal fisheries do not operate in a socio-economic or institutional vacuum; rather, the economics of fishing (and the incomes derived therefrom) are influenced by numerous other factors that must also be understood before a management plan that modifies the status quo can be implemented. Certainly the biological status of the stocks will be a prime determinant of the potential need for restrictive measures to control levels and/or certain types of fishing effort so that these resources can provide long-term high sustainable yields. The prevailing profitability of the most prevalent and productive gear types will be a second indicator of the possible need for management interventions to either improve profitability or to redistribute benefits among the various groups of competing fishermen. Between them, these two major indicators will permit assessment of the degree of biological and economic overfishing in Carigara and Maqueda Bays and will indicate to what extent and in what form fishing effort must be restricted. For successful formulation of management objectives, implementation of management institutions and mechanisms, and anticipation of their impact, a more holistic view of the fisheries sector in Carigara and Maqueda Bays is necessary, however. This broader view should include:

(1) An assessment of the role and power of **input supply and marketing intermediaries** (the ubiquitous "middlemen") who control much of the informal credit into these fisheries and the disposition of products out of them.

(2) An assessment of the dependence of fishing households upon fishing income and the extent to which **supplementary and alternative income sources** other than capture fishing are available to them or can be developed.

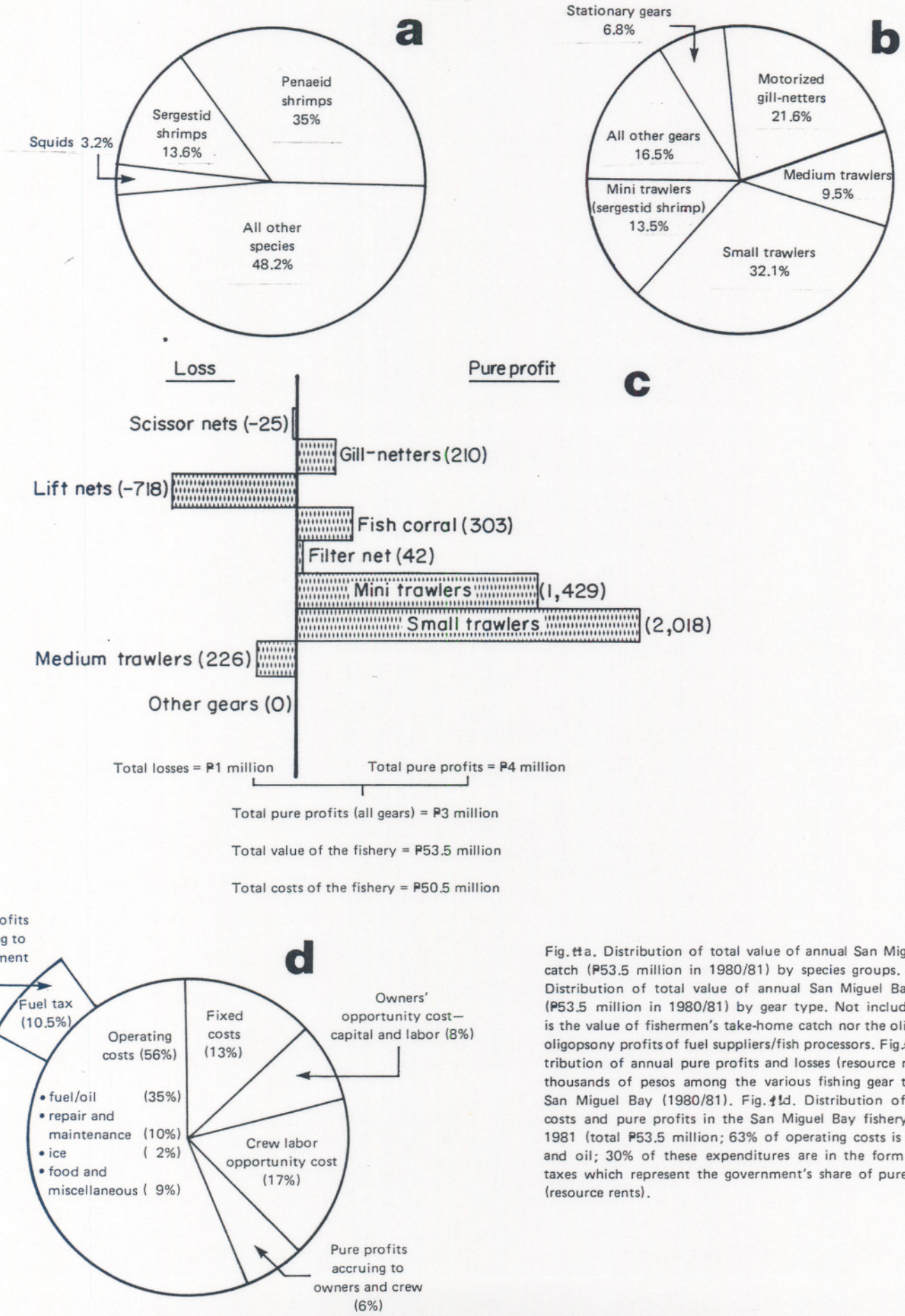

Fig. 11a. Distribution of total value of annual San Miguel Bay catch (₱53.5 million in 1980/81) by species groups. Fig. 11b. Distribution of total value of annual San Miguel Bay catch (₱53.5 million in 1980/81) by gear type. Not included here is the value of fishermen's take-home catch nor the oligopoly/oligopsony profits of fuel suppliers/fish processors. Fig. 11c. Distribution of annual pure profits and losses (resource rents) in thousands of pesos among the various fishing gear types of San Miguel Bay (1980/81). Fig. 11d. Distribution of annual costs and pure profits in the San Miguel Bay fishery, 1980-1981 (total ₱53.5 million; 63% of operating costs is for fuel and oil; 30% of these expenditures are in the form of fuel taxes which represent the government's share of pure profits (resource rents).

Fig. 11. Sample presentations of fishery data made possible by a record-keeping activity.

(3) An evaluation of **fisheries management institutions and leaders** (governmental and non-governmental, formal and informal, and community-based) that influence access to fishing (and fishing inputs and markets) by individuals or groups and that provide opportunities for participation by fishermen and their families in decision-making regarding resource use. Particularly important in this context are fishermen's own perceptions of fisheries management problems and solutions.

The need to take this broader view of fisheries when evaluating management options for the sector has been stressed in much of the international research and planning literature on small-scale fisheries. This literature need not be enumerated here (but please see the attached Bibliography for relevant publications and reports about Philippine fisheries). This broader perspective is deemed necessary because the current low incomes of fishing households of Maqueda and Carigara Bays are the result of a host of environmental, economic, socio-political and institutional factors, most beyond the control of individual fishermen and their families.

Unfortunately, there has been scant previous research on these aspects of the rural economies and society of Leyte and Western Samar Provinces. The few recent studies (see Bibliography), while helpful, are somewhat incomplete and dated. Consequently, there is a need in this Pilot Management Study to update available secondary data and to complement the macro-level investigations of the agricultural component of the Rainfed Resources Development Project (RRDP) with three (3) Special Studies to complement the stock assessment and economic investigations of the fisheries described earlier in this report.

Though obviously inter-related, these three Special Studies can best be understood if first discussed separately in greater detail (see below).

Special Study 1: Inputs and Marketing.

For most fishermen in the study area, supply of inputs for fishing, especially credit for the day's operations (i.e. fuel) and marketing of the catch are interrelated in the form of the "suki" arrangements that exist between fishermen and middlemen. To the extent that these middlemen (or more correctly and more prevalently, "middlewomen") receive an economic return above their opportunity costs, they will be able to extract a share of the resource rent from the fisheries and thus benefit from possible oligopsony/oligopoly arrangements that increase their economic power and incomes. It is not uncommon to find rural economies characterized by this combination of moneylending and marketing arrangements; in fact in most small-scale fisheries of the tropics, these arrangements exist. Indeed, it is primarily the credit flows that sustain such relationships. While potentially exploitative, the "suki" or patron-client relationship also provides services of a positive nature

to fishing households, such as readily available credit and even outright cash grants in emergencies, that help to reduce the risk faced by these households due to the inherent uncertainty and seasonal nature of the fishing activity.

An investigation of the economic and sociological aspects of the "suki" relationships as prevail in Carigara and Maqueda Bays will not only uncover the extent to which these land-based intermediaries derive benefits (i.e. a share of the resource rent) from the fisheries, the extent to which economies of scale exist for the functions that they perform, but will also determine the potential for fishing households, as individuals or groups, to undertake these functions and what supporting mechanisms (e.g. credit, training, community organizing) are necessary to make this possible.

Additionally, this special study will examine selected input markets (e.g. fuel supply, boatbuilding, netting), the extent to which processing of the catch takes place outside the coastal communities, the general commodity flows for major species harvested from these communities to major nearby markets, and the potential for improvement in the existing structure and relationships.

The theoretical framework for this special study will be of the common structure/conduct/performance approach to the economic analysis of markets (see Bain 1968, and numerous previous studies on fisheries in the Philippines conducted by BAEcon), supplemented by sociological explanations for the existence of "suki" relationships and their tenacity. The following data sources would be tapped:

(1) Formal interviews and participatory research (with emphasis on the latter) with fishing households, input suppliers and marketing intermediaries.

(2) Primary data gathered during the preliminary inventory phase of the project by the BFAR, which among other things will identify households in the study area that are involved in marketing and processing activities and the nature of that involvement.

(3) Primary data gathered during the record-keeping activity (costs and earnings study undertaken subsequent to the household inventory) which will identify marketing channels used and costs incurred by selected fishing households.

(4) Other available literature from the study area as generated by the non-fisheries components of the RRDP.

Special Study 2: Alternative Income Sources.

A primary explanation for low fishing incomes in Maqueda and Carigara Bays is the relative shortage of alternative income-generating activities for fishing households. While certain households in the study area have small vegetable gardens or small numbers of poultry and pigs, the area in general appears to be

characterized by very low levels of economic activity and diversification. The agricultural economy as a whole is depressed, with coconuts and bananas providing the bulk of produce. Fishing communities face the additional constraint of limited access to agricultural land. These elements of the overall economic situation in the two provinces impact upon fishing incomes, the sharing systems for division of the proceeds from the catch, and on the mobility of labor between fishing and other activities.

One can hypothesize that fishing incomes are no lower than incomes from other disadvantaged groups in the area such as landless laborers and upland farmers. The low incomes that prevail throughout the local economy are thought to result in low opportunity costs for labor which therefore keep entry to the coastal fishery high, with resulting low incomes in that sector as well. Conversely, at present there appears to be little of promise to attract fishermen out of fishing in order to produce a resulting reduction in levels of fishing effort, a condition likely to be necessary for effective fisheries management.

Consequently, within the fishing sector sharing arrangements for division of the income from the fishing catch are likely to be skewed in favor of capital (i.e. the boat owner with relatively high opportunity costs for capital, such as moneylending) rather than labor. One would expect to find variability amongst sharing systems, even for given gear types, due to differing opportunities in alternative labor markets. For example, fishing labor in the vicinity of Catbalogan may receive a higher share of the daily net income of the fishing unit than in other locations due to the presence of other labor-intensive activities in Catbalogan, such as fish processing.

In addition, mobility of labor into asset ownership or out of fishing is not likely to be great due to capital shortages in fishing households (and hence concentration of capital in few hands). There are likely to be very real barriers to exit of fishermen to other activities outside fishing due also to their or their families' lack of training or exposure to alternatives. Presumably, here as elsewhere, agricultural extension agents concentrate their efforts on field crops in agricultural communities rather than in fishing settlements with limited access to land, while fishery extension agents concentrate their efforts on fishing and aquaculture technology. The result of this specialization is likely to be lack of effective support to fishing communities for their efforts to diversify their income sources.

The proposed special study on alternative income sources would accomplish the following:

(1) An assessment of the extent of diversified income sources for fishing households in the two provinces. Particular attention would be paid to current aquaculture (e.g. mussel farming) and small-scale animal husbandry and agriculture. Included would be an assessment of the various support services of extension and educational institutions and other informal means of information exchange amongst fishing communities.

(2) The estimation of opportunity costs for fishing labor and identification of the factors (e.g. skill and expertise, risk) that cause variability in such costs amongst gear types and locations.

(3) Descriptions of prevailing sharing systems by gear type and location, with analysis of the factors which produce differences. This would include not only analysis of economic factors, but also sociological factors such as family and extended family relationships.

(4) Identification of factors that inhibit the mobility of labor from fishing to other sectors and means by which this mobility can be increased.

Data to complete the above tasks would be gathered from a variety of sources, including:

(1) Costs and earnings studies for the agricultural sector undertaken by BAEcon for other components of the RRDP. These studies would identify incomes earned and potential profitability of such activities as small-scale animal husbandry, from which opportunity costs of labor can be determined.

(2) Primary data on sharing systems and variations generated by the BFAR/BAEcon record-keeping activity which will cover the most important gear types in the study area.

(3) A special survey of existing aquaculture activities to establish costs and earnings profile. This economic assessment would be complemented by already available technical information from BFAR on such aspects as potential for expansion and constraints (e.g. red tide poisoning of green mussels).

(4) Participatory research with selected fishing communities and other community workers (e.g. teachers, extension agents). Among other methods of participatory research, this would entail community meetings and workshops to fully bring out community viewpoints and solutions.

Special Study 3: Fisheries Management Institutions and Leaders.

The ultimate success of a Pilot Management Scheme for Carigara and Maqueda Bays will depend critically upon the extent to which (1) management problems and needs are agreed as being both critical and potentially resolvable by current users of the resources and (2) management decision-making processes and solutions are accepted. These criteria for success are absolutely essential because in any management plan that affects levels or forms of fishing effort, there are bound to be both losers and gainers. In the case of highly competitive fisheries such as those that exist in the area, management

decisions will almost certainly result in redistribution of benefits and incomes currently derived from the resources. Such redistribution effects of management interventions or changes are inherently political in nature and thus problematic when viewed in terms of currently prevailing economic and political power structures.

Therefore, a thorough understanding of these existing economic and political power structures, particularly as they relate to resource use and management of Carigara and Maqueda Bays is an essential prerequisite to the development of any pilot or community management scheme. The purpose of this special study will be to develop such an understanding. In addition, this study, more perhaps than any other other activity during these first two years of the pilot study, will be undertaken in a participatory research mode (see Appendix D) which will provide the building blocks upon which the subsequent management scheme can be based.

