

PARTICIPATORY COASTAL RESOURCE ASSESSMENT



**A Handbook for Community Workers
and Coastal Resource Managers**

Walters • Maragos • Siar • White

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and Coastal Resource Managers**

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PREFACE

This handbook has been developed to help integrate the knowledge of local coastal resource users with the understanding of scientific experts and thus maximize the effectiveness of integrated coastal resource management projects. It is based on work and research conducted by the authors in the Philippines and other countries in relation to various coastal resource management efforts and as doctoral students in geography and human ecology. It is also based on lessons from the implementation of participatory coastal resource assessment in San Vicente, Palawan and other areas as part of the Coastal Resource Management Project.

This handbook is intended primarily for community workers and coastal resource managers involved in community development for sustainable coastal resource use. It has two main purposes: first, to help community workers maximize the contribution they can make to initial coastal resource assessment and project monitoring and evaluation; and, second, to initiate, as early as possible, dialogue and input from community-level coastal resource users in a way that is relevant and meaningful to them.

The participatory coastal resource assessment methods described here will allow community workers to work with local fishers and other coastal resource users to generate valuable information for coastal resource management planning and implementation. This is done while simultaneously improving community participation and local empowerment. Though this handbook was developed to be as comprehensive as possible, practical constraints prevented the authors from covering all aspects of participatory coastal resource assessment. Any suggestions to improve this edition's usefulness and effectiveness would be most welcome.

ACKNOWLEDGMENTS

Several persons contributed significantly to the development of this handbook. The authors especially acknowledge the precious time, effort and knowledge graciously given by the fishers of Honda, Ulugan and San Vicente Bays, Palawan during the testing and refinement of the participatory coastal resource assessment methods presented here.

Indeed, by itself, this handbook is a product of a collaborative process. The Puerto Princesa City Government, the Department of Agriculture-Agricultural Training Institute, Palawan; the Department of Environment and Natural Resources-Coastal Environment Program, Palawan; and Palawan-based non-governmental organizations such as the Ulugan Bay Foundation, Inc., were instrumental in completing the research. Participatory methodologies developed by Dr. Elmer Ferrer and Dr. Liana McManus inspired important aspects of the methods presented. Dr. Ron Senykoff and Dr. Fred Vande Vusse provided critical theoretical guidance and championed the applicability of participatory coastal resource assessment among donor and government agencies in the Philippines. Dr. Jefferson Fox provided essential technical guidance during the writing of the handbook. Dr. Hilconida Calumpong and Dr. Catherine Courtney facilitated funding and field testing of the methods, while Yasmin Arquiza assisted to refine the methods through additional field tests conducted in San Vicente, Palawan. Michael Alcala contributed lessons from field implementation in Negros Oriental.

In addition, the United States Agency for International Development supported this undertaking by sponsoring the Coastal Resource Management Project through Tetra Tech EM Inc. and a cooperative agreement with Silliman University. Equally significant were the contributions of the learning area coordinators for the Coastal Resource Management Project, Mr. Hermenegildo Cabangon in Sarangani Bay and Ms. Mel Tagudar-Corkum in Palawan, who helped organize training workshops to test the draft manual. The workshops were attended by 50 participants, whose inputs proved crucial to making the manual more relevant to “real world” tropical coastal environments in the Philippines. Ruperto Sievert developed Tables 2.3, 2.4 and 2.5 based on the results of the participatory coastal resource assessment in Palawan and in other learning areas while Evelyn Deguit developed the Socio-demographic Profile Questionnaire and the Sample Survey for Fishing Practices.

Dolores Ariadne D. Diamante-Fabunan designed the outline for the coastal environmental profile of the learning areas, assisted in technical editing and contributed in developing the final presentation of this handbook. Ms. Diamante-Fabunan, Ms. Deguit and Mr. Sievert are also actively involved in the conduct of the Participatory Coastal Resource Assessment in other project areas. Asuncion Sia edited while Ysolde Collantes and Mary Gale Bituin dela Cruz crafted the final presentation of this book.

Lastly, credit is due the rest of the project staff for their valuable and able support as well as our partners in coastal resource management including other fisherfolk for their continued cooperation.

