A Rapid Appraisal Approach to Evaluation of Community-Level Fisheries Management Systems: Framework and Field Application at Selected Coastal Fishing Villages in the Philippines and Indonesia

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Among the recent attempts to use the Rapid Rural Appraisal (RRA) techniques traditionally employed in agriculture and other terrestrial resource systems is in the evaluation of the coastal and marine fisheries' environments. One of these approaches is called Rapid Appraisal of Fisheries Management Systems (RAFMS) which was developed at the International Center for Living Aquatic Resources Management (ICLARM). The RAFMS is a diagnostic tool designed to quickly document and evaluate the operating fisheries management systems both formal and informal at the community level. As a critical first step in diagnosing the existing types of community-level fisheries management systems, the RAFMS shall provide general information on their essential features, operations and impacts. Given limited funds, time, and research personnel, it is not always possible to conduct in-depth studies of community-based fisheries resource management systems at a specific site or across a country. While the RAFMS is no substitute for more detailed studies, it can provide cost-effective information and a research and/or policy direction for further study. This paper first describes the framework of the RAFMS. Then, it provides examples of output from RAFMS generated through field applications in the fishing villages of Ulugan Bay and Binunsalian Bay in Palawan Island, Philippines and Nolloth Village in Saparua Island, Indonesia. The RAFMS was found useful in generating information for use of the outside experts, the local researchers and the residents of the fishing communities. The outputs from the field application in the Philippines and Indonesia are now being used for various planning, project development and research purposes.

Keywords community based management, fisheries management, rapid rural appraisal

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Since Rapid Rural Appraisal (RRA) (Chambers 1980, 1992) was formally introduced during a 1978 workshop of rural development practitioners at the University of Sussex, UK, it has been used to denote a set of techniques or procedures for the quick study of land based resource systems and/or activities such as agriculture, health and forestry. RRA encompasses a wide range of approaches and shares strong conceptual and methodological similarities with research techniques such as *Sondeo* (Hildebrand 1982); *informal agricultural survey* (Rhoades 1982), *exploratory survey* (Collinson 1981), *agroecosystem analysis* (AEA) (Conway 1985, 1987) and *Participatory Rural Appraisal* (PRA) (Mascarenhas et al. 1991). The RRA-related approaches specific to the aquatic environment, particularly to fisheries, are just emerging. In general, most of the techniques and data-gathering instruments for RRA in agricultural/terrestrial contexts are well established but this level of sophistication is yet to be achieved for fisheries and coastal areas. The complex nature of coastal ecosystems, both natural and human, requires the development of new RRA methods for primary data collection and ecosystem analysis.

Many of the RRA experiences and concepts dealing with coastal areas and fisheries are found within the Asian region. Pido and Chua (1992) developed the notion of *rapid appraisal of coastal environments* (RACE) for coastal zone management. Some RRA methods for coastal and fishing communities have been developed by Townsley (1993a) and McCracken (1990) in India, Howes (1987) for coastal wetlands in Malaysia, and Fox (1986) for Philippine coastal fisheries. The Philippines has probably the richest experiences in coastal RRA, although these are mostly found in gray literature. RRA or AEA exercises have been conducted in varying forms in coastal areas such as Malalison Island, Antique (Bimbao and Dalsgaard 1991; Siar 1992); Natipuan, Batangas (Lamug 1994) and Malampaya Sound, Palawan (Pido et al. 1990, Pido 1995).

The purposes of this paper are four-fold: (1) to highlight the need to understand the informal management systems that often coexist with a formal government management system in many fishing communities in the tropical developing world; (2) to argue that a rapid appraisal approach can be a useful critical first step in evaluating the existing types of community-level fisheries management systems to provide general information on their essential features, operations and impacts; (3) to introduce the Rapid Appraisal of Fisheries Management Systems (RAFMS) developed at the International Center for Living Aquatic Resources Management (ICLARM) as composite diagnostic tool designed to quickly document and evaluate fisheries management systems at the community level; and (4) to discuss the results of the RAFMS' field applications in two Asian countries.

This paper begins with the rationale and objectives of RAFMS. The technical elements of the RAFMS handbook are then elaborated. This is followed by a discussion of the field applications of RAFMS in fishing villages in Palawan, Philippines and Saparua Island, Indonesia. The paper concludes with a synthesis of the lessons learned and the implications of the use of RAFMS for research and management.

Rationale for a Rapid Appraisal Approach

As fisheries were developed over the last four decades, many countries increased the role of the government in managing the fisheries. The role of local level control through traditional and informal management and custom has correspondingly diminished. By appropriating this control over coastal fisheries management, the national government has underestimated the capacities of coastal communities to manage local fisheries resource systems to meet their needs. In many instances, the national government has overestimated its ability to manage these resources. Without denying that the traditional

and informal systems of fisheries management can often be inequitable and ineffective, state interventions that have chosen to ignore them have seldom fared better.

The growing realization of the need for a stronger community role in resource management can be seen in a wide range of programs and projects worldwide. Both increased local participation and institutional restructuring have given greater control of resource management to the community and resource users. There is increased recognition of the importance of traditional and informal system of fisheries management. These informal management systems, devised and implemented by a community of resource users which often coexist with a formal government management system, are not easily observed or understood by outsiders to the community. [In this context, community-level management operates at the village level; it may geographically imply a cluster of villages or political units below the district or municipal level.] Many of these community resource management systems have achieved ecological sustainability, social equity and economic efficiency. Some local-level systems are new, while others are time-tested. Some systems have complex rights and rules while others are simple and easily enforceable. An example of a long-enduring informal fisheries management system in South East Asia is the *sasi* (closed) system in Maluku province of Indonesia (Bailey and Zerner 1992, Nikijuluw 1994).