Fisheries management in the Philippines is addressed through a mixture of national regulations, municipal authority and traditional community-based allocation systems. Over time, the community-based systems, such as those of senior fishermen who allocate sites for fixed gears, have declined in importance as fishing units have become motorized and hence more mobile. Municipal authority over waters up to 3 nautical miles from the shore has been mandated nationwide since the 1930's, but rare is the municipality that has effective means of enforcement. The Bureau of Fisheries and Aquatic Resources (BFAR) has a clear mandate for licensing all vessels over 3 gross tons, but enforcement of the area restrictions (i.e. fishing zones) that have been legislated for such vessels is a continuing problem for BFAR and other agencies (of which the Coast Guard is the most important) which generally lack the necessary resources to be effective.

Confusion over legislative and enforcement authority is particularly pronounced in the case of the so-called "baby trawlers" and "baby purse seiners" in the 2-5 ton range which fish with relative impunity in most coastal waters of the Philippines, including some parts of Maqueda and Carigara Bays. (See Smith, Pauly and Mines 1984 in the Bibliography for detailed discussion of a similar aquatic environment and fishery in San Miguel Bay and related legislative issues). The problem of effective enforcement of even existing legislation on area restrictions and mesh sizes is seriously complicated by the fact that owners and operators of these vessels frequently are among the most influential of residents in coastal communities. In Maqueda and Carigara Bays, the situation is even further complicated by allegations from municipal fishermen that the intruding commercial vessels frequently have military protection.

In an effort to deal with these difficulties, in 1981 waters within 7 kilometers of the shoreline in Samar Sea, to which Maqueda and Carigara Bays are shoreward and adjacent, was declared off-limits to all commercial vessels over 3 gross tons. A subsequent exploratory fishing study undertaken by the U.P. College of Fisheries showed dramatic recovery of the fish stocks. At the present time, it is

somewhat unclear as to the extent to which the 7 kilometer ban is still enforced. Perhaps partly due to the ban, but more likely due to escalating fuel costs, new fishing technology in the form of "hulbot-hulbot" (Danish seines) have spread to the Samar Sea from other regions of the Visayas. These highly productive gears are a new form of fishing gear that also competes for some of the same stocks, though at greater depths, as those sought by municipal fishermen.

The stock assessment and economic record-keeping components of the pilot study are likely to find that the extent of competition among gear types in Maqueda and Carigara Bays remains high and that existing legislation and authorities are inadequate or of an inappropriate form to deal with the sensitive allocation decision that an effective fisheries management program should address. Consequently, this proposed special study on fishery management institutions and leaders is a critical component for the development of an effective community-based management scheme.

In more specific terms, this special study will:

(1) Assess existing national and local legislation and management institutions, both formal and informal, that influence the key decisions of fishermen as to where and when they can fish and with what vessel and gear types.

(2) Investigate allegations of extreme competition between municipal non-trawl gears and commercial gears.

(3) Assess the potential for a more coordinated approach to fisheries management issues by the various individual, community (barrio), municipal, provincial and national institutions with a potential interest in management.

(4) Gather from fishermen, their families and communities, their perceptions of fishery management problems, their desire to participate in the development of a pilot management scheme for Maqueda and Carigara Bays, and their ideas for practical solutions and steps that can be taken to embark on such a management direction.

(5) Identify vested interests that will stand in the way of any community-based management scheme and recommend practical steps that will help resolve these differences.

(6) Identify key community leaders who can be expected to play a prominent and positive role in future community-based fisheries management.

More than the other two special studies that have an important quantitative element to their data and analysis, this third special study will be primarily qualitative in nature. Special research skills will be required to complete this study. In particular, this study will require frequent and intense interaction with numerous

individuals and groups through participatory research and extended periods in the area; normal survey methods will not apply. Researchers undertaking this work must be experienced in rural and community development work, especially its economic and socio-institutional dimensions.

Implementation and Output of Special Studies.

The expected output of the special studies will take the form of both visible written reports as well as a less tangible, but probably more important increase in community awareness and community organizing in preparation for the pilot fisheries management scheme to follow. For these reasons, it will be important to identify a research and community development group that can not only undertake the three studies described above, but which can also contribute subsequently to the development of the detailed management plan and the continuing community involvement that will be necessary for the plan to be successfully implemented.

Because of the nature of the work described for these special studies, there are advantages to the project to involve a third group to complement the more quantitative investigations of the two government agencies (BFAR and BAEcon) which will be responsible for generating the stock assessment and economic data on the fisheries. Given the sensitive nature of these special studies, there are also considerable advantages to subcontracting the special studies to a non-governmental institution. At this time, the most appropriate group to undertake these special studies is the Institute of Social Work and Community Development (ISWCD) of the University of the Philippines (see Appendix C). This Institute has considerable experience already working on very similar issues in fishing communities of Lingayen Gulf, Laguna de Bay and Cavite. The ISWCD researchers are especially adept at techniques of participatory research in rural communities of the Philippines, and have expressed interest in undertaking the proposed special studies in Samar and Leyte.

A final point about research methods is that the common approach of gathering information through short, one-time surveys will most likely fail to uncover the real dynamics of the coastal communities of Maqueda and Carigara Bays. These methods most commonly generate compilations of descriptive statistics, which while very useful as baseline data, can hardly form the basis for sound fisheries management planning which will depend critically upon non-quantifiable institutional dimensions. The Rainfed Resources Development Project (RRDP), with its emphasis on community-based approaches to management of renewable natural resources, offers a unique opportunity to build the three-way partnership amongst (1) fishing communities and associated support institutions (e.g. mayors, provincial officials), (2) governmental scientific research groups (e.g. BFAR and BAEcon) and (3) non-governmental community workers (e.g. ISWCD) that must each play a prominent role if management is to achieve its mutually agreed-upon objectives.

9.3. PHASING OF RECORD-KEEPING AND SPECIAL STUDIES

The record-keeping and special studies described above should not proceed independently, but rather should be integrated into planning and implementation of Phase I from the beginning. Section 10.3 shows how their integration would occur in time.

Integration in concept and output will be the responsibility of a project task force established for this purpose. At the initial stage of Phase I, this team will consist of:

- One project co-leader from BFAR
- One project co-leader from BAECON
- One consultant (externally recruited)

By the end of year 1 of Phase I, the group/institution which will implement the special studies will have been identified. The Special Studies leader will become the fourth member of the project task force at that time.

The goals of this project task force will be the following:

1) Develop the conceptual framework for the record-keeping along the lines suggested in this document (see Section 9.1, Chapter 9 above);

2) Develop the conceptual framework for the special studies (see Section 9.2 above);

3) Implement both the record-keeping and special studies;

4) Based on these results and other investigations of the RRDP (i.e., agricultural sector studies), develop a methodology for evaluation of management options under an ongoing management scheme; and

5) Recommend an appropriate management infrastructure (institutional framework, staffing, information needs) for decision making and management implementation in Phase II (see Chapter 12 of this report for more details) and to prepare a preliminary budget for Phase II.

This last goal is particularly important to assure continuity from Phase I to Phase II.

9.4. COMMUNITY PARTICIPATION IN PHASE I

A necessary precondition for Phase II (Implementation of Management Scheme) is that the fishing communities surrounding Carigara and Maqueda Bays not only understand the rationale for the data collection but also participate actively in the provision of such data and in the year-2 stages of management planning in Phase I.

For this reason, the project staff will hold regular information meetings with selected community leaders throughout Phase I. These meetings will help to reinforce the role of the barrio assistants and other field staff involved in the record-keeping and special studies.

As the project task force begins its analysis of the collected data and consideration of possible Phase II management methodologies, institutions and infrastructures, a small number of responsible community leaders with strong commitment to fisheries management could be invited to contribute to and provide feedback during this part of Phase I. Such interaction should be considered an integral part of participatory research such as that which can be undertaken by the record-keeping and special studies; its exact nature and depth should evolve as Phase I progresses and the project staff become more familiar with conditions in Maqueda and Carigara Bays.

CHAPTER 10. PROJECT ADMINISTRATION, STAFFING, TIMING OF ACTIVITIES AND TRAINING

10.1. PROJECT ADMINISTRATION

The implementation of Phase I of the Pilot Study of Fishery Management Schemes in Carigara Bay and Maqueda Bay will directly involve the participation of the research, statistics and extension departments of the Bureau of Fisheries and Aquatic Resources, the research department of the Bureau of Agricultural Economics, and one other research institution which will be identified at the beginning of Phase I. (The U.P. Institute of Social Work and Community Development is recommended).

These three institutions will each contribute the services of a senior counterpart to the project task force which will be joined by a foreign consultant in fisheries economics and management recruited especially for this pilot study. This expertise does not presently exist within the Philippines. The project task force will thus consist of four individuals who will have shared responsibility for project implementation. The foreign consultant will play an important leadership role in this team, especially in the early stages. However, since the proposed consultant will not be full-time for the entire 2-year period (he or she will make 2 visits of 1 and 12 months duration), the BFAR and BAEcon counterparts will be considered the formal project leaders. Finally, the fourth team member will be that person heading the Special Studies from the research organization (outside BFAR and BAEcon) with experience in participatory research approaches. This individual will play a key role in the second year of Phase I as activities move away from information collection and towards community/fisheries management planning.

BFAR and BAEcon will work hand in hand in the record-keeping activity. The presence of BAEcon's staff in the municipal level and the experience in similar activities will support BFAR. Likewise, BFAR's familiarity with the fishing activities in the different communities will support BAEcon staff.

The 8 Barrio Assistants (BAs) hired by BAEcon locally and the 6 BFAR extension workers will monitor the fishermen's daily catch and expenses. Each of the BAs will cover 20 units of the major gears while each of the BFAR extension workers will cover 10 units for a total of 220 fishing gears to be monitored in the two provinces. Involving the BFAR extension workers enables a bigger sample size and at the same time exposes the BFAR extension workers to the RK data collection technique.

Both the BAs and the BFAR extension workers will be supervised by the BAEcon District Officers (BAEcon DOs) assigned in the study areas. The summarized RK forms accomplished by the BAs and BFAR extension workers will be collected and reviewed by the BAEcon DOs and then forwarded to the BAEcon Provincial District Officers.

Once a month the BAEcon senior researcher from the Central Office will go to Samar and Leyte to check and collect the monthly RK forms. Lastly, the monthly summaries will be compiled, tabulated and analyzed at the BAEcon Central Office.

The specific tasks of each of the project staff involved in the RK activity and the RK data collection flowchart are shown in Table 8 and Figure 12 respectively.

In addition to leading the RK activity, the BAEcon Senior Research Assistant will also supervise an investigation of the economics of the minor fishing gears in the study areas.

Reports containing the results of the record-keeping activity and the investigation of the economics of minor fishing gears will be completed simultaneously with the report of the special studies.

The special studies planned to have a holistic understanding of the fishery sector will be contracted to an outside research organization such as the U.P. Institute of Social Work and Community Development. The Special Studies will be headed by a highly qualified senior researcher who will also participate in the development of the fishery management scheme. Preferably, all the special studies will be awarded to only one research institution for easy coordination and management control. Selection of the research team for the special studies will be based on the experience of the research institution in conducting similar activities elsewhere and qualifications of the team members. The members of the team must be composed of experienced researchers with backgrounds in agricultural economics, sociology, community development and related fields.

To assure a well-planned research framework and to give an overall direction to the whole project, a consultant with specialization in fisheries management is recommended. The consultant will develop the research framework and research instruments, train the researchers and barrio assistants, and synthesize the information generated by the record-keeping activity and special studies and additional information gathered by the fish stock assessment team. Specific timing of the consultant's participation is shown in the Staff Timing Flowchart.

The BFAR and BAEcon counterparts, the leader of the Special Studies, and the consultant will form the core staff of this project component. They will prepare the final report and preliminary budget for Phase II. It is also highly recommended that technical reports on the different activities, i.e., fish stock assessment, record-keeping, and special studies be published. These materials will greatly benefit not only the people that will be involved in the studies of other fisheries in the country during the expansion phase of this project but also other researchers elsewhere conducting similar fisheries management activities.

Table 8. Specific tasks of project staff involved in the record-keeping activity

Project Staff	Tasks
1. BAEcon Senior Researcher (Central Office)	1. Help design the RK framework 2. Supervise training of BAs and BFAR extension workers 3. Monthly visit to Leyte and Samar BAEcon Provincial Offices 4. Collect/review monthly summary forms 5. Summarize/analyze the RK data 6. Write final report
2. BAEcon Provincial Officer	1. Coordinate with the District Officers 2. Collect RK forms from the District Officers 3. Help review the monthly RK forms
3. BAECon District Officers	1. Help recruit/train BAs 2. Supervise the BAs; conduct bi-weekly visits to BAs' base area 3. Collect the RK forms from the BAs, review and submit same to the Provincial Officers
4. BFAR Extension Workers	1. Help identify/select cooperators 2. Assist in monitoring fishermen's daily catch and expenses 3. Visit cooperators once a week 4. Collect/summarize RK forms and submit same to BAEcon District Officer
5. Barrio Assistants	1. Help identify/select cooperators 2. Visit cooperators twice a week 3. Collect/summarize RK forms 4. Report to BAEcon District Officer once a month
6. Cooperators	1. Fill up the daily RK forms

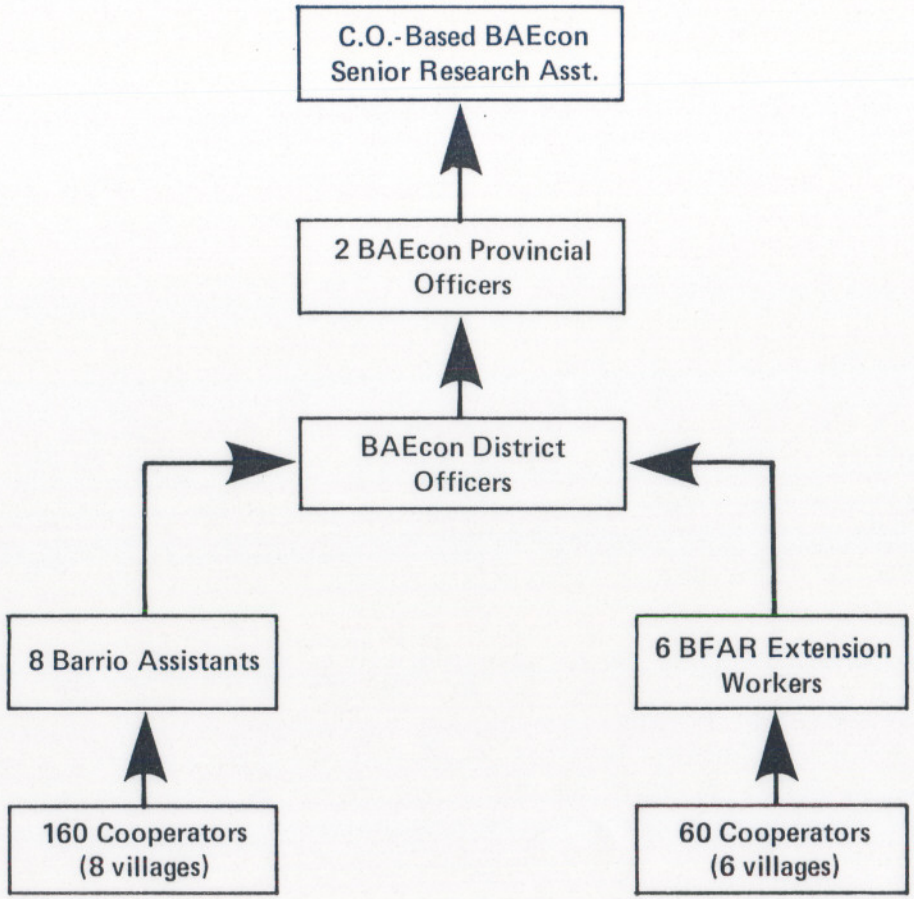

Fig. 12. Record-keeping data collection flowchart.