The Authors

ACRONYMS and ABBREVIATIONS

CRM	coastal resource management
CRMP	Coastal Resource Management Project
CW	community worker
DA	Department of Agriculture
DA-ATI	Department of Agriculture-Agricultural Training Institute
DA-FSP	Department of Agriculture-Fisheries Sector Program
DENR	Department of Environment and Natural Resources
DPWH	Department of Public Works and Highways
DSWD	Department of Social Welfare and Development
DTI	Department of Trade and Industry
GPS	global positioning system
LGU	local (municipal, city and/or provincial) government unit
MARINA	Maritime Industry Authority
NAMRIA	National Mapping and Resource Information Agency
NGA	national government agency, e.g. DENR
NGO	non-governmental organization
PAGASA	Philippine Atmospheric, Geophysical, Astronomical Services Administration
PCRA	participatory coastal resource assessment
PCSD	Palawan Council for Sustainable Development
RDC	Regional Development Council or similar development authority

DEFINITIONS

bahura: a Tagalog word roughly corresponding to reef or shoal, any significant rise in the sea floor; depending on local usage, it may or may not indicate the presence of live coral.

base map: a predrawn map of selected features that serves to orient the mapper to the area and provides a consistent scale for the mapper to draw in additional features or elements of the coastal resource system.

coastal area profile: a document produced using various resource assessment and analysis techniques, including PCRA. It presents a variety of information required for effective decision-making and planning, including environmental and socioeconomic information, and analyses of problems and opportunities for sustainable coastal development.

coastal habitat: any ecologically distinct ecosystem that supports the production of coastal resources, including coral reefs, mangrove swamps, tidal flats, seagrass beds, and beaches.

coastal resource: any non-living or living natural product, such as finfish, marine invertebrates and aquatic plants, that is found in coastal areas and is of use or value to humans.

coastal resource management (CRM): the wise use of coastal resources to promote and maintain sustainable development in coastal areas. CRM involves maximizing the utility of coastal resources by regulating human behavior and activities in coastal areas. Successful CRM requires multi-sectoral collaboration and strong community participation.

coastal resource regime: the system of rights and responsibilities that governs the use of coastal resources. Often, the operative or *de facto* regime is not the same as the legal or *de jure* regime. Despite a relatively well developed *de jure* regime of laws and regulations, the operative coastal resource regime in many areas of the Philippines is described as an open access regime, an unregulated free-for-all situation in which sustainable use is unlikely to occur.

coastal resource system: a diverse human-ecological system composed of all coastal habitats and the various aspects of coastal economies related to the production, distribution and consumption of coastal resources, as well as other products and economic activities derived from coastal resources.

community worker (CW): any person involved in community organization or community development, usually associated with NGOs and LGUs.

ground truthing: field checking or verification of data.

isdang bato: a Tagalog term which in some areas refers to a variety of fish caught with hook and line on coralline and rocky reefs, usually including grunts, parrotfish, wrasses and emperors; a collective term referring to all those fish caught using hook and line which are not the most desirable or high-value species ("high-value species" generally refers to species such as groupers and snappers).

local coastal resource users: coastal residents who live in the management area, including municipal fishers and small-scale aquaculturists, whose primary basis of livelihood or subsistence involves capturing, harvesting or growing of any fishery resource; or deriving economic (cash and non-cash) benefit from coastal resources.

participatory coastal resource assessment (PCRA): resource assessment accomplished with extensive participation and contributions from local coastal resource users.

resource assessment: the process of producing information required for effective resource management planning; a research process involving a variety of methods and techniques that allow a better understanding of environmental and social factors affecting coastal resource systems, and the elucidation of problems and opportunities for sustainable development in coastal areas. A resource assessment usually culminates in the production of a coastal area profile.

yamang dagat: a Tagalog term that literally translates as wealth or riches of the sea; frequently used when referring to coastal resources.

Chapter 1

INTRODUCTION



his handbook is designed to serve as a guide for people who work with local coastal resource users to promote sustainable development in coastal communities. It presents various ways by which the important environmental and social characteristics of the coastal area can be learned, recorded, and better understood by those involved in community development. In so doing, it can help facilitate the early, useful and meaningful involvement of coastal resource users in the development of coastal resource management (CRM) plans that encompass their communities' and adjacent resources. The goal is to see participatory coastal resource assessment (PCRA) become an integral component of CRM.

*Successful
management
requires multi-
sectoral
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strong community
participation.*

This chapter introduces the important terms and concepts related to PCRA and includes background notes on CRM as well as an introduction to PCRA. A detailed discussion of specific PCRA methods is presented in Chapter 2. Chapter 3 offers guidelines for making PCRA results useful to CRM projects.

An overview of coastal resource management

The exact nature of CRM varies from place to place, but some basic characteristics can be identified. In its broadest sense, the term “coastal resource management” refers to the wise use of coastal resources to promote sustainable development in coastal areas. By “coastal resources” we refer to the natural resources found in coastal areas, including individual species such as fish as well as the complex habitats and ecosystems that support them. Coastal resources also generally include other often important resources such as those with archaeological, historic, sacred, or gender-specific significance.