Information on local community-based marine resource management systems exists in many countries. This information, however, is often anecdotal or written in narrative format. As such, they lack the specifics needed about the systems' institutional and organizational characteristics to provide a useful basis on which to analyze its operations. If effective fisheries management efforts are to succeed, it is essential that resource managers and policymakers have up-to-date information about these community-based management systems and their socioeconomic, political and ecological contexts. Studies need to be current, detailed and location-specific to provide a comprehensive knowledge base on the range of types, functions and status of fisheries management systems in a country. There are compelling arguments to strengthen local management and responsibility because very few governments could manage their fishery resources effectively without the cooperation of the fishing community.

With limited funds, time, and research personnel, it is not always possible to conduct detailed, in-depth studies of community-based fisheries resource management systems at a specific site or across a country. A rapid appraisal methodology can be useful as a critical first step in documenting the existence of community management systems and in providing general information on their operation and impacts. The rapid appraisal method is no substitute for more detailed studies, but it can provide cost-effective information and a direction for further action. Hence, the RAFMS (see Pido et al. 1996) has been developed for this purpose.

The RAFMS is primarily a topical RRA because it aims at documenting and evaluating the existing informal (including traditional) fisheries management systems in a coastal community, and its relationship with the more formal fisheries management systems administered by the state authorities. As such, the RAFMS has been designed to identify the existence of informal fisheries' management systems, or to document conditions which may afford opportunity for their creation. The RAFMS is partly a participatory tool because the involvement of the local researchers and members of the fishing community is imperative. The mode of participation, however, is consultative (Biggs 1989) where the fishers interact in a two-way communication process during the conduct of research. The RAFMS is a research tool designed to extract, in a relatively short time, pertinent information from the fishers and other coastal stakeholders in a consultative mode; it is not necessarily a tool to empower the community. The intended audience of the RAFMS are fisheries managers and development workers who need to

gain an understanding of the fisheries management system at the community level, both informal and formal, in order to strengthen, legitimize, revise, and/or transfer the system

The RAFMS is collectively undertaken by three groups: (1) RAFMS practitioners, (2) local researchers, and (3) the fishing community (Figure 1). The RAFMS practitioners lead the exercise and are experts on RRA/PRA methods. They can be either local or outside scientists, academicians, or development specialists. The local researchers are technicians/specialists based in or near the study area. The fishing community includes fishers or other coastal stakeholders engaged in various fishing activities. Hence, the results of the RAFMS exercise are a synthesis or convergence of three viewpoints. It must be stressed that the conduct of RAFMS does not solely rely on the existence of outside experts. The long-term end is to increase the technical competence of local researchers in order for them to undertake RAFMS on their own.

Although RAFMS may be used to evaluate any fisheries-based setting, it has several limitations. First, the variables or factors to be examined are concentrated on fisheries. Although the evaluation is nested within broader coastal resources management, the analysis deals only on a limited basis with the other dominant sectors of the coastal zone, such as industry, tourism and agriculture. Second, it is suited to application at the village or community level rather than a larger geographic or political area. Third, the success of RAFMS depends on the experience and knowledge of the researchers undertaking it and the active participation of the fishing community.

Rapid Appraisal of Fisheries Management Systems Framework

The four components of the RAFMS' framework are: (1) the conceptual base, (2) the contextual variables and their attributes; (3) the research or survey steps; and (4) the expected output. These are given here in synoptic forms. The details are embodied in the recently-released RAFMS' handbook (Pido et al. 1996).

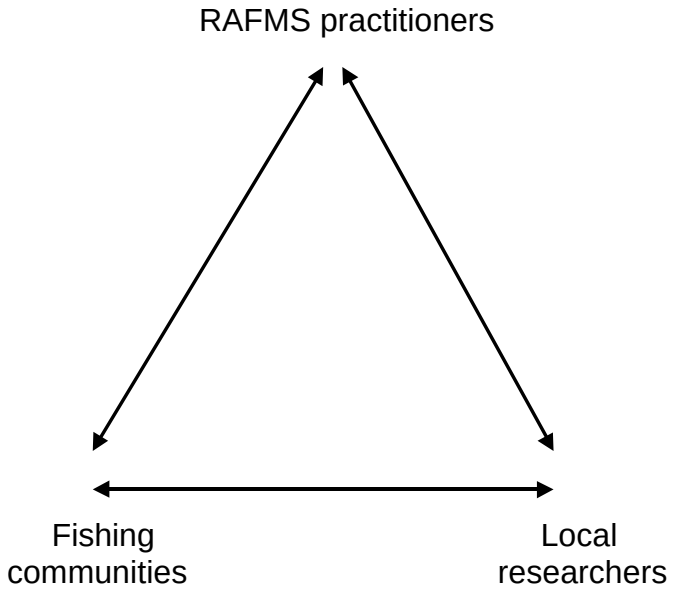

Figure 1. Relationship among RAFMS practitioners, local researchers and fishing communities.

Component I - Conceptual Base

RAFMS uses as its main conceptual base a method known as institutional analysis and development (IAD). In conducting studies on fisheries management systems, we are essentially interested in understanding how rules affect the behavior and outcomes achieved by fishers using fishery resources. Institutional analysis focuses on institutional arrangements, the set of rights and rules by which a group of fishers and the government organize resource governance, management and use in collective action situations. The institutional analysis framework was developed by researchers at the Workshop in Political Theory and Policy Analysis at Indiana University, USA. It uses concepts from economics, political science, anthropology, biology and law, and relies mainly on methods described by Kiser and Ostrom (1982), Ostrom (1986 and 1990) and Oakerson (1992).

The institutional analysis research framework provides for a structured approach to document and evaluate the origin, current status, operation, impact and performance of fisheries management institutions. Figure 2 presents the basic framework with the attributes divided into six groups as they relate to the RAFMS. Oakerson (1992) has stated that such a "framework must be specific enough to offer guidance in the field, yet general enough to permit application to widely variable situations." It allows for the essential elements of the action situation to be identified and examined. The framework is a method for logically arranging information on key attributes which characterize collective action situations at multiple levels, examining relationships among attributes, and considering or describing outcomes. The framework can be used in different situations at varying levels of complexity and completeness as required (Oakerson 1992).