10.2. Manpower requirement

The staff needed for the full implementation of Phase I of the pilot management study and the amount of time to be inputted by each staff are as follows:

	Duration
1 Fisheries Management Consultant (Foreign Hire)	15 man-months
Additional Technical Assistance	1 man-month
1 BFAR Senior Researcher	24 man-months
1 BAEcon Senior Researcher (Part-time)	12 man-months
2 BAEcon Research Assistants	12 man-months
8 Barrio Assistants (Part-time)	60 man-months
2 BAEcon Provincial Officers (Part-time)	6 man-months
8 BAEcon District Officers (Part-time)	30 man-months
1 Sr. Researcher for the Special Studies (Half-time)	12 man-months
2 Research Associates	18 man-months
6 Sr. Research Assistants	36 man-months
1 Typist*	7 man-months
1 Bookkeeper/Adm. Asst.(Part-time)	3.5 man-months

A short-term input of 1 man-month Technical Assistance (TA) is recommended in April 1986 to assist in the setting up of the record-keeping activity and in training researchers and barrio assistants. An additional 1 man-month technical service is also recommended in order to solicit participation from other socioeconomists who have been exposed to similar fisheries management activities elsewhere. Their inputs would be very beneficial during workshops, particularly in the preparation of the management schemes for Carigara and Maqueda Bays.

The timing of participation of the other project staff is shown in the following flowchart.

10.3. Timing of activities

The planned life of Phase I of the Pilot Study of Fishery Management Schemes in Maqueda and Carigara Bays is two years commencing in 1986.

A detailed schedule of activities for the two-year project is shown in Fig. 14.

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* For Special Studies only. Other typing needs of the Pilot Study Phase I will be met by the secretariat of the Stock Assessment Component.

Figure 13
Staff Timing Flowchart

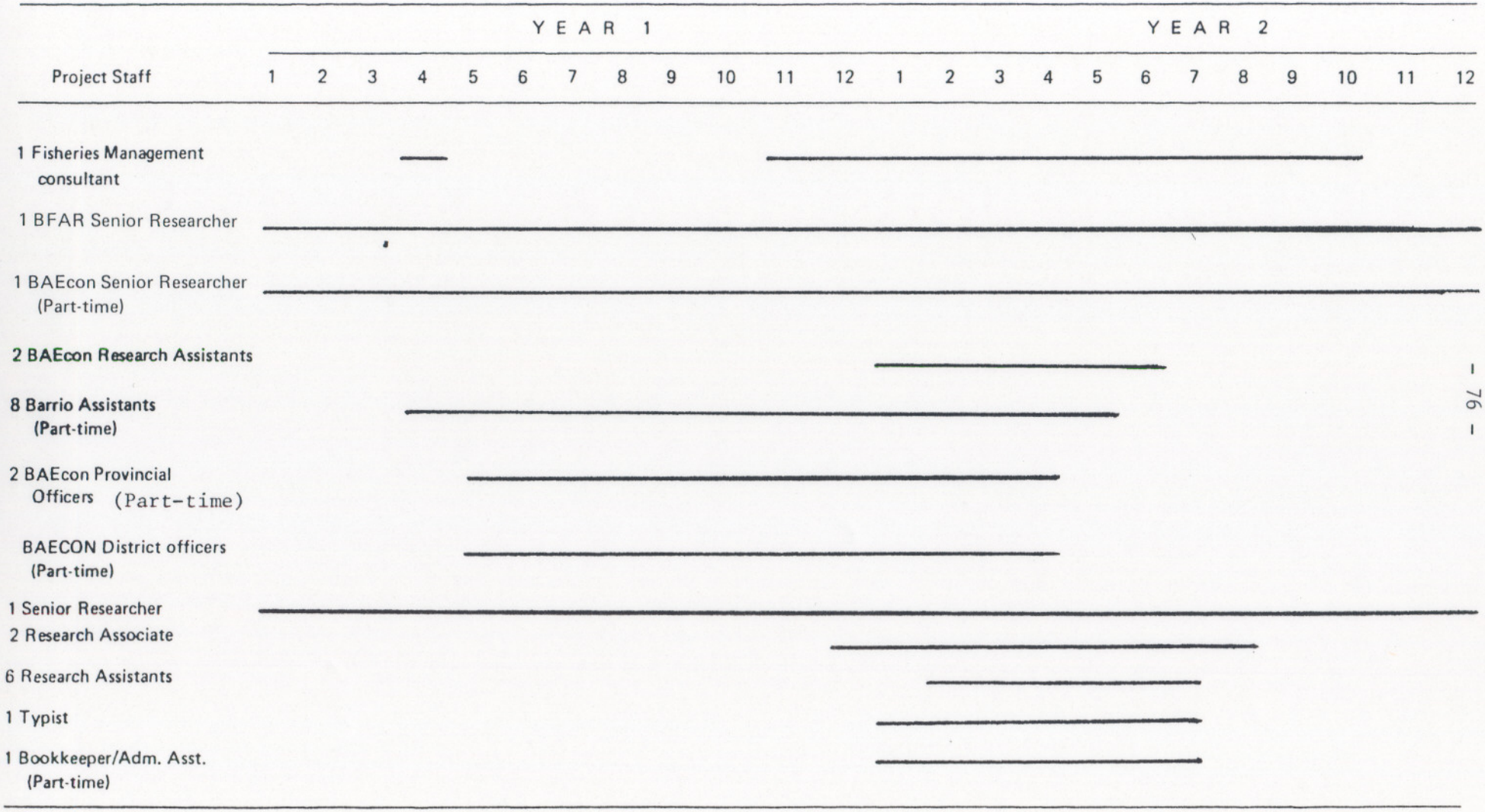
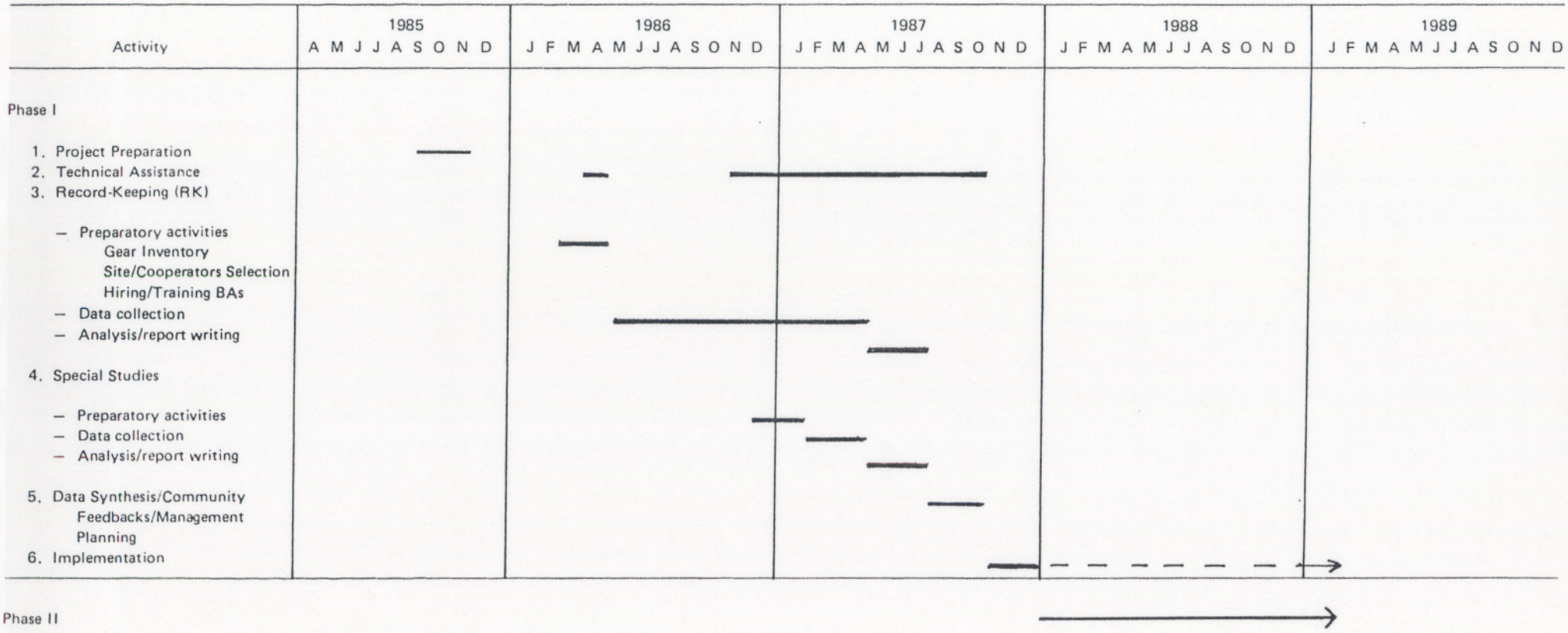


Figure 14

Fish Stock Assessment Component
Pilot Study of Fishery Management
Schedule of Activities



10.4. Training

It is desirable that the staff of the Bureau of Fisheries and Aquatic Resources (BFAR) be strengthened with the addition of a trained fisheries economist who can participate in the activities in Phase I. If an appropriate individual is not available from the current staff, it is recommended that 2 new positions be created within the BFAR Research Division for individuals with training to the Masters Degree level. If no trained individual can be found for these position, it is recommended that two be sent to the Masters degree program (Resource Economics, Fisheries Specialization) of the Universiti Pertanian Malaysia, Serdang, Selangor, Malaysia (see Appendix B). This program, which has been in existence for 3 years, is designed to train fisheries researchers and would be well-suited for BFAR needs. Admission to the program is in June each year, with applications due in November of the previous year. The earliest that BFAR can avail of this opportunity is 1987.

Funds for this program of training have been included in the budget for this component of the project. If, as would be desirable, BFAR has employees already qualified, or can hire two, this budget line item could be used instead to help support these positions. As a general principle, it would appear to be desirable for BFAR to add fisheries economists and other social scientists to its staff.

A short training course on participatory research is recommended for the BFAR/BAEcon researchers and barrio assistants to complement their training on the record-keeping data collection technique. In particular, the training will provide the BFAR/BAEcon researchers with deeper insights into the intricacies of a community-oriented research activity. This is necessary since the BFAR/BAEcon counterparts will be involved in the whole duration of this pilot study.

CHAPTER 11. PROJECT COSTS (PHASE I)

The budget presented in this section covers Phase I of the Pilot Study of Fishery Management Schemes in Carigara and Maqueda Bays. Total project cost for Phase I is P 7,552,440 spread over a two-year period. Details are shown in the following pages.

Table 9. Budget summary (Phase I) of the pilot fishery management scheme in Carigara and Maqueda Bays.

	Philippine Peso (₱)		
	Year 1	Year 2	Total
A. Personnel Services			
Salaries/wages	118,000	86,000	204,000
B. Maintenance and other operating expenses	115,400	134,600	290,000
C. Equipment	4,900	-	4,900
D. Other Services			
1. Technical Assistance	1,159,400	2,600,400	3,759,800
2. Training	21,000	500,000	521,000
3. Publications	-	250,000	250,000
4. Special Studies	82,000	410,200	492,200
Sub-Total	1,262,400	3,760,600	5,023,000
	1,540,700	3,981,200	5,521,900
E. Contingency Allowance (20%)*	308,140	796,240	1,104,380
Total	1,848,840	4,777,440	6,626,280

* Includes likely inflation.

Table 10. Budget details (₱) of the pilot management scheme in Carigara and Maqueda Bays.