In maximizing the utility of coastal resources, much of the management effort is devoted to regulating human behavior and activities in coastal areas. Successful management requires multi-sectoral collaboration and strong community participation. In the context of the Philippines and

the Local Government Code of 1991, CRM focuses on integrated management which allows local and national government agencies to work most effectively with NGOs, research institutions, private businesses, and resource user organizations (e.g. fisherfolk associations).

CRM can be represented as a cycle of information gathering, institutional development, planning, and implementation. Each phase of CRM has several associated activities (Fig. 1.1). This handbook describes those methods designed to help community workers (CWs) work most effectively with fishers and other coastal resource users during the information gathering phase of the management process. Nevertheless, because all phases of the process are interrelated, this handbook might also help, at least indirectly, in the other three phases, most notably in encouraging community development activities associated with institutional development.

The information gathering phase of CRM can be divided into four general activities as shown in Fig. 1.1. The PCRA methods discussed in this handbook can be helpful in all four of these activities; so far, however, they have been applied predominantly in baseline assessment.

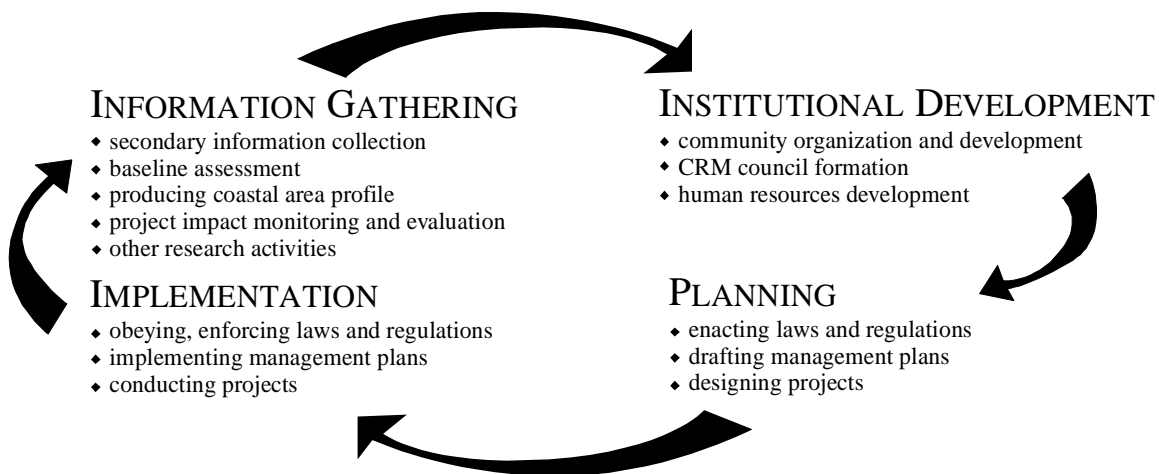


Fig. 1.1 One way of representing the cyclical process of CRM.

The participatory coastal resource assessment process

Resource assessment, or what some call resource analysis or appraisal, is accomplished primarily to facilitate the numerous decisions that must be made in planning and implementing successful CRM.

Resource assessment involves gathering and analyzing environmental, ecological, social and economic information about the management area.

Resource assessment is most useful in CRM when the information collected and analyzed helps managers to understand the past, present and potential usefulness of coastal resources, and identifies limits and opportunities for coastal resources to contribute to environmentally sustainable economic development in coastal areas.

PCRA focuses on resource assessment from the perspective of local coastal resource users. Scientifically acquired information is also very useful and important during resource analysis, but the type of information gathered by scientists differs from that obtained from coastal resource users, and the techniques to acquire the information are also different.

The methods described in this handbook will help accomplish resource assessment that involves the extensive participation of local resource users (e.g. fishers) in gathering and analyzing information to be used in management planning. PCRA involves the integration of the wisdom and knowledge of local fishers and resource users with the technical expertise of other people or groups — NGOs, universities, research institutions and LGU staff — involved in the management process. Its rationale is simple: Coastal communities, because of their dependence on coastal resources, can offer important perspectives on which resources are important, the changes in resource availability and harvesting success, and the problems and issues that can deny the community the benefits of resource use.

In PCRA, local coastal resource users are assisted to arrive at a common understanding of environmental and ecological information concerning the coastal environment to be managed and the

*PCRA focuses on
resource
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*PCRA is a
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process.*

natural resources found there. In addition, members of the coastal community also gather and document social and economic information about the local coastal resource system and examine ways by which coastal resources have been used in the past and are used at present, and how they could be most effectively used in the future.

Clearly, PCRA is a multifaceted process. It has several interrelated components, including the following:

1. gathering of documented information;
2. direct observation of and participation in assessing the local coastal resource system;
3. purposeful gathering of local knowledge;
4. generation of local feedback (primarily from local resource users) on information collected; and,
5. integration of all information generated in the first four components into a document called "coastal area profile," which serves as an important information source during participatory planning (Fig. 1.2).

Coastal area profiles are an important outcome of the initial PCRA process. The coastal area profile is a

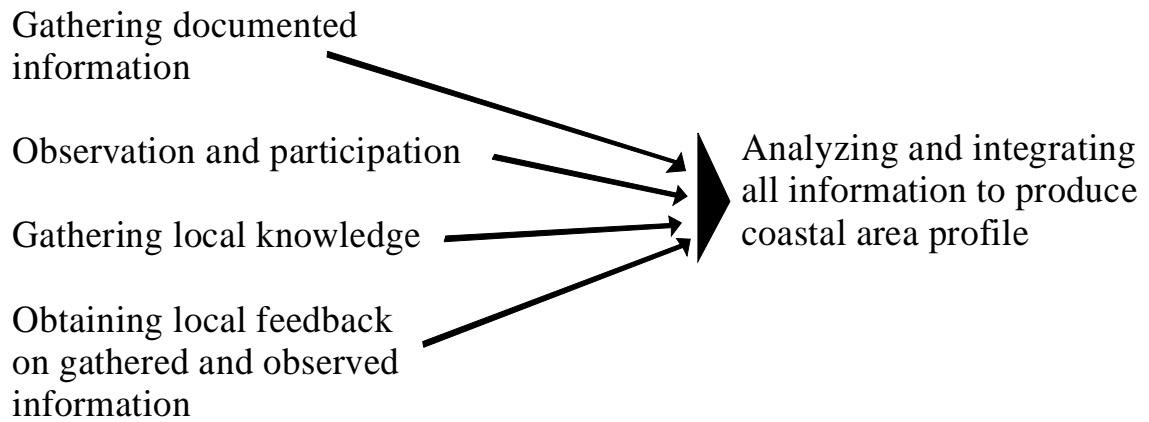


Fig. 1.2 Key steps in the PCRA process.

document that presents in an organized and integrated form all the results and information gathered in resource assessment activities. Note that in producing a profile, in addition to information generated from PCRA field methods, one considers information from a variety of other sources (Table 1.1).

This handbook considers only the participatory methodology; the knowledge and skills required to contribute from a technical or scientific point of view are not described here. There is no doubt that proficiency in scientific disciplines such as biology, ecology and economics is helpful in preparing a profile. Nevertheless, for the practical needs of many

planning situations, purposefully using the PCRA methods discussed in this handbook as one's primary or sole source of information can still result in the production of high quality profiles.

The benefits of participatory coastal resource assessment

If done successfully, PCRA offers at least four beneficial outcomes:

1. important information that would otherwise not be obtained and considered using traditional scientific approaches such as local knowledge of resource locations, is made available for CRM planning purposes;
2. resource management is made more participatory as local fishers and resource users are more intimately involved in an essential first phase of CRM;
3. local users are more likely to participate actively in subsequent phases of the CRM process and contribute to decisions that will be supported by the community;
4. PCRA demonstrates the relevance of the information provided by the resource users and shows how the information is used for management needs.

Thus, PCRA helps create well-informed, supportable, and implementable coastal resource management projects. Simultaneously, it helps empower local fishers and other resource users to productively participate in — and more likely benefit from — these projects.

In specific terms, PCRA methods are advantageous because they:

- produce spatial details (via maps and diagrams) about the coastal area, such as locations of small but productive reefs that are not usually shown in maps or revealed in assessments conducted by outside experts;
- produce temporal details (via trends and seasonal diagrams) about important events (such as seasonal fish spawning aggregations), changed status of resources and emerging issues that are almost impossible for outside assessment experts to discover independently;
- add specific details to general information generated by experts, such as specific information about the relative condition (e.g. old growth, previously logged) and cultural values of areas described by experts as only a single general category of mangrove;

PCRA helps create well-informed, supportable, and implementable coastal resource management projects.

PCRA is most useful in the learning or information gathering phase of CRM.

- facilitate efficient group exercises and verification of collected data;
- uncover gender-specific or age-class distinction in resource use, importance and other perceptions; and
- provide insights on trends in resource abundance and levels of exploitation that cannot be obtained from other sources.

A framework for participatory coastal resource assessment in coastal resource management

PCRA is most useful in the learning or information gathering phase of CRM. PCRA methods help produce outputs that are essential elements of coastal area profiles and CRM project monitoring and evaluation. They also consider a variety of scientific disciplines which reflects the wide range of information areas covered. This is important for generating the baseline information presented in coastal area profiles as well as for measuring indicators of the success of CRM projects.

The framework for using PCRA methods in the information gathering phase of CRM is shown in Table 1.1. Note that several basic types of methods are used repeatedly and in different combinations to produce the numerous different kinds of outputs

that fall into the various profile content headings and project indicator types. These basic methods include: interviews (group and individual); mapping, trend diagrams; identifying and classifying resources and activities; making transects; calendar diagrams; historical trends; identifying stakeholders; integrating information; and obtaining recommendations. This shows the widespread applicability of PCRA methods in CRM. The framework does not depict the contribution PCRA methods make in community organization and development activities. Although it is not the focus of this handbook, the empowerment that usually results from conducting PCRA should always be considered by CWs, and the goal of its achievement is implicit in the following chapter which describes various PCRA methods in detail. Note also that PCRA involves — or at least ideally involves — the collaboration of a number of organizations and agencies.

PCRA process:

- 1. gather existing information;*
 - 2. direct observation and participation in assessing coastal resource system;*
 - 3. gather local knowledge;*
 - 4. generate local feedback; and,*
 - 5. integrate all information into a “coastal area profile.”*
-

Table 1.1 Framework for using PCRA methods in the information gathering phase of CRM.

GENERAL PROJECT INDICATOR TYPE	GENERAL PROFILE CONTENT HEADING	SPECIFIC OUTPUTS PRODUCED	PCRA METHODS EMPLOYED ^a	SCIENTIFIC DISCIPLINES CONSIDERED	POSSIBLE COLLABORATORS AND INFORMATION SOURCES ^b
Environmental/ Ecological	Physical Setting	Geophysical overview including land, sea floor, and coastal habitat classifications	Identifying and classifying physical elements of the coastal environment, drawing transects	Geography, geology	DA, DENR
		Overview of coastal forests, rivers and watershed status	Individual and group mapping, drawing timelines, documenting historical trends	Geography, forestry, hydrology, agronomy, ethnogeography	DA, DENR, DPWH, universities, research institutions
		Thematic and locator maps	Mapping	Cartography	NAMRIA, other existing maps
	Climate	Descriptions and diagrams of seasons, rainfall, winds and temperature	Drawing calendar diagrams	Climatology	PAGASA, DA, DENR
	Oceanography	Descriptions, diagrams and maps of bathymetry, current/circulation patterns, tidal flow, waves, water quality, eddies, runoff patterns	Mapping, drawing calendar diagrams, drawing timelines or trend diagrams, documenting historical trends	Oceanography	NAMRIA, PAGASA, MARINA, universities, research institutions
	Important Habitats Coral reefs (all descriptions focus on ecological factors influencing past, current, and potential economic productivity)	Description, diagrams, and maps of coral reefs (or local equivalent), live coral cover, coral and fish diversity, cultured species (or potentials), gear uses and resource issues	Identifying associated resources, mapping, documenting historical trends	Marine biology, ecology, zoology	DA, DENR, universities, research institutions
	Seagrass Beds	Descriptions, diagrams and maps of seagrass beds and other soft-bottom habitats, diversity, fish/seaweed abundance, cultured species (or potentials)	Identifying associated resources, mapping, documenting historical trends	Phycology, marine biology, botany, ecology	DA, DENR, universities, research institutions
	Mangroves	Descriptions, diagrams and maps of mangrove areas, old-growth areas, diversity, fish abundance, cultured species (or potentials)	Identifying associated resources, mapping, documenting historical trends	Botany, estuarine biology, ecology, forestry	DA, DENR, universities, research institutions
Beaches	Length, width, level of disturbance, pollution, erosion	Group mapping, transect diagram, field assessment, trend diagrams	Shoreline and coastal geology	DA, DENR, universities, research institutions	
Estuaries	Fish catch trends, level of pollution, nutrient cycles	Group mapping, controlled fishing, trend or seasonal diagram	Marine and water quality analysis, limnology	DA, DENR, universities, research institutions	

GENERAL PROJECT INDICATOR TYPE	GENERAL PROFILE CONTENT HEADING	SPECIFIC OUTPUTS PRODUCED	PCRA METHODS EMPLOYED ^a	SCIENTIFIC DISCIPLINES CONSIDERED	POSSIBLE COLLABORATORS AND INFORMATION SOURCES ^b
Environmental/ Ecological (continued)	Lagoons and Bays	Fish catch trends, pollution and contamination	Group interviews, mapping, trend diagrams	Oceanography, water quality sampling, current studies	DA, DENR, universities, research institutions
	Natural Resources (fish, invertebrates, plants, etc.)	Inventories and local classification systems	Identifying and classifying, drawing transects	Geography, ecology, taxonomy	DA, DENR, universities, research institutions, museums
Socio-economic/ Institutional, Resource Users, and Issues	Fisheries	Descriptions, diagrams and maps of production by species, gear, community, assessment of past, current and potential productivity	Identifying species and local names, drawing calendar diagrams, mapping	Fishery science	DA, DENR, universities, research institutions
	Other Coastal Resource Users (e.g. tourism, industries, shipping, etc.)	Description, maps, diagrams of use/production systems, assessment of past, current and potential productivity	Identifying uses and associated resources, drawing calendar diagrams, mapping	Natural resource economics, anthropology	DA, DENR, DTI, universities, research institutions
	Local Resource Users	Descriptions, diagrams of demography, livelihood, community organizations, past, present and potential CRM projects, activities	Household surveys, documenting historical trends, drawing diagrams, mapping	Geography, anthropology, sociology, natural resource economics	DA, DENR, DTI, DSWD, universities, research institutions
	Past and Present CRM	Description, diagrams of LGUs, national agencies, and NGOs and their projects, activities, laws, regulations, etc.	Identifying involved entities, interviewing representatives, documenting historical trends, drawing Venn diagrams, mapping	Political science, geography, natural resource economics, history, anthropology, archaeology	RDCs, all involved government agencies
	Other Stakeholders	Descriptions of composition, local interests and roles in coastal resource use	Identifying other stakeholders, interviewing representatives, documenting historical trends, drawing diagrams, mapping	Political science, geography, natural resource economics	RDCs, all involved government agencies
	Management Issues and Alternatives for Development, Monitoring and Mitigation	Descriptions of current constraints on sustainable CRM	Integrating information, identifying issues, interviewing representatives from all involved groups/sectors	All of the above	RDCs, all involved government agencies
	Recommendations	Description of recommended management interventions	Integrating information, eliciting, formulating and validating recommendations	All of the above	RDCs, all involved government agencies

^a All methods are accomplished through participant observation and interviews with local coastal resource users and/or group workshops.

^b Possible collaborators and information sources listed are in addition to NGOs and local government agencies which should always be consulted first, including agriculture, planning and development, and environment and natural resources offices at the municipal and provincial levels. In many areas, a Regional Development Council (RDC) or its equivalent (e.g. PCSD in Palawan), will also be a good information source and collaborator in information gathering.

Chapter 2

PARTICIPATORY COASTAL RESOURCE ASSESSMENT METHODS

P CRA methods provide various forms of information that are useful in CRM planning and implementation. The process of taking results from PCRA methods and producing a coastal area profile for such use is discussed in Chapter 3. The PCRA methods are presented in the approximate order in which they are best accomplished. Some of these methods can be implemented simultaneously or over several iterations, or not implemented at all depending on time requirements and other constraints (Fig. 2.1). Generally, a PCRA exercise in one community or barangay will take 2 to 3 days and should be conducted in succeeding days without break. These methods are most effective when the CW works together with at least one partner or counterpart from an LGU or NGO, where the counterpart has knowledge

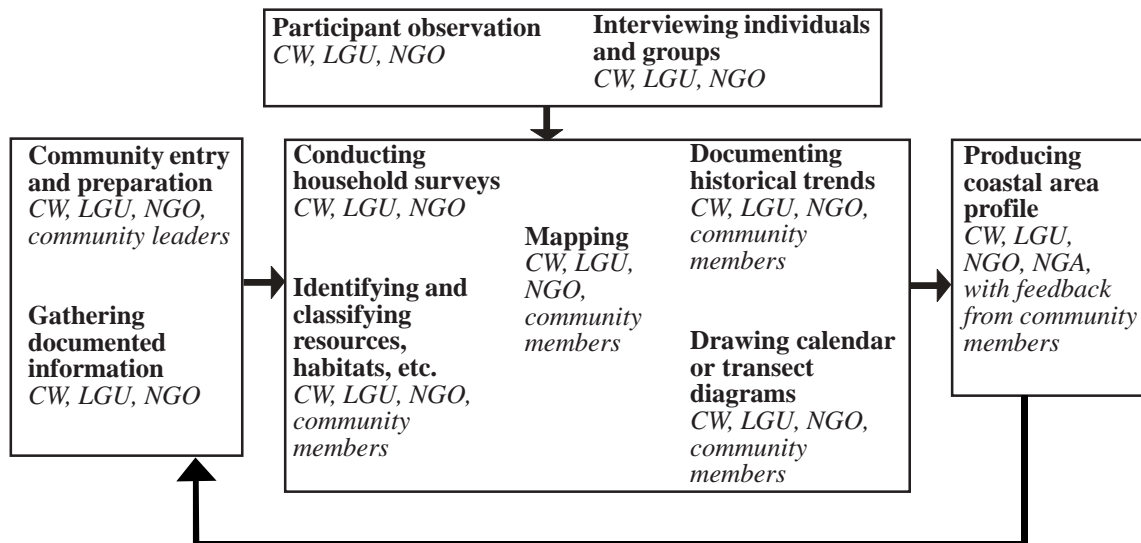


Fig. 2.1 The interrelated methods of PCRA (potential actors are shown in italics).

and skills that complement those of the CW. CWs should be as objective and non-partial as possible.

Gathering existing information

Collecting all information produced previously in a “hard” form — reports, planning documents, legal documents, maps, satellite images, aerial photographs, and old photographs — is almost always the best way to start the PCRA process. Such materials, sometimes referred to as secondary information, are valuable. Often, a great deal of good quality information already exists, allowing the researcher to substantially reduce the number of, or to

redirect, assessment activities. Plans for PCRA efforts in the field should therefore be kept open until after an appraisal of existing documented information has been completed. It is also critical to evaluate the existing information and to use relevant and current but not obsolete reports or data.

Documented information for CRM planning typically falls under two basic categories: government/institutional documents and scientific documents.

Government documents such as ordinances, regulations, plans, and other documents related to the legal CRM regime are important indicators of past and present government involvement or non-involvement in CRM. The information they provide is useful in identifying government management strategies and evaluating the success of previous and current government CRM activities.

Scientific studies in ecology and/or socio-economics are also prevalent and useful. These studies provide information on the status of coastal ecosystems and the living and working conditions in coastal communities. For PCRA purposes, this information is considered as “baseline”, i.e., a starting point in determining the long-term impact of CRM efforts.

Plans for PCRA efforts in the field should be kept open until after an appraisal of existing documented information has been completed.

=====
*Leave no stone
unturned in
looking for useful
information.*
=====

If a profile or similar document has not been produced previously, collecting existing documented information is usually not easy. Potential information sources within the general profile headings where each type of information falls are listed in the far right column of Table 1.1. In general, the sources are local and national government agencies, NGOs and research institutions such as universities, museums, and technical schools. In some cases, however, barangay councils and/or fisher associations will also provide useful information from studies they have conducted or participated in. The best strategy is to use Table 1.1 as a guide, “leave no stone unturned,” and always be vigilant for information from an unexpected source. Often, aid organizations sponsor planning, development, and conservation projects and may be good sources of previous, ongoing, or planned studies.

There is no detailed methodology for gathering information, which is mostly a matter of writing letters, making telephone calls, visiting offices and libraries, and interviewing officials, teachers, scientists, and researchers. Using the right contact persons and/or letters of introduction is always helpful. When collecting information, always:

- a) respect and credit the rights and wishes of the source;

- b) promptly return any borrowed material; and,
- c) respect the wishes of a source to be or not be credited when the information is presented to others.

Although the CW might find it difficult to track down all the existing information available (from barangay halls in the barrios to museums, libraries and government offices in Manila), the mere effort is good for all concerned. In addition to gathering data, it allows the CW to establish contact with other informants and experts who have something to offer the CRM process. This in turn helps the CW understand better the many perspectives from which one can view CRM. It also allows involved outsiders, such as scientists and technicians, to interact directly with the CW, who can then serve as their intermediary with local fishers and other resource users (Fig. 2.2). The CW might view this activity as contributing to the development of a broader definition of community, or what some call institutional strengthening. In accomplishing this task, therefore, the CW should have a twofold objective:

1. gather extensive, good quality information (as practical); and,
2. develop relationships with and between

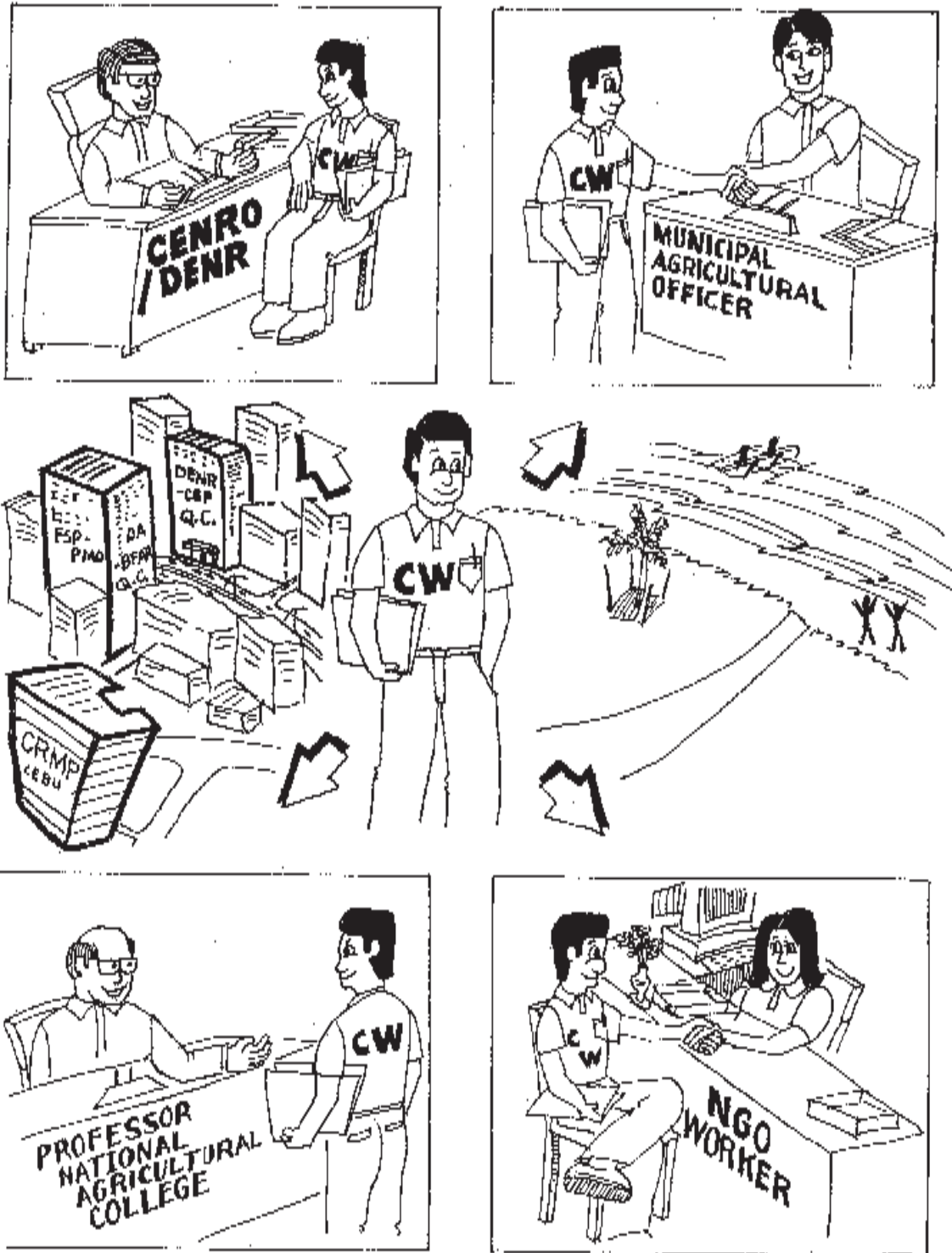


Fig. 2.2 While gathering assessment information from a variety of sources, the CW can simultaneously build professional relationships and facilitate institutional strengthening.

scientists, government workers, and other stakeholders that can be used beneficially in the CRM process.

Community entry and preparation

This handbook assumes preexisting proficiency in community entry and other aspects of effective community organization and development in Philippine coastal communities. Because of this, only a few recommendations specific to successful application of PCRA are made. These are:

1. Attempt PCRA exercises only in communities where a significant amount of community development has already been accomplished and where there is strong interest or where community organizers are available and willing to serve as interfaces. There should at least be a solid organization such as a fisherfolk association with which to work.
2. Consider fishers and other resource users who participate in PCRA as local consultants and collaborators, and not just beneficiaries. Treat them with appropriate respect as essential contributors to the CRM process. CWs usually get a great deal more information when they

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and not just
beneficiaries.***

*Good
participant
observation
requires
effective
note-taking.*

cast themselves as researchers interested in helