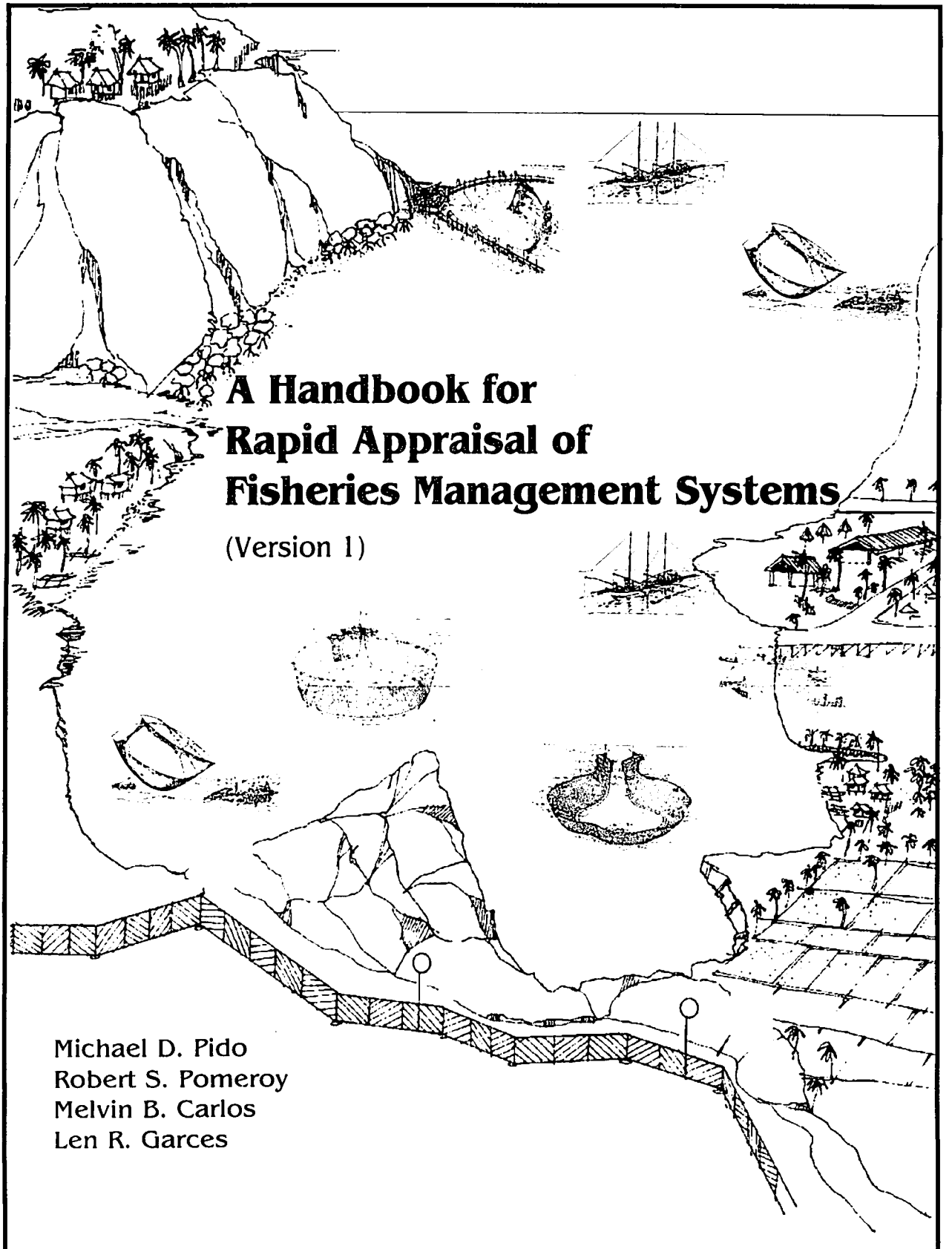

A Handbook for Rapid Appraisal of Fisheries Management Systems

(Version 1)

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Len R. Garces

ICLARM
International Center for Living Aquatic Resources Management

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INTERNATIONAL CENTER FOR LIVING AQUATIC RESOURCES MANAGEMENT
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Foreword

Effective natural resource management ideally requires a comprehensive knowledge base on human and biophysical systems. The acquisition of reliable information by conventional surveys, however, can often be both a costly and lengthy process. The challenge then to field practitioners is to find less costly and faster methods to acquire information through the active participation of target communities without sacrificing the scientific validity. These applied techniques in field data collection have become popularly known as rapid rural appraisal and/or participatory rural appraisal. Many researchers under the Consultative Group on International Agricultural Research (CGIAR) have developed research methodologies affiliated with RRA and sometimes PRA methods. Among these are the exploratory survey at the International Center for the Improvement of Maize and Wheat (CIMMYT) in Mexico; informal agricultural survey at the International Potato Center (CIP) in Peru; diagnosis and design at the International Centre for Research in Agroforestry (ICRAF) in Kenya; rapid assessment of minor irrigation systems at the International Irrigation Management Institute (IIMI) in Sri Lanka; and RRA field guides and training for rice at the International Rice Research Institute (IRRI) in the Philippines. The RRA/PRA approaches to agricultural research and rural development planning have contributed valuable insights for the CGIAR's work on natural resource management, sustainability and institution building.

At ICLARM, a number of RRA/PRA - affiliated methodologies have been, and are being developed. Many of these techniques are either borrowed or modified from RRAs/PRAs applied in agriculture and terrestrial resource management. We have the rapid appraisal of management parameters (RAMP), designed for the evaluation of management of coral reef systems; RESTORE, which is a participatory research tool for natural resource management, monitoring and evaluation with focus on farm households; rapid appraisal of coastal environments (RACE), which attempts to expedite the planning and management processes for the coastal zone; and recently the rapid appraisal of fisheries management systems (RAFMS).

RAFMS is a semistructured research tool designed to quickly document and evaluate existing local-level fisheries management systems in a given coastal community. The results of RAFMS will provide direction for undertaking more formal research or quantitative surveys to describe institutional arrangements and performance. RAFMS is suited to the village level, or to a cluster of villages within a defined marine unit such as a bay.

RAFMS is technically a topical RRA since the emphasis is on the evaluation of the rights and rules system governing the use of the fisheries resources at the local level. The approach is also participatory because it is designed for the joint use of RAFMS practitioners and local researchers in collaboration with local fishing communities. The mode of community participation, however, is consultative. RAFMS also has elements of exploratory RRA because the process of data generation and analysis can be used - or modified - to appraise any coastal fisheries or marine environment.

We publish this guide as Version 1 and welcome feedback for further refinement. This version of the guide has been tested over the last two years in collaboration with ICLARM's research partners at the following sites: Ulugan Bay and Binunsalian Bay in Palawan, Philippines, and Nolloth Village at Saparua Island in Indonesia. Several NGOs and development projects are currently using a draft of this RAFMS handbook for their coastal and fisheries surveys in Asia and Africa.

The ultimate challenge is the actual use of RAFMS in fisheries planning and management. The outputs or results of the RRA/PRA must be usable for development interventions, further research and organizational strengthening. Hence, we encourage users to share their experiences in using the handbook.

M.J. Williams
Director General
ICLARM

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List of Acronyms and Abbreviations

AEA	agroecosystem analysis
BFAR	Bureau of Fisheries and Aquatic Resources
BOP	Bureau of Prisons
CAD	computer-aided design
CBCRM	community-based coastal resources management
CENRO	Community Environment and Natural Resources Office
CIMMYT	International Center for the Improvement of Maize and Wheat
CIP	International Potato Center
CRM	coastal resources management
DAR	Department of Agrarian Reform
DECS	Department of Education, Culture and Sports
DENR	Department of Environment and Natural Resources
DOJ	Department of Justice
FAD	fish aggregating device
FGD	focused group discussion
FSR	farming systems research
GIS	geographic information system
IAD	institutional analysis and development
ICLARM	International Center for Living Aquatic Resources Management
ICRAF	International Centre for Research in Agroforestry
IIMI	International Irrigation Management Institute
IPPF	Iwahig Prison and Penal Farm
IRD	integrated rural development
IRRI	International Rice Research Institute
ISF	integrated social forestry
LGU	local government unit
MARO	Municipal Agrarian Reform Office
NGA	national government agency
NGO	nongovernmental organization
PARO	Provincial Agrarian Reform Office
PENRO	Provincial Environment and Natural Resources Office
PO	people's organization
PRA	participatory rural appraisal
RACE	rapid appraisal of coastal environments
RAFMS	rapid appraisal of fisheries management systems
RRA	rapid rural appraisal
SSI	semistructured interview

Executive Summary

Rationale and objectives

The Rapid Appraisal of Fisheries Management Systems (RAFMS) is a semistructured research tool designed to quickly document and evaluate the existing local-level fisheries management systems in a given fishing community. These fisheries management systems may be formal, informal/traditional or combinations. Undertaking a rapid appraisal approach is deemed useful to provide a general description of basic physical and fisher/community characteristics and institutional arrangements. RAFMS then gives the direction for undertaking more formal research or quantitative surveys. The village or a cluster of villages within a defined fishing area, such as a bay or a lake, is RAFMS geographical focus.

As a composite methodology, RAFMS shall identify and document the characteristics of both the formal management regimes and the informal systems of rules and rights. It shall describe how these institutional arrangements affect, positively or negatively, resource use patterns over time. RAFMS shall examine the tentative relationships among the relevant biophysical, socioeconomic and institutional factors as well as the linkages between the formal and informal management systems. Although the focus is on fisheries, the evaluation is nested within the broader context of coastal resources management (CRM). RAFMS attempts to synthesize the viewpoints of: (1) the RAFMS practitioners who are mainly outsider scientists, academicians or development consultants; (2) the local researchers who are technicians or specialists from the government agencies, the academe, nongovernmental organizations (NGOs) and people's organizations (POs) based in or near the study area; and (3) the fishing community of the actual fishers or other coastal stakeholders engaged in various fishing activities.

RAFMS is among the RRA-affiliated methodologies being developed at the International Center for Living Aquatic Resources Management (ICLARM), which is specific to fisheries.

Research/survey framework

RAFMS has adopted as its main theoretical foundation the institutional analysis and development (IAD) framework developed by researchers at

the Workshop in Political Theory and Policy Analysis at Indiana University, USA. The IAD framework uses concepts from economics, political science, anthropology, biology and law, and relies on methods described by Kiser and Ostrom (1982), Ostrom (1986, 1990) and Oakerson (1992). Hence, the focus of RAFMS is institutional arrangements, although it takes into account the relevant biophysical and socioeconomic variables. The IAD is complemented by agroecosystem analysis (AEA) (Conway 1985, 1987), particularly in its adoption of the four AEA patterns: space, time, flow and decision. RAFMS has also borrowed or modified many RRA tools and techniques currently used in both terrestrial and coastal settings.

RAFMS has three components: the variables or attributes to be examined, the research or survey steps, and the expected output. A total of 33 variables to be examined are classified into six groups: (I) biological, physical and technical; (II) market (supply and demand); (III) characteristics of fishers, stakeholders and community; (IV) fisher/community institutional and organizational arrangements; (V) external institutional and organizational arrangements; and (VI) exogenous factors. RAFMS focuses on the attributes for group IV, which are at the village level for the processes of appropriation, provision, monitoring, law enforcement, policymaking and other management functions that directly affect fishing activity.

The second component pertains to the four research/survey steps. Also called quadriangulation, these are: (1) secondary data analysis, (2) reconnaissance survey, (3) field data gathering and (4) community validation. Steps 1 through 4 may be accomplished within one to two weeks (7 to 14 days). Another two to four weeks is needed for report writing.

The third component refers to the output, i.e, report, to be generated at the end of the exercise. The report, which may be entitled *The profile of fisheries management systems,* should specify the rights-and-rules systems that govern the utilization of fisheries resources. The report's three sections are: the basic profile of fisheries/coastal setting; the institutional analysis of fisheries management systems; and the recommendations related to planning/policymaking, research and development. RAFMS sheds light on the planning/policymaking agenda, which shall provide the direction towards improved institutional and organizational arrangements. The agenda includes the clarification of legal rights and responsibilities, particularly the traditional or customary use rights, and of organizational jurisdiction and responsibilities. The research recommendations pertain to the additional information that needs to be generated while the development recommendations relate to those that require project investments.

Features of RAFMS

RAFMS has added new features to the conventional RRAs. One, the local researchers take on the role of active research partners rather than field guides or administrative coordinators. Two, RAFMS attempts to generate quantitative data, while most RRA data are qualitative in nature. Most RRA data are qualitative in nature or are mostly expressed in nominal scales. Three, RAFMS incorporates some scientific field methodologies particularly those used in the "quick" biological assessment of coastal habitats. It likewise advocates the use of modern equipment/instruments (such as the global positioning system), as needed. Four, it attempts to integrate AEA and the IAD framework to expand the evaluation of the fisheries management system. Although the appraisal is focused on the household and village levels, the basic linkages among the local, regional and national levels are taken into account. Five, it promotes "quadriangulation" as a self-checking process of describing the management system.

RAFMS is not a panacea for improved fisheries research and management. As a tool, it is suited to the village or community level rather than larger geographic or political areas. Since its results are tentative or preliminary, these must be reinforced by more formal research or quantitative surveys. The success of RAFMS also depends on the experience of the researchers undertaking it and the active participation of the fishing community.

Note to the users

The survey procedures and methodologies described are meant to be guides, not hard-and-fast rules. Since the users are specialists in their disciplines, they are expected to make innovations or modifications when the RAFMS techniques given do not work for one reason or another. The rule of thumb is that the users should, particularly when the survey gets rough, exercise their own best judgments.

About five to eight technical specialists in social and natural sciences are required to undertake RAFMS. Previous exposure to RRA-related surveys provides certain advantages to the users. Those unfamiliar with RRA are directed to read the publications of Chambers (1980, 1992); Honadle (1982); Conway (1985, 1987); McCracken et al. (1988); Sajise et al. (1990); Townsley (1992, 1993a, 1993b); Schonhuth and Kievelitz (1994); and Mikkelsen (1995). It is stressed that those who intend to use RAFMS must have a basic understanding of RRA/PRA methods and the characteristics of fisheries and

fishing communities. Further, they must be prepared to work for about a week of intense field data gathering, brainstorming with professional colleagues and active interaction with the local communities.

The handbook is divided into six parts: (1) introduction to rapid appraisal; (2) research/survey framework; (3) procedures and methodologies; (4) afterword; (5) references; and (6) an appendix of six matrices. It has been tested at several sites in the Philippines (e.g., Ulugan Bay and Binunsalian Bay in Palawan) and Indonesia (e.g., Saparua Island in the Central Maluku). It has been revised thrice since the first draft in November 1994.To the extent possible, the tables, figures and charts used were those obtained from the field application of RAFMS. Nonetheless, there is still room for refinement or simplification. The users are encouraged to write the authors about their positive and negative experiences with RAFMS. These will be useful in subsequent editions of this handbook.

Part I - Introduction to Rapid Appraisal

This part provides background notes on the history, concepts and research/survey methodologies affiliated with rapid rural appraisal (RRA). It gives a summary of emerging literature on the use of RRA in coastal areas, mostly drawn from Asian experiences, particularly the Philippines'.

This section tackles both the usefulness and limitations of using RRA in marine fisheries and other coastal environments.

INTRODUCTION TO RAPID APPRAISAL

Historical overview

Rapid rural appraisal (RRA) was formally introduced during a workshop of rural development practitioners at the University of Sussex, United Kingdom, on 26-27 October 1978. It was an offshoot of their realization that most of the local communities were not actively involved in both development and research activities. Hence, many of the development interventions introduced in the rural areas were conceived by outside experts with little consideration for the priorities and indigenous knowledge of the beneficiaries. As a result, project interventions and development needs were mismatched. Further, highly structured survey and research techniques used were inflexible and required much time and resources. The field practitioners then began looking for techniques of gathering information that could actively involve the target group or beneficiaries. These techniques were pulled together into a more systematic framework that became RRA (Townsley 1993b).

McCracken et al. (1988) described RRA as a "semi-structured activity carried out in the field, by a multi-disciplinary team and designed to acquire new information, and new hypotheses, about rural life." Chambers (1980) averred that RRA has emerged to fill in rural development's need for information that is timely, accurate and usable. Although conceived for the rural setting, RRA has since been used to denote a set of techniques or procedures for the quick study of almost any situation or type of environment. But this development has been muddled with semantics due in part to the many nouns and adjectives attached to the word *rapid*, e.g., *rapid reconnaissance* for development administration (Honadle 1982) and *rapid assessment techniques* for coastal wetland evaluation (Howes 1987).

Related methodologies

RRA encompasses a wide range of approaches and shares strong conceptual and methodological similarities with the following research methods: *sondeo* (Hildebrand 1981); *informal agricultural survey* (Rhoades 1982); *informal methods and reconnaissance survey* (Shanner et al. 1982); *exploratory survey* (Collinson 1981); *agroecosystem analysis* (AEA) (Conway 1985, 1987); and *participatory rural appraisal* (PRA) (Mascarenhas et al. 1991). *Sondeo* (Spanish for survey) was developed in Guatemala to assess

farmers' constraints and technology needs for agricultural research. The informal agricultural survey, which originated in Peru, aimed at providing basic information for the design and execution of more formal surveys and in-depth investigations. The reconnaissance survey is an informal method for collecting primary data needed for decisions on research to be undertaken in farmers' fields. The exploratory survey pioneered in Mexico is used for diagnosing farming problems and opportunities. AEA provides a multidisciplinary research technique that focuses on patterns analysis. PRA emerged in the late 1980s mainly through the efforts of grassroots organizations striving to find better ways of helping rural villages solve their problems.

RRA evolved from and partly alongside the *farming systems research* (FSR) movement (McCracken et al. 1988) and *integrated rural development* (IRD). The systems orientation of RRA is partly influenced by IRD and AEA approaches; hence, the current RRA typologies are largely combinations with AEA, FSR and IRD. The majority of RRAs were conducted on land-based resource systems, primarily in agriculture, health and forestry. RRA pioneer Robert Chambers admitted that there is no way one can track down the extent to which RRA has spread. The common trend is to use PRA/RRA interchangeably.

Summary of coastal RRA literature

The RRA-related approaches specific to marine environment, particularly to fisheries, are just emerging. Majority of the experiences and concepts can be traced to the Asian region. McCracken (1990) conducted an RRA-type of survey in a fisherfolk community in Tamil Nadu, India. Likewise, Townsley (1993a) developed rapid appraisal methods with applications in the coastal communities of India. In Malaysia, Howes (1987) assembled techniques for the rapid appraisal of coastal wetlands. McArthur (1994) reviewed some RRA and client-based tools and methods for coastal zone resource management.