	Year 1	Year 2	Total
A. Personnel Services			
1. Salaries and Wages (including other benefits)			
1 BFAR Senior Research Assistant (Full-time) 12 man-months ₱3,000	36,000	36,000	72,000
1 BAEcon Senior Research Assistant (Half-time) 12 man-months ₱3,000	18,000	18,000	36,000
2 BAEcon Research Assistants 12 man-months @ ₱2,000	16,000	8,000	24,000
8 Barrio Assistants 60 man-months @ ₱1,200	48,000	24,000	72,000
Sub-total	118,000	86,000	204,000
B. Maintenance and Other Operating Expenses			
1. Supplies (including xeroxing) ₱2,400/month for 24 months	28,800	28,800	57,600
2. Communications ₱1,000/month for 24 months	12,000	12,000	24,000
3. Travel Expenses			
a. C.O. Board BFAR/BAEcon Researchers	64,000	47,800	112,400
36 trips @ ₱1,500 = ₱54,000 per diem - 200 days @ ₱100 = 20,000 local transport @ ₱200/trip= 7,200			
b. Local transport of BAs @ ₱150= 14,400			
c. 2 RAs (non-major gears study)			
4 trips @ ₱1,500 = ₱54,000 field allowance 2 x 3 mos. x ₱1,500/month = 9,000 local transport = 1,800			
4. Conferences/meetings Consultation meetings with government agencies, residents, etc. of Maqueda/ Carigara area.	20,000	32,000	52,000

Table 10 (continued)

	Year 1	Year 2	Total
5. Incentives to cooperators 14 villages (220 cooperators) @ ₱200/cooperator	30,000	.14,000	44,000
Sub-total	155,400	134,600	290,000
C. Equipment			
14 hand calculators @ ₱350	4,900	-	4,900
D. Other Services			
1. Technical Assistance			
a. Fisheries Management Consultant/ Add'l Technical Service (14 man-months)			
Professional Fees @ $9,000/mo.*	693,000	2,079,000	2,772,000
Air fare (2 trips @ $2,500)	55,000	55,000	110,000
Local transport	25,000	50,000	75,000
Per diem ($80/day - Metro Manila; $50/day - outside Metro Manila)	171,600	60,000	237,000
Housing	40,000	200,000	240,000
Sub-total	984,600	2,450,000	3,434,600
b. Professional Fees			
1. Senior Researcher (half-time) 12 man-months @ ₱10,000 (Team leader of special studies)	60,000	60,000	120,000
2. 2 BAEcon Provincial Officers 12 man-months @ ₱600	4,800	2,400	7,200
3. BAEcon District Officers 8 villages x 12 mos x ₱500/village	32,000	16,000	48,000
4. 6 BFAR Extension Workers 18 man-months @ ₱1,200	12,000	6,000	18,000
	108,800	84,400	193,200
c. Information Search (Acquisition of publications/other materials)	66,000	66,000	132,000
	1,159,400	2,600,400	3,759,800

* 1 US $ = ₱22

Table 10 (continued)

	Year 1	Year 2	Total
2. Training			
a. Barrio Assistants/BFAR extension workers/cooperators training 14 villages @ ₱1,500	21,000	-	21,000
b. Long-term training 2 MSc Economics (UPM) - school fees, stipend, air fare, thesis support	-	500,000	500,000
	21,000	500,000	521,000
3. Publications Technical Reports/leaflets	-	250,000	250,000
4. Special studies (see attached for details)	82,000	410,200	492,200
Sub-total	1,262,400	3,760,600	5,023,000

Table 11. Budget Details: Special Studies

A. Personnel Services		
1. Professional fees*		₱ 168,750
2 Research associates		
18 man-mos. @ ₱3,500	63,000	
6 Senior Research Assts.		
36 man-mos. @ ₱2,500	90,000	
	153,000	
2. Salaries/wages		
1 typist		
7 man-mos. @ ₱1,500	10,500	
1 part-time bookkeeper		
3.5 man-mos. @ ₱1,500	5,250	
	15,750	
B. Supplies (including research materials and xeroxing) ₱3,000/mo. for 6 mos.		18,000
C. Communications ₱800/mo. for 6 mos.		4,800
D. Workshops (including transportation, supplies, lodging)		60,000
E. Microcomputer (including accessories and supplies)		61,250
F. Travel		179,400
Transportation		
1. Airfare - 50 trips @ 1,500	75,000	
2. Local transport - 9 x 6 x 400/mo.	14,000	
	89,400	
Per diem/field allowance		
8 x 6 x 1,500/mo.	72,000	
1 x 60 days x 300/day	18,000	
	90,000	
Total		₱492,200

* Excluding Senior Researcher which is shown under Professional fee category (D.1.b) with the main budget.

CHAPTER 12. MANAGEMENT SCHEMES (PHASE II)

As indicated in earlier chapters, it is not possible at this point in time to predict what form of management infrastructure and associated tools for management will be required to implement a community based management scheme. Nor, therefore, can the likely costs of such an approach be estimated at this time.

However, the major components of a management approach can be identified and these are briefly discussed here so that the likely direction of evolution of this pilot study can be appreciated.

A management program for Carigara and Maqueda Bays should address the following major tasks:

1. Setting of objectives: Alternative goals of management could be maximizing sustainable yield or catch, maximizing net economic returns or resource rents from the fishery, maximizing employment, or equitable distribution of benefits from the fishery. These goals cannot be achieved simultaneously. For example, achieving the goal of equitable distribution of benefits may be at the expense of economic efficiency.

2. Selecting a mechanism for controlling access and use rights: Alternatives include licenses, quotas, taxes, restrictions on certain gear types or on vessel sizes or power, closed seasons or closed areas. The choice of the most appropriate mechanism would depend upon the characteristics of the fishery in question and the management objectives to be achieved.

3. Establishing a system for transfer of use rights such as an open market or bidding for licenses, for example.

Alternative approaches to these tasks for capture fisheries have been thoroughly explored in published literature, but there has been quite a gap between the theory and the application of management measures as evidenced by the very small number of programs around the world that have successfully limited fishing effort and produced higher net economic benefits. The few locations where limited entry licensing schemes are effective are in temperate areas and cover only single species. Multi-species, multi-gear fisheries as exist in Carigara and Maqueda Bays are exceedingly complex and management will be no easy task, but it is imperative that the first steps be taken to establish effective fishery management organizations.

The major tasks of management enumerated above imply the need for the following:

1. The creation of a management organization which can serve as a forum for expression of the points of view of the competing users of the coastal waters, make the necessary decisions of

setting management objectives and run the management program. This management organization need not necessarily be a statutory body in the formal sense because traditional community-based institutions for regulating fishing effort may still exist in fishing communities. However, it is more likely that these traditional institutions may have broken down in the face of competition from other users such as trawlers or more efficient gears. Because the two Bays are surrounded by numerous communities with incomplete jurisdiction over the whole, it will most likely be necessary to create a statutory body, perhaps similar to the Laguna Lake Development Authority, with fishing community participation assured. Needless to say, this statutory body must not only be formed, it must effectively deal with often opposing and contentious points of view and administer an effective management program in order to achieve its objectives.

2. The establishment of an information system. Allocation decisions cannot be made without the necessary data base, and at the minimum the following time-series data will probably need to be collected on a regular basis:

- catch and/or harvest by competing users
- effort (number of units of competing gear types; number of trips/year)
- catch composition
- prices by major species
- costs and earnings of major gear types (and from this, incomes of competing users)

The first four variables above will allow determination of the total value of the Bays' fishery and the relative shares earned by each gear type or user. This work should be seen as an extension of the Phase I data collection, but a way must be found for more cost-effective data collection based upon the experience of Phase I. An ongoing supervised record-keepng activity may not be possible, for example, without voluntary participation by fishermen who provide reliable data to the management authority. The Phase I study should assess the feasibility of such an approach. There are advantages, however, to surveys for particular data sets in that they invite the involvement of competing users in the management process. Steps will have to be taken to assure the reliability of the data provided by these users because at a minimum, cost and returns data are necessary for continued monitoring the economic health of the fishery.

In addition, data collected on a regular basis should also cover:

a) changing patterns of ownership among the various users to determine the degree of concentration, &

b) changing opportunity costs of labor and capital since these two cost items must be included in the calculations of total costs to determine if any positive costs to determine if any positive resource rents are being earned and to decide on the degree of emphasis that must be put on generating alternative sources of income outside fishing.

3. The selection of a management mechanism or mechanisms and the means with which to enforce it. It is in this area that the best-intentioned management schemes break down. Either an inappropriate mechanism which fails to adequately limit effort or entry is selected or as is presently the case in the Samar Sea the regulations of use (e.g., coastal zones where trawling is prohibited) are not fully enforced. Total catch quotas have also been found to be ineffective in some locations outside the Philippines because they fail to limit entry and thus do not control effective effort and over-capitalization of the fishery still results. At the extreme, such as in Pacific yellowfin tuna fishery, the total catch quota in 1970 was taken in 2 1/2 months with many of the vessels lying idle the remainder of the year, thus representing considerable waste to the economy. Licenses that are transferable on the open-market appear to be a better system of assuring that positive resource rents are sustainable.

In Maqueda and Carigara Bays, enforcement of regulations will be the most difficult component of the management regime because 1) it is costly, 2) it will mean restrictions on the activities of some present users of the Bays, and 3) it can be circumvented through the use of non-price discriminatory practices by management authorities.

If the license fee is sufficiently high, it will serve its purpose of limiting entry and effective fishing effort in the fishery will be controlled. The 'price' of the license will then allocate use rights. However, if the license fee is low, as is the case currently with only nominal fess collected, it will not effectively limit entry and it is likely that other 'informal taxes' will be paid by potential users to permit use in forms other than those legally permissible.

Lest the above comments on the complexity of the management process appear discouraging, it is worthwhile to cite several examples of successful management systems or evolving systems that have promise of success in Asia. The most comprehensive and effective is in Japan where coastal and inland waters are under the management of fishing communities and cooperatives. The fishing communities exercise jurisdiction over coastal waters to a distance of 26 miles and make all the use and allocation decisions related to who can fish, where, when and with what kind of gear. The cooperative serves as a forum for the resolution of conflicts and the cooperative leaders are highly respected in their communities. The keys to the success of these Japanese systems have been that they have complete authority within

their area of jurisdiction and they have involved a high degree of participation by the fishermen themselves. This is in marked contrast to the capture fisheries in much of Asia where there are hybrid systems of national and local jurisdiction and regulation but little participation by fishermen.

A second example drawn from the Philippines demonstrates how fisheries management regimes can benefit local governments. Milkfish fry grounds, coastal aquaculture and the placement of fish corrals in both marine and inland waters are governed by municipal concessions which allow the municipality to extract some of the resource rent in the form of a license fee. These licenses are awarded annually (or for a maximum of 5 years) to the highest bidder who then has exclusive use rights to the area in question. There are important questions regarding the distribution of benefits, equity and incidence of risk with these systems but the point to be made here is that the concessions produce a significant proportion of the annual income of many rural municipalities in the Philippines. In a few of these municipalities the small-scale fishermen or fry gatherers operate the concessions through cooperatives.

The third example, also from the Philippines, is in Sampaloc Lake, just south of Laguna de Bay. Here, a system has evolved whereby use rights to the waters adjacent to the shoreline must be obtained by purchase from present users. It is unclear how this system evolved because nearby San Pablo City does not regulate the use of Sampalok Lake in any way nor issue licenses. The first users have apparently successfully established private property rights over what has formerly public property. They have benefitted from the establishment of these property rights which now command high prices and effectively limit entry to the lake's culture fishery. San Pablo officials could consider turning this system to the city's advantage by instituting a licensing scheme with part of the proceeds of the open-market sale of licenses going to the public treasury.

These are but very few examples that demonstrate the potential usefulness of coastal fisheries management programs. There are undoubtedly other examples that could be drawn from other countries of Asia.

A key element in any management scheme will be the provision for participation of users in the decision-making process. In the Philippines as in most parts of the tropics, fisheries regulations and authority tend to be centralized at national levels. Locale-specific refinements are rare and the almost total lack of fishermen involvment in planning and management for regional specific fisheries has created a situation where enforcement is extremely difficult. The Japanese system of coastal fishing rights cited earlier indicates the potential for systems that include a prominent role for fishing communities and which could be considered for Philippine coastal waters.

The advantages and potential of participation by fishermen in the development and management process have been eloquently argued by numerous authors and similar arguments have been put forward for rural

dwellers as a whole. This literature should be thoroughly reviewed by the Pilot Study Task Force during Phase I and carefully examined for possible use in Maqueda and Carigara Bays. The U.P. Institute of Social Work and Community Development may be particularly useful a contributor to this because of the Institute's previous work with fishing community organizations in Lingayen Gulf and elsewhere in the Philippines. These arguments for 'participatory management' are more than mere rhetoric; it is abundantly clear that centralized fisheries management lacks the necessary locale-specific refinements and support of fishermen themselves that are necessary ingredients of any effective management program.

Given the uncertainty at the present time surrounding the likely form and mechanisms of management for Maqueda and Carigara Bays, a budget cannot yet be prepared for Phase II of this Pilot Study. This should be possible, however, towards the end of Phase I. At a minimum, Phase II should plan on continued information collection and analysis and the involvement of groups committed to the strengthening of community institutions so as to increase the involvement of fishermen in the management process.

Finally, a second element of Phase II could be the initiation of Phase I-type activities in another location, taking into account the success of this effort in Maqueda and Carigara Bays and opportunities for producing the costs of such pilot studies.

In conclusion, the initiation of community management approaches and other forms of more localized control over use of coastal resources requires the socio-economic and other non-technical aspects, be institutionalized throughout the fisheries infrastructure up to national levels. Hopefully, this pilot study will provide sufficient rationale and evidence of success with the approach for such institutionalization - and the attendant staff and budget commitments - to be made. In that way, fisheries management could move beyond its present project-by-project approach with stronger institutional support.

A P P E N D I C E S

APPENDIX A

THE NATURE OF CARIGARA/MAQUEDA BAY FISHERIES

The purpose of this Appendix is to provide some background data for planning of the pilot management and fishing sampling strategies. Most of these are derived from the National fishery census.

Essentially, data are presented to give preliminary indications of

1) Proportions of different municipal gears operating (per day) in the core study area. Table 1.

2) The major species groups upon which the fishery depends - TABLES II - VIII.

3) A comparison of relative intensity of fishing effort and yields in various parts of the study area. Table IX.

4) An analysis of vital statistics of fish from various species in Visayan/Samar sea.

A full discussion on these data is premature at this stage, and may in any case be modified in the light of further analysis. However, the following biological features should be considered in the project planning process, to ensure meaningful objectives and priorities.

COMPOSITION OF FISHERY

The declared total catch from Samar Sea is 78% municipal and 22% commercial. Although the study area is predominantly municipal, it can be assumed that some commercial vessels operate within the Carigara Bay area. The majority of declared catches in the Samar municipal fishery are derived from gill nets and long lines.

IDENTIFICATION OF "UNIT" STOCKS

There are essential differences between the fisheries in Maqueda and Carigara bays. The former is characterized by predominantly shallow water, legalized species, while the latter is based largely on migratory species, many with pelagic spawning habits.

The significance of this terms of project planning, is that the Maqueda Bay fisheries probably form fairly discrete populations between which there is limited exchange (unit stocks) and would therefore respond consistently to management within the project area. In Carigara however, at least half the yield is derived from strongly migratory species, for which supplementary data may be needed (e.g. location of major spawning zones, fishing pressure along migratory routes etc.) before the project results will make "sense".

In other words, "unit" stocks can be examined with a simple analysis of localized fishing effort within the sample area; Data on strongly migratory (seasonal) species however, will need to be related to overall trends on a regional or even national scale (e.g. tuna).

FISHING INTENSITY IN DIFFERENT AREAS OF THE BAY

The greatest amount of fishing pressure is concentrated in the N. Maqueda Municipalities (Wright, Catbalogan, Jiabong; Motiong and San Sebastian - see Table IX) and here the yields per fishing hour are low (e.g. around 1 kg/hr for gill nets and hook and line). On the other hand, in the municipalities where fishing boat density is lower (E. Biliran and Carigara bay), average catches are increased to around 3 kg/hr.

With more accurate description of fishing gears and numbers operating, and by superimposition of several years data, this relationship can be used to assess optimum fishing pressure required for maximum total yield.

IMPORTANT PAST STUDIES

With regard to results of past studies - two surveys stand out as extremely important in the present context, namely; that of Warfel and Manacop (1950) and that conducted more recently (Armada and Silvestre 1981, Viloso and Hermosa 1982 and Armada et al 1983).