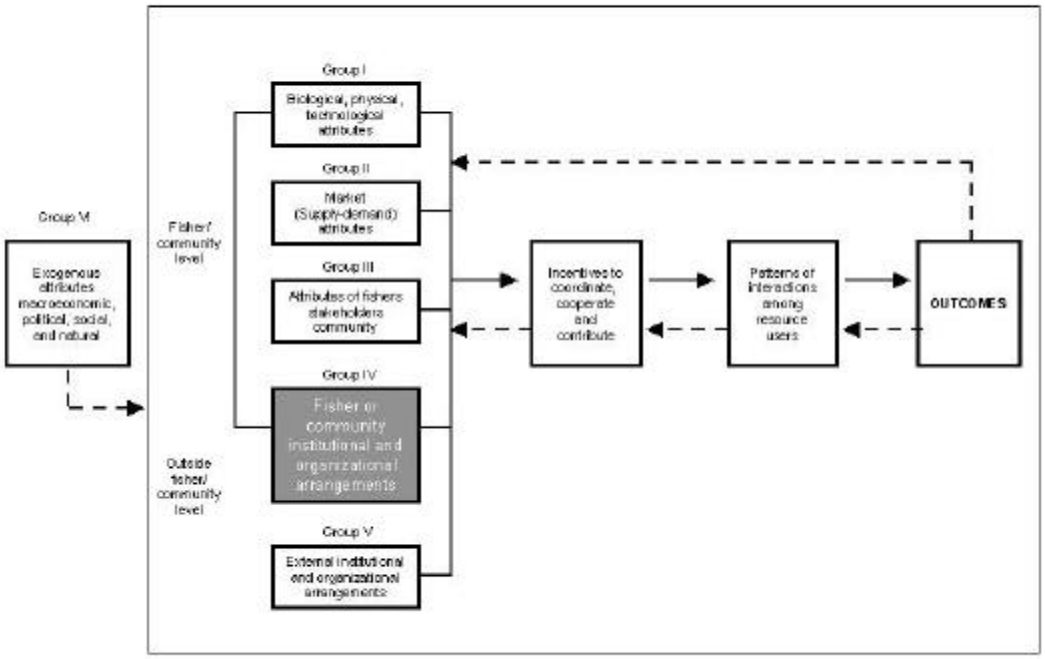

Figure 2. A research framework for institutional analysis. (Adapted from Oakerson, 1992)

The research framework links contextual variables characterizing key attributes of the resource and resource user, with the local fisheries management institutional arrangements (rights and rules). The contextual variables are referred to as a set since each is composed of a number of attributes. A causal relationship exists among and between the contextual variables, the institutional arrangements (the focus of the analysis) and the resulting transactional (action) situations. The local institutional arrangements, structured by the contextual variables, affect the actions of the resource users by shaping the incentives and disincentives they face to coordinate and cooperate in resource governance, management and use. These incentives, in turn, shape the patterns of interaction that result when resource users select and implement fishing strategies; these interactions result in certain outcomes. These outcomes may, in turn, affect other outcomes. Time is a critical element. All the contextual variables can change through time. This can cause change in institutional arrangements which, in turn, affects incentives, patterns of interaction and outcomes. Based on the contextual variables, one tries to explain or predict the patterns of interactions and outcomes that are most likely to occur for an action situation, given the incentive structure. These explanations and predictions for what is observed are then verified in an empirical setting. The performance of the outcomes are then evaluated using established criteria (Ostrom 1990, Tang 1992, Ostrom, Schroeder and Wynne 1993).

In analyzing institutional arrangements, the basic strategy is to separate and dissect the parts of the action situation - contextual variables, incentives, patterns of interactions and outcomes; identify and collect data on the attributes of each part; and examine the relationships between and among the attributes of each part. Each part of the framework has a causal relationship with other parts, some stronger and some weaker depending upon the situation. These relationships can be analyzed forward or backward depending upon if one is using the framework as an evaluative, diagnostic or design tool (Oakerson 1992). The RAFMS uses institutional analysis primarily as a diagnostic tool, and partly as an evaluative tool. As such, RAFMS can quickly diagnose the elements of the existing fisheries management system and make a tentative evaluation of how such a system operates and performs.

The *agroecosystem analysis* (AEA) (Conway 1985, 1987) forms another conceptual foundation of the RAFMS. The four patters in AEA, i.e. pattern in space, pattern in time, flow pattern and decision making pattern are essential to describe the features or elements of the local-level fisheries management system. These four patters are elaborated in the section on Highlights of Findings. The RAFMS also borrowed some conceptual elements from the RRA/PRA methods earlier described, particularly in the adoption of "traditional RRA techniques" such as semi-structured interviewing and diagramming.

Component II - Contextual variables

Six sets of contextual variables and 33 attributes or factors are relevant for the RAFMS (see Table 1). The basic difference between RAFMS and more formal surveys is the focus on these selected and limited sets of variables. Survey data are structured in a variable by case matrix format (de Vaus 1993) for statistical manipulation. This is not adopted in the RAFMS because although the variables could be measured either qualitatively or quantitatively, they are not designed to be tested for statistical significance. Figure 3 presents the data acquisition/verification scheme to document and evaluate existing fisheries management systems at the community level. These are relevant to Components II though IV.

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 reef

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 arrangement
- Individual organizations
- Institutional arrangements

Group V. External institutional and organizational arrangements
- Individual organizations
- Institutional arrangements

Group VI. Exogenous factors
- natural calamities
- macroeconomic/political/socio-cultural

Symbol: square bullet (□), operational attribute.

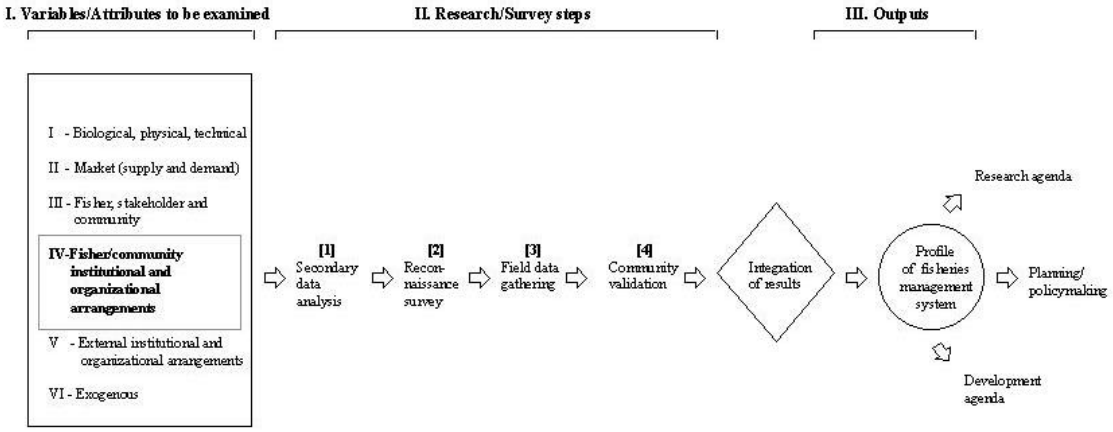

Figure 3. Data acquisition and verification scheme for Rapid Appraisal of Fisheries Managemnt Systems (RAFMS).

These variables and their attributes form the context within which fishers and other resource stakeholders coordinate, cooperate and contribute to establish organizations and institutions to manage the fishery. Fisher/community institutional and organizational arrangements (Group IV) is the focus of the RAFMS. These variables define the sets of rights that fishers possess in relation to the fishery and the rules that define what action they can take in utilizing the fishery. In general, institutional arrangements are defined by authority relationships that specify who decides what in relation to whom. Before the fisher/community institutional and organizational arrangements could be defined, however, there are other data sets that must be collected and analyzed.

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. Problems and constraints over resource use most often originate in the biological and physical attributes of the resource and in the harvesting technology used. The nature of interaction among fishers are commonly structured by the biophysical and technological environment of the fishery. These include the status of the coastal habitats and the state of resource exploitation. To help define the status of fish stocks, attention is given to the species harvested and the fishing technology in use.

The market attributes (Group II) focus on the supply-demand relationships for marine products. Resource problems are often market based. Market attributes (price, structure and stability) can affect the incentives for resource use activities, effort levels and compliance with rules. These attributes include those related to market operations and functions, and to fisher and fish trader relationships. The attributes of stakeholders, e.g. fishers, fishers family, fish traders, processors and money lenders, in the fishery refer to the social, cultural and economic conditions and characteristics that affect their incentives to cooperate with and contribute to management (Group III). These attributes include, among others, religious affiliation, traditions and customs, sources of livelihood, the degree of community heterogeneity or homogeneity, individual behavior, and asset ownership.

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 and law

enforcement that authorize and support community-level institutional and organizational arrangements. There may be nested, multiple layers of organizations at different political and administrative levels. Group VI are exogenous attributes which are mainly external factors beyond the control of the local, and at times, the national levels. These variables are exogenous surprises or sudden shocks to the management system which bring changes or affect the survival of the system. They include typhoons, civil unrest, political elections and inflation. These variables indicate how well the management system is functioning through its resiliency or capacity to accommodate sudden changes.

Component III - Research/survey steps

The third component pertains to the research/survey steps that should be taken. 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 for report writing. Many of the steps and techniques described by Mikkelsen (1995), Sajise et al. (1990) and Schonhuth and Kievelitz (1994) have been adopted in the RAFMS

Quadriangulation then becomes a series of generating and verifying data for the given set of relevant attributes under examination. As is common to the RRA process, the "truth" is approached through the rapid buildup of diverse information rather than via 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 the reconnaissance survey (Step 2). This data will then be generated through actual field data gathering in Step 3, and reconfirmed or ascertained during the community validation (Step 4).

Component IV - Expected output

The fourth component refers to the outputs to be generated at the end of the exercise. There will be an integration of the results generated from the secondary data analysis (step 1) through community validation (step 4) to produce a technical report or a policy paper. The document should describe the informal and formal management systems that govern the utilization of the fisheries resources at the local level and how such a system relates to the broader institutional environment. The report should have three substantive sections: (1) the basic profile of fisheries/coastal environmental setting; (2) the institutional analysis of the fisheries management systems; and (3) the recommendations related to planning/policymaking, research, and development.

The essence of RAFMS' results lie in the planning/policymaking agenda, which shall provide the direction towards improved institutional and organizational arrangements. It includes the clarification of legal rights and responsibilities, particularly the traditional and informal use rights as well as the clarification of organizational jurisdiction and responsibilities. In terms of other outputs, the research agenda will describe the subject or problem areas where further information needs to be generated, while the development recommendations indicate the investment areas that will require detailed project feasibility studies.

Data Collection Scheme

The data will be collected from multiple sources using a variety of methods. Table 2 shows an example in a seven-column data collection scheme. Columns 1 through 3 specify the items to be examined. Column 1 contains the *attribute* and refers to the

Table 2
Example of some attributes to be examined and the tools/techniques for data collection and validation.

Column 1 Attributes	Column 2 Indicators	Column 3 Unit/Scale of Measurement	Column 4 Secondary data Source(s)	Column 5 Field Observations	Column 6 Field data collection techniques	Column 7 Community validation techniques
I. Biological, Physical and Technical Attributes						
Biological attributes						
□ coral reefs	• coral condition	Δ percentage cover	-agriculture/fisheries agency - research academic institution	• benthic life forms	- manta tow surveys - benthic life form surveys	- workshop
□ 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 government records	• churches/temples	- interview	- workshop
	• ethnicity	Δ ethnolinguistic group/affiliation	- census office	• dialect spoken		- workshop
Research/Survey Steps:			Step 1 Secondary data analysis	Step 2 Reconnaissance survey	Step 3 Field data gathering	Step 4 Workshop validation

Symbols: square bullet (□), operational attribute; round bullet (•), indicator; triangular icon (Δ), unit of measurement; dash (-), secondary data source for column 4 and data collection technique for columns 6 and 7.

factors or entities to be examined. It varies in levels or hierarchies. The operational attribute is indicated by a square (□) bullet. The three examples of attributes, the full list is given in the earlier Table 1, are coral reefs (under Group I), level of exploitation (under Group I), and demography (under Group III). Column 2 pertains to the *indicator*: 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 round (•) bullet. In this case, the two indicators for the attribute demography are religion and ethnicity. An indicator may have one or more *units or scales of measurement*, as specified in Column 3, which could be in nominal, ordinal, interval or ratio scales. A triangular icon (Δ) points to a unit of measurement. The coral condition is measured by percentage cover (interval scale), while growth overfishing is measured in terms of the size of fish catch (ordinal scale). Hence, there is a corresponding increase in details as the examination of an attribute moves from Columns 1 through 3.

Columns 4 through 7 outline the sources and techniques of data collection. Column 4, *sources of secondary data*, specifies the agencies, institutions or persons where secondary literature can be obtained. These are relevant to secondary data analysis, which is research/survey step 1. The *Field observations* in Column 5, preceded also by a round bullet, are the items to be "annotated" in the field during reconnaissance survey (Step 2) or when making direct observation. For example, the ethnicity of the fishers may be known in the field by simply listening to the dialects spoken. The *field data collection techniques* in Column 6 pertains to the specific method for the generation of the primary data in the field. Each technique is indicated by a dash (-); for instance, the coral condition could be quickly appraised by either the manta tow surveys or the benthic life form surveys. Column 7 on *community validation technique* verifies all compiled primary and secondary data with the local communities. This is often done in the form of a community workshop or assembly.

The entire scheme can be likened to completing a jigsaw puzzle with Column 1 as the reference point. The secondary data (Column 4) may be validated through 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 attributes relevant to the study of the existing community-level fisheries management system. At the bottom of the matrix are the research/survey steps given earlier in Fig. 3. Steps 1 through 4 have a one-to-one congruence with Columns 4 through 7, in the data collection and analysis scheme.

It is stressed, though, that not all indicators for the proposed 31 attributes could and should be collected. These are ideals and the final data sets will still be dictated by factors such as quality of available secondary data, cooperation of the fishers, or other practical realities in the field.

Field Application

The field application and testing of the RAFMS was undertaken in three coastal fishing villages: two in the Philippines and one in Indonesia (see Figure 4). A summary of field activities is given in Table 3. These villages were pre-selected for three reasons. First, local (Philippine and Indonesian) researchers were interested in participating in the field application of the RAFMS. Second, the local research collaborators believe that a rapid appraisal approach, i.e., the RAFMS, would be helpful in generating crucial information which they could use for planning, project development and research. Third, the local

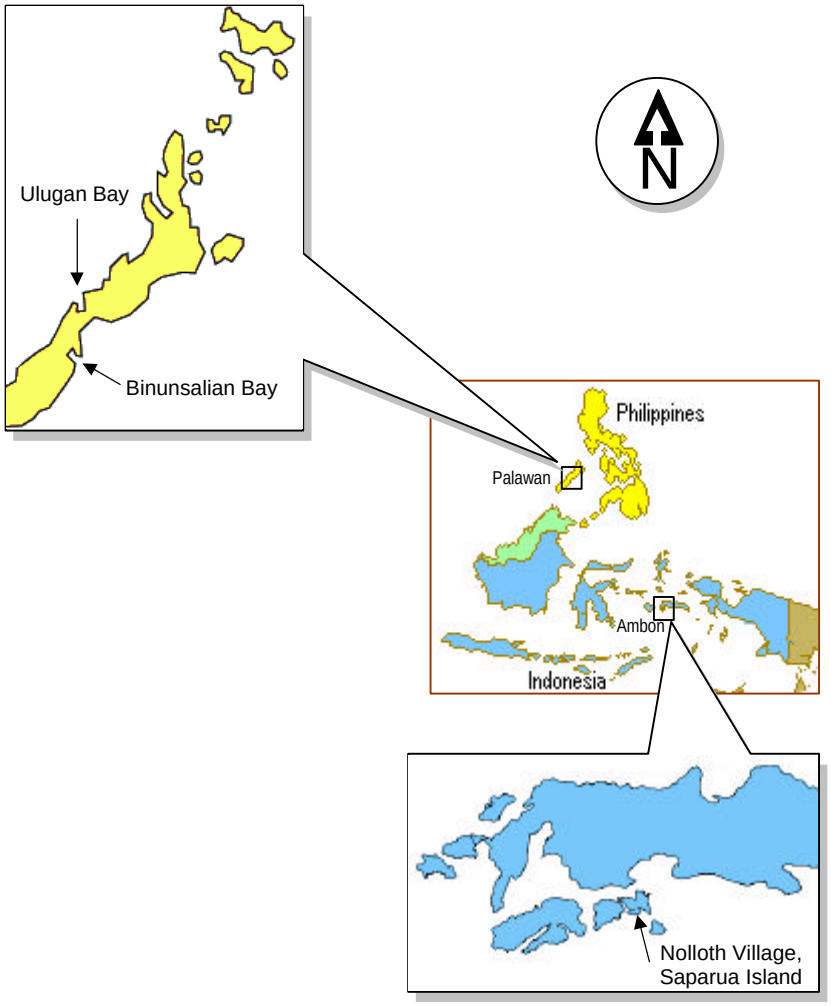

Figure 4. Location map of Rapid Appraisal of Fisheries Management Systems (RAFMS) field site.

fishing communities were willing to participate in the activities. This section presents the type of information which can be generated by RAFMS.

Preparatory activities

The researchers from ICLARM took the lead as the RAFMS practitioners. Upon drafting of the RAFMS handbook, informal agreements were made with the research collaborators. After the sites were chosen and the logistics were arranged, the RAFMS team was formed. In the case of the Philippines, there were three organizations involved: Philippine Council for Sustainable Development Staff (a national government agency); Ulugan Bay Foundation, Inc., and Binunsalian Bay Foundation, Inc., (both non governmental organizations). For Indonesia, the collaborator was the Research Institute for Marine Fisheries, a national research agency attached to the Ministry of Agriculture. The research collaborators took charge of making the local arrangements.

Upon arrival in the site, there was a joint workshop between the RAFMS practitioners and the local researchers. It involved a discussion of elements of the draft

Table 3
Summary of activities during the field application of Rapid Appraisal of Fisheries Management Systems (RAFMS) in Indonesia and the Philippines

Place/Date	Research Collaborator	Groupings/ No. of members	No. of respondents	Research / Survey Steps			
				1 Secondary data analysis	2 Reconnaisance survey	3 Field data gathering	4 Community validation
1. Nolloth Village, Saparua Island, Indonesia (24-28 April 1995)	- national research agency	I. Institutional - 4 II. Socioeconomic - 3 III. Biophysical - 3 10	18	1 day	1 day	2 days	1 day
2. Palawan, Philippines (28 Feb.-4 Mar. 1995) • Ulugan Bay • Binunsalian Bay	- national government agency - two non-government organizations	I. Institutional - 6 II. Socioeconomic - 5 III. Coastal habitat/ fisheries - 6 IV. Terrestrial mapping - 4 21	 59 22	 1 day 1 day	 ←—— ←——	 2 days 1 day	 ——→ ——→

RAFMS handbook. It was followed by the allocation of the members into various technical groups. The three basic groupings were: (1) institutional, (2) socio-economic, and (3) bio-physical. A leader was assigned to each group. The evaluation of the available secondary data was handled primarily by each group, although some concerns were discussed by the entire team. The institutional group handled the variables (mainly Group III, IV, V and VI) that relate to characteristics of fishers/community stakeholders and the institutional and organizational arrangements. The socio-economic group evaluated the information on market and supply attributes (mainly Group II and partly Group I and Group III). The bio-physical group took charge of attributes (mainly Group I) relating to the marine habitats, species harvested and fishing technology. The workplans of each group were also drafted.

Field activities

The field activities in each site followed similar routines. Between two to four days were spent in each village. First, there was a courtesy call to the village headman and other officers from the village council. This was followed by the reconnaissance survey which allowed the team to familiarize themselves with important features in the field such as resource characteristics, make annotation between reported and real conditions, and settle administrative arrangements. The key informants (e.g. fishers, fishers wives, money lenders, fish traders, government officials, etc.) were identified and/or chosen during this activity. The third step was field data collection which was the actual generation of the primary data based on the methodologies provided. Semi-structured interview (SSIs) was the main tool used in interviewing the key informants to obtain institutional, socio-economic and bio-physical data. The SSI was administered either individually or in small groups. Other field data collection techniques included actual diving in the coral sites, resource mapping, and market visits. Fourth, each evening included a brainstorming on the day's work. The results of interviews and personal observations were reported and deliberated. These results were synthesized into key tables, figures and diagrams.

The last step was the community validation. This was the wrap-up process of verifying with the community the data generated. The village leader called a community assembly in the village hall to discuss the findings of the RAFMS exercise. In the Philippines, all village members were invited; while in the case of Indonesia, only selected individuals attended. The workshop started by again briefing the community about the nature and relevance of the RAFMS. Then, the designated members of the research team presented the prepared charts, figures and diagrams. The local researchers presented the findings since the results were summarized in the local dialect (Pilipino in the Philippines and Bahasa in Indonesia) to facilitate communication. After the presentation, an open forum followed. This provided the community members with an opportunity to either confirm or reject the various items presented.

Highlights of Findings

This section presents some of the information generated by the RAFMS field applications in the Philippines and Indonesia. Only key outputs are presented in this article although several "working" papers or documents were produced for the three sites. The output illustrates how the interplay of many contextual variables/attributes, e.g. biophysical nature of the resource, state of technology, exogenous factors, etc., shape the rights and rules systems that govern the fishery. To come up with a broad picture of the management of marine fisheries at the community level, there are many data sets (see Table 1) that must be generated and analyzed quickly. Again, it should be noted that

these outputs were generated in a relatively short time and provide information which was not readily available to fisheries managers about the fisheries management system.

Case 1: Ulugan and Binunsalian Bays, Palawan, Philippines

Ulugan Bay is located on the midwestern coast of Palawan some 47 kilometers from the capital city of Puerto Princesa. It is a traditional fishing ground with mangrove, coral reefs, sea grass beds and small islands. Five villages (*barangay*) surround the Bay with a population of about 5,000 in 1991. [In the Philippine context, a village is the lowest political unit; several or a cluster of villages makes up a Municipality which is equivalent to a District in Indonesia.] The majority of the workforce are engaged in fishing and farming. Binunsalian bay, on the other hand, is located some 20 km south east of Puerto Princesa. The bay originally formed part of a Penal (Prison) Reservation but was released in 1986 for civilian settlement. The coastal stretch, with extensive coral reefs and mangroves, is bounded by two villages with 1550 individuals in 335 households. Since 1986, the fishers have harvested fish, shellfish and mangroves all year round in the area.

Through the RAFMS, it was shown that there is a nested organizational/institutional arrangement structure that operates with regard to marine fisheries. Table 4 shows that in the small village of Binunsalian, there is a whole array of organizations from the national government agencies (NGAs), local government units (LGUs), nongovernmental organizations (NGOs) and people's organizations (POs) that undertake activities which has bearing to fisheries management.

The results of the RAFMS exercise also highlights the duality of fisheries management that exists in both villages. Binunsalian and Ulugan Bays, as municipal fisheries, are legally or formally under a state property regime. As such, the right and rules systems with regard to the use or management of the fishery resources emanates from the national government and the municipal (city) government of Puerto Princesa. There is, however, an informal fisheries management system present which exists, although is not legally sanctioned by the city government. For example, conflict resolution (see Figure 5) in Ulugan Bay, can be solved by either informal or formal channels. When there is a conflict between two fishers, the formal process is to settle first the conflict at the level of the sub-village president. There is an informal way, however, of settling the conflict through a mediation of a respected community elder or a senior fisher who are not members of the village council. If the conflict is not settled at the level of the subvillage president, it may be formally resolved through the village chief, or informally through other respected members of the community.

The RAFMS also identified unwritten rights and rules which govern the use of certain gears within the village of Manabore of Ulugan bay. A gill netter may only set his net at least 10 meters away from the entrance of a fish corral. In the case of gill nets criss-crossing, the first one to remove the net is the top most and others should work down to the bottom net. Hook-and-line fishers can fish near fish aggregating device only if verbal concurrence is given by the owner. Again, the enforcement of the above rules is largely informal (Sibal et al. in press). There are also informal codes of conduct that exist among certain user groups in Binunsalian Bay. A verbal agreement exists among the 13 religious ministers to continuously remind their members against engaging in destructive fishing practices (Cabrestante et al. in press). Although there is a national law (Fisheries Code) and existing city ordinances that legally prohibit destructive fishing practices, its implementation is facilitated by informal sanction at the community level. Many features of the informal fisheries management system identified by RAFMS are not readily observable by government fisheries managers; some only became apparent during the community validation (step 4) of the RAFMS process. Thus, the RAFMS exercise was

Table 4
Nested organizational/institutional arrangements for Binunsalian Bay, Philippines (Cabresante et al. 1995).

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

Abbreviations:

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
IPPF	Iwahig Prison and Penal Farm		

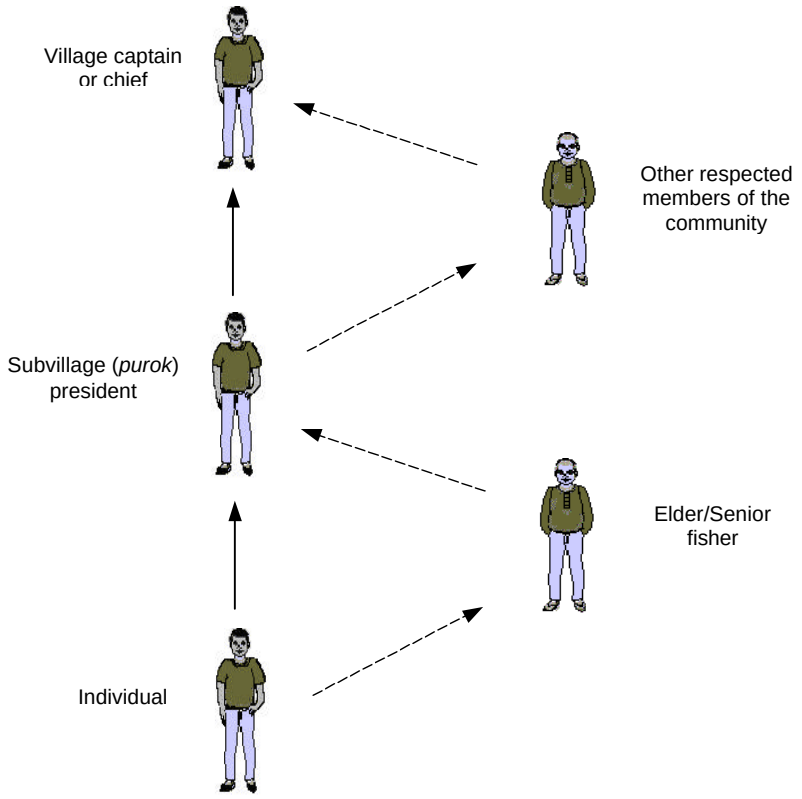

Figure 5. Conflict-resolution in Tarunayan, Palawan, the Philippines (M. Sibal et al., 1995).

able to inform fisheries managers of the importance of the informal system to the local fishers.

Case 2: Nolloth Village, Saparua Island, Indonesia

Nolloth is a coastal village located in the Hatawano peninsula on the north coast of Saparua Island. It is about 10 km from the district capital by land. It is administratively part of Saparua District, Central Maluku. Nolloth has a total land area of 1600 ha with 2673 individuals as of 1994. There are 450 fishers. Only a handful of fishers can be classified as full-time because many are also engaged in other economic activities such as vegetable farming and livestock raising.

The transformation of the fisheries management in the village is depicted by a time line in Table 5. Fishing has largely been shaped by improvements in technology. The modernization of fishing started in the 1950s when fishing boats with outboard motors were introduced. With the decline in the price of clove in recent years, small-scale marine fisheries has become the most important economic sector. The main species caught is flying fish (*Cypsilurus* spp.) followed by barred garfish, mackerel and scads (Andamaki et al. 1995). In 1994, the recorded fish landing was about 190 tons. There has reportedly been a decrease in production for these major fish species harvested over the last 15 years. The RAFMS was able to generate the relevant type of overfishing that occurs

Table 5
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 tilling through Prona program.
	1993	Two fishing boats owned by a Chinese businessman are operated by villagers.
	1994	Purchase of a fishing motor boat (an inboard) by the Village Cooperative Unit (KUD).

through semi-structured interviews. Figure 6 shows the relative trend for the decline of catch rate of some commercially important species.

The results of the RAFMS exercise also highlighted the duality of fisheries management that exists in Nolloth. The marine fisheries of Indonesia are formally managed by the state through the Indonesian Department of Fisheries and the district governments. In addition, the residents of Nolloth were found to practice the traditional norms of fishing called *sasi* (meaning to witness) or closed system. In practice, to sasi means to place prohibitions on the harvest, capture, or collection of particular resources of economic or subsistence value to the community. In Nolloth village, the *sasi* is for a mollusc locally called "lola" (*Trochus niloticus*) and certain marine fish species. The geographic coverage of the sasi area is three kilometers landward and 100 meters

seaward. *Sasi* has been very effective as far as protection of the coral resources is concerned. Through the use of manta tow reconnaissance technique, it was found that the live coral cover in the area was more than 60%. In the adjoining marine waters, the live coral cover was less than 30%. There is also the existence of a "church-led" *sasi* which has an independent administration from the village organizations. Such "church-led" *sasi* is more concerned with the resources of the terrestrial environment.

It was found that in the "merging" with formal institutional, political and economic systems that *sasi* appears to be encountering some problems. The Central Maluku area is rapidly developing, and the government administration, including the fisheries, is getting more formalised. Sasi is slowly getting subsumed by modernization, particularly with the local organizational changes. Over the last ten years, the traditional leader (Kepala Soa) was omitted from the formal village organizational structure and the sasi auction was abolished (Hiariey and Kinseng 1995). In addition, there are exogenous factors which the sasi system cannot deal with. One is the effects of siltation due to the logging activities in nearby Seram Island.

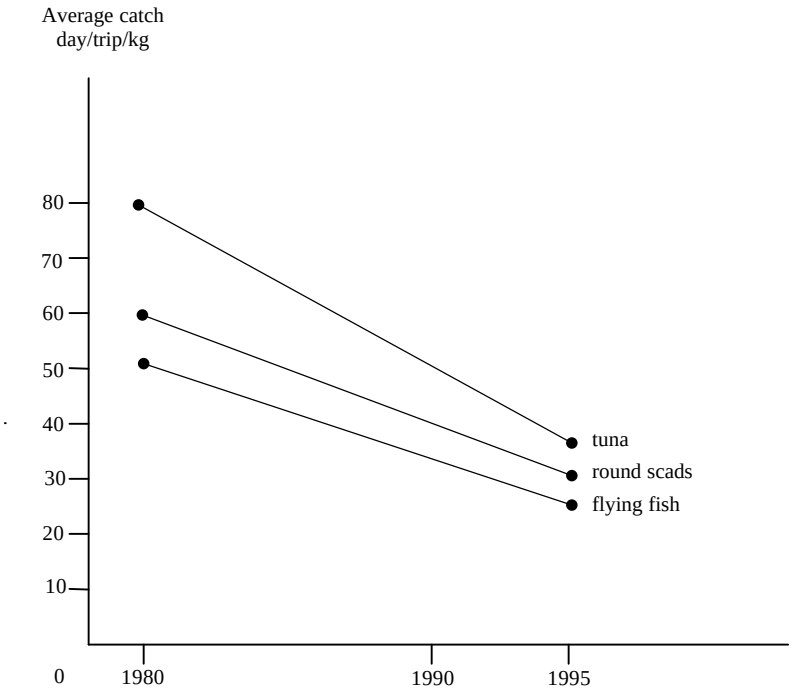

Figure 6. Trend of the catch rate of some species in Nolloth Village, Saparua Island, Indonesia. (Andamaki et al., 1995).

For both the Philippine and Indonesian cases, the RAFMS was useful in showing that there is a duality (formal and informal system) of fisheries management that exists at the local level. Many of the features of this informal management system were captured through the RAFMS process.

Implications for Research and Management

The RAFMS is among the pioneering attempts to develop a rapid appraisal guide for coastal marine environments, and specifically for understanding the system of fisheries management at the community level. Among its unique features is the adoption of institutional analysis as the main analytical framework in combination with AEA and other RRA techniques. The other innovations of RAFMS are the: (1) active roles of the local researchers and members of the fishing community, (2) the ability to generate some quantitative (interval or ratio scales) data, and (3) the use of quick biological assessment techniques.

The process of conducting RAFMS revealed two useful procedural insights. One, the local or indigenous ecological knowledge which are a very rich source of information could be quickly generated and analyzed using a variety of RRA techniques. In both places, the duality of fisheries management, where an informal local system co-exists with a formal government system has been identified. Second, the RAFMS could be used as a linking tool between the researchers (both local and outsiders) and the local community.

The results of the field application in Indonesia and the Philippines showed that the RAFMS is useful in quickly (less than a week's time) generating an understanding of a local fisheries management system. A number of draft technical reports were generated. Further, RAFMS generates outputs which are useful for policy/planning, research and development activities. The results of the RAFMS field applications have been used in several ways by the local research counterparts. The report for the Binunsalian Bay has been incorporated into developing a Strategic Land Use Plan for Iwahig which serves as the bay's catchment basin. The results of the Ulugan Bay study are being used in developing the area's resource management plan. In Nolloth village, the results are being transformed into a policy paper about the traditional fisheries management system in central Maluku province.

ICLARM has used the field results in finalizing a RAFMS handbook (Pido et al. al. 1996) which was recently released. The authors acknowledge that the RAFMS was pilot-tested under a rather ideal conditions where the local researchers and the community members actively participated. It is hoped that as more practitioners use the RAFMS, it could be further simplified and refined so that the results can more easily be translated into an agenda for formal research, planning/policy making, or project development.

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