The Philippines has probably the richest experiences, although these are mostly in grey literature. Fox (1986) came up with a rapid appraisal guide for Philippine coastal fisheries. Coastal RRA or AEA exercises were done in varying forms in several provinces, although in general, the procedures were either adopted or modified from terrestrial-based RRA or AEA. The basic steps are: (1) setting of RRA objectives, (2) preparatory activities, (3) reconnaissance survey, (4) field data gathering, (5) preliminary report writing, (6) community validation and (7) final report writing. On Malalison

Island, Antique, a combined exploratory and participatory RRA was conducted to identify the resources of the community and to undertake consultation (Bimbao and Dalsgaard 1991; Siar 1992). A topical RRA on Guiwanon Island in Iloilo assessed the potential of agroforestry and included an analysis of the coastal and fisheries resources. A coastal RRA training was held on Rapu-rapu Island, Albay, Bicol, to assess the site's problems and resource potentials (Diamante, pers. comm.). Another coastal RRA involved several research institutions and a development NGO in a village in Arnedo, Pangasinan. Lamug (1994) developed a PRA guide for coastal communities that was pilot-tested in the town of Natipuan, Batangas. Other studies were conducted by NGOs and project implementors.

Some coastal RRAs include the adjoining watershed as part of the planning area. These "integrated" RRAs were conducted in Honda Bay (Dygico 1990) and Malampaya Sound (Pido et al. 1990; Pido 1995), both in the province of Palawan. Here, the full spectrum of resources systems and activities, from the top of the mountain down to the sea, was considered. These experiences point to RRA's becoming a learning tool in "integrating agriculture, fisheries and forestry and the complications of managing common versus private resources" (Flora, pers. comm.).

Pido and Chua (1992) developed the notion of *rapid appraisal of coastal environments* (RACE) at ICLARM. RACE is a conceptual and methodological attempt to develop an RRA package relevant to coastal zone and fisheries. Pido and Chua (1992) argued that although most RRA techniques and procedures in agricultural/terrestrial contexts are well-established, these have a limited applicability to coastal zone and fisheries planning. The RRA practitioners for terrestrial areas are already familiar with minimum secondary data required, primary data sets generated and components of agroecosystems for analysis. This level of sophistication, however, is yet to be achieved in fisheries and coastal zone planning. The need for an RRA package for this was expressed by a number of regional and international institutions. In July 1992, a national workshop was held in Silliman University, Dumaguete City, Philippines, to come up with a primer on coastal RRA which would be useful in preparing coastal zone or fisheries profiles and plans. Several activities are underway to achieve this objective.

Part II - Research/Survey Framework

This provides the rationale and objectives for using RAFMS to document and evaluate fisheries management systems in coastal areas. It also describes the general survey design in terms of attributes or variables to be examined, research steps and anticipated outputs. The analytic and spatial framework are discussed.

RESEARCH/SURVEY FRAMEWORK

Background to tropical fisheries management

In many tropical developing countries, the mode of fisheries management is often intertwined between formal and informal or traditional systems (Fig. 1). Making clear-cut definitions of formal and informal systems is difficult because of overlaps. For the purposes of this handbook, however, a formal system is one legally sanctioned by the existing government or state authority. In the Philippines, for instance, the formal management of fisheries resources is divided between the national government through the Bureau of Fisheries and Aquatic Resources (BFAR) and the local government units (LGUs), principally through the municipal (equivalent to town or district) governments. BFAR manages commercial fisheries while LGUs manage municipal fishing operations or activities.

An informal fisheries management system is a rights-and-rules system collectively sanctioned by fishers or other coastal resource users. It may have been handed down through generations, by custom and tradition. It may involve co-ownership among fishers and stakeholders and exclusion to nonmembers. It may or may not be legally sanctioned by the government. An example of such a system is the *sasi* (closed) system in Indonesia.

Rationale for a rapid appraisal approach

In many fishing communities, a dualistic system of fisheries management exists. An informal management system, devised and implemented by a community of resource users, often coexists with a formal government management system. Often, outsiders to the community are unaware of informal systems as these are not easily observed or understood. Some of these systems have worked well at meeting the management objectives of the community and at achieving ecological sustainability, social equity and economic efficiency. Some local-level systems are new while others are time-tested. Their rights and rules may be complex or simple and easily enforceable.

Although information on community-based marine resource management systems exists, especially in the Asia-Pacific region, it is often not current because of rapid changes at the national and community levels due to modernization. If effective fisheries management efforts are to succeed, it is essential

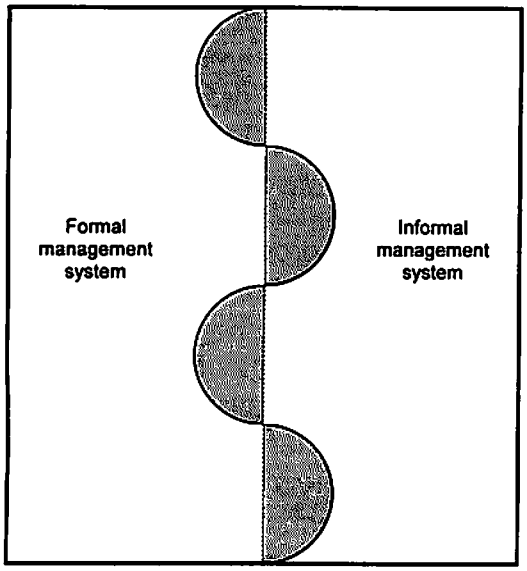

Fig. 1. Typical two-tiered components of fisheries management systems in tropical developing countries.

that resource managers and policymakers have up-to-date information about community-based management systems and their socioeconomic, political and ecological contexts. Studies have to be contemporary, detailed and location-specific for a comprehensive knowledge base on the range of types, functions and status of fisheries management systems in a country.

In many locations, new management systems, such as the community-based coastal resources management (CBCRM), are being imposed on top of existing local informal ones. The new systems often fail because fishers are unwilling to give up a system they themselves devised. A new management system that complements or builds on the existing informal systems definitely has improved chances for success. Ostrom (1992b) stated that:

> If a people has lived in close relationship with relatively small common-pool resources over a period of time, they have probably evolved some system to limit and regulate use patterns. . . .
>
> Before one imposes new rules on local systems, inquiries should be made to determine if some rules and customs do not already exist. If customs and rules do exist, study these carefully in order to understand how they affect use patterns over time.

With limited funds, time and personnel, it is not always possible to conduct detailed in-depth studies of community-based marine resource management

systems at a specific site or across a country. A rapid appraisal methodology can be useful in determining the existence of such systems and in gathering preliminary information on their operation. Although not a substitute for detailed studies, the method can provide cost-effective information and direction for further research.

The rapid appraisal methodology is called *rapid appraisal of fisheries management systems* (RAFMS). A subset of the broader *rapid appraisal of coastal environment* (RACE) earlier developed at ICLARM, RAFMS is an operational translation of RACE with emphasis on the fisheries sector. Where appropriate, RAFMS takes into account the relevant elements of the entire coastal zone system. It is technically classified as a topical RRA because it aims at discovering the existing fisheries management systems in a coastal community. It has elements, however, of exploratory and participatory RRAs. It is exploratory because some of the tools and techniques are designed to generate standard baseline information, and participatory because the involvement of the local researchers and members of fishing communities in the process is imperative.

RAFMS objectives and limitations

The main objective of RAFMS is to quickly document and evaluate a coastal community's local-level fisheries management systems, both formal and informal. RAFMS identifies their characteristics and describes how they will affect, positively or negatively, resource use patterns over time. It establishes the tentative relationships among contextual variables and their attributes (Table 1). Although the focus is on fisheries, evaluation is nested within broader coastal resources management (CRM).

RAFMS analyzes existing systems from three viewpoints (Fig. 2). One, its

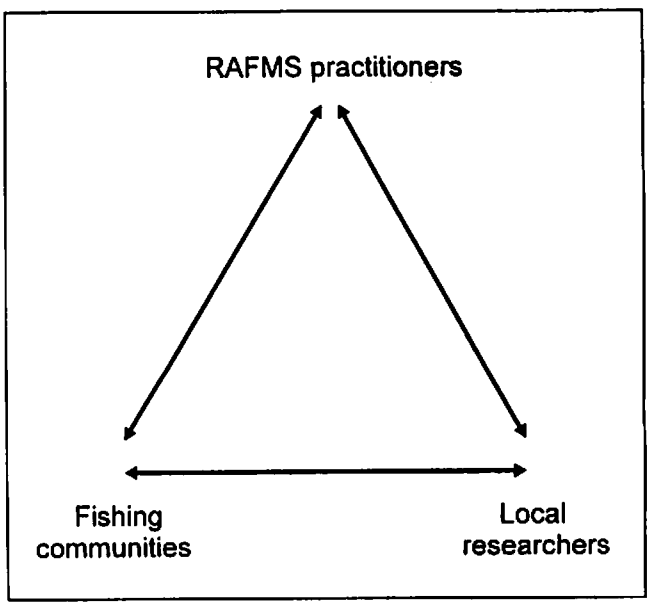

Fig. 2. Relationship among RAFMS practitioners, local researchers and fishing communities.

Table 1. Contextual variables and their attributes.

Group I. Biological, physical and technical attributes

Physical attributes

- ☐ resource use
- ☐ climatic data
- ☐ physiography
- ☐ physical oceanography
- ☐ water quality

Biological and habitat attributes

- ☐ seaweeds/seagrasses
- ☐ mangroves
- ☐ coral reefs

Technical attributes

- ☐ gear/fishing technology
- ☐ species harvested
- ☐ level of exploitation

Group II. Market (supply-demand) attributes

- ☐ supply of marine products
- ☐ pricing scheme/system
- ☐ market functions
- ☐ market rules
- ☐ stability of demand
- ☐ market structure
- ☐ market orientation

Group III. Characteristics of fisher/community stakeholders

- ☐ demography
- ☐ tenurial status
- ☐ economic status
- ☐ culture
- ☐ livelihood (occupational structure)
- ☐ attitudes and outlook of fishers
- ☐ resource use/harvesting conflicts
- ☐ ecological knowledge
- ☐ community

Group IV. Fisher/community institutional and organizational arrangements

- ☐ individual organizations
- ☐ institutional arrangements

Group V. External institutional and organizational arrangements

- ☐ individual organizations
- ☐ institutional arrangements

Group VI. Exogenous factors

- ☐ natural calamities
- ☐ macroeconomic/political/sociocultural factors

practitioners, experts on RRA/PRA methods, lead the exercise. They may be outside or local scientists, academicians or development specialists. Two, the local researchers, technicians/specialists based in or near the study area, come from nongovernmental organizations (NGOs), local government units (LGUs), academic institutions or government agencies. Three, there are the actual fishers or other coastal stakeholders.

The conduct of RAFMS, however, should not rely solely on outside experts. The long-term end is the more active partnership between local researchers and the fishing community, but they must be sufficiently trained by outside experts on tools and techniques to enable them to conduct RAFMS on their own. As local researchers become technically capable, reliance from outside experts may be minimized.

Although RAFMS may be used to evaluate any fisheries-based setting, it has several limitations. One, the variables and data sets to be examined are concentrated on fisheries and touch only briefly on the other dominant sectors of the coastal areas, such as industry, tourism and agriculture. Two, it is suited to the village or community level rather than the larger geographic or political area. Three, its results, which are tentative or preliminary, must be reinforced by more formal research or quantitative surveys. The success of RAFMS also depends on the experience of the researchers and the active participation of the fishing community.

General survey/research design

The three components of RAFMS are: (1) contextual variables and their attributes to be examined; (2) research or survey steps; and (3) expected output. Fig. 3 presents the data acquisition/verification scheme to appraise existing fisheries management systems.

COMPONENT I - CONTEXTUAL VARIABLES

In conducting studies on fisheries management systems, we are essentially interested in understanding how rules affect the behavior and outcomes of fishers using available resources. Providing the framework is institutional analysis and development (IAD), which focuses on institutional arrangements, the set of rights and rules by which a group of fishers and the government manage the resource in action situations, such as fishing. (The IAD framework will be discussed in greater detail in Part III's section on preliminary analysis of data).

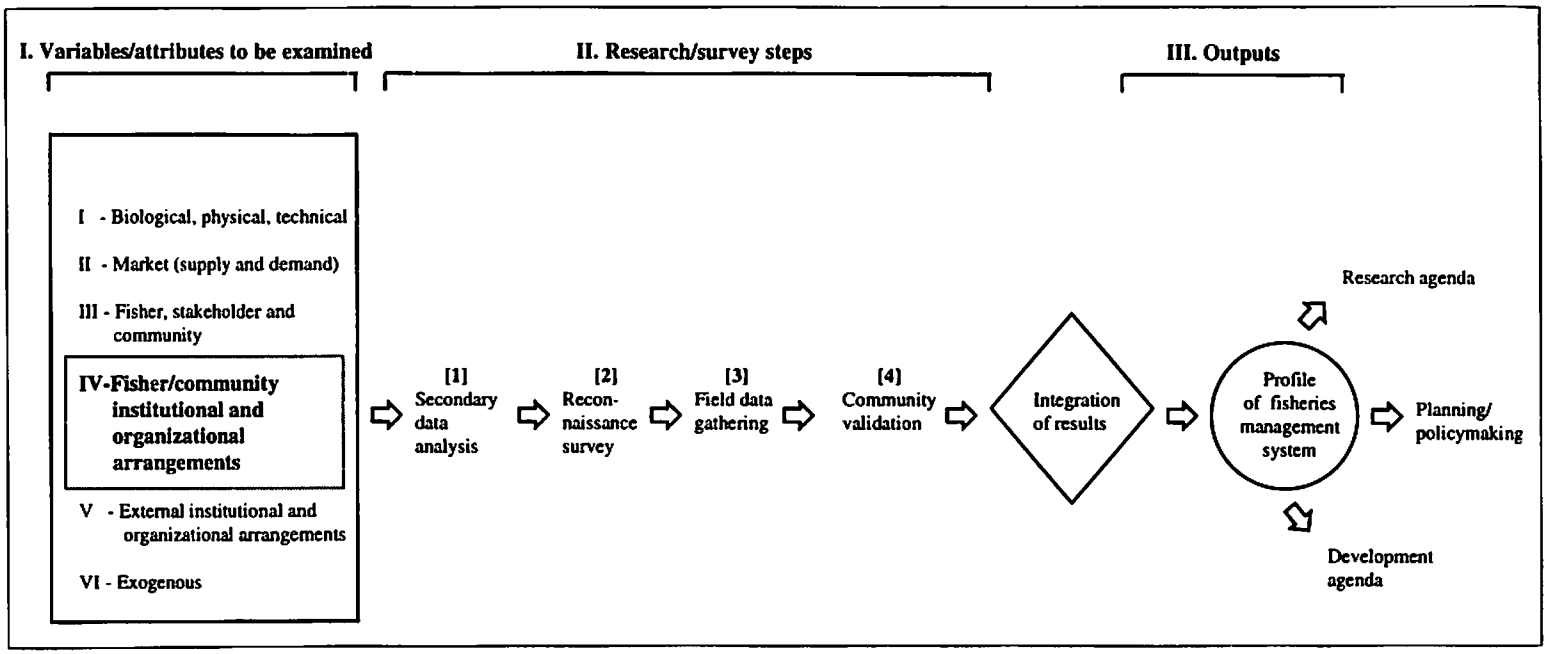

Fig. 3. Data acquisition and verification scheme for RAFMS.

The first RAFMS component identifies variables affecting the fishing action situation, i.e., the institutional, biophysical, technical, market, social, cultural, economic and political attributes and conditions of fishers and the fishery. These variables form the context within which fishers and other resource stakeholders coordinate, cooperate and contribute to establish organizations and institutions to manage the fishery.

The attributes under contextual variables include:

- who are involved in a situation;
- what their stakes and resources are;
- the types of action they can take;
- the costs of those actions;
- what information is available to them;
- how much control individuals can exercise;
- how individuals and actions are linked to one another and to outcomes;
- what outcomes can be expected in relation to what actions; and
- how rewards and punishments are allocated to particular combinations of actions and outcomes.

Because the attributes are interrelated, a change in one may create a new structure of incentives, which results in different outcomes. Based on the contextual variables, one tries to explain or predict the patterns of relationships and the interactions and outcomes that are most likely to occur for an action situation.

The attributes, numbering 33, fall readily into 6 sets of contextual variables (Table 1). RAFMS highlights the attributes for fisher/community institutional and organizational arrangements (Group IV). Institutional arrangements define the rights fishers possess in relation to fishery and the rules that delineate their action in utilizing it. In the final analysis, institutional arrangements are defined by authority relationships that specify who decides what in relation to whom.

The biophysical attributes (Group I), which pertain to both terrestrial and marine environments, are important determinants of the biological productivity and sustainability of fisheries resources in a given area. These include the status of the coastal habitats and the state of resource exploitation. To help define the status of fish stocks, emphasis is given to species harvested and fishing technology, particularly the gear.

The market attributes (Group II) focus on the supply-demand relationships, including price structure and stability, and those related to market operations and functions and to fisher and fish trader relationships. The attributes of stakeholders (Group III) refer to social, cultural and economic conditions and

characteristics that affect their incentives to cooperate with and contribute to management. These attributes include religious beliefs and practices; traditions and customs; sources of livelihood; the degree of social, cultural, economic and locational heterogeneity or homogeneity; asset ownership; community mores; level of community integration into the economy; and polity. Stakeholders include fishers and their families or family members, fish traders, processors and money lenders.

Group V is composed of attributes for institutional and organizational arrangements external to the community. These are variables at the national, regional, district or municipal levels for the processes of policymaking, legislation, governance, conflict resolution and law enforcement that authorize and support community-level institutional and organizational management. They may be nested, multiple layers of organizations, formal or informal, at different political and administrative levels.

Group VI are mainly external factors beyond the control of the local, and at times, the national levels. The variables are exogenous surprises or sudden shocks which change or affect their survival. They are recent (i.e., dated to within the last two years) but the management systems should be put into an historical timeframe. They measure how resilient the management system is.

The 33 attributes, however, are not absolute requirements. Some may be deleted and others not included may be added, as needed.

COMPONENT II - RESEARCH/SURVEY STEPS

The second component pertains to research/survey steps. These are: (1) secondary data analysis; (2) reconnaissance survey; (3) field data gathering; and (4) community validation. The four-step process, called "quadriangulation," may be accomplished within one to two weeks (7 to 14 days). Another two to four weeks is allotted to report writing.