These are important because they show quantitative data on relative density and depth distribution of fish resources in Carigara Bay/Samar Sea prior to and after the imposition of the 7 km trawl ban. (Figure 15).

Again, it is premature to make sweeping conclusions until the long term study has looked into and verified specific aspects of the present resource distribution. However, the two sets of surveys indicate that since the trawl ban, there is now an increase in the density of fish as one moves from shallow to deeper zones. Fish appear to be especially abundant in waters deeper that 80 m.

This is contrary to that expected in a completely unexploited fishery, where maximum densities occur in shallow regions. It would appear that most of the current fishing is now focussed in shallow zones, leaving a biomass "reserve" in deeper areas.

In terms of management this may be an ideal situation, because as shown by Tiews and Caces-Borja (1965) in Manila Bay, there may be a continual migratory interchange of fish of different age groups between deeper and shallower regions. Thus providing a natural resource replenishing process. On the other hand, it could also be argued that deeper waters now have a surplus production and are underfished.

Altogether, the final conclusion must depend on accurate plotting of the extent of various depth zones, in relation to the 7 km. zone, and on assessment of whether the greater densities in deeper water represent a significant "reserve" in real terms (i.e. it may simply be that inshore fisheries are so intensively cropped, that the deep water stocks appear dense).

FISHERY INTERACTIONS WITH AQUACULTURE

One topic which needs attention in the proposed project (but could not be investigated here in any detail) is the potential interaction - beneficial and/or negative of fisheries operations with aquaculture in the Maqueda /Carigara Bay Fisheries.

Also attention should be given to the potential effect of "red tides" - which affect both wild and cultivate invertebrates and fish stocks. Thus White et al (1984 p. 11) note that "there was a loss of about P500,000 (US$25,000) during a 2-week ban on mussel from Maqueda and Villeral Bays in the Philippines. From mid-July 1983 to mid-March 1983, there was an estimated loss of about P10."

This quote, incidentally, calls into question the accuracy of some of the data reported here (notably on Table IV) in which mussel "catches" is supposed to have dropped to zero in 1982, i.e. one year before the reported red tide outbreak.

Table I Estimated average numbers of municipal units landed per day, Carigara and Maqueda Bays 1982.

Gill Nets	630
Hook and Line	356
Crab Lift Net	191
Fish Corral	153
Beach Seine	143
Baby Trawl	97
Ring Net	89
Push Net	84
Crab Pot	82
Fish Pot	49
Drag Seine	33
Long Line	29
Scissor Net	19
Spear	6
Round Hawl Seine	2

* Figures raised from data sheets of the National Census according to recorded numbers of landing sites and average daily activity.

Although the relative proportions of different gears are meaningful, actual numbers may be underestimated.

Table II. Major yielding species in the Carigara/Maqueda Bay municipal fisheries (1986 all gears combined).

Carigara Bay (Leyte II)	%	S. Maqueda Bay (W. Samar III)	%	N. Maqueda Bay (W. Samar I)	%
Sardines*	27	Slipmouth	25	Indo-Pacific Mackerel*	26
Indo-Pacific Mackerel*	12	Sillago whiting	14	Sardines*	18
Slipmouths	9	White shrimp	12	Slipmouth	6
Wolf herring*	8	Threadfin bream	8	Sillago whiting	5
Roundscads*	7	Goatfish	8	Blue crabs	4
Threadfin breams	5	Grunt	8	Spanish mackerel*	5
Anchovies	5	Blue crabs	7	Roundscads*	4
Frigate tuna*	4	Mullets	5	Perchlet	3
Snapper	3	Squids*	2	White shrimp	3
Big-eyed scad*	3	Indo-Pacific mackerel*	2	Yellowfin tuna*	3
Smooth scad*	3	Porgy	1	Goatfish	2
Crevalle*	2	Sergeant fish	1	Crevalle*	2
Mullet*	2	Leather jacket*	1	Mullet*	2
Blue crab	2	Rays*	1	Threadfin breams	2
Mojarra*	1				
	93		97		88

* Indicates migratory species which spend much of their life cycle outside the sampling area and under the influence of other fisheries. These will not therefore respond consistently to management within Carigara/Maqueda Bays and will require supplementary population data from surrounding areas. Note that the fish community in the shallower Maqueda Bay are mostly non-migratory and can therefore be considered as unit stocks for the purpose of management.

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Frigate tuna*	4	Mullets	5	Perchlet	3
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Smooth scad*	3	Porgy	1	Goatfish	2
Crevalle*	2	Sergeant fish	1	Crevalle*	2
Mullet*	2	Leather jacket*	1	Mullet*	2
Blue crab	2	Rays*	1	Threadfin breams	2
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Table III Contribution by different fishing gears to the catches of major yielding species in Carigara/Maqueda Bays.

A. Municipal fisheries

Species	Hook & Line (%)	Gill Net (%)	Troll Line (%)	Corrals (%)	Crablift Net (%)	Others (%)
Threadfin Bream (Bisugo)	41	21	17	15	-	-
Sardines (Tonsoy)	-	91	-	-	-	-
Span. Mackerel (Maladyong)	-	88	-	-	-	-
Slipmouth (Sapsap)	-	34	-	37	-	-
Frigate Tuna (Tulingan)	-	-	-	-	-	87
Big-eyed Scad (Matang baka)	-	94	-	-	-	-
Siganids (Samaral)	37	23	-	19	-	-
White Shrimp (Hipong puti)	-	59	-	26	-	-
Indo-Pacific Mackerel (Hasa hasa)	-	78	-	-	-	-
Blue Crab (Alimasag)	-	46	-	-	30	-
Squid (Pusit)	45	15	-	27	-	-

B. Commercial fisheries

Species	Purse Seine (%)	Trawl (%)	Roundhawl Seine (%)
Roundscads (Galunggong)	49	48	-
Slipmouth (Sapsap)	-	96	-
Indo-Pacific Mackerel (Hasa hasa)	-	33	50
Goatfish (Saramalyete)	-	100	-
Hairtail (Balila)	-	99	-
Sardines (Tonsoy)	37	55	-
Squid (Pusit)	-	97	-
Anchovies (Dilis)	-	94	-
Indian Mackerel (Alumahan)	61	38	-
Threadfin Bream (Bisugo)	-	96	-
Lizard fish (Kalaso)	-	100	-

Table IV Municipal catches Samar Sea. Major yielding species groups (Tonnes per year).

Species	Year 1980	1981	1982	1983	1984
Roudnscad	2252	2543	395	1061	1832
Threadfin bream	2208	1710	2261	999	1237
Sardines	6106	3192	1825	1827	1754
Spanish Mackerel	1609	1863	1686	4012	572
Slipmouth	3776	37782	1591	3154	1460
Frigate Tuna	987	1652	1369	1437	1368
Bigeyed scad	222	466	1360	657	685
Siganids	451	706	1284	342	733
White shrimps	1610	2121	1234	997	1132
Indo-Pacific Mackerel	1743	2455	899	2665	1322
Blue crabs	2056	2516	803	1060	968
Squids	601	1131	614	522	262
Porgies	158	472	568	350	221
Majarras	354	759	559	138	278
Mullets	187	372	603	323	296
Snappers	1782	1441	520	425	702
Skates & rays	609	745	451	190	77
Sillago whiting	1454	1403	420	416	708
Groupers	1456	1395	364	469	921
Indian Mackerel	1974	910	125	306	521
Anchovies	3988	2021	245	1315	2081
Round herring	1093	298	112	344	446
E. little tuna	1131	1326	104	5659	307
Giant clam	11794	1738	-	-	63
Green mussels	1218	803	-	-	2
Jellyfish	600	270	200	55	25

Table V Commercial catches Samar Sea. Major yielding species groups (Tonnes per year).

Species	Year 1980	1981	1982	1983	1984
Lizardfish	152	107	258	141	113
Threadfin bream	131	221	259	354	599
Slipmouth	529	524	765	891	995
Goatfish	244	280	464	401	487
Roundscad	374	1354	1164	456	286
Sardines	350	553	332	562	141
Anchovies	376	303	263	256	527
Frigate tuna	-	110	-	-	66
Indo-Pacific Mackerel	780	2194	770	739	673
Indian Mackerel	245	240	784	387	126
Squid	166	342	307	92	126
Jellyfish	600	-	-	-	-
Crevalles	-	186	-	100	35
Cavalla	-	325	-	136	30
Eastern little tuna	531	-	-	126	36
Majarras	-	-	139	28	4

Table VI Relative abundance of 25 most abundant species/groups in a trawl survey of Samar Sea (data from Armada and Silvestre, 1981).

Species	Total Survey Area		Samar Sea		Carigara Bay	
	CPUE	%	CPUE	%	CPUE	%
1. Leiognathus bindus	42.00	24.10	36.20	20.20	51.50	30.40
2. Loligo spp.	10.00	5.70	10.90	6.10	10.30	6.10
3. Pentaprion longimanus	9.70	5.60	8.20	4.60	10.40	6.10
4. Saurida undosquamis	7.60	4.40	9.10	5.10	5.00	3.00
5. Upeneus sulphureus	6.10	3.50	4.10	2.30	9.60	5.70
6. Saurida tumbil	6.00	3.40	5.70	3.20	5.60	3.30
7. Nemipterus nematophorus	5.20	3.00	6.00	3.40	3.80	2.20
8. Leiognathus splendens	4.80	2.80	7.30	4.10	0.40	0.20
9. Rastrelliger brachysomus	4.60	2.60	3.20	1.80	7.00	4.10
10. Apogonidae	4.60	2.60	4.80	2.70	4.00	2.40
11. Decapterus spp.	4.20	2.40	3.80	2.10	2.00	1.20
12. Sepia spp.	3.90	2.20	4.70	2.60	2.80	1.60
13. Leiognathus equulus	3.90	2.20	4.70	2.60	2.60	1.50
14. Trichiurus haumela	3.80	2.00	4.10	2.30	3.30	1.90
15. Tetraodontidae	3.40	1.80	4.30	2.40	1.90	1.10
16. Priacanthus tayenus	3.20	1.70	2.60	1.40	4.40	2.60
17. Priacanthus macracanthus	3.00	1.70	3.80	2.10	1.50	0.90
18. Rastrelliger chrysozonus	2.90	1.70	4.20	2.30	2.10	1.20
19. Fistularidae	2.90	1.30	2.20	1.20	4.00	2.40
20. Stolephorus indicus	2.20	1.20	2.40	1.30	1.80	1.10
21. Triglidae	2.00	1.00	2.20	1.20	1.80	1.10
22. Selaroides leptolepis	1.80	1.00	0.90	0.50	3.20	1.90
23. Alepes djebaba	1.70	0.90	2.40	1.30	0.50	0.30
24. Nemipterus japonicus	1.60	0.90	2.10	1.20	0.70	0.40
25. Leiognathus brevirostris	1.50	18.10	2.10	1.20	0.50	0.30
26. Others	31.70		36.80	20.60	28.60	17.00
TOTAL	174.00		178.80		169.30	

Table VII Depth distribution (kg./hr.) of 8 most abundant species, Carigara Bay (data from Armada and Silvestre 1981).

Species	Depth (m) 10-20	20-30	30-40	40-50	50-60	60-70
Leiognathus bindus	0.50	10.50	127.40	42.10	32.20	48.10
Pentaprion longimanus	0.50	3.40	18.50	14.70	9.80	10.80
Saurida undosquamis	0.00	0.20	1.70	3.50	7.30	9.40
Upeneus sulphureus	2.60	8.90	17.10	8.70	6.40	9.30
Saurida tumbil	7.00	6.30	3.90	5.70	7.00	6.30
Nemipterus nematophorus	0.00	1.40	0.80	1.60	6.70	6.20
Leiognathus spendens	10.40	0.20	1.20	0.00	0.00	0.00
Rastrelliger brachysomus	0.00	15.40	13.00	4.80	4.50	4.30

Table VIII Monthly variation in biomass (ton/sq. km.) by depth, Carigara Bay (data from Armada and Silvestre 1981).

Cruise	Month	Depth (m) 10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	AVE.
96	March 1979	-	1.57	2.92	0.28	1.02	1.00	-	-	-	1.30
97	April	-	3.25	2.41	1.25	1.18	2.88	-	-	-	1.87
98	May	-	1.20	2.06	1.15	2.12	1.85	-	-	-	1.76
99	June	2.35	0.40	-	0.73	1.78	0.35	-	-	-	0.96
100	July	-	-	1.63	1.46	2.77	1.45	-	-	-	1.77
102	August	-	0.77	4.35	1.29	1.73	2.58	-	-	-	2.24
104	September	-	0.82	-	1.30	1.21	1.28	-	-	-	1.18
106	February 1980	0.95	1.78	2.21	1.36	2.17	3.09	-	-	-	2.04
107	March	-	1.25	9.66	2.06	2.53	3.46	-	-	-	4.54
108	April	-	1.07	1.92	3.00	2.35	1.89	-	-	-	2.30
110	May	-	0.65	2.21	2.42	1.89	2.23	-	-	-	2.00
	Average	1.65	1.24	3.57	1.55	1.80	1.87	-	-	-	2.00
	MAM 1979	-	2.01	2.41	0.89	1.34	1.91	-	-	-	1.64
	MAM 1980	-	0.99	4.28	2.62	2.23	2.26	-	-	-	2.94
	Increment	-	1.02	1.87	1.73	0.89	0.35	-	-	-	1.30
	Increment (%)	-	50.60	77.70	193.30	66.70	18.40	-	-	-	79.30

Table IX. Assessment of active fishing effort and yields in four major regions of Carigara/Maqueda Bays; 1984 (data raised from data sheets of the National Census according to recorded number of landing sites).

Area	Total No. Barangays	Sample Size: No. of Brgy/days Sampled	Sample Size: No. Units Sampled		Estimated Total Units landed/day	Average Yield/hr	
			Gill nets	Hook line		Gill nets	Hook line
Biliran	48	45	198	88	350	3.65	3.00
Carigara Bay	23	74	563	337	372	2.73	1.58
S. Maqueda	31	39	287	131	296	3.08	1.47
N. Maqueda	42	34	205	25	930	1.36	1.86

Table X. Population coefficients of species from Samar Sea/Visayan regions, processed to show theoretical increase in yield after adjustment of length of capture (Lc) and fishing effort (E) (coefficients obtained from Ingles and Pauly (1984).

Species	Location	Year	Z	M	F	K	Actual coefficients E	Actual coefficients Lc	Calculated optimum coefficients E	Calculated optimum coefficients Lc	% Increase in Yield
1. S. tumbil	Visayan Sea	1976-77	2.22	1.30	0.92	0.70	0.42	9.60	0.70	19.00	31.50
2. S. undosquamis	Visayan Sea	1976-77	4.07	1.54	2.53	0.80	0.62	15.00	0.90	18.00	10.60
3. E. sexfaciatus	Visayan Sea	1976-77	1.95	1.14	0.81	0.51	0.42	10.70	0.60	13.00	15.00
4. P. tayenus	Samar Sea	1979-80	8.95	2.09	6.86	1.25	0.77	17.50	0.90	17.50	5.90
5. S. leptolepis	Visayan Sea	1976-77	8.64	2.11	6.53	1.18	0.76	13.80	0.90	13.80	4.00
6. L. bindus	Manila Bay	1958	6.70	2.79	3.91	1.25	0.58	4.50	0.90	6.00	14.30
7. L. brevirostris	Samar Sea	1979-80	12.00	3.07	8.93	1.69	0.74	8.20	0.90	8.20	7.30
8. L. daura	Manila Bay	1957	9.53	4.10	5.52	2.10	0.58	6.60	1.20	6.60	30.00
9. L. equulus	Samar Sea	1979-80	5.97	2.22	3.75	1.28	0.63	12.40			
10. L. lineolatus	Manila Bay	1957	9.23	2.77	6.46	1.30	0.70	7.10	1.10	7.10	14.50
11. L. splendens	Samar Sea	1979-80	3.77	1.76	2.01	0.72	0.53	8.70	1.10	8.70	26.70
12. N. japonicus	Manila Bay	1978-79	3.31	1.41	1.90	0.70	0.57	14.80	0.90	18.00	11.80
13. N. nematophorus	Visayan Sea	1976-77	3.38	1.39	1.99	0.65	0.59	11.50	0.80	15.00	12.50
14. N. oveniides	Visayan Sea	1976-77	1.52	1.60	0.46	0.42	0.30	13.10	0.80	13.10	44.20
15. P. longimanus	Carigara Bay	1979-80	15.20	2.83	12.37	1.59	0.81	7.90			
16. P. longimanus	Samar Sea	1979-80	12.20	2.81	9.39	1.55	0.77	7.40	0.90	10.00	10.00
17. U. moluccensis	Samar Sea	1979-80	6.96	2.27	4.69	1.20	0.67	10.50	0.90	10.50	6.30
18. U. sulphureus	Samar Sea	1979-80	6.96	2.27	4.69	1.20	0.67	10.50			
19. R. brachysoma	Samar Sea	1977-80	9.49	2.56	6.93	1.60	0.73	16.70	1.00	16.70	9.80
20. S. commerson	Visayan Sea	1976-77	1.49	1.23	0.76	0.70	0.17	18.50			

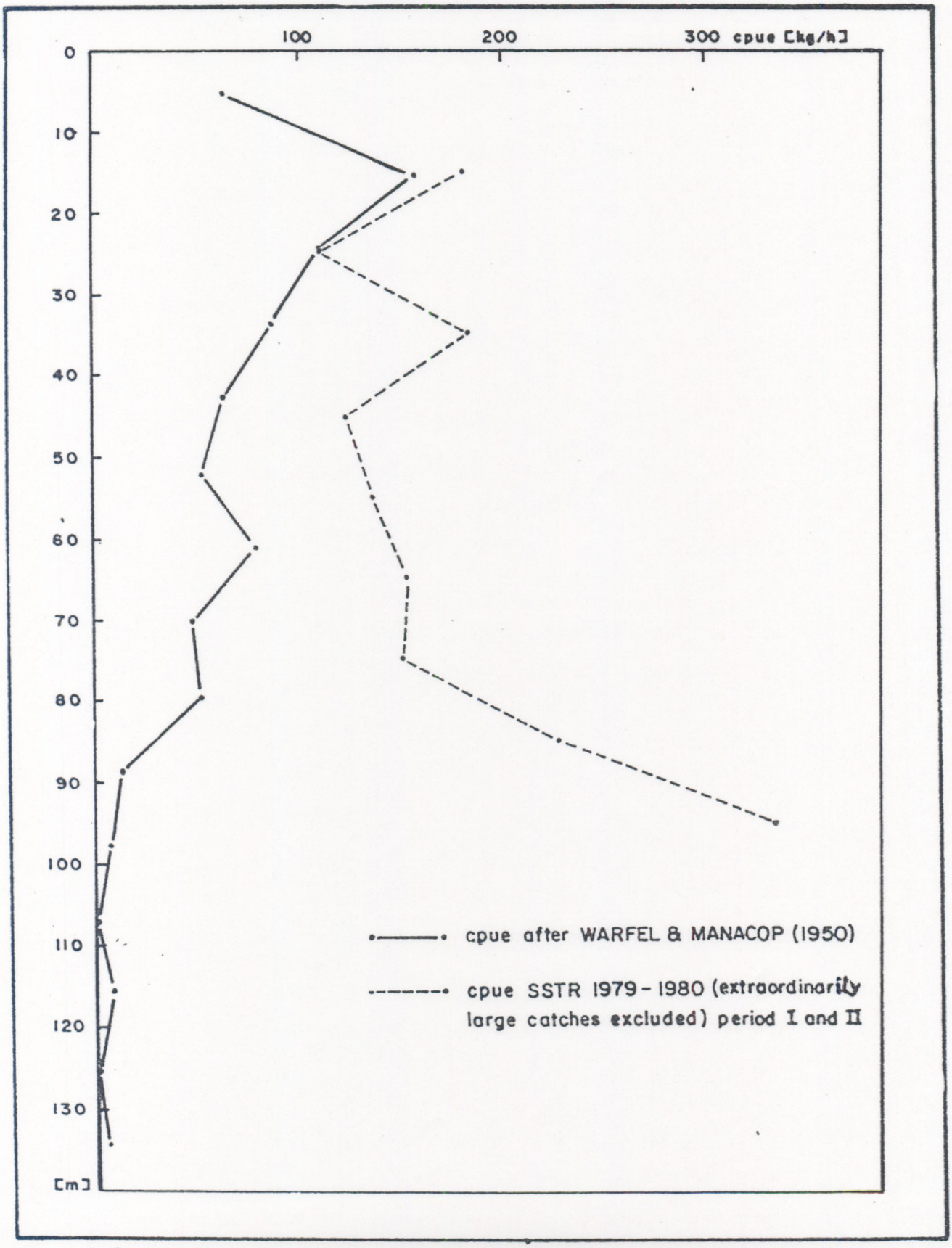


Fig. 15. Depth distribution of cpue of the SSTS (arithmetic mean) compared with the cpue of WARFEL & MANACOP (1950).

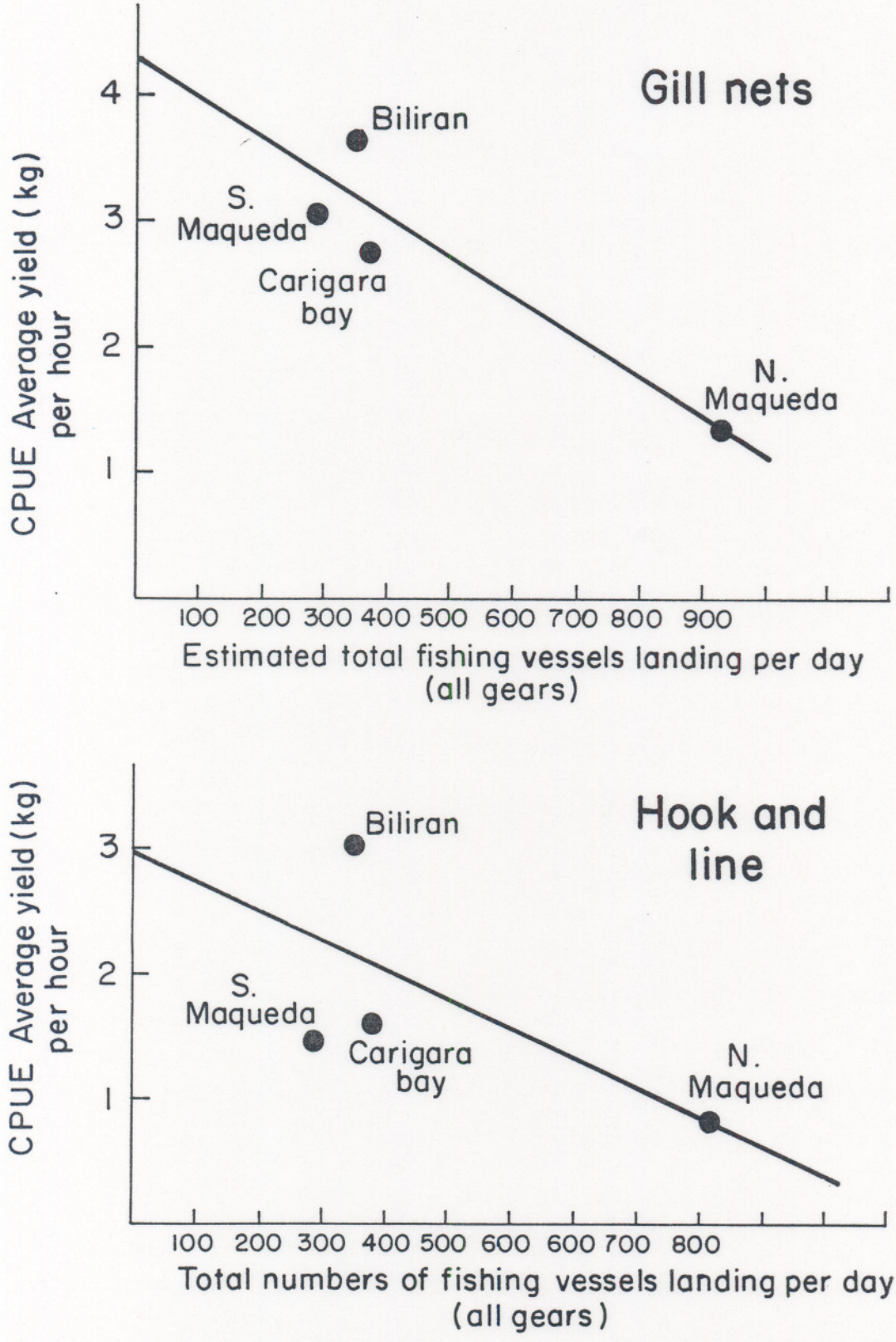


Fig. 16. Changes in CPUE in relation to fishing pressure.

APPENDIX B

GRADUATE PROGRAMME IN FISHERIES ECONOMICS LEADING TO MASTER OF SCIENCE (RESOURCE ECONOMICS)

FACULTY OF RESOURCE ECONOMICS AND AGRIBUSINESS UNIVERSITI PERTANIAN MALAYSIA

Throughout Asia aquatic animals are an important source of food and the capture, culture processing and trading of marine and freshwater organizms provide a livelihood to many thousands of households. However, most households which depend on the production of fish for their livelihood remain poor despite the development programmes and projects of the past several decades which have sought to improve fishing technology and thereby to raise the level of living of fishing households. It has become clear that there are serious problems of fisheries management and aquaculture production that cannot be solved by technology alone but which require the long-term sustained professional input of economists and other social scientists whose analytical skills can help to clarify the alternative choices available to decision makers, be they government policy makers, project managers, private entrepreneurs, or fisherman themselves. While there are many opportunities for the constructive contributions to fisheries management and aquaculture development issues by economists there is only a handful of active fisheries economists in Asia and there has been no programmes in the region's universities which provide professional training in fisheries economics.

In order to begin meeting the need in Malaysia and other Asian countries for well trained fisheries economists, the Faculty of Resource Economics and Agribusiness, Universiti Pertanian Malaysia with the assistance of IDRC, ADC and ICLARM announces the establishment of a programme in fisheries economics leading to the Master of Science (Resource Economics): the first graduate programme in fisheries economics in the region. The programme consists of coursework (24 Credits) and research (12 Credits) and all requirements will normally be completed within two years.

SUMMARY OF THE PROGRAMME

1. Economic theory (6 Credits)
   - — Microeconomics
   - — Macroeconomics
2. Statistics and Quantitative Methods (6 Credits)
   - — Econometric Methods
   - — Linear Programming
3. Natural Resource Economics (3 Credits)
4. Fisheries Economics and Management (3 Credits)
5. Economics of Aquaculture Production (3 Credits)
6. Seminar in Fisheries Policy and Problems (3 Credits)
7. Research Methods and Thesis (12 Credits)

The above courses and research will normally satisfy the full requirements for the M.S. (Resource Economics) but candidates might elect to

take additionai courses offered by the Faculty such as Land Economics, Economic Development & Planning, Project Evaluation, International Economics, Forestry Economics, Production Economics, Consumption Economics, Agricultural Finance, Price Analysis.

ENTRY QUALIFICATION

A person is eligible to be considered for admission as a candidate (full time or part time) if he/she possess:

(i) a Bachelor of Science in Resource Economics or Agribusiness from Universiti Pertanian Malaysia.
(ii) a Bachelor of Economics preferably with Honours from any other University of recognized standing.
(iii) a Bachelor Degree or equivalent qualification from an institution approved by senate as of comparable academic standard.

Apart from the academic background applicants should preferably have had several years of working experience in a relevant field.

RESEARCH ASSISTANTSHIPS

A limited number of research assistantships are available for the period of thesis research.

PERIOD OF STUDY

(i) A full time candidate will enrol for not less than two semesters but not more than six semesters.
(ii) A part time candidate will enrol for not less than six semesters but not more than ten semesters.

EXAMINATIONS

(i) **Course work**

A candidate must pass the written examination in each course and must achieve a minimum standard as approved by the Faculty Graduate Committee, failing which, that course is not taken into credit.

(ii) **Thesis**

A candidate is also required to successfully defend his thesis before the board of examiners.

ENQUIRES

For further enquiries please write to:

Dean,
Faculty of Resource Economics & Agribusiness,
Universiti Pertanian Malaysia,
Serdang, Selangor, Malaysia

APPENDIX C

THE ISWCD PROGRAM

The Institute of Social Work and Community Development (ISWCD), created in 1967 by Republic Act No. 5174, engages in professional and advanced training, research and extension services to foster and inculcate the importance of social work and community development.

It has two departments: the Department of Social Work and the Department of Community Development—which take charge of the teaching function of the Institute. Both departments offer academic programs designed to develop students into effective social practitioners so that they will be able to assist people in transforming themselves into a participating citizenry imbued with a strong sense of identity and national purpose.

The Offices of Research and Publication and Continuing Education, directly plan and implement the research and extension programs of the Institute to complement its academic activities.

Objectives

In teaching:

* provide students knowledge and skills for social work and community development practice.

* continuously develop and evolve a curriculum that would respond to the educational needs of prospective social work and community development practitioners.

In research:

* undertake research and publication programs focusing on collaborative developmental undertakings with other units of the University and outside entities to enrich instructions and improve practice.
* experiment with innovative strategies in development.

In extension services:

* engage in continuing education programs to meet the training needs of indigenous leaders, development workers, Institute alumni and faculty.
* implement faculty and staff development programs that would enhance and improve their competence for their respective functions and responsibilities

ADMISSION REQUIREMENTS

The Undergraduate Program:

* completion of at least a minimum requirement of 60 units of General Education (GE) courses from the U.P. College of Arts and Sciences or from other U.P. units with a weighted average of 2.5 for BSSW; and 2.25 for BSCD of the course curriculum.
* submission of a certified true copy of grades, clearance and transfer permit from the college wherein last enrolled.
* students who are deficient in any of the subjects required for admission but who otherwise, are found competent and may therefore be admitted, must make up all deficiencies within one (1) year.
* undergo an interview at the discretion of the Admissions Committee of the Institute.

The ISWCD's admission policy takes into consideration the previous education and experience of the applicant.

The Graduate Program

The general rules set by the U.P. Graduate School for admission to the graduate program shall apply to all the applicants of the ISWCD degree program.

* an applicant should be a Bachelor degree holder with a general weighted average of at least 2.0 or its equivalent for entry into the masteral degree programs of Social Work and Community Development.
* an applicant must submit the requirements set by the Institute at least one (1) month before the registration period for the semester.

DEPARTMENT OF SOCIAL WORK

SOCIAL WORK (SW) is a professional service to people aimed at helping them solve personal, group and community problems which prevent or impede effective social relationships.

Social work is concerned with the provision of services and the creation of social conditions necessary for effective social functioning of individuals.

Areas of the social work curriculum

* human behavior and social environment
* social welfare policies, programs and services
* social work practice
* field instruction

The Department of Social Work has the following Academic program of studies, namely:

1. the undergraduate program, Bachelor of Science in Social Work (B.S.S.W.)
2. the graduate programs, Master of Social Work (M.S.W.) and Diploma in Social Work (Dip. S.W.)

The B.S.S.W. program, a four-year course, is designed to prepare students for responsible entry into the human services; it provides the students an education for beginning competence in professional social work practice.

On the other hand, the Masteral degree in Social Work (M.S.W.), a two-year course, prepares social work practitioners for leadership positions in administration, supervision, research, social planning, social work education and advanced direct practice.

The program for a Diploma in Social Work (D.S.W.), a one-year post-bachelor program, responds to the need for higher level competence among social workers who are unable to pursue the 2-year masteral course.

The B.S.C.D.program prepares students to be steeped in the professional training and experience of people already involved in community development work; while the M.C.D. program further trains them to specialize on program planning and implementation in urban and countryside development, develop research as well as community organization skills.

THE GRADUATE PROGRAMS

The curricula of the CD graduate degree programs are divided into modules, each designed to attain specific objectives.

Module	D.C.D. units	M.C.D.(A) units	M.C.D.(B) units
core courses	12	12	12
seminar courses	9-10	7	12-13
sub-specialization	—	6	6
field work	—	3	6
thesis	—	6	—
comprehensive exam	—	—	00
	21-22	34	36-37

GRADUATION REQUIREMENTS

Community Development Degree Programs

B.S.C.D.

1. completion of at least (141-146) units of approved course work.
2. completion of P.E., ROTC/Social Orientation courses
3. a weighted grade average of 2.25 or better in all CD courses
4. one (1) full year of residence prior to graduation.

M.C.D.

Plan A

1. completion of 34 units of approved course work
2. thesis and an oral examination
3. a weighted grade average of 1.75 or better in all CD courses
4. one (1) full year of residence prior to graduation

Plan B

1. completion of 36-37 units of approved course work
2. passing a comprehensive examination
3. carries requirements 3 and 4 of Plan A

D.C.D.

1. completion of 21-22 units of approved course work.
2. a weighted grade average of 2.0 or better in all CD courses
3. one (1) full year of residence prior to graduation.

FACILITIES AND SERVICES

The location of the Institute makes it accessible to other facilities within the University. Just across its left side are the Drive-In Canteen and the Women's Swimming Pool. Behind the Institute is the round-shaped Catholic Chapel. The U.P. Infirmary, the Philippine National Bank, the Protestant Church of the Risen Lord, the University Shopping Center, the Republic Bank and the U.P. Cooperative Store are just a block away.

The Bulwagang Tandang Sora, adjacent to the OCE, has an air-conditioned conference hall complete with audio-visual facilities. It has a maximum seating capacity of 80 persons. Also, the ISWCD has a collection of sound slide films on social work and community development trends and other interesting social issues available for borrowing. For detailed information regarding the sound-slide titles, description and borrowing arrangements, please contact the ISWCD library.

Publications

The ISWCD publishes materials to document and disseminate teaching/training techniques, research findings, and other developmental issues in social work and community development and other related subjects. A listing of these materials are available in the Office of Research and Publication.

THE GRADUATE PROGRAMS

The M.S.W. degree program is offered in two (2) choices of core courses falling under plan A and plan B. Both have the following list of core courses:

Courses	*Units*
Social Behavioral Theory	3
Social Administration or Social Work Practice	12
Social Work Research	6
Field Instruction	6
Seminar in Social Welfare	3

However, plan A requires an additional Master's Thesis credited with 6 units. On the other hand, plan B adds in its program 6 units of Cognates, 3 units of an Elective course, and a comprehensive examination.

The D.S.W. degree program has the same load of core courses as that of the M.S.W. but without the additional courses of the plan A and plan B programs.

The curricula of the SW graduate program offers a choice of three concentrations: advanced direct practice, social administration, and social work education. All graduate students take the same courses in the first semester of the first year; the concentration in a chosen area starts in the second semester.

GRADUATION REQUIREMENTS

B.S.S.W.

1. completion of 143 units of approved course work
2. completion of PE and ROTC/Social Orientation courses
3. one (1) full year of residence prior to graduation
4. a weighted grade average of 2.75.

M.S.W.

Plan A

1. completion of 36 units of approved course work
2. thesis
3. a weighted grade average of 2.0
4. one (1) full year of residence prior to graduation.

Plan B

1. completion of 39 units of approved course work
2. passing a comprehensive examination
3. carries requirements 3 and 4 of plan A

D.S.W.

1. completion of 24 units of approved course work
2. carries requirements 3 and 4 of the MSW plan A program.

DEPARTMENT OF COMMUNITY DEVELOPMENT

COMMUNITY DEVELOPMENT (CD) is a commitment to the creation of a society that provides for equal access to opportunities and benefits in the social, economic and political spheres through popular participation, the main components of which are: critical awareness, democratic organization and responsible action.

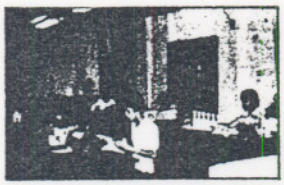
Areas of the CD Course

* theories, principles and methods of community development
* knowledge and analysis of Philippine reality
* planning and administration of development programs
* research

These programs are designed to provide students with knowledge, skills, attitudes and commitment necessary for working effectively with the people in the community.

The Department of Community Development offers the following academic programs, namely:

1. the undergraduate program, Bachelor of Science in Community Development (B.S.C.D.).
2. the graduate program, Master of Community Development (M.C.D.), and the diploma program, Diploma in Community Development (D.C.D.).



The ISWCD Administration Office

The office provides clerical and administrative services to the Institute's major programs of teaching, research and extension.

ISWCD Cooperative Canteen

The Institute has a canteen which is operated by a pre-cooperative association of ISWCD constituents.

The canteen was set up in 1972 as a social laboratory of the Institute to experiment on the cooperative principle.

The ISWCD Library

The ISWCD library provides the Institute and the other units of the University system with literature on social work and community development and other social science subjects to meet their information needs in these areas.

Acquisitions		as of Jan.-Dec. 1981
* books	—	4,437
* pamphlets	—	347
* periodicals	—	500
* theses	—	147
* Xerox materials	—	306

.....and an evergrowing number of xeroxed materials

Library hours
Monday to Friday
8:00-6:00 p.m.
Saturday
9:00-12:00 a.m. and 1:00-4:00 p.m.

OFFICE OF RESEARCH AND PUBLICATION

The **Office of Research and Publication** (ORP) was organized in January, 1973 to take charge of developing and implementing the research and publication programs of the Institute in the fields of Social Work and Community Development.

Functions:

1) stimulate, support, undertake and coordinate research and publication activities of the Institute
2) formulate policies and set up the research and publication priorities of the Institute;
3) develop and recommend research studies for funding
4) develop and produce publication materials on social work and community development
5) promote research and publication linkages with other units of the University and external agencies.

Funding

The ORP, develops and undertakes research and publication projects for external funding to generate additional income for the office's activities.

OFFICE OF CONTINUING EDUCATION

The **Office of Continuing Education** (OCE) responds to the learning needs of adult and youth leaders, development workers and people in general, who are involved in social development programs and services all over the country.

Functions

* develop short-term and long-range training seminars
* study proposals and establish priorities of the continuing education program

* establish liaison with government and non-governmental agencies, organizations, and other units of the Institute concerning their needs for short courses and/or seminars;
* explore, tap and assess possible sources of funding in line with existing University policies and external assistance.

The objectives of the OCE training program are threefold, namely:

1. to provide the leader-trainees an opportunity to form their own perspective on development and acquire the skills and knowledge needed for effective leadership in the community.
2. to further train community workers to acquire a conceptual framework and strengthen their competence in skills appropriate for community work.
3. to upgrade the skills and knowledge of ISWCD staff and social work and community development practitioners by keeping them abreast with current trends in development issues.

ACTIVITIES

Training

PAGLIKOM (Pagsasanay para sa mga Lider ng Komunidad), 1 ten day training course for indigenous community leaders, conducted four (4) times a year.

PARTNERS (Training Course in Social Work and Community for Partners in Development) a 6-week training course for community workers who are non-graduates of social work or community development, conducted twice a year.

CEP (Continuing Education Program), short and long-term courses for ISWCD staff and graduates of social work and community development.

Funding

OCE currently draws its funding from the BREAD FOR THE WORLD FOUNDATION and the University of the Philippines. In addition, the office also generates its own funds from conducting courses commissioned by other agencies involved in social development.

DEPARTMENT HEADS

Prof. Sylvia H. Guerrero
Dean

Prof. Esther C. Viloria
Secretary

Prof. Romeo C. Quieta
Chairperson, Department of Social Work

Prof. Amaryllis T. Torres
Chairperson, Department of Community Development

Prof. Evelina A. Pangalangan
Coordinator, Office of Research and Publication

Prof. Elmer M. Ferrer
Coordinator, Office of Continuing Education

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Assistant Professor

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A.B., M.A., Ph.D. Psych.
Associate Professor

Ma. Theresa V. Tungpalan
A.B. Psych., M.C.D.
Instructor

APPENDIX D

Participatory Research* & Academic Social Science

some reflections based on shifting methodological frameworks in sociology

Ma. Cynthia Rose Banzon-Bautista

This introductory paper aims to situate participatory research approaches in the context of competing methodological positions in the social sciences. Since I am more familiar with developments in sociology, the paper focuses mainly on positions in the discipline. It is organized around three assertions:

1. Some of the theoretical underpinnings of participatory research** can be drawn from the methodological positions which are gaining ground in sociology relative to the still dominant positivist position. Because of its theoretical affinity to these positions, people-based social science has become a legitimate area of concern and participatory approaches, legitimate research strategies.
2. Participatory research strategies have the potential of enhancing theoretically-based critiques of the discipline and of the existing social and economic order on a micro and macro scale;
3. Issues dealing with the relationship between theory and action even among committed social scientists who are open to, if not engaged in participatory strategies, have yet to be clarified.

Research may be viewed as a process in which raw materials are obtained and transformed into finished products, which take the form of knowledge. Just as the means of producing one commodity consist not just of the one machine which churns this product but of the entire technology of which the machine is a part, the means of producing knowledge consists of entire methodological frameworks as well as specific methods or techniques of gathering, analyzing, and interpreting data. Methodology refers to the complex process of acquiring and producing knowledge, particularly the process of concept formation and explanation.

The task of this section of the paper is twofold. First, it presents the existing methodological frameworks in sociology, and possibly in the social sciences, in order to show some of the theoretical roots of participatory research. Second, it describes the factors which led to a breakdown in the academic resistance to methodological frameworks which compete with positivism and with which participatory research is related theoretical-

* Paper read at the Seminar on Alternative Roles for Social Scientists in People-Based Development, Sponsored by the Joint Committee for Southeast Asia, Social Science Research Council, Tagaytay City, May 27-31, 1985.

** Participatory research in this paper is used loosely to refer to the process by which the people investigate their problems with the researcher, analyze the results of their investigation in a boarder structural context, and draw long range and short-term action plans to solve these problems.

ly to existing methodological 'paradigms', it may be more rooted in a position which may be emerging out of indigeneous experiences and developments at the grassroots. Since we are not yet able to identify such a position, our starting point will be existing frameworks in the discipline.

There are at least three methodological positions in sociology; the positivist position, specifically the hypothetico-deductive variant of positivism and functionalism, the interpretive, hermeneutic, phenomenological, anthropological position, and the Marxist position. There are variants within each of these positions. Academic Marxism, for instance, has two variants: the critical school also referred to as the Hegelian or humanist Marxist and the structuralist Marxism. It should be noted that specific theories do not fall neatly into any one of these positions. Each of these methodological positions differ in their assumptions about the social world, about the process of arriving at knowledge, and about their ethical prescriptions for social scientists and researchers.

For the positivist, there is an external world out there characterized by regularities. Social science like the natural sciences, is an attempt to gain predictive and explanatory knowledge about the world. To do this, one must construct theories which consist of highly general statements, expressing the regular relationships that are found to exist in this world. These general statements or laws enable us to predict or explain the phenomena that we discover through systematic observation and experiment. To explain something is to show that it is an instance of these regularities. The truth of statements expressing these regularities cannot be established a priori. Instead, such statements must be 'objectively' tested by means of expēriments and observations, which are the only source of sure and certain empirical knowledge. It is not the goal of science to get beyond or behind the phenomena revealed to us by sensory experience. In other words, science for the positivist is not meant to give us knowledge of unobservable natures, essences, underlying mechanisms or structures. For the positivist, there are no necessary connections in the social world, there are only regularities which can be systematically represented in the statistical laws of 'scientific" social theory.

Within the positivist tradition, all theoretical constructs, no matter how abstract are linked to observation through a series of operationalizations. The existence and meaning of the theoretical constructs are given in the variable operationally defined by the researcher himself. Let us consider the notion of class as an example. The term has been imported from the European tradition of social theory and cast into a positivist framework by social scientists engaged in social stratification research. Within the positivist tradition, the concept of class involves labelling different levels of social economic status. In contrast, class in the Marxist tradition refers to social entities which are not directly observable, yet are historically present and the members of which are potentially aware of their common interests and consciousness. In this tradition, class is a relational concept and is not to be identified with gradational measures of income inequality, wealth, educational attainment, etc. Class structures are the ones which determine the patterns of inequalities.

Since observations play the critical role in defining theoretical constructs as well as in establishing the validity of a theory, scientists must retrain from allowing values to enter into the research process. In other words, a genuine social science must be 'objective'. The ethical prescription of positivism is that social scientists must not only abstract objective knowledge from the social world, they must also refrain from making value judgments on the basis of their knowledge.

In practice, however, social science researches following the positivist tradition have not been undertaken for the sake of discovering statistical laws or generalizations in a vacuum where values have no role. The interest motivating most social science researchers in the era of development planning has been technical control. It is assumed, sometimes naively, that the findings of research will be inputs to policies promulgated by technocrats from the top. In effect, therefore, the traditional positivist researches are actively espousing particular values and interests which take the structure of power in society for granted. What makes it worse is that claims of being scientific, objective and value-free further legitimate the powers that be.

To summarize, for the positivist, the goal is to arrive at a complex network of laws and lawlike propositions which can be used to explain phenomena and which in turn are true unless falsified by empirical research. As an aside, the hypotheses we test statistically are expressed as null hypotheses reflecting falsification as a means of showing the validity of scientific theories. Social research in principle then is an attempt to test hypothesis and theoretical system but in practice, academic concerns are relegated to the background and the university becomes the seat of commissioned researches done along an accepted methodology in the name of development. I would venture to say that oftentimes, the findings of these researches are not useful per se for policy planning. The fact that a 'scientific' research was undertaken is what legitimizes whatever policies are rammed down the throat of people from the top.

". . .the university becomes the seat of of commissioned researches done along an accepted methodology in the name of development."

Traditional research, done along positivist lines, continues to dominate sociology although its hold has weakened considerably. In the past, committed social scientists separated their work as social scientists in the university from their commitment to people and to social change. While they found the university irrelevant, they gave up the ideological battle within by continuing to teach the usual positivist process of conceptualization and to do their researches in the traditional way. In time, however, research experiences and exposure to conditions outside the walls of academe led to theoretical and methodological positions which challenge the very foundations of positivist sociology.

I shall discuss three such positions, two which provide some of the methodological basis for the acceptance of participatory research in academe.

For sociologists falling under the interpretive, phenomenological tradition, there is a clear distinction between knowledge of the natural world and that of the social world. The process of human interaction, which is mediated by symbols and language, is seen to be the basic condition of human life which distinguishes it from physical and natural life. Out of the everyday interaction of real human beings, who not only think but feel and act, evolves a common sense. This common sense constitutes a largely taken for granted stock of knowledge about the everyday world. A social science should then aim to develop concepts of human behavior which are linked to or dependent on a prior understanding of the concepts used by the people in the process of sustaining a meaningful social world. To quote Alfred Schutz,

> The constructs of social science, are so to speak, constructs of the second degree, namely constructs made by the actors in the social science whose behavior the social scientist has to observe and explain. If the social sciences aim indeed at explaining social reality, then the scientific constructs on the second level must include a reference to the subjective meaning an actor has for his action."

What this is saying is that the validity of sociological knowledge depends on its capacity to capture the way people define their world, their problems, their joys, their traditions. Unlike positivism with its fear of contamination, establishing validity under this theoretical position requires an increase in communication between the social scientist and the actors. It is imperative to go back to the people to test whether one's second level constructs, properly explained, can be intelligible to them. The face to face interaction also develops rapport which diminishes the traditional view of people as subjects to be observed. They become important for what they are and not only for what they can give the researcher by way of publishable findings.

"It is imperative for the social scientist to actively participate in the struggles of the working class which are aimed at a radical transformation of oppressive structures."

The theoretical position of the interpretive sociologist imposes methodological requirements on social researchers which are different from positivist requirements. Because of its ultimate reliance on the meaning systems of people, precise hypotheses cannot be formulated in advance. The method of data collection incorporates a lot of field observations and communication with people. In this context, the survey and quantitative analysis of positivism can, at best, scratch the surface. They cannot uncover the qualitative dimension which is at the heart of this position.

The positivistic sociologists are quick in dismissing the value of the interpretive position. They claim that the approach may degenerate into subjectivism as the 'respondents' definitions of reality are given primary importance. It should be noted, however, that this perspective does not say that the social scientist must accept the subject's definition as the interpretation of reality. What makes the social scientist a social scientist is that he is required to construct second-order concepts which would link individual meanings to reality on a micro and macro level. Oftentimes, however, sociologists in this tradition stop short of linking what they observe in a social setting to wider structural and historical concerns. One can attribute this fact to the goals and prescribed ethics of social science in this tradition.

In general, the goal of research in interpretive sociology, unlike positivism, is not to generalize the findings obtained from one group to the population but to arrive at an understanding of the social group or culture in question. While it may not be a necessary component of the approach, some interpretive sociologists hold the implicit assumption that the researcher is not in the position to raise the possibilities of changing the cultural patterns observed. The unique patterns of interest to the researcher, therefore, need not be situated in a wider context because action or transformative goals are not part of the tradition. Which brings me to a variant of the Marxist position which shares some of the assumptions of the interpretive, phenomenological position.

There are two methodological positions in academic Marxism: the humanist or Hegelian perspective and the Structuralist perspective. Both Marxisms share the following assumptions: that social change is brought about by the contradictions within a given totality and is therefore endemic in a system and that class struggles play a pivotal role in social transformation.

For the humanist Marxist, there is a distinction between the world of appearance and essence. Underlying what appears to our senses is a reality which actually determines the world of appear-

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ance. (Please note that appearance in this context does not refer to an illusion. People go hungry at the level of appearances). Let me illustrate the distinction between appearance and essence by using Marx's notion of commodity fetishism. On the level of appearance, the exchange of goods between a seller and a buyer can be perceived as an exchange of things. Underlying this level, however, is a capitalist system of production whose ideology prevents people from seeing that the commodities embody labor alienated in the process of production.

A further distinction is made between the *is* which is constituted by the essence and its appearance, on one hand and the *ought*, on the other. It is only by negating the *is* that man's real essence as a creative laborer (his actual essence is that of an alienated laborer) can be realized. Negation, or the elimination of an irrational state of affairs requires the transformation of society into one where the means of production are controlled by a community of human beings embodied in the working class who actively participate in directing the productive processes towards the needs and wants of a society. A transformation of this kind must take place through political practice, guided by a critical theory of society. There are four important features of this theory. First, it starts from an evaluation of existing reality as fundamentally irrational. Second, guided by a materialist philosophy, it identifies the possibilities for change in the reality. Research comes in here. Third, it challenges the reified consciousness which is generated by existing reality and which systematically conceals the potentialities for social transformation. Finally, it is opposed to positivism because of its positive stance towards an otherwise irrational social order.

How does one arrive at knowledge in this position? Concepts and theories, which are developed in order to facilitate and hasten the process of social transformation, are formulated in the process of change. Men can only know what they create. In a state of passivity, they cannot formulate new knowledge. Theory and practice are intertwined in this perspective. Materialist theory guides practice but practice gives substance and validation to theory.

The research process for the social scientist enlightened by this tradition is not only geared towards a theoretical critique of society but also entails participation in the process of change. It is imperative for the social scientist to actively participate in the struggles of the working class which are aimed at a radical transformation of oppressive structures.

For structuralist Marxists, there is also a distinction between the level of appearance and an underlying structure. Structuralists share the positivist view of science as an empirically based, rational enterprise, the purpose of which is to provide a true explanatory and predictive knowledge of reality. To explain phenomena, however, is not to show that it is an instance of statistical generalizations but to discover the necessary relation between phenomena and underlying structures and mechanisms at work, specifically the mode of production. A scientific theory for the structuralist is a description of the underlying structures and mechanisms which actually generate the world of appearance.

The research process is essentially a process of documenting the manifestations of the underlying structure and providing empirical data which can link the phenomena and the structures. Structuralists have been criticized by other Marxists as positivist because they claim that survey methodology, questionaires, and computers can be used in research although the more interesting questions to structuralists may not be dealt with by the dominant technical apparatus of academic social science research. However, a basic distinction exists. Where positivism is based on an empiricist theory of knowledge, Marxism is essentially rationalist. The critical concepts of the paradigm (e.g. mode of production) were arrived at rationally. The process of research for the structuralist then is not meant to prove the existence or lack of existence of the concepts produced in theoretical work but to analyze how concepts of structures are manifested concretely in the real world and how they actually determine phenomena. In other words, the set of determinants are clear but their concrete mechanisms and relations to one another remain the subject of inquiry.

The four positions are by no means the only theoretical positions in sociology or the social sciences. Many theories do not fall neatly into these positions and social scientists may be straddling between a number of positions although one or the other is dominant. These are significant positions, however, because they are not only making claims about the social world but are also making claims about the process of concept formation and explanation.

Some of the theoretical underpinnings of participatory research in its ambiguous state are rooted in the interpretive sociological tradition as well as in humanist Marxism. Like the former, participatory research assumes the existence of real human beings with their own interpretations of their world and their problems. However, participatory research goes beyond trying to understand the people's everyday reality. It is guided by the goal of ultimately allowing the people to critique some of their notions, to identify their problems, and to organize themselves in order to make them participate in the process of social transformation. Participatory strategies assume implicitly

that genuine understanding for both the social scientist and the people can only be arrived at in the process of actively changing conditions in the interest of the oppressed groups. Oppressed groups have been identified in terms of classes and sectors of society. In this sense, participatory research draws from the humanist Marxist notion of praxis.

However, while participatory research is consistent with some of the epistemological and substantive assumptions of humanist Marxism, it would be erroneous to subsume the approach under this tradition. Judging from the wide range of views regarding the goals and practice of participatory research, there is nothing in the approach which commits it to the problematique of historical materialism although some segments can claim that carried to the extreme, Marxism is the only comprehensive theory which can guide the transformation process invoked in participatory research.

There is a tension between the possible dogmatism of a comprehensive theory and the creative flow of ideas and strategies for change derived from active participation in the people's struggle to understand their situation. In as much as participatory strategies can be said to straddle between the liberal position of the phenomenologists and the well developed theories of determination of Marxists, this tension is real. Participatory research ultimately aims to raise people's levels of consciousness, to organize them in the most creative way possible towards change but the directions of change are not specified.

In the last decade, the power of positivism has been undermined by the persistence of social and economic problems despite numerous researches aimed at providing the basis for policy. The alternative theoretical and methodological positions I discussed earlier gained adherents in formal and informal sociological circles. The adherents were mostly students of the late sixties and early seventies who participated in struggle to make the university more relevant to the needs of their societies. Whether in developed or underdeveloped societies, this period marked the disillusionment with functionalist and hypothetico-deductive positivist conceptions of social science. The persistence of poverty and an unequal distribution of resources in Third World countries like the Philippines further increased the number of social scientists committed to the value of helping the oppressed sectors out of their predicament. Some of these social scientists, however, left the ideological debates in the university. For this reason the traditional theoretical and methodological paradigms remained dominant. Others, however, actively took part in the ideological struggles within their disciplines and the university. This accounts for the stronger position of alternative paradigms and the continued re-examination and critiques even of alternative frameworks.

Participatory research as a label and as an alternative research strategy posed to the traditional research techniques emerged during this period. While staunch positivists scoff at this 'unscientific and subjective' position, other social scientists who no longer believed the myth that there was only one way of doing social science, welcomed this development. The theoretical affinity of this method to existing methodological positions in the discipline has made it easier to argue for openness among traditional social scientists to the possibilities of this method.

ii

New developments in the socio-economic-political order and in the struggle for structural change call for a continued re-examination and critique of existing frameworks we use and teach in the social sciences, including the alternative methodological and theoretical positions discussed earlier. Without this re-examination, even progressive theories and positions with potentials for growth and development can be reified and stunted. The Marxist position, for instance, once taken in a very dogmatic fashion loses creativity and the possibility of growth since it could not incorporate elements unique to the experiences of the culture and the people. This re-examination becomes even more important in the context of a Third World social science that is attempting to pose not just alternative frameworks within academic disciplines but alternative macro institutions and systems. While social scientists, committed to the value of social transformation may develop alternatives at critical points of political and economic transition by researching into the experiences of other nations and testing their ideas in debates, they may end up to be technocrats of a different social and economic order unless they draw ideas systematically from constant interaction with strongly organized communities and sectors.

In light of the need of social scientists to develop and critique alternative frameworks as it continues to wage the ideological struggle in the university, and of the need to formulate and experiment on alternative institutions, it is imperative to develop networks with community and sectoral organizers and participatory researches who have accumulated their insights into the pulse and development of people at the grassroots. It is in this sense that participatory research and the organizing component that comes with it has tremendous potential for enhancing not only theoretically-based critiques but ideas about concrete alternatives.

iii

The need for links between social scientists who are committed to the disenfranchised and impoverished sector and community organizers brings me to some issues which may have to be clarified but need not be resolved for now. These issues revolve around the tension between theory and action.

One of the major factors constraining the link-up has been the absence of attempts to clarify the relations among the roles of people-based social scientists: of those who are committed to change but who are not directly engaged in participatory research, of participatory researchers, and of community and sectoral organizers. Because roles and their links to each other are not clarified, we are in a situation where the gains of people-based social science in academe are not matched by interaction and openness among the committed social scientists.

Participatory researchers, arguing implicitly from the position that knowledge evolves out of practice, may be perceived to be arguing for the superiority of participatory strategies over all else. Those who are not directly engaged in participatory research, on the other hand, may be perceived as arm-chair researchers who afterall are not committed to the people. The latter would argue that in the process of people-based change, developing strong organizations must be complemented by macro-level investigation which require as much time and vigor. Incidentally, both positions are reflected in heated theoretical debates.

Participatory researchers who do not stay on to do the hard nitty gritty work of community organizers may be perceived by community organizers to be abandoning the ship at midpoint. ■

APPENDIX E

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