Quadriangulation becomes a series of generating and verifying data for the given set of relevant attributes under examination. Fig. 4 provides a systems description of the fisheries management system through RAFMS process. As is common to many an RRA process, the "truth" is approached through the rapid buildup of diverse information rather than statistical replication (McCracken et al. 1988). For instance, the literature listing the municipal fishing gear obtained from secondary data analysis (Step 1) could be checked during reconnaissance survey (Step 2), generated through actual field data gathering in Step 3, and reconfirmed or ascertained during the community validation (Step 4).

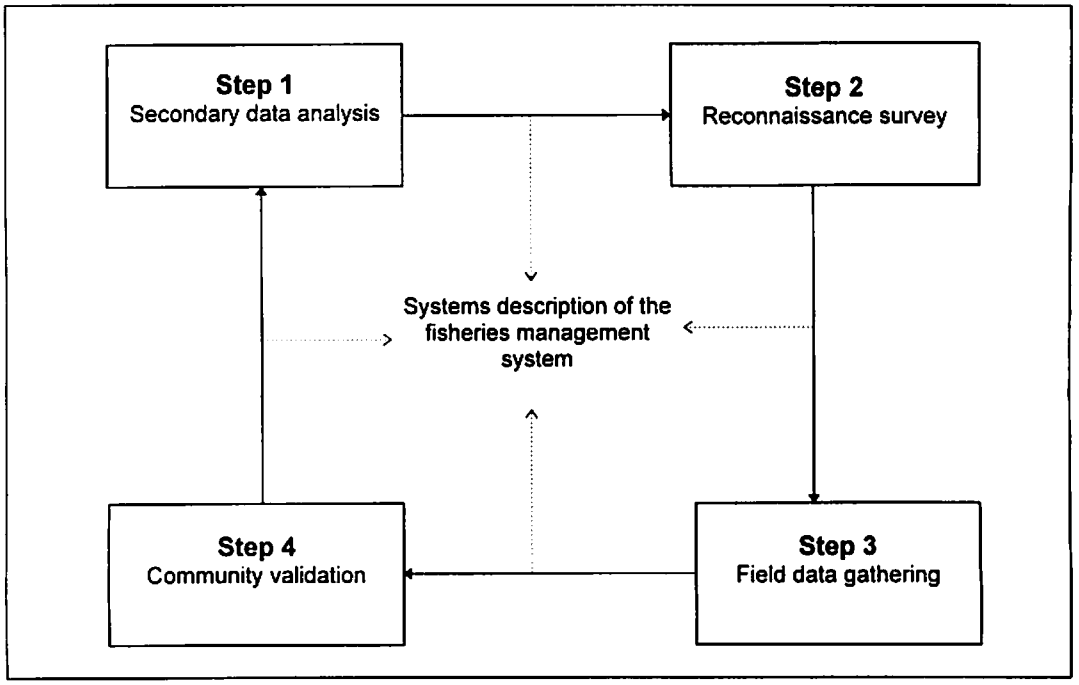

Fig. 4. Systems description of the fisheries management system through RAFMS process.

COMPONENT III - EXPECTED OUTPUT

The third component refers to the outputs to be generated at the end of the exercise. Data gathered from the secondary data analysis through community validation will be integrated to produce a technical report or working paper. The document, which may be entitled as "The profile of fisheries management systems", should specify the rights-and-rules systems that govern the utilization of the fisheries resources at the local level and how such systems relate to the broader institutional environment. The report has three sections: the basic profile of fisheries/coastal setting; the institutional analysis of the fisheries management systems; and the recommendations related to planning/policymaking, research and development. The essence of RAFMS lies in the planning/policymaking agenda, which shall provide the direction towards improved institutional and organizational arrangements. RAFMS describes the legal rights and responsibilities, particularly traditional use rights, and of organizational jurisdiction and responsibilities. The recommendations for research will describe the subject or problem areas where further information needs to be generated. The development recommendations will indicate investment areas that require detailed project feasibility studies.

Analytical framework

The three groups of factors to be considered when appraising the existing management systems in a coastal marine fisheries are the: (1) levels of organizational hierarchy; (2) data coverage; and (3) clusters of attributes. Fig. 5 presents the framework of levels, boundaries and attributes for data collection and analysis.

For the Philippine government administrative structure, the basic levels are the central/national at the top and the village at the bottom. Such hierarchical elements, however, may be modified. For example, the municipality in the Philippines is roughly equivalent to a district in Malaysia. Also, the Philippine province roughly translates to a state in Indonesia.

The data coverage refers to the relative amount of information to be gathered at each organizational level. The focus of analysis for RAFMS is the village or community level. RAFMS is generally suited to analysis at a micro scale. Its reliability diminishes as its geographical coverage increases. Nonetheless, information at international or national levels at the top and at households and individuals at the bottom are considered parts of the analysis.

The data coverage relates to the attributes to be examined, which are divided into six groups. The attributes on external institutional and organizational arrangements (Group V) and exogenous factors (Group VI) are outside the scope of the local community. All the other variables (Groups I to IV) are centered at the community level. The arrows indicate the geographical overlaps among the attributes.

Data collection and analysis scheme

Table 2 shows a seven-column data collection and analysis matrix. Columns 1 through 3 specify the items to be examined while Columns 4 through 7 outline the techniques of data collection and analysis. The scheme can be likened to completing a jigsaw puzzle with Column 1 as the reference point. The secondary data (Column 4) may be validated by the field observations (Column 5) during the reconnaissance survey. The primary data (Column 6) generated in the field may be ascertained during the community validation (Column 7). Thus, RAFMS is an interactive process of generating, analyzing and validating data for the attributes relevant to the study of existing fisheries management systems.

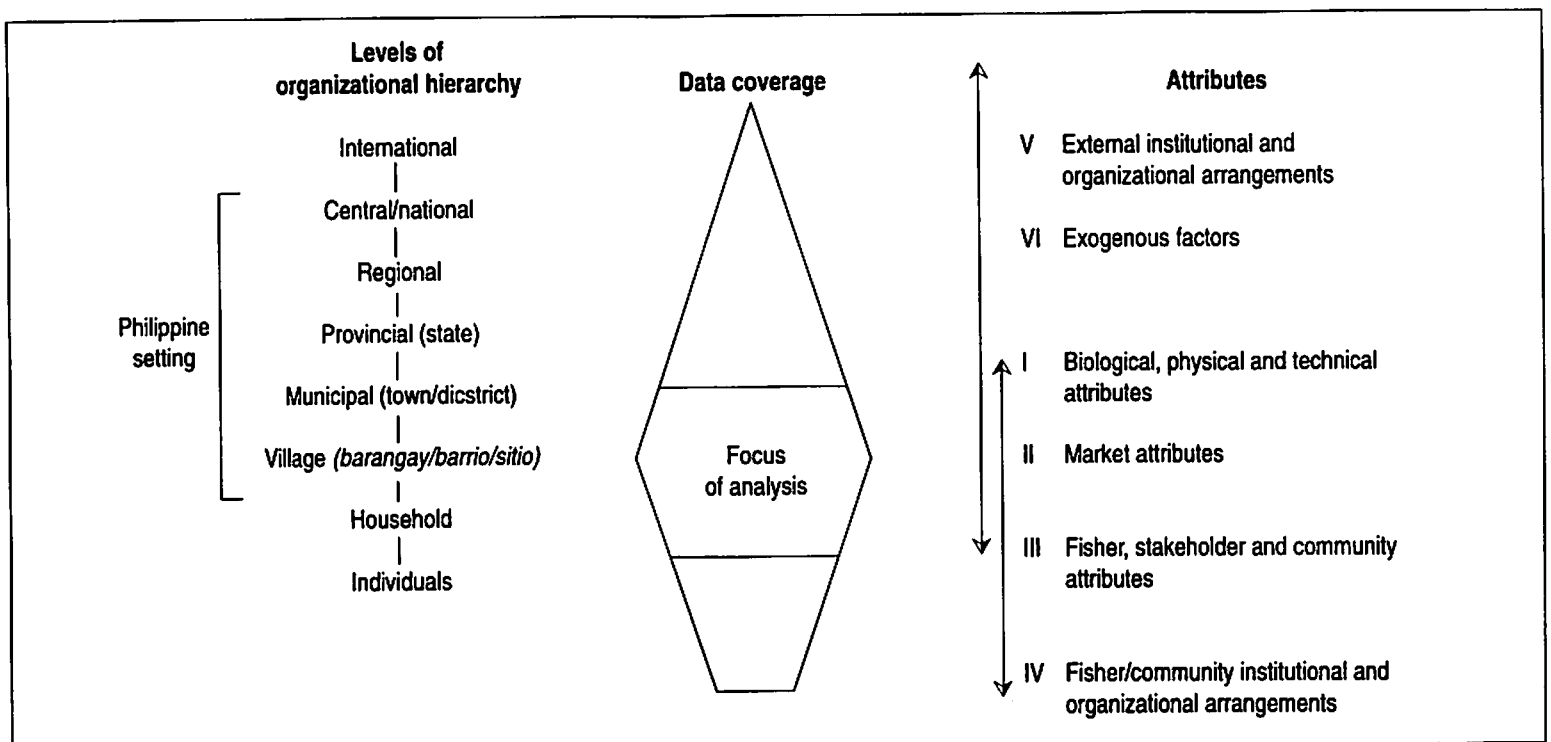

Fig. 5. Framework of organizational levels, data coverage and attributes for data collection and analysis in RAFMS.

Table 2. Data collection and analysis scheme.

Column 1	2	3	4	5	6	7
Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
Research/ Survey steps			Step 1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

At the bottom of the matrix are the research/survey steps given in Fig. 3. Steps 1 through 4 have a one-to-one congruence with Columns 4 through 7, on data collection and analysis. For instance, field indicators (Column 5) shall be collected during the reconnaissance survey (Step 2).

The specifics of the column headings are given below. In this context, an *attribute* refers to the factors or entities to be examined. It varies in levels or hierarchies. The operational attribute is indicated by a square (□). An *indicator* is a property of an attribute that can be measured, quantified or observed by the researcher (McArthur and Trinidad 1995). An attribute may have more than one indicator and is preceded by a bullet (•). An indicator may have one or more *units or scales of measurement*, which could be qualitative, quantitative or both. A triangle (Δ) points to a unit of measurement.

The logical *sources of secondary data* specify the agencies, institutions or persons where they can be obtained. These are relevant to secondary data analysis, which is research/survey step 1. *Field observations*, preceded by a bullet, are the items to be "annotated" in the field during reconnaissance survey (Step 2) or when making direct observation. The *methodology or technique for actual field data collection* pertains to the indicators in Column 2 and not to the field indicators in Column 5. Each technique is indicated by a dash (-). The appropriate *validation technique* verifies all compiled primary and secondary data with the local communities. It is preceded by a dash (-). The entire scheme is best illustrated by Table 3, which provides the attributes to be examined and the tools/techniques for data collection and validation.

Coral reefs, a biological attribute, have living coral condition for an indicator and percentage cover as a unit of measurement. The secondary data may be obtained from agriculture and fisheries agencies and the offices of research and academic institutions. Field indicators are the benthic life forms. The percentage of cover for coral condition may be collected in the field using two techniques: manta tow surveys and benthic life form surveys. Finally, such data could be confirmed or compared with community perceptions in the form of a workshop.

A technical attribute, the level of exploitation, has growth overfishing as an indicator that can be measured by the size of the fish caught. The most likely sources of secondary information are resource assessment studies or records at the agriculture/fisheries agencies. In the field, a fisheries biologist may observe that indicators such as the landing of small-size (juvenile) fish and the use of small-meshed gear point to growth overfishing. The primary data about growth overfishing may be obtained through interviews or market/ fish landing surveys. The data may also be verified through a community workshop.

Table 3. An example of attributes to be examined and the tools/techniques for data collection and validation.

Column 1	2	3	4	5	6	7
Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
I. Biological, physical and technical attributes						
Biological attributes						
❑ coral reefs	• living coral condition	Δ percentage cover	- agriculture/ fisheries agency - research/academic institution	• benthic life forms	- manta tow surveys - benthic life form surveys	- workshop
Technical attributes						
❑ level of exploitation	• growth overfishing	Δ size of fish catch	- agriculture/ fisheries agency	• landing of small-size fish • use of small-meshed gear	- interview - market/fish landing surveys	- workshop
IV. Characteristics of fishers/ stakeholders						
❑ demography	• religion	Δ form	- local governments records	• churches/temples	- interview	- workshop
	• ethnicity	Δ ethnolinguistic group/affiliation	- census office	• dialect spoken		- workshop
Research/ Survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

Demography, an attribute under the characteristics of fishers/stakeholders (Group IV), has religion and ethnicity as indicators. The unit of measurement for religion is its form while ethnicity has ethnolinguistic group or affiliation. The secondary information can be obtained from municipal records or the village profile. In the field, the form of religion can be observed by looking at the religious structures, e.g., mosques and temples. The ethnolinguistic group can be known by listening to the dialects being spoken. The data for these indicators can be obtained through interviews and validated through community workshops.

Part III - Procedures and Methodologies

This part provides a general guide to RAFMS activities from start to finish. These include: (1) preparatory activities (e.g., site selection and team organization); (2) reconnaissance survey; (3) field data collection; (4) preliminary analysis of data; (5) organization of initial results; (6) community validation; and (7) final report writing.

Emphasis is given to field data collection. Each group of attributes to be examined is presented in a seven-column matrix that summarizes data collection and validation techniques. Sample tables, figures and charts are also shown.

PROCEDURES AND METHODOLOGIES

Step 1. Preparatory activities

Preparatory activities include site selection, team organization, and collection and analysis of secondary data. They are done prior to field visit and are joint activities of RAFMS practitioners and local researchers.

SITE SELECTION

RAFMS can be used to evaluate fisheries management systems in any fisheries village or community. There are considerations that must be met, though.

1. There must be a group of local researchers (from government, academe, private group or NGO) who are willing to collaborate. Without this group, it is extremely difficult for outside RAFMS practitioners to enter into a community.
2. The local fishing community (and local government authorities) must be willing to cooperate and actively participate. There is no use conducting RAFMS in an area where the populace is hostile to the researchers.
3. Fishing must be an important economic activity.
4. The size of the area must be manageable enough so that fieldwork, in both land and sea, can be accomplished within four to seven days. Thus, focus is on the village or community rather than on the larger geographic or political area. If the area is large, like a bay or a gulf, two alternative approaches may be undertaken: subdivide the site into more manageable units and do a series of RAFMS or conduct RAFMS only in representative sample sites.
5. The fishing village must be accessible.

TEAM ORGANIZATION

Personnel requirement is dictated by the 33 attributes to be examined (Table 4). Although the suggested ideal is eight and the minimum is five researchers, this is not a hard-and-fast rule. Actual composition will be ultimately decided by factors such as expertise available, quality of secondary data and other practical realities in the field.

Since RAFMS is multidisciplinary in approach, the more important consideration is balance of expertise coming from both natural and social

Table 4. Researchers required for the conduct of RAFMS.

	Ideal	Minimum
Group I. Biological, physical and technical attributes		
Physical attributes		
☐ resource use	Land use planner/ forester	Coastal habitat expert
☐ climatic data		
☐ physiography		
☐ physical oceanography	Water quality analyst	
☐ water quality		
Biological and habitat attributes		
☐ seaweed/seagrasses	Marine biologist/ ecologist	
☐ mangroves		
☐ coral reefs		
Technical attributes		
☐ gear/fishing technology	Fisheries biologist	Fisheries/marine biologist
☐ species harvested		
☐ level of exploitation		
Group II. Market (supply-demand) attributes		
☐ supply of marine products	Economist	Economist
☐ pricing scheme/system		
☐ market functions		
☐ market rules		
☐ stability of demand		
☐ market structure		
☐ market orientation		
Group III. Characteristics of fisher, stakeholders and community		
☐ demography	Sociologist/ anthropologist	Sociologist/ anthropologist
☐ tenurial status		
☐ economic status	Economist	
☐ culture	Sociologist/ anthropologist	
☐ livelihood (occupational structure)		
☐ attitudes and outlook of fishers		
☐ resource use/harvesting conflicts		
☐ ecological knowledge		
☐ community		
Group IV. Fisher/community institutional and organizational arrangements		
☐ individual organizations	Political scientist/ public policy analyst	Political scientist/ public policy analyst
☐ institutional arrangements		
Group V. External institutional and organizational arrangements		
☐ individual organizations	Political scientist/ public policy analyst	
☐ institutional arrangements		
Group VI. Exogenous factors		
☐ natural calamities	Resource planner	
☐ macroeconomic/political/sociocultural		

sciences, and ideally from integrative sciences such as environmental resource planning or systems analysis. It may be feasible to have two RAFMS practitioners complemented by four local researchers. For instance, RAFMS practitioners could consist of a fisheries biologist and an economist while the local researchers may be a marine habitat expert, an anthropologist, a public policy analyst and a resource planner. Given sufficient training in RAFMS, local researchers or NGO members may form a group and conduct the survey themselves. The long-term vision is for local scientists to be able to undertake RAFMS on their own.

The position of the team leader is crucial because the success or failure of the exercise depends to a large extent on his/her handling of the situation. He/she may be appointed beforehand or the team members may collectively decide among themselves who the leader will be. He/she may have no technical assignment or may be a leader of any subgroup acting in a concurrent capacity. In a typical RRA, some team members have dual roles: as technical specialist and as support staff for administrative operations.

During preparatory and field activities, team members may be divided into three small groups: socioeconomic, institutional and biophysical. Each group must be handled by a leader specializing in socioeconomics, public policy/political science and marine/fisheries biology, respectively. Table 5 presents the actual composition of the RAFMS team in Indonesia. There must be at least a pair in each group. Similar to *sondeo* (Hildebrand 1981), members may be rotated during the conduct of the interviews. An expert from one discipline may join another group to provide an interdisciplinary perspective. As a rule of thumb, however, at least one specialist must remain

Table 5. Composition of the RAFMS team in Nolloth Village, Saparua Island, Indonesia, 25-28 April 1995.

Group/technical expertise	Institutional affiliation	Administrative role
Biophysical group		
1. Marine biologist	RAFMS practitioner	Group leader
2. Fisheries biologist	Local research agency	Treasurer
3. Resource economist	Local research agency	
Socioeconomics group		
4. Resource economist	RAFMS practitioner	Group leader
5. Sociologist	Local research agency	
6. Agricultural economist	Local research agency	
Institutional group		
7. Planner	RAFMS practitioner	Team leader
8. Resource economist	Local research agency	Co-team leader
9. Institutional economist	RAFMS practitioner	
10. Resource economist	Consulting firm	

in each group, e.g., one marine biologist must remain in the biophysical group or an economist in the socioeconomic group.

COLLECTION AND ANALYSIS OF SECONDARY DATA

Secondary data analysis operationally defines data coverage of appraisal and covers both published and unpublished data. Of significance here are the spatially related data, particularly thematic maps and aerial photographs. McCracken et al. (1988) emphasized that "time spent on quickly reviewing and summarizing secondary data in the form of simple tables, diagrams or brief written notes can be of considerable value in setting the RRA task in the context of previous work." This activity can be undertaken by means of a team workshop.

The collection of hard copies of secondary literature is the responsibility of the collaborative local research group. The analysis of secondary data, however, is the joint responsibility of RAFMS practitioners and the local research group. The available secondary literature shall be evaluated by each concerned group. By convention, the socioeconomic group shall take charge of reviewing information relevant to social and economic characteristics (Groups II, III, VI and some aspects of I); the institutional group, to organizations, legal and institutional arrangements (Groups IV and V); and the biophysical group, to natural resources and general environmental setting (Group I).

The guide questions for each group of attributes (see section on tools and procedures according to group of attributes below) may help in the analysis of secondary data. This phase shall facilitate "scoping" of data to be collected in the field.

The scale of base or working map must be agreed upon. Overlay mapping will be facilitated at a later stage if all groups work with maps of the same scale. Maps with larger than 1:50,000 scale are recommended.

Step 2. Reconnaissance survey

This stage is the first field activity and is Step 2 in the RAFMS four-step process. It includes both field reconnaissance and final selection of survey instruments. One to two days must be allotted for this purpose.

FIELD RECONNAISSANCE

The main purpose of field reconnaissance is for team members to use their "power of observation" to get a general "feel" of the fishing village and

to set activities for field data gathering (Step 3). This stage allows the members to familiarize themselves with important field features, such as terrain, natural resources and concentration of fishing activities and human settlement, and to know firsthand the feasibility of conducting surveys. Dangers (e.g., peace and order situation), may be evident at this stage.

As part of research, members shall annotate the checklist of field indicators provided in each of the six matrices (see Appendix). The base/working maps must be annotated. The initial transect map may be also constructed to include observations about key biophysical processes, social events and relationships between people and their natural environment. Reconnaissance makes possible the identification of various fishing zones and the noting of differences between reported and real conditions. Such annotated notes will be helpful in revising, as needed, guide questions for semistructured interviews (SSIs). Instruments or equipment must also be checked if they are working under field condition, e.g., a handheld global positioning system, camera, compass and water quality kit.

The team may also settle administrative arrangements such as briefing local government officials and community organizations on upcoming RAFMS, arranging accommodations of the team during the survey and listing key informants. Where applicable, respondents or key informants may be also organized in fishing communities, according to ethnolinguistic origin or groups, such as cooperatives. These teams shall be used when conducting focused group discussions (FGDs).

The selection of respondents and key informants must ideally represent a cross-section of the target population. In this case, fishers that include men and women, young and adult, are the target population. The respondents may be divided into groups, for example, according to income level, occupation, gear type. There is no rigid rule on the ideal number of respondents because the sample population is not subjected to a statistical analysis.

The key informants must have special knowledge of the site and can discuss key issues or specific topics. They include but are not limited to the following: local government officials, community leaders, elders, teachers, model citizens and religious leaders. Special attention should be given to elders because of their knowledge of informal fisheries management systems in the area, handed down to them through generations.

DETERMINATION OF SURVEY INSTRUMENTS

Based on the annotated checklist, decisions may have to be made in terms of revising survey instruments, particularly SSIs. Some RAFMS tools

initially considered, e.g., FGD, may have to be dropped or altered. New techniques may be also introduced.

Step 3. Field data collection

Field data collection, Step 3 of the RAFMS cycle, is divided into two parts. The first describes generic or general RRA tools which may be used for RAFMS. The second describes detailed methodologies that include survey procedures, guide questions and the matrix of attributes and their data collection techniques. Sample figures, tables and diagrams are also provided. The methodologies are classified according to six groups of attributes.

GENERAL TOOLS

A variety of techniques or tools can be used for collecting RAFMS primary data. Many of these are fairly standard tools for conducting rapid appraisal. They overlap with one another. McCracken et al. (1988); Sajise et al. (1990); Townsley (1992, 1993a, 1993b); Schonhuth and Kievelitz (1994); and Mikkelsen (1995) may be referred to for detailed descriptions of such tools or techniques. Basic definitions follow.

Semistructured interviews (SSI)

Probably the most powerful of RRA techniques (McCracken et al. 1988), the *semistructured interview* (SSI) is a field technique where the informant is guided by the researcher in session interview by means of a key, predetermined set of questions. Through an interview schedule, the construction of key questions must be prepared with care. Table 6 is a guide to conducting SSIs.

This technique, however, is flexible because new lines of questioning or inquiry can be opened during the actual interview. The SSI is ideal for discussing specific topics or issues, building up case studies and collecting historical information. The information derived from SSIs will be among the most vital acquired during field data gathering if one knows in essence what to ask, how to ask and whom to ask (Sajise et al. 1990).

Group interviews

A variant of SSI, group interview is used in both field data gathering and community validation. Among the popular versions are FGDs. During fieldwork, it is effective in identifying social norms and accepted views;

Table 6. Guide to conducting SSIs (adapted from Sajise et al. 1990).

1. Properly introduce yourself before starting the interview.
2. Those who are conducting the interview should be familiar with the local dialect; if not, bring an interpreter. (If an interpreter is used, it is important that he/she understands the objectives and applications of RAFMS. If necessary, involve the interpreter in the researchers' discussions so meaning and style of interaction are not lost in the translation.)
3. Put the fisher or key informant at ease before starting the interview. Ask easy questions first before difficult ones.
4. Do not ask leading questions. Open-ended questions should be used to generate more information.
5. Do not write in front of fishers or carry tape recorders unless they give prior permission.
6. Do not promise anything.
7. Do not ask questions simultaneously.
8. Use indirect questions for sensitive aspects, e.g., income, ownership, disability, age, marital status, educational attainment, etc.
9. Blend in with the fishers' activities.
10. Be conscious about the time you conduct and spend during the interview.
11. Do not abuse fishers' hospitality. Try to pay/compensate for products given in great quantities.
12. Obtain information from other members of the family, e.g., wife, children.
13. Do not interpret in front of fishers.

pinpointing special interest groups; and knowing collective views and feelings. It may be used at the end of the fieldwork to cross-check information.

FGDs can be used to generate more information regarding specific topics. Separate sets of key questions or interview schedules may be prepared and administered to an ethnolinguistic group, e.g., those who speak Cebuano in the Philippines, or to a particular organization, e.g., a multipurpose cooperative. FGDs can also facilitate accumulation of diverse information, such as marketing structure, problems and priorities. Table 7 provides useful hints on conducting FGDs as well as community dialogues and meetings.

Participatory exercises

Among the popular modes of participatory exercise are: diagramming, ranking, and stories and portraits. *Diagrams* are simply models that convey information in easily understandable visual forms. They have the advantage of forcing participants to think through the dynamics while constructing the models. Diagrams are also a good medium for stimulating discussion with local people as well as communicating ideas and findings. Following the AEA concept (Conway 1985, 1987), diagrams may be expressed in terms of space, time, flow and decision. *Ranking* is an analytical game used to find out the preferences or priorities of an individual or a group. It takes various forms. A simple ranking may only ask a series of simple questions while a more complex one uses a series of two-way comparisons. *Stories and portraits* are short, colorful descriptions of situations encountered by the team or stories recounted by people in

Table 7. Guide to conducting FGDs and community dialogues (adapted from Sajise et al. 1990).

1. Set the meeting at a date, time and place most convenient to the community.
2. Assign someone to preside over the meeting, and request a local leader to introduce the group to the community.
3. State clearly the purpose of the visit.
4. Maintain eye contact especially with the less active members of the community to encourage them to participate in the discussion.
5. Tactfully tone down community members who tend to monopolize the discussion.
6. Do not leave issues hanging. Carefully synthesize the discussion and clearly phrase the conclusions for approval.

the field (McCracken et al. 1988). As such, they describe information not easily converted or transformed into diagrams. Local folk relate best to stories and portraits as a way of describing their way of life.

Reporting and brainstorming

These tools are done all throughout the field activities to cross-check findings and review the methods and techniques used. Both *reporting* and *brainstorming* may also be used to monitor progress of the appraisal.

Mapping

Spot mapping or *sketch mapping* is a simple procedure of laying down on paper the important features of an area, which can be related in spatial terms or referenced geographically. Among these features are settlements, infrastructure and water bodies. The spot map must corroborate the map prepared during the earlier secondary data analysis, and portray the top view or aerial perspective of the study area (Fig. 6).

The spot map is useful in locating all households or clusters of households in a community. It can be used to select a random sample if necessary. For RAFMS, maps are especially important in locating marine resources, fishing areas and gear, water transportation routes and fish landing facilities. This map can also be used to segregate the community according to ethnic group, clan, family, wealth, length of residence, etc. The main points to remember are (Townsley 1993b):

1. Maps made during a rapid appraisal do not need to be exact, but they have to be clear since they will be mainly used to represent issues or particular aspects of the community.

2. If good maps are available, trace an outline of the main features of the area being investigated, fill in the details and reproduce for team members.

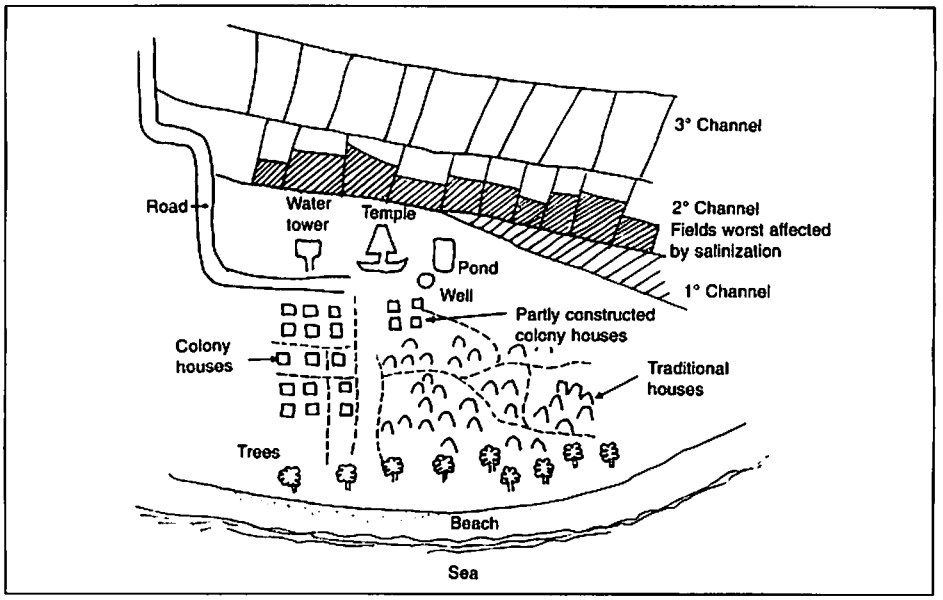

Fig. 6. Spot map of Chinnamedu Village, Tamil Nadu, South India, prepared with the villagers (Townsley 1993a).

3. Prepare sketch maps based on information provided by local people, or ask the local people to prepare the maps themselves.
4. Don't try to get too much information into one sketch map.

Transect-making

A *transect* is a general reference line cutting across a representative portion of the study area (Sajise et al. 1990). In effect, the transect line is the side view or cross-section of the site. Transects are both a way of representing information and a technique for familiarizing with the different parts of the community and the agricultural and ecological zones that make up the area (Townsley 1993b). Among the advantages of a transect is the simple portrayal of the resources present and the associated economic, social and environmental issues in spatial terms (Fig. 7).

The four simple steps to transect-making are (Sajise et al. 1990) :

1. Locate a line that will cut across the study site.
2. Superimpose along the transect line the critical biophysical information, such as slope, type of soil, marine habitats, etc.
3. Indicate the major resource uses, such as farming systems and fishing practices.
4. Plot out the problems encountered.

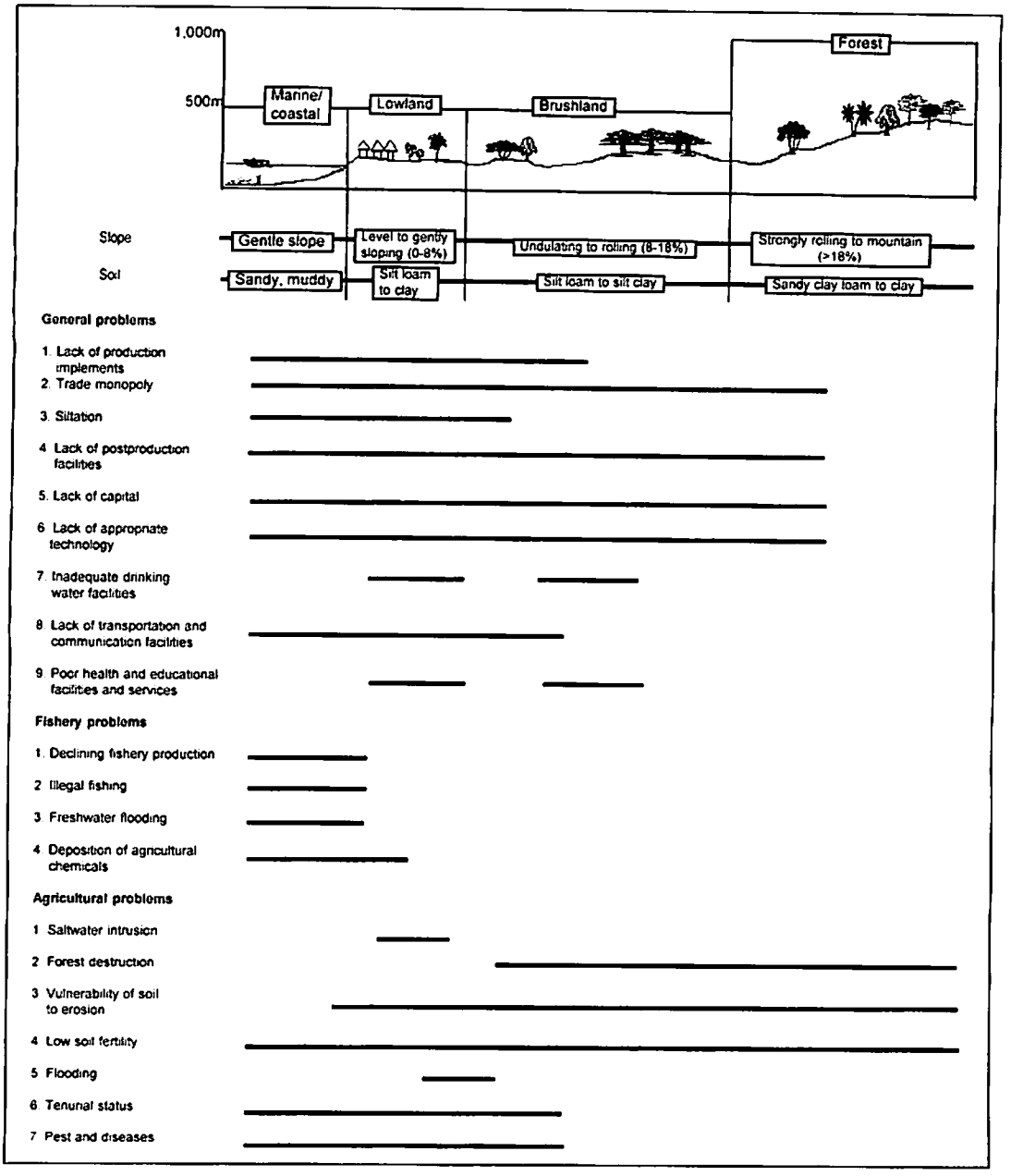

Fig. 7. Transect of Malampaya Sound, Palawan, Philippines (Pido et al. 1990).

In the case of a large gulf or bay where there is great variation in terms of natural resource endowment or fisheries issues, several transect lines may have to be drawn to account for such variations.

Timelines

Timelines give a clear idea of what events in the past are considered important and how they occur in a sequence (Townsley 1993b). They can be used to represent data provided by informants.

Calendars

Calendars show data relevant to fishing patterns and of labor throughout the year and food availability from different sources. Townsley (1993b) recommended these procedures on making calendars:

1. Find out how local people divide up the year, i.e., months, seasons, etc. Mark these divisions along the top of the calendar.
2. Focus attention on one particular aspect, e.g., time of access to fishing ground.
3. Plot responses on your calendar, or explain it to informants and get them to plot the topics themselves. The calendar can be drawn on the ground.

Historical transects

Historical transects consist of a series of transects that illustrate how a particular area has changed over time. They show changes in land use in different zones along a transect or modifications in fishing practices through time. Transects are prepared as follows (Townsley 1993b):

1. Together with an informant, draw a transect through the area of interest. This can be derived from a more complete transect already prepared to tag the agroecological zones (fishing zones in the case of RAFMS) in the area. This can also be done from scratch.
2. Get the informant to describe what current conditions are like in each zone or in particular parts of the transect.
3. Ask what conditions were like 10 years ago, 20 years ago and so on.
4. Redraw the transect and strive to represent these conditions schematically.

Process charts

Helpful in breaking down and analyzing important activities (Townsley 1993b), *process charts* specify the people involved in activities and alternative

ways of doing these activities. They get respondents to focus on and explain features of activities they might otherwise take for granted and not reveal to outsiders. The charts are particularly good for analyzing economic activities, and attendant inputs and outputs. They are prepared thus (Townsley 1993b):

1. Focus the informants' attention on a particular activity.
2. Ask them to describe in detail how the activity is carried out.
3. If informants try to rush through the description superficially, stop them and get them to describe in greater detail.
4. For each step in the activity, ask what inputs are involved, the quantities required, cost per unit of input and the resulting product or products, if any.
5. Mark each step down as a box in a process, with the inputs or outputs noted beside it.
6. Work through the activity from beginning to end to get a complete picture.

Decision trees

Valuable in grasping resource management strategies of users, *decision trees* also unearth reasons why users take up or give up particular technologies (McCracken et al. 1988). These trees analyze factors influencing the local people's important decisions, thus clarifying their priorities. For fishers, the trees are useful in illustrating their decisions on resource allocation and alternative or supplemental economic activities. Townsley (1993b) proposed that decision trees be created in two ways:

1. Start from a particular resource or activity and establish what alternatives are available. For example, point out different ways of using the same resource or activity. Find out why people decide on one alternative or the other. For each alternative, find out what further choices are available and why people might choose them.
2. Start from existing practices, find out what alternatives are available and what influences choices of alternatives. Work backwards through the various alternatives until the "original" resource and the decisions on its use are reached.

Venn diagrams

Venn diagrams can be used to show the relationships between different groups and organizations within a community (Fig. 8). Particularly useful in identifying potential conflicts between interest groups, Venn diagrams also clarify roles of individuals and institutions. They are prepared based on data

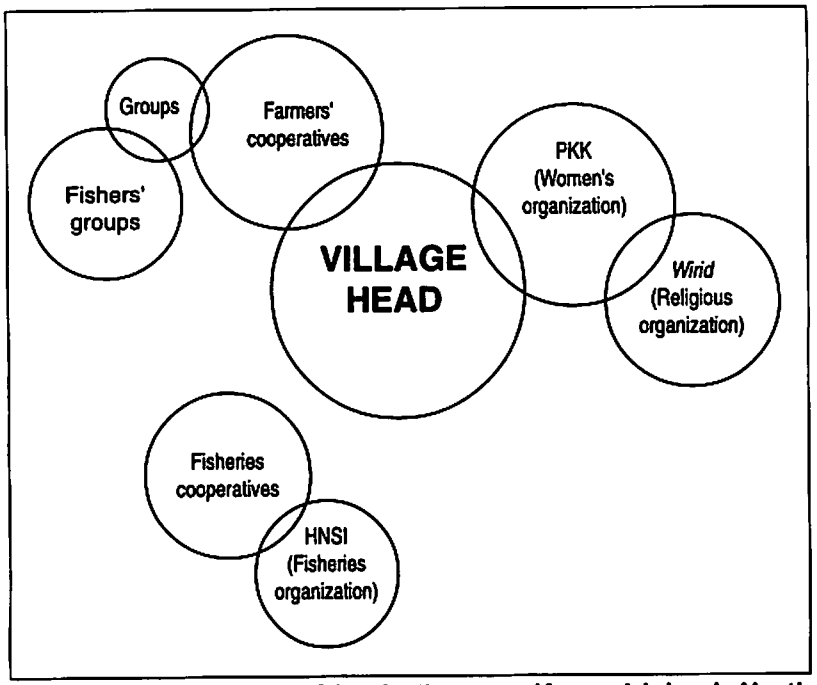

Fig. 8. Venn diagram of institutions on Kampai Island, North Sumatra, Indonesia (Townsley 1993a).

provided by informants about groups and institutions. Townsley (1993b) recommended that team members should find out, with care, sensitive information about leadership, membership, activities, decisionmaking processes and interaction or conflicts.

TOOLS ACCORDING TO GROUPS OF ATTRIBUTES

The six groups of attributes have their own matrices (see Appendices) where the field data collection techniques are identified, among other aspects.

Group I - Biological, physical and technical attributes

Matrix 1 lays out Group I's attributes and techniques for data collection and validation. Much of the data for physical attributes may be generated through *resource mapping*. Key activities include demarcation of study area, establishment of base map and preparation of different thematic maps. These activities determine both marine and terrestrial extents of the study area. Since the focus of RAFMS is on the village level, maps of at least 1:50,000 in scale are required. The *base* and *working maps* should have the same scale.

A *thematic map* displays selected information relating to a specific theme, such as land use, coastal habitats, slope, elevation and soil. These may be qualitative (e.g., land use) or quantitative (e.g., population density). The three requisite thematic maps are land use, coastal habitats and transect/cross-section. All or some may be sourced from government agencies.

A *land use map* refers to the actual land cover or any form of man's use of land, including special uses, such as built-up (settlement) and commercial areas or marginal lands. If this map is not available, the team can do spot mapping. A *spot map* is a sketch map that describes the area in terms of important features, such as roads, rivers, benchmarks, and natural or cultural landmarks. The team can determine distances with a measuring tape and geographical directions, i.e., east, west, north or south, with a compass. A spot map should be comprehensive in terms of all the characteristics of the area but clear enough to be understood by the users.

Land use must be viewed from a historical perspective. The guide questions for generating the elements of a land use map are given in Table 8.

A *coastal habitat map* shows the location of mangroves, coral reefs, seaweed/seagrass beds and other soft-bottom communities. It can be derived from a topographic map or generated through spot mapping. The land use and coastal habitat maps may be also merged. A *transect map* is produced by plotting alongside environmental resources the various problems and opportunities existing in the study area. (See earlier section on general tools, p. 30, for a review of transect-making.) The other maps, which are ideal to have on hand but are not obligatory, are the *soil map, slope map* and *climatic map*.

For the water quality attribute, water transparency and pollution level indicators can be evaluated qualitatively. For example, murky waters indicate high suspended solids or a high silt load. The presence of floating solid waste indicates poor domestic or industrial waste management in the area.

There are field techniques for assessing biological and habitat attributes, particularly major coastal habitats. For coral reefs, a rapid visual survey using the *manta tow reconnaissance technique* is recommended as the basic minimum in assessing the quality of coral cover. This technique enables visual assessment of large reef areas within a short time and is highly recommended for selecting sites for more detailed transect studies (Dartnall and Jones 1986; English et al. 1994). It is conducted by towing a snorkeler holding a manta board following the contour of the reef slope. The tow lasts for two minutes at a speed of 1 to 1.5 knots (0.77-1.03 m/s). This reconnaissance technique allows the snorkeler to observe the coral community and describe it semiquantitatively by making estimates of the percentage cover

Table 8. Guide questions for land use.

I. Profile of the respondents
Name: Age:
Position: (i.e., village captain, elder, key informant)
Address (i.e., village, town)

II. Data/information needed
- A. *General land use*
  1. When did you arrive in the area (year)? What were the original land uses in the area? Approximately, what is the area in hectares?
  2. Has there been a change in the use of the land through time (the first time you arrived compared to the present)? What are the changes?
- B. *Settlement pattern*
  1. Was there a settlement already? Approximately, what is the area?
  2. Approximately, what is the present area covered by settlement?
  3. How fast is the expansion of settlement? What is the direction (i.e., lateral or along the shore, or towards inland)?
  4. What is the previous land use of the area covered by expanded settlement (i.e., agriculture, grassland, forest, etc.)?
  5. If the direction of settlement expansion is inland, do you clear the area (cut trees or clear grassland) for settlement?
  6. What is the extent of clearing (area)?
- C. *Mangrove area*
  1. Was there a mangrove area when you first arrived in the area? Approximately, how large is the area? Describe the type (in terms of density and size of the tree). Where is it located?
  2. Are the mangrove areas still there? Have they changed in area coverage and type?
  3. Is there mangrove harvesting in the area? For what purpose, and what is the extent of harvesting?
  4. Is there mangrove reforestation in the area? Who conducted the reforestation activity? Who is managing the reforestation area? What is the people's perception of mangrove reforestation? What are the benefits that the people can derive from mangrove reforested areas?
- D. *Agriculture area*
  1. Is there any agricultural cultivation in the area? Where is it located? What type of crops are grown in the area? Approximately, what is the area of each crop?
  2. In the uplands, is there also any form of cultivation? For what crops? What is the extent of cultivation (in terms of area coverage) for each type of crop?

of live, dead and soft corals using these categories: 1= 0-10%; 2 = 11-30%; 3 = 31-50%; 4 = 51-75%; and 5 = 76-100%.

If time, equipment (i.e., SCUBA) and expertise are available, the more detailed study using *line intercept method* and *fish visual census* described by English et al. (1994) may also be done. These techniques will provide more reliable information on the percentage cover of living corals and relative abundance or density of reef fishes, respectively.

The manta tow technique can be employed also to check the extent or relative cover of seaweeds and seagrasses. If time permits and expertise is available, the modified *transect-quadrat method* described by Saito and Atobe (1970) and English et al. (1994) can be used to determine the species composition or relative density of cover of both communities.

For mangroves, the *transect line plot method* described by Dartnall and Jones (1986) should only be conducted in the absence of secondary data in

the study area and only if there is enough time. The method determines relative frequency, density and species diversity of mangroves. For each site, transect lines are drawn from the seaward margin of the forest at right angles to the edges of the mangrove forest. Plots are established at 10-m intervals along a transect through the mangrove forest in each of the main forest type or zone. The method provides quantitative descriptions of the species composition, community structure and plant biomass of mangrove forests.

The technical attributes indicate what type of overfishing occurs and to what extent the study area is overfished. Table 9 presents an SSI guide questionnaire for capture fisheries assessment. Done properly, the SSI can generate data about the major species harvested, fishing grounds, the number of gear or fishers, and conservation awareness. It can also estimate fishing effort (Table 10), seasonality of species by gear type (Table 11) and catch rate changes over time (Fig. 9). The focus should be on gear composition of local versus migratory fishers. Site inspection shall be undertaken to determine the use of destructive fishing methods.

Group II - Market (supply and demand) attributes

Matrix 2 presents the market (supply and demand) attributes of fisheries and the tools/techniques for data collection and validation. Market information and orientation will be gathered mainly through these field data collection techniques: SSI, FGD, market visit, and temporal diagramming or combinations thereof.

For SSI, only some questions and topics are predetermined, so probing can be extensive. Probing refers to follow-up questions aimed at clarifying a previous answer to a question or pursuing a previous topic. Individual respondents, key informants or groups may be interviewed. Attention must be given to the selection of respondents, time and location of interviews. Table 12 is a checklist of guide questions for market attributes.

The FGD for homogenous groups can be conducted to gather information on specific topics and problems. Groups then will have the opportunity to answer specific questions and issues peculiar to their group or sector. Table 13 is a summary of relevant fish prices volunteered by fish traders during an actual FGD. SSIs and FGDs can be conducted for different types of persons involved in fish marketing, such as fishers, wives of fishers, fish traders, fish consumers, fish processors, boat operators, market agents, transporters and other market participants.

The *market visit* is an ocular inspection of relevant fish products and byproducts in the marketplace. It is also a way of checking prevailing prices

Table 9. Guide questions for capture fisheries assessment.

Name of respondent: _____
Barangay/village: _____ Municipality/province: _____
Age of respondent: _____ No. of years as fisher: _____
Fishing gear used: _____
No. of hours spent using gear type: _____
Departure time: _____ Arrival time: _____
Is the catch increasing or decreasing? _____
Previous catch rate (per day trip): _____ Year: _____
Current catch rate (per day trip): _____
Reasons for change in catch rate: _____
_____
Are there changes in catch composition? _____
Previous species caught (major species): _____
Current species caught (major species): _____
Fishing areas of major gear (use base map): _____
_____
Is there a shift in fishing areas? _____
Reasons for shift in fishing areas: _____
_____
_____
Previous fishing areas (use base map): _____
_____
_____

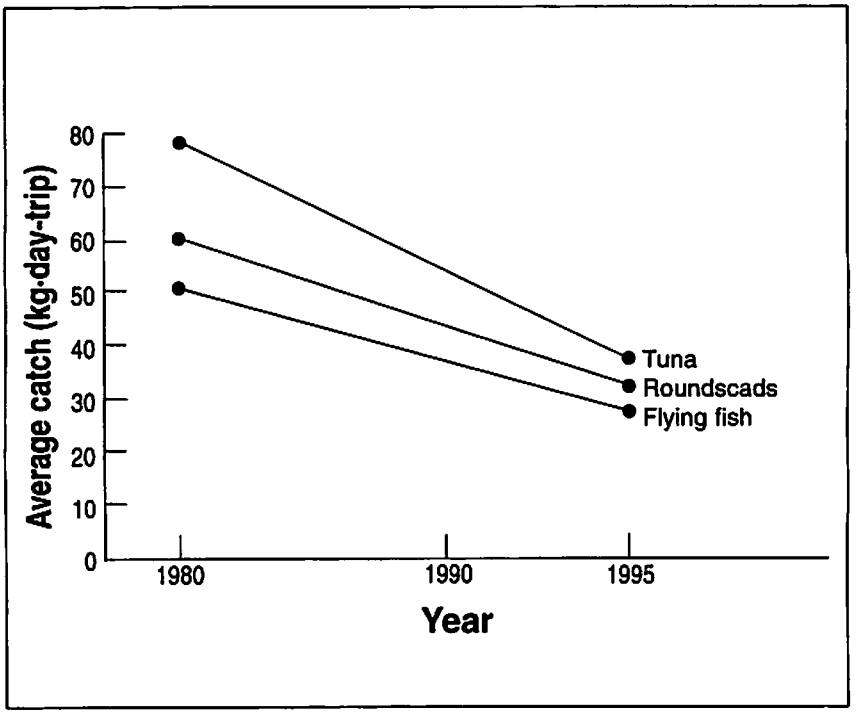

Fig. 9. Trend of the catch rate of some species in Nolloth Village, Saparua Island, Indonesia (Andamaki et al. 1995).

Table 10. Estimates of fishing effort and season in Nolloth Village, Saparua Island, Indonesia, 1995 (Andamaki et al. 1995).

Gear type	No. of units	Species caught	Seasonality (months)	Volume of catch (per day trip)	No. of fish days/month
Drift gillnet for flying fish	350	Flying fish	Year-round	25 kg	20-25
		Half-beaks	Year-round	15 kg	20-25
Drift gillnet	75	Indian mackerel	Sep-Dec	35 kg (150 ind.)*	20-25
Squid jigger	350	Yellow tail squids	Jan-Apr	25 kg	20-25
			Oct-Jan	(200 ind.)	20-25
Handline I	100	Trevallies	Year-round	510 ind.	20-25
Handline II	1,000	Scads	Year-round	100 ind.	20
Handline III	5-10	Tuna	Dec-Apr	25 kg (2 ind.)	20-25
Troll line	1,000	Skipjacks	Sep-Apr	25 kg (10 ind.)	20-25
Pole and line	4	Skipjacks	Jun-Aug	500 ind.	15-20
Mini purse seine	4	Sardine	Jun-Aug	250 kg	15-20
		Scads	Jun-Aug	250 kg	15-20
Beach seine	3	Anchovy	Year-round	25 kg	20-25
Cast net	7	Anchovy	Year-round	20 kg	20-25

*Ind. - number of individuals.

Table 11. Seasonality of species by gear type in Binunsalian Bay, Palawan, Philippines, 1995 (Sta. Cruz et al. 1995).

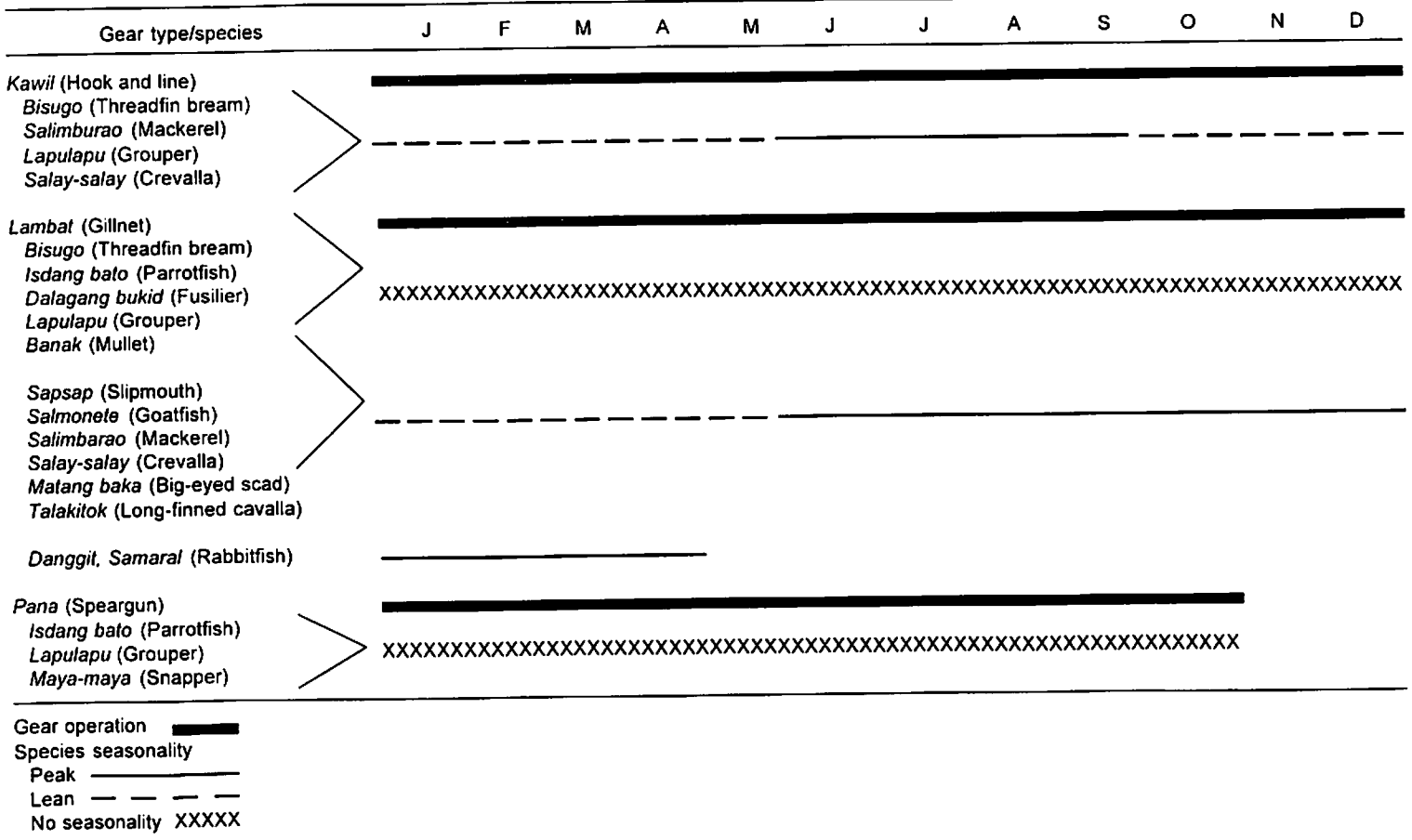

Table 12. Guide questions for the market attributes.

Supply
What types of fish are caught ?
When (what months) is fishing prevalent?
Where are the different kinds of fish caught?
What are the types of fish sold?
Where are the different types of fish sold?
Pricing
How much do different classes of fish cost at the time of harvest?
How much do different types of fish cost in the market?
How are fish products priced?
What other factors influence fish prices?
What are the types of fisher-buyer relationships in the village?
Are the fish prices affected by changes in prices of substitutes, such as pork?
Market functions
How is the fish catch handled?
How is the fish catch packaged?
How is the fish catch stored?
How is the fish catch transported?
Are fish graded/classified? How?
Are fish processed? How?
What are the marketing facilities, e.g., transportation/road networks, landing sites, port areas?
Market rules
Are there fees for landing the fish at the port?
How much has to be paid for fish landing?
What are other restrictions or rules in fish trading?
Stability of demand
Is the demand for fish and other marine products changing?
What are the reasons and patterns of change?
Is there a change in dietary preferences?
What is the rate of substitution?
Market structure and orientation
What are the types of fishers, e.g., municipal, commercial?
How many fishers are there in the village?
How many of the fishers are residents of the village and how many are not (i.e., migrant fishers)?
At the local market, what is the ratio of direct buyers (consumers) to traders?
How many fish traders are there?
How does the fish catch reach the market? How many channels do they pass?
Where are the markets? (e.g., local, city, provincial/regional, national, international export, etc.)
Where are the fish traders from?
How is price information disseminated?
Are there traditional marketing arrangements? Is there a credit-marketing relationship between fish and fish trader?
What are the problems in marketing of fresh fish?
What are the constraints in marketing other fish products?

Table 13. General price levels of fish and marine products by channel and grade in Binunsalian Bay, Palawan, Philippines, 1995 (Sandalo et al. 1995).

Type/class of fish	Price range per kilogram (in pesos)	
	Fisher to consumer	Fisher to fisher trader
1st	20-25	40
2nd	15-20	25-30
3rd	10-15	15-25
Others: squid, octopus, cuttlefish	20-25	40

US$1.00 = P26.02 as of March 1996.

of fish products, both wholesale and retail. This visit also helps analyze the marketing process as well as market structure and orientation.

Effective in gathering market information, *temporal diagrams* are graphic depictions of data on various topics, issues and concerns along the temporal dimension.

Group III - Fisher, stakeholder and community attributes

The attributes of fishers and community stakeholders and tools/techniques for data collection and validation are plotted out in Matrix 3. Vital information on these characteristics are gathered mainly through SSI, FGD, house or home visit, temporal diagramming, resource mapping, and walk-through and boat ride.

The SSI is used with individual and group respondents according to the procedure already explained in the section on Group II attributes. A guide questionnaire on the characteristics of fishers, stakeholders and the community is given in Table 14.

The FGD is used for gathering information from groups of persons who are expected to share common knowledge on specific issues. A summary of relevant information, which can be obtained during an FGD, is shown in Table 15. SSIs and FGDs will be conducted for different types of stakeholders, e.g., coral reef fishers, fisher-farmers, women, youth , elders, traders, migrant settlers, local government officials and others to determine, among other things, ecological knowledge.

The *house/home visit* is an ocular inspection of the type of dwelling place of local folk, their real properties and assets. This also gives the researcher a good chance to observe the way of life, traditions, family activities and social structure prevailing in a given community. Usually, a visit can be combined with an SSI.

Table 14. Guide questions for the characteristics of fishers and community stakeholders.

Demography
Who is the oldest resident of the village? When did he arrive there?
Are the local folk original inhabitants of the place or not?
If migrants, where did they come from? When did they arrive?
Are there schools in the village?
Do the children and youth go to school?
What is the prevailing religion? What are the other sects?
What is the average family size?
Tenurial status
Do people own real properties? How about their home lots?
What are the existing tenurial arrangements?
Are there property rights in fishing areas?
Do local fishermen establish boundaries in their fishing areas?
Economic status
What types of dwelling places exist in the village?
What other assets, i.e., furniture, appliances, are commonly owned by the residents?
What fishing gear, i.e., boats, engines, nets, do residents own?
Culture
What special occasions are observed by the local folk?
What beliefs, superstitions, practices do the fishers/local folk adopt in relation to fishing?
What are the people's pastimes and recreational activities?
Livelihood
What is the main source of livelihood and income?
What are other alternative or supplementary sources of income?
How many families/households depend on fishing for their livelihood?
What is the proportion of the population dependent on other types of livelihood?
Attitudes/outlook
How do the local folk perceive the future of fishery resources?
How do the local folk perceive their livelihood in the future?
How do the local folk value cooperative action and community projects?
How do the local folk identify with the larger community, i.e., town, province?
Are community members concerned about the sustainability of resource use?
What are their attitudes towards risk?
Resource use/harvesting conflicts
Are there conflicts in the fishing activity and use of other marine resources?
What is the nature of these conflicts (gear, space, organization)?
How are conflicts resolved? Are there informal ways of resolving conflicts?
Ecological knowledge
Do the resource users have indigenous or traditional ecological knowledge of the fisheries and coastal resources?
Is the traditional ecological knowledge passed through generations?
Is this traditional ecological knowledge compatible with conventional science?
How does ecological knowledge relate to the conservation of marine habitats?
Community
What are the housing/settlement patterns?
What are the services available in the community, e.g., health, physical infrastructure, communications?
What is the type and structure of formal political system? What are the linkages between formal and informal governance?

Table 15. An example of comparative socioeconomic characteristics of fishers/stakeholders in Manabore and Tarunayan, Ulugan Bay, Palawan, Philippines, 1995 (Sibal et al. 1995a).

Attributes	Indicators	Manabore	Tarunayan
□ demography	• age	- new settlers; more of young population	- more of old population
	• experience in fishing	- experience carried over from previous place of residence	- experience carried over from previous place of residence
	• length of residence	- since 1987	- since 1957
	• family size	- 4-5 members	- 7 members
	• religion	- Pentecostal, Oneness with Christ	- United Church of Christ in the Philippines, Evangelist, Roman Catholic
	• ethnicity	- Leyte, Cebu, Masbate	- Bohol, Cebu, Samar, Iloilo
	• population	- with first-generation settlers	- more dense (man-land ratio) compared with Manabore
□ tenurial status	• land claim	- squatters in the area but they are not threatened (with relocation)	- unwritten land claims
	• fishery claim	- fish cages/corrals; areas based on unwritten agreement between operators	- fish cages/corrals do not exist in the area
		- they were not issued permits by the city government for the previous and current years	- hook-and-line fishers can fish anywhere

Temporal diagramming for Group III attributes is best illustrated by Table 16, a timeline. A chronology of significant events in the history of a community, a timeline is constructed together or in consultation with the local folk. It is ideally composed for specific events, such as migration patterns, population changes, livelihood changes, establishment of schools, social infrastructure, industries, political history of village, etc. Resource mapping can be used to determine resource use/harvesting conflicts.

The *walk-through* and the *boat ride* should be done in tandem to complement other activities of field data gathering. Going around the village and the relevant fishing areas presents a broader perspective of the developments in the community, e.g., the social infrastructure present; the sociocultural, political and religious activities in the area; and the state of the natural resource base. These techniques are also useful in observing the local folk's livelihood activities, including fishing, which is important to the community profile.

Groups IV and V - Local and external institutional arrangements

Matrices 4 and 5 are outlines of the attributes of Group IV's local and Group V's external institutional arrangements as well as of the tools for data

Table 16. Timeline of Nolloth Village, Saparua Island, Indonesia, 1517-1995 (Hiariey and Kinseng 1995).

Year		Event
	1517	Move from Nolloth and Hatarena to Air Ratu.
	1603	War against the Dutch colonials.
	1652	Move to Hatawano Bay (the place of Nolloth Village now).
	1769	Construction of the Traditional Assembly Hall.
	1860	Building of the church.
1950s		Modernization of fishing tools (outboard motor and monofilament [*tasi*]).
		Establishment of cooperative at village level (KUD).
1960s		Start of Asphalt Nolloth-Saparua road construction.
		Introduction of public electricity.
		Start of operation of public transportation (cars).
	1964	Division of State Primary School (SDN) into two (SDN 1 and SDN 2).
1970s		More motor boats.
		Coming of two Chinese traders.
	1977	Construction of a primary school.
		Building of more small shops (*warung*).
1980s		Completion of Asphalt Nolloth-Saparua road.
		Construction of more houses made of cement.
	1985	Building of village office.
		More televisions.
		Entry of more clove traders.
		More skipjack motor boats.
	1986	Installation of electric posts along roads.
		Exclusion of the traditional leader (*Kepala Soa*) from the formal village organizational structure.
		Mechanization of *sagu* (palm) production.
	1987	Abolition of *sasi* auction.
		Transmigration of Seram Island.
1990s		Decline of clove prices.
		Impact of logging industry in Seram Island felt by fishers.
		Cancellation of church *sasi*.
		Conduct of land titling through *Prona* program.
	1993	Two fishing boats owned by a Chinese businessman are operated by villagers.
	1994	Building of canning factories near the village.
		Purchase of a fishing motor boat (an inboard) by the Village Cooperative Unit (KUD).

collection and validation. Tables 17 and 18 provide guide questions for Groups IV and V's data generation.

Both groups generate data using the following steps, which are not necessarily sequential:

1. Identify all the existing "village-level" institutions and organizations within the study area for Group IV and all the institutions above the village level for Group V.

2. Concentrate on institutions associated with fisheries or CRM. For example, Table 19 presents a list of livelihood associations around Ulugan Bay in Palawan, Philippines. Offhand, it can be deduced that only three organizations are in one form or another involved in fisheries. Hence, data gathering can be focused on their members.

Table 17. Guide questions for the local institutional arrangements.

- Individual organizations

  What village-level organizations exist in the area?
  Which are engaged in marine fisheries or CRM?
  Which are formal (legally recognized) groups, and which are informal?
  For formal groups, to which category do they belong: (1) LGUs, (2) NGOs,(3) POs, (4) private interest groups and (5) others?
  What are the organization's mandates or objectives and administrative structure?
  How long has the organization been in existence, and what is its historical development?
  Is the membership increasing or decreasing?
  What are the organization's technical, manpower and financial resources?
  How is the organization affiliated with other organizations vertically and horizontally?
  What is the members' awareness of the conditions of the fisheries/marine resources?

- Local institutional arrangements

  What are the property rights in terms of access, withdrawal, management, exclusion and transfer?
  What are the operational rules that pertain to boundary, allocation, authority and equity?
  What are the regulatory mechanisms (e.g., quota, closed season, etc.) and incentives (e.g., taxation, licensing, etc.)?
  What are the collective choice rules, such as adjudication and enforcement?
  How is the rulemaking body formed in terms of leadership, membership and representation?
  What are the boundaries (i.e., political, gear type, traditional/customary, organizational, physical), their size/clarity, ownership, geographical coverage and changes over time?

Table 18. Guide questions for the external institutional arrangements.

- Individual organizations

  Which organizations existing in the area are above the village level?
  Which are engaged in marine fisheries or CRM?
  Which are formal (legally recognized) groups, and which are informal?
  For formal groups, to which category do they belong: (1) LGUs or other state-level bodies, (2) NGOs, (3) POs, (4) private interest groups, and (5) NGAs and other regional agencies, (6) bilateral/regional bodies, (7) international agencies and (8) others?
  What are the organization's mandates or objectives and administrative structure?
  At what level does the organization operate: (1) international, (2) regional, (3) national/central, (4) regional, (5) province/state, or (6) district/municipal/town?
  How long has the organization been in existence, and what is its historical development?
  What are the organization's technical, manpower and financial resources?
  How is the organization affiliated with other organizations vertically and horizontally?
  What is the organization's awareness of the conditions of the fisheries/marine resources?

- External institutional arrangements

  For the relevant organizations, what are the formal policies, programs, regulations, laws and legislation related to fisheries and CRM?
  How do these national policies, programs, regulations, laws and legislation affect fisheries and CRM at the local level?
  How do the other national policies, programs, regulations, laws and legislation on economic development and general public administration affect fisheries and CRM?
  How is each organization affiliated with other organizations vertically and horizontally, or arranged in terms of nested layers with other formal or informal organizations?

Table 19. Livelihood associations around Ulugan Bay, Palawan, Philippines (Sibal et al. 1995b).

Name of association	Project	No. of members	Barangay/village
1. Umulagan Community Development Association	Peanut production	15	Bahile
2. Bahile Central Multi-purpose Association	Peanut production	13	Bahile
3. Dedicated Farmers Association	Peanut production	10	Bahile
4. Pag-asa Women's Association	Rice trading	14	Bahile
5. CEP Supporters' Association*	Drugstore and fishing supply	23	Bahile
6. Samahang Kababaihan ng Manabore	Community store	6	Bahile
7. Masaya Rice Trading Association	Rice trading	22	Macarascas
8. Samahang Pangkabuhayan at Kaunlaran ng Bagong Sikat	Community store	21	Macarascas
9. Baruang Livelihood Association	Community store	8	Macarascas
10. Samahang Kapatiran ng Dacolanay	Goat-raising and rice trading	12	Buenavista
11. Madahon Sari-sari Store Association	Community store	17	Buenavista
12. Buenavista Centro Livelihood Association	Rice trading	18	Buenavista
13. Tagabinet Valley Association	Sugarcane milling	23	Tagabinet
14. Nasuduan Fishermen's Association *	Fish corral	11	Tagabinet
15. Makirawa Fishermen's Association *	Snack bar	12	Tagabinet
16. Nag-iisang Samahan sa Tagnipa	Agricultural supply	11	Cabayugan

* With bearing on fisheries and CRM.

3. Classify the relevant organizations into clusters. For Group IV, these are village-level government agencies; NGOs primarily involved in the delivery of projects; local people's organizations (POs), the primary beneficiaries or recipients of projects; private interest groups, which include middlemen, traders and money lenders; and other cultural/societal organizations, which include the religious sects, sociocultural groups and other traditional organizations.

Group V's clusters are the LGUs or other state-level bodies; NGOs; POs; private interest groups; national government agencies (NGAs) and other regional agencies; bilateral and regional bodies; international agencies and others.

4. Identify the appropriate indicators from data gathered from organizations' records or from interviews with their officers or members.

5. Construct Venn diagrams to illustrate interaction and relationships among various groups. If applicable, use plus and minus signs (+ and -) to indicate positive or negative relationships.

6. Construct a network chart of organizations at the village level for Group IV and at the municipal level and above for Group V. In addition, connect Group V organizations with Group IV's village-level ones. The nested organizational and institutional arrangements for Binunsalian Bay, Palawan, Philippines, are shown in Table 20.

7. For Group IV only, plot in maps relevant boundaries: political; gear type; individual or organization; traditional/customary; natural; as well as other social ownership-constructed boundaries. If possible, illustrate the trend over time.

8. Enumerate and qualify local-level systems of rights and rules, both formal and informal, that govern resource use. Table 21 lists local-level systems related to the use of artisanal fishing gear in Manabore, Palawan, Philippines.

For Group V, detail the formal systems for resource use.

9. Illustrate the conflict-resolution mechanisms at the local level for Group IV and at higher levels for Group V. Fig. 10 shows the conflict-resolution mechanisms in Tarunayan, Palawan, Philippines.

Group VI - Exogenous or external factors

Matrix 6 delineates the attributes that relate to external factors and the tools/techniques for data collection and validation. External factors are those brought about by natural occurrence or human intervention. Table 22 draws up the guide questions for data generation.

Table 20. Nested organizational/institutional arrangements for Binunsalian Bay, Philippines (Cabrestante et al. 1995).

Administrative level	NGAs				LGUs	NGOs	POs
National	o DENR	o DECS	o DAR	o DOJ (BOC)	o National government	-	-
Provincial	o PENRO	o Division	o PARO	o IPPF	o Provincial government	-	-
Municipal	o CENRO	o District	o MARO	o Sta. Lucia subcolony	o City government (Bantay Puerto)	-	-
Village		o Elementary/ high school			o Mangingisda Barangay Council	o Ligaya ng Buhay o Binunsalian Bay Foundation, Inc.	o Christian Multipurpose Cooperative o Barangay Mangingisda Senior Citizens' Association o Charity Women's Association o SAMAMUCO o LUZMA
Purok	-	-	-	-	o Subvillage (*purok*) council (7) - Puting Buhangin - Rolling Hills - Pantalang Bato - Magsasaka - Bagong Silang - Paglaun - Magtulungan	-	-

BOP	Bureau of Prisons	LUZMA	Luzviminda Mangingisda Ministerial Fellowship
CENRO	Community Environment and Natural Resources Office	MARO	Municipal Agrarian Reform Office
DAR	Department of Agrarian Reform	PARO	Provincial Agrarian Reform Office
DECS	Department of Education, Culture and Sports	PENRO	Provincial Environment and Natural Resources Office
DOJ	Department of Justice	SAMAMUCO	Samahan ng Mangingisda at Magsasaka Multipurpose Cooperative
PPF	Iwahig Prison and Penal Farm		

Table 21. Informal rights-and-rules system in the use of artisanal fishing gear in Manabore, Palawan, Philippines.

1. Fish corral
   a. Gillnetters must stay 10 m away from the entrance of fish corrals.
   b. The number of fish corrals inside Manabore Bay should be limited to 13 units.
   c. Permission must first be secured from existing owners of fish corrals before a new one is constructed.

2. Gillnet
   a. In case of gillnet crisscrossing, the fisher who owns the topmost net should be the first one to remove it. The fishers should work down to the bottom net.

3. Hook and line
   a. No rights and rules exist. The open-access system is practised.

4. Fish aggregating devices (FADs)
   a. Hook-and-line fishers can fish near FADs provided previous permission is given by the owners.

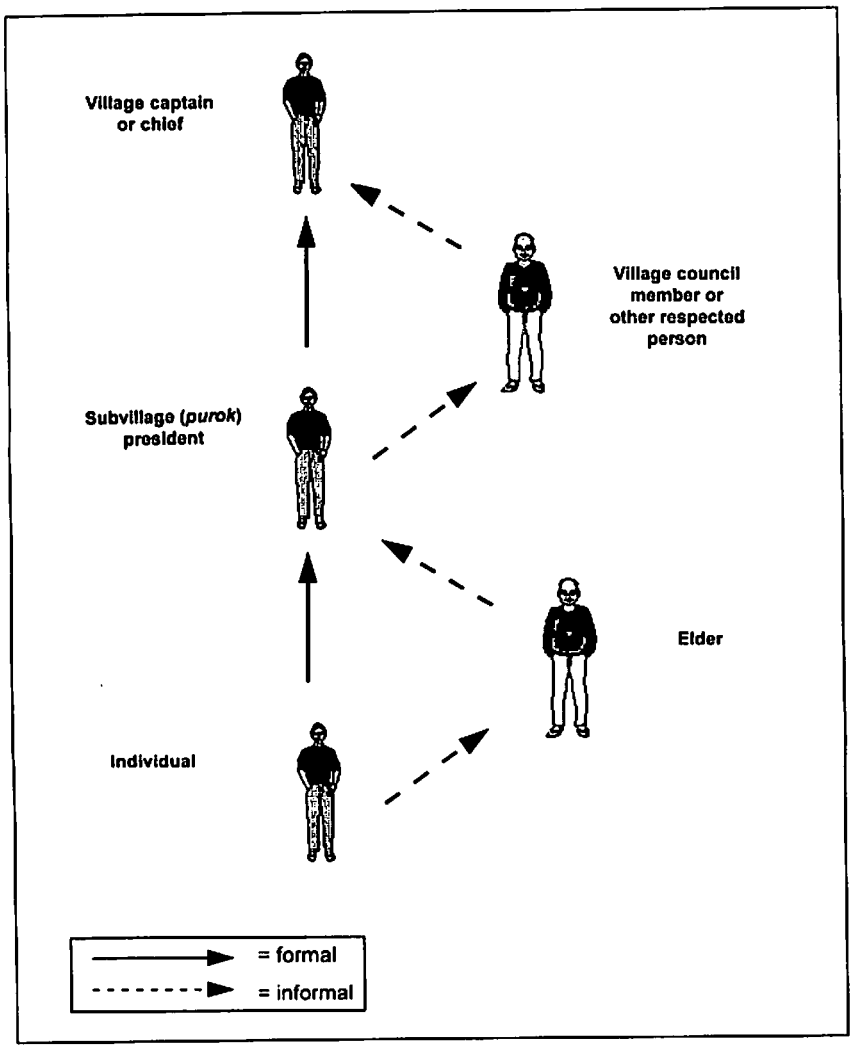

Fig. 10. Conflict-resolution mechanisms in Tarunayan, Palawan, Philippines (Sibal et al. 1995b)

Table 22. Guide questions for the exogenous attributes.

◻ Natural calamities
Do natural calamities, such as floods, droughts and earthquakes, occur in the area?
◻ Macroeconomic/political/sociocultural factors
Is there an ongoing war or an armed conflict?
Has there lately been dramatic changes in the political leadership or agenda?
Is there rapid growth in industrial or commercial development?
Are there new technological innovations related to harvesting and processing of fish and other marine products?
What are the impacts or implications of international agreements on fisheries (e.g., the General Agreement on Tariff and Trade on trading of fisheries products, disputes related to the Exclusive Economic Zone)?
Is the current inflation beneficial or harmful to the trading of fisheries products?

Step 4. Preliminary analysis of data

Preliminary analysis pertains to on-field data analysis. At the end of each field day, the team leader convenes the members. The chief objective is to evaluate the progress of field data collection activities and make the necessary adjustments in terms of data collection or other administrative arrangements. Team members report or present their findings orally, preferably with the aid of tables, figures and charts, either individually or as a subgroup.

During this session, the primary data collected shall be used to validate information generated during the secondary data analysis (Step 1) and reconnaissance survey (Step 2). For instance, the kinds of artisanal gear being used, identified from secondary literature (Step 1) and annotated from the field checklist (Step 2), shall be verified. The three sources of data sets assembled at this stage are: (1) secondary literature, (2) direct observation and (3) interview. In effect, the process is triangulation "whereby one checks the validity of data using at least three sources of information or methodologies" (Sajise et al. 1990).

This preliminary data analysis is a team exercise. In RAFMS, the data shall be analyzed mainly through combinations of IAD and AEA (Conway 1985, 1987). The IAD framework focuses on institutional arrangements, set of rights and rules by which a group of fishers and government organize resource management and use in collective action situations. This framework provides for a structured approach to documenting and evaluating the origin, current status, operation, impact and performance of fisheries management institutions.

With the IAD framework, the essential elements of the action situation are identified and examined. Information on key attributes (Table 1) that characterize the collective action situation is collected and organized. These can be used to describe and analyze other situations, conduct a systematic and comparative analysis of diverse situations and identify relationships

among variables. Although it can be used to investigate causal relationships, the IAD framework is not a causal input-output model. Rather, it is a method for arranging information logically, examining relationships among attributes, and considering or describing outcomes. It can also be applied to different situations at varying levels of complexity and completeness (Oakerson 1992).

In this framework, contextual variables characterizing resource and user attributes are linked with the local fisheries management's institutional arrangements. A causal relationship can be inferred among contextual variables, institutional arrangements (around which the analysis is based) and the resulting transactional (action) situations (Fig. 11).

The local institutional arrangements, structured by contextual variables, shape the incentives and disincentives users face as they coordinate, cooperate and contribute to resource management and use. The incentives, in turn, shape the patterns of interaction that result when resource users select and implement fishing strategies. These interactions give way to outcomes that, in turn, affect other outcomes. Time is a critical element. All the contextual variables can change through time. This change causes variations in institutional arrangements which influence incentives, patterns of interaction and outcomes.

The users of fisheries resources often develop rules to establish how rights are to be exercised, e.g., harvesting rules. Rules give substance to rights, structure a situation, define the behavior of group members and reduce conflict. They create different incentive structures that have bearing on cooperation or conflict among fishers. They structure human behavior into four categories: compulsory, permitted, authorized and nonauthorized (Thomson 1992). The types of rules that are devised will depend on the severity of the fishers' problem, the level of information they possess, the extent of the bundle of rights they hold, sociocultural traditions, the level of opportunistic behavior, and the ease with which actions can be monitored and enforced. Rules can provide stability of expectations, and efforts to change rules can rapidly reduce their stability (Ostrom 1990). The institutional arrangements fishers develop and use may not always be the same as formal laws and regulations. The fishers may develop arrangements that meet their needs but are not recognized and legitimized by government. These informal rights and rules may be equally or even more important and credible to local fishers than formal fisheries laws and regulations.

In analyzing institutional arrangements, the basic strategy is to dissect the parts of the action situation—contextual variables, incentives, pattern of interactions and outcomes; identify and collect data on the attributes and

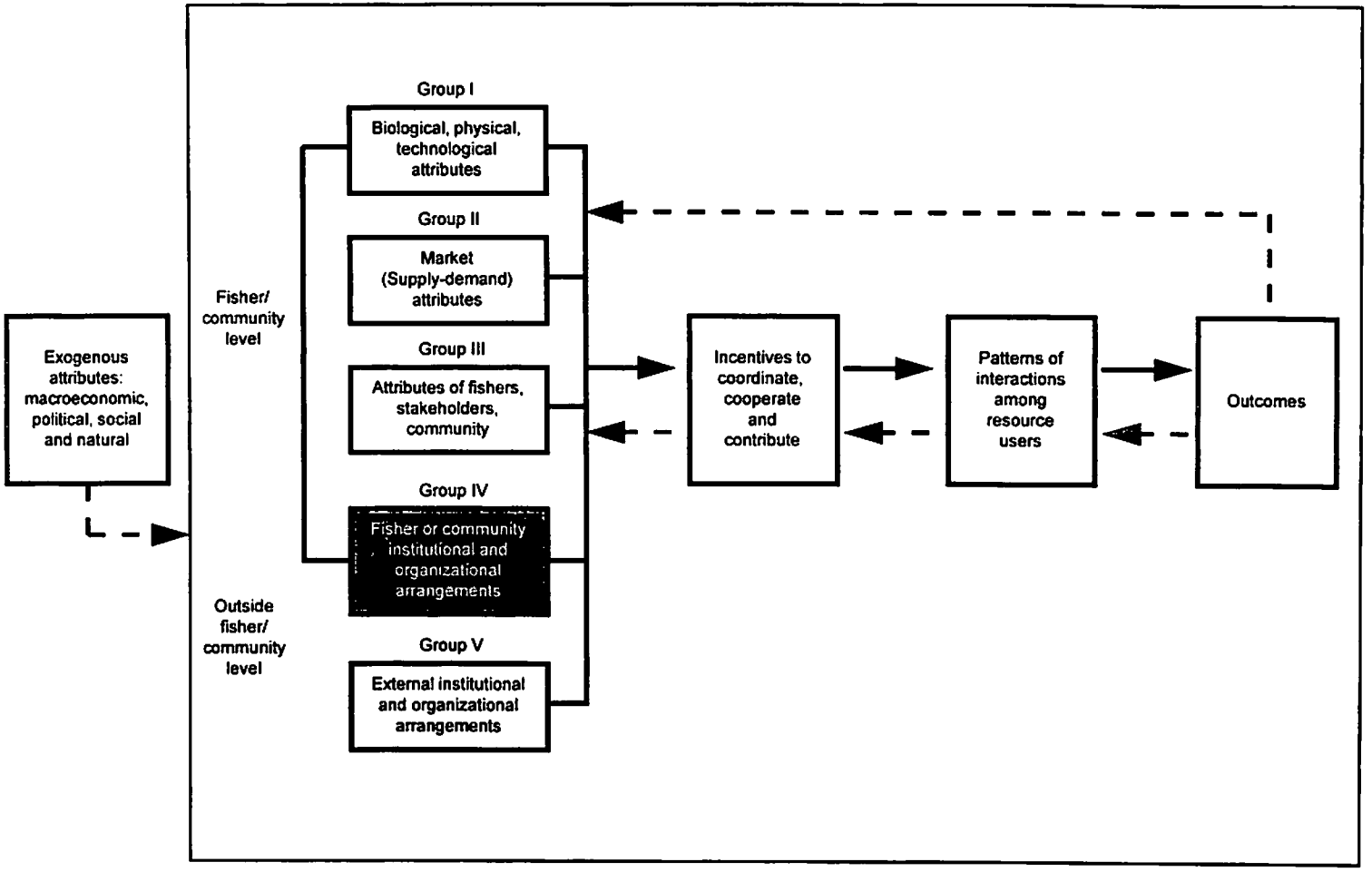

Fig. 11. A research framework for institutional analysis (adapted from Oakerson 1992).

conditions of each part; and examine the relationships between and among the attributes and conditions of each part. Relationships between and among parts are examined when the action situation is dissected. Each part of the framework has a causal or feedback relationship with other parts. Biophysical and technical attributes can have a direct effect on outcomes, for example, as high levels of fishing effort can lead to overexploitation, regardless of whether or not institutional arrangements are in place. Institutional arrangements, on the other hand, have an indirect effect on outcomes as they lead to changes in human behavior and choice, which affect interactions and outcomes (Oakerson 1992). Different combinations of these parts can be examined depending on the situation. These relationships can be analyzed forward or backward depending on the use of the framework, i.e., as an evaluative, diagnostic or design tool. Explicit and implicit assumptions about the relationships help structure and guide the analysis.

In the case of AEA, four patterns will be determined: space, time, flow and decision.

Patterns in space may be revealed through overlays and transects. *Overlay mapping* is done to discover patterns, problems or relationships of the area in terms of physical characteristics. It may be done manually or by using a computer. If you are doing manual overlay, maps of the same scale should be prepared (transparency for small maps and Mylar for big ones) either by reducing or enlarging them with a pantograph. Once the maps have the same scale, a light table is needed to lay the different thematic maps on top of each other. Areas with homogeneous characteristics will be delineated and this is called *land mapping unit*. The delineation is necessary in describing the area in terms of resources and other features. If you are using the geographic information system (GIS), maps need not be on the same scale because the digitizing step will take care of standardizing the scale. GIS refers to an automated computer-based information system that uses geographically referenced information for decisionmaking. It is an integrated information system management that has the capability to store, edit, update, process, analyze and display spatial data for a particular set of purposes. What makes GIS different from other information systems and computer-aided design (CAD) is its ability to treat data together with its geographic position, topological description and attributes. Spatial data are commonly referenced to a location on the earth's surface through a system of coordinates, i.e., the x and y values. These coordinates may be local, national or internationally accepted projections.

Patterns in time may be reported using timelines. As the term suggests, the reference is time or the temporal dimension. In the case of marine

fisheries, it is usually a graphical combination of climate, gear, species caught and relevant socioeconomic variables (see Table 11).

Flow patterns may be used to illustrate the flow of the major products harvested. They provide an idea on where the agricultural produce is going and by how much. Among the questions that need to be answered for fisheries are: What are the economically important species being harvested? Where do these products go or where are they marketed? Who benefits, and what is the relative distribution?

Decision patterns depict the options or alternative courses of actions that the fishers can undertake. Among the key questions that must be asked are: What makes fishers engage in fishing as their primary occupation? What are their alternative livelihood options if fishing is no longer economically viable? The factors identified may be used to formulate strategies as development entry points to attain sustainable management of coastal fisheries (Fig. 12).

Venn diagrams may be used to illustrate the interaction and relationship between groups, institutions and individuals in the community (Townsley 1993b). The size of the circles may indicate their relative size, degree of importance or overlap. Venn diagrams are particularly essential when doing institutional analysis (see Fig. 8).

The various management issues or problems identified may be presented in a matrix format. Table 23 is an array of problems, perceived solutions and proposed projects for Malampaya Sound in Palawan, Philippines. Solutions perceived by the community are expressed as broad action strategies. The aim of the matrix is to show possible solutions to various issues identified in a "problem-perceived solution-proposed project" format.

The proposed projects have research, development and policymaking implications. As described earlier, RAFMS aims to furnish the "entry points" for appropriate institutional, development and research interventions. In the case of fishery problems, the resource inventory of fishes and marine habitats is a research project. The acquisition of patrol boats is a development project. The communal fishing ground management, however, requires institutional strengthening.

Step 5. Initial organization of results

The results of RAFMS must be organized in "synoptic formats," such as tables, figures, charts and matrices. Constructed on a daily basis, these should be written prior to community validation to ensure that primary data

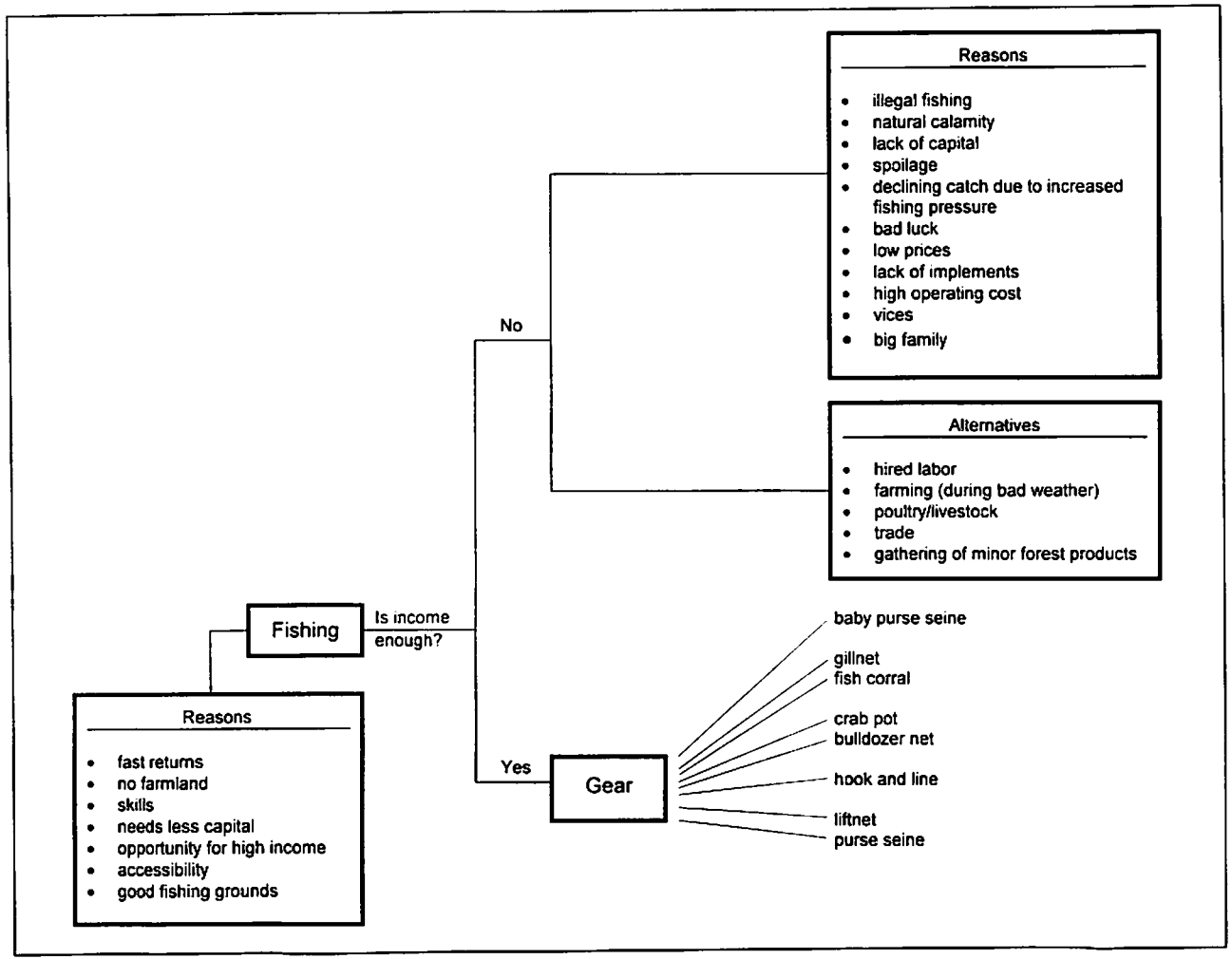

Fig. 12. Decision pattern for fishing as an occupation in Malampaya Sound, Palawan, Philippines (Pido et al. 1990).

Table 23. Matrix of agricultural and fisheries problems, perceived solutions and proposed projects for Malampaya Sound, Palawan, Philippines (Pido et al. 1990).

Problems	Perceived solutions	Proposed projects
Agricultural problems		
Saltwater intrusion	- Building of dikes	+ Feasibility study on dike construction
	- Conversion of ricelands into fishponds/livestock areas	+ Feasibility study on the economics of converting ricelands into fishponds/livestock areas
	- Introduction of saltwater-resistant rice varieties	+ Pilot-testing of varieties
Forest destruction	- Forest protection	+ Upland stabilization project
		+ Hillside farming
		+ Integrated social forestry (ISF)
Vulnerability of soil to erosion	- Introduction of appropriate farming	+ Application of sloping agriculture land technology
		+ ISF
Low soil fertility	- Enhancement of soil fertility	+ Introduction of organic farming
		+ Provision of fertilizer subsidy
Flooding	- Forest protection	+ Riverbank protection
		+ Reforestation
Tenurial status	- Land titling	+ Land survey and titling
		+ Land stewardship contract
Pests/diseases	- Introduction of appropriate agricultural technology	+ Integrated pest management
Fishery problems		
Declining fishery production	- Conservation of resource base	+ Resource inventory of fishes and marine habitats
		+ Application of new fishing technologies for mariculture/ aquaculture
Illegal fishing	- Review and enforcement of existing fishery laws	+ Acquisition of patrol boats
		+ Environmental education
		+ Communal fishing ground management
Freshwater flooding/ siltation	- Forest protection	+ Reforestation
		+ ISF
Deposition of agricultural effluents	- Monitoring of chemical	+ Monitoring/evaluation of key chemical parameters in selected sites

or field notes do not get lost, and that relevant field insights are still fresh in the minds of the researchers.

The most important thing is to come up with a written outline of the items to be prepared. It shall serve as a guide for draft report writing and during community validation. As a rule, each diagram, figure, chart or matrix should be accompanied by bullet statements or notes. This activity may have to be parceled out among the team members.

At this stage, the summaries and their accompanying bullet statements are drafted mainly from the twin perspectives of RAFMS practitioners and local researchers. The viewpoint of the fishing community is yet to be integrated.

Step 6. Community validation

The results of RAFMS (from secondary data analysis through field data gathering) will have to be validated with the members of the target community to come up with a synthesis or a "triangulated" perspective, i.e., the RAFMS practitioners, the local community and the local researchers as earlier depicted in (Fig. 2). It must be stressed to the members of the community that they are co-owners of the results of the study, which they can use for local-level planning and project development. The co-ownership of the results becomes an incentive for them to participate in the process. The community's verification of the results is an essential condition of the final report writing. The elements to be validated include facts and interpretation.

The presentation of the results should be made simple and translated into layman's terms, whenever possible. Although achieving a consensus is ideal, the more important thing is for the community members to be more aware of their problems and opportunities as they relate to the management of their fisheries resources. Consensus may not be desirable or even realistic at the whole community level. Among subgroups of the community, it may be possible to gain consensus. It may be equally important to document differences among groups. At this juncture, these members can also fill in some of the data gaps and give recommendations on the issues and problems in their community.

There are two ways of validating the results. First, invite only the key leaders and selected respondents of the community as was done in the conduct of RAFMS in the village of Nolloth, Saparua Island, Indonesia. Second, invite the whole community to one large forum as was done during the conduct of RAFMS in several coastal villages in the Philippines. The choice of community validation option depends on the political and social climate of the community. Community validation may also follow Table 7's seven steps to conducting FGDs.

Step 7. Final report writing

The final RRA report should be written immediately after the validation. The report should incorporate the necessary corrections and recommendations of the target community. Table 24 presents a suggested contents page for the RAFMS report.

The research team should promptly furnish copies of the report to the community, other relevant local government agencies or users. The report

Table 24. Suggested contents page of a RAFMS report.

may be transformed into other documents, such as policy papers, background papers for project development or references in preparing project proposals.

Afterword

The RAFMS is among the pioneering attempts to develop a rapid appraisal guide that is specific to fisheries. Among its unique features is the adoption of IAD as the main analytical framework. The other innovations of RAFMS are the: (1) active roles of the resident researchers and members of the local community; (2) attempts at generating quantitative data; and (3) use of quick biological assessment techniques.

The RAFMS has undergone field testings at various coastal sites in the Philippines and Indonesia. Many of the cited tables, figures and charts were extracted from these exercises. Nonetheless, there is still room for refinement or simplification. The users are encouraged to write the authors about their RAFMS experiences, both positive and negative. These would be extremely helpful in revising future editions.

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Appendices

Matrix 1. Biological, physical and technical attributes to be examined and the tools/techniques for data collection and validation.

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
Physical attributes						
□ resource use	• terrestrial use	Δ hectare; percentage by classification into natural vegetation; built-up areas; agricultural; other land uses	- agriculture/fisheries agency - environment/natural resources agency - research/academic institutions	• natural vegetation types • types of built-up areas • agricultural crops	- resource mapping	- workshop
	• marine use	Δ hectare; percentage by classification		• fishing spots/grounds • tourism/outdoor recreation sites		
□ climatic data	• monsoon	Δ annual/seasonal pattern	- weather bureau	• wind direction		
	• rainfall	Δ millimeters/year		• humidity		
□ physiography	• slope classes	Δ percentage (0-8%; 8-18%, 18-30%; >30%)	- agriculture/fisheries agency - environment/natural resources agency	• terrain, steepness		
	• elevation	Δ height in meters (0-5, 5-10, 10-15, 15-100)	- mapping agency			
	• soil	Δ class/type (sandy, clayey, loamy, silty)		• texture		
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 1. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ physical oceanography	• current	Δ circulation patterns	- agriculture/fisheries agency		- ocular inspection	
	• tides	Δ tidal patterns	- research/academic institutions	• tidal height	- mapping	
	• bathymetry	Δ depth in fathoms/ meters		• depth		
	• substrate	Δ hectare; percentage by classification	- marine office	• bottom characteristics (e.g., sand, mud, corals)		
□ water quality	• transparency	Δ meters	- environment/natural resources agency		- ocular inspection	- workshop
	• level of pollution	Δ types of waste materials	- pollution control office	• sewage disposal system • agricultural fertilizers/ pesticides • factories/industrial establishments		
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 1. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
Biological and habitat attributes						
☐ seaweeds/ seagrasses	• area/location	Δ hectare	- agriculture/fisheries agency - environment/natural resources agency - research/academic institutions	• species composition • presence of seagrass/ algal beds • harvested species	- resource mapping and interviews - transect-quadrat technique/manta tow survey	- workshop
	• species com-position/density	Δ percentage abundance Δ percentage cover				
	• harvested/utilized species	Δ amount (kilogram)				
☐ mangroves	• area/location	Δ hectare			- resource mapping	
	• species, composition/ density	Δ percentage, abundance		• species composition	- transect-plot method	
	• conversion into other uses	Δ hectare		• fishponds; charcoal chimneys; cut poles; cutting activities		
☐ coral reefs	• area/location	Δ hectare			- resource mapping	
	• living coral condition	Δ percentage cover		• benthic life forms (e.g., live corals, dead corals)	- manta tow survey/ benthic life form survey	
	• reef fish abundance	Δ fish count/biomass Δ reef fish percentage		• species composition and abundance	- fish visual census	
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 1. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
Technical attributes of fisheries						
□ gear/fishing technology	• artisanal gear	Δ types and number		• gear types used • boats (motorized or nonmotorized)	- interviews	
	• commercial gear	Δ types and number				
	• level of fishing technology	Δ number or percentage				
	• seasonality of fishing operations	Δ seasonality (months)	- agriculture/fisheries agency			- workshop
	• destructive fishing methods	Δ types	- research/academic institutions	• presence of dynamite blasts • blasted reef	- site inspection	
□ species harvested	• major types of species	Δ relative abundance		• catch composition	- interviews	
	• changes in species composition of catch					
	• changes in size of fish caught					
	• catch rate	Δ kilogram/trip		• fish catch		
	• changes in catch rate					
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 1. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ level of exploitation	• ecosystem/ recruitment overfishing • growth over-fishing	Δ relative abundance of fish catch Δ species composition Δ size of fish	- agriculture/fisheries agency - research/academic institutions	• change in species composition • types of fish caught • landing of small-size fish • use of small-meshed size gear	- interviews - market/fish landing surveys for growth overfishing	- workshop
	• excess fishing effort	Δ fishing effort expressed in the number of fishers/ coastline length and number of boats/ coastline length Δ total catch Δ exploitation ratio		• number of fishers • number of boats • catch		
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 2. Market attributes to be examined and the tools/techniques for data collection and validation.

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ supply of marine products	• type-quantity • availability/ seasonality	Δ species Δ month/seasonal occurrence	- agriculture/fisheries agency - trade/industry office	• fish landed in ports • fish traded in the market • other fish and fish-based products in the market	- ocular inspection - SSI - FGD - market visit - walk-through/ boat ride	- workshop
□ pricing scheme/ system	• wholesale, retail values • information access/ availability • criteria	Δ pesos/kilogram or tonne Δ degree of dissemination Δ average cost Δ markup (marketing) Δ international price				
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 2. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ market functions	• processing	Δ types of products		• number of fish-based products	- ocular inspection	
	• packaging	Δ types of materials		• variety of materials for packaging	- SSI - market visit	
	• grading	Δ criteria/standards		• fish classes/grades		
	• transporting	Δ mode of transport for fish		• sources of fish sold		
	• storage	Δ facilities for storage				
	• distribution scheme	Δ distribution route		• dates of fish catch/ landings		- workshop
□ market rules and licenses	• fees	Δ types Δ values/amount	- agriculture/fisheries agency - trade/industry office	• payment	- SSI - market visit	
	• restrictions	Δ type of quality control (e.g., cyanide testing)		• trading practices		
	• entry/exit conditions	Δ barriers		• average capital investment		
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 2. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ stability of demand	• population change • population growth • changes in tastes and preferences • price changes of other substitute commodities	Δ migration (in-out) Δ population pattern Δ preference for substitute Δ rate of substitution	- local government records - census office	• average family size	- SSI - market visit	
□ market structure	• buyer concentration • seller concentration • channels	Δ population economic units Δ ratio of primary buyers to fishers Δ number of primary buyers per total number of landings Δ economic units Δ number of intermediaries	- agriculture/fisheries agency - trade/industry office	• number of households • average family size • number of stalls • number of fishers • number of middlemen • type of middlemen	- ocular inspection - SSI - FGD - market visit - diagramming	- workshop
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 2. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ market structure	• location	Δ geographic scale and position	- agriculture/fisheries agency - trade/industry office	• distance from residence/fishing grounds	- mapping	- workshop
	• degree of competition among sellers/ buyers	Δ residence or "home base" of primary buyers		• geographic location/ concentrations		
		Δ credit relationships between primary buyers and fishers		• ratio of fishers to traders		
		Δ type of buyers (e.g., number of and percentage of direct consumers and traders)		• defined marketing tie-ups		
		Δ type of sellers (e.g., number and percentage of direct sellers and traders)				
□ market orientation	• type of market	Δ subsistence market Δ local Δ regional Δ national Δ international		• number of middlemen • mode of transport	- interview	
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

Matrix 3. Fisher, stakeholder and community attributes to be examined and the tools/techniques for data collection and validation.

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ demography	• age	Δ years		• physical appearance		
	• experience in fishing	Δ years				
	• education	Δ degree (levels)				
	• gender relations	Δ equality of opportunities/control and access of resources between men and women	- agriculture/fisheries agency			
	• length of residence	Δ number of years	- local government records	• training levels		
	• training	Δ number of years Δ types				
	• family size	Δ number	- census office	• number of children/ household	- ocular inspection	
	• nutrition/health status	Δ malnutrition rate Δ mortality rate; life expectancy	- health department		- SSI - FGD - market visit	- workshop
	• religion	Δ form Δ number of religious communities and organizations		• types of existing temples/churches	- walk-through/ boat ride	
	• ethnicity	Δ tribal group/ethno-linguistic group		• dialect spoken		
	• population	Δ density (man-land ratio) Δ growth rate Δ distribution Δ number of fishers Δ number of households		• household size • proportion of adults per family		
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 3. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ tenurial status	• land claim	Δ location of residence Δ proprietary rights (owner-operated; tenant-operated; leased; stewardship contract)	- agriculture/ fisheries agency - local government records - taxation/internal revenue bureau	• physical boundaries	- ocular inspection - SSI - FGD - walk-through/ boat ride	- workshop
	• fishery claim	Δ location of claim Δ proprietary right				
□ economic status	• wealth ranking	Δ economic class (upper class; middle class; lower class)		• assets owned • type of house		
	• assets: fishing	Δ boats (number and specifications) Δ engine (number and specifications) Δ gear (number and specifications)	- agriculture/fisheries agency - taxation/internal revenue bureau			
	• assets: others	Δ house appliances Δ vehicles Δ furniture and fixtures				
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 3. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ culture	• special occasions • customs/ traditions • recreation	Δ dates Δ types Δ years Δ types Δ types	- tourism bureau - local government records	• festivals/feasts • beliefs/taboos about fishing • sports and games	- ocular inspection - SSI - FGD - market visit	- workshop
□ livelihood (occupational structure)	• occupation • income level • duration/ frequency of livelihood activities	Δ types of employment Δ values and amounts Δ monthly/weekly/daily	- taxation/internal revenue bureau - trade/industry office	• practices/prevailing activities		
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 3. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ attitudes and outlook of fishers	• risk and uncertainty	Δ risk behavior (risk averse; risk neutral; risk loving)	- research/academic institutions - local government records	• general physical landscape and way of life • existence of POs/ NGOs • knowledge about past heritage • extent of resource exploitation • flow of goods and services	- ocular inspection - SSI - FGD - walk-through/ boat ride	- workshop
	• social change	Δ conservative/ traditional vs. adaptive				
	• future community development prospects	Δ positive vs. negative				
	• values for collective action	Δ strong, weak, indifferent				
	• intergenerational information transfer	Δ strong, weak, nonexistent or not in use				
	• concerns for resource sustainability	Δ strong, weak, indifferent				
	• integration into bigger economy/ political system	Δ strong, weak, indifferent				
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 3. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ resource use/ harvesting conflicts	• resource use conflicts	Δ types	- agriculture/fisheries agency - research/academic institutions	• fishing spots/areas per gear type	- resource mapping	
□ ecological knowledge	• awareness/ overall concern about fishing problems	Δ level of awareness		• fishing conservation billboards/slogans		- workshop
□ community	• settlement • services	Δ patterns Δ health Δ infrastructure Δ communications Δ market	- local government records	• types of houses • existing facilities	- interviews	
	• state governance	Δ structure Δ linkages				
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

Matrix 4. Local or community institutional arrangement attributes to be examined and the tools/techniques for data collection and validation.

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ individual organizations	• administrative level	Δ formal/informal Δ government/NGOs/ POs/private/others	- organization records - research/academic institution - local government records	• organization signs • fisheries/CRM-related activities	- interview	- workshop
	• mandate	Δ objectives/mission statements Δ plans Δ spatial jurisdiction Δ legal authority Δ functions/responsibilities Δ services offered				
	• organizational structure	Δ organogram/functional chart Δ leadership				
	• period of existence	Δ number of years/months Δ historical development Δ stability				
	• membership	Δ number (actual and trend) Δ type/graduations Δ eligibility Δ requirements Δ rights				
	• resources	Δ technical/technological Δ manpower Δ financial				
	• relationship/ affiliation with other organizations/ institutions	Δ horizontal linkages Δ vertical linkages				
	• awareness of resource condition	Δ perceptions Δ legitimacy Δ respectability Δ traditions Δ support				
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 4. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ local institutional arrangements	• property rights	Δ access Δ withdrawal Δ management Δ exclusion Δ transfer	- research/academic institution - local government records	• man-made boundaries	- interview	- workshop
	• rules: operational	Δ boundary Δ allocation Δ authority Δ scope Δ information Δ aggregation Δ penalty Δ payoff Δ input Δ level of rule, compliance and violation Δ overall support Δ procedures for monitoring of behavior Δ procedures to sanction nonconformist or opportunistic behavior Δ role changes over time Δ perceptions of benefits and costs of rules Δ degree of equity Δ availability of information on condition of resources, their benefits and costs				
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 4. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
	• regulatory mechanisms	Δ regulations (quotas, gear and size restrictions, closed season, closed area) Δ incentives (taxation, licensing, individual transferable quota)				
	• collective choice rules	Δ adjudication, enforcement, formulation and modification of operational rules Δ detection and sanction against rule violation Δ accountability	- research/academic institution - local government records		- interview	- workshop
	• rulemaking body	Δ leadership Δ membership Δ representation				
	• boundaries	Δ political Δ gear type Δ traditional/customary Δ fishing spot Δ organization Δ physical/natural Δ size and clarity of boundary Δ change over time				
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 5. External institutional arrangement attributes to be examined and the tools/techniques for data collection and validation.

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
O individual organizations	• political/ administrative level	Δ international, regional/ bilateral, national/ central, regional, province/state, district/ municipal/town	- organization records - national government records	• organization signs • fisheries/CRM-related activities	- interviews	- workshop
	• mandate	Δ objectives/mission statements Δ plans Δ spatial jurisdiction Δ legal authority Δ functions/ responsibilities Δ services offered				
	• organizational structure	Δ organogram/functional flowchart				
	• period of existence	Δ number of years/ months Δ historical development Δ stability				
	• membership	Δ number (actual and trend) Δ type/graduations Δ eligibility Δ requirements Δ rights				
	• resources	Δ technical/technological Δ manpower Δ financial				
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 5. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
	• relationship/ affiliation with other organi-zations/ insti-tutions	Δ horizontal linkages Δ vertical linkages Δ shared responsibility				
	• awareness of resource condition	Δ perceptions Δ legitimacy Δ respectability Δ traditions Δ support				
D institutional arrangements	• formal fisheries and CRM policies/ programs	Δ responsible administrative agency Δ objective Δ scope of application Δ provisions Δ responsibilities Δ regulations Δ powers, duties Δ functions	- national government records - research/academic institutions		- interviews	- workshop
	• formal development and public administration legislation/ regulations affecting fisheries and CRM					
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

continued...

Matrix 5. (continued)

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
	• policies programs legislation at national, regional, municipal/ district levels in support of local CBCRM	Δ right to organize Δ right to make management rules Δ amount of authority and responsibility granted Δ degree of generality and flexibility Δ exclusivity, certainty, sustainability of fishing rights Δ coordination for activities	- national government records - research/academic institutions		- interviews	- workshop
	• nested layers of organizational and institutional arrangements (formal and informal)	Δ linkages Δ overlap Δ coordination Δ power structure relationship				
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

Matrix 6. Exogenous attributes to be examined and the tools/techniques for data collection and validation.

Attributes	Indicators	Unit/scale of measurement	Sources of secondary data	Field observations	Field data collection techniques	Community validation techniques
□ natural calamities	• typhoon • floods • droughts • seismic waves • earthquakes			• destroyed crops and properties • waterlogging • barren soils • destroyed properties • gullies/soil erosion		
□ macroeconomic/ political/ sociocultural	• war • insurgency • political changes/ agendas • development: industrial, commercial, residential • technology innovation • factor availability • communication/ transportation/ infrastructure • social • cultural • inflation/economic growth/commodification • international agreements (boundaries, resources, trade)	Δ type, number and frequency	- national government records - research/academic institutions	• military checkpoints/ operations • new fishing gear	- interviews	- workshop
Research/survey steps			1 Secondary data analysis	2 Reconnaissance survey	3 Field data gathering	4 Community validation

A handbook for rapid appraisal of fisheries management systems (version 1). M.D. Pido, R.S. Pomeroy, M.B. Carlos and L.R. Garces. 1996. Reprinted 1997. ICLARM Educ. Ser. 16, 85 p.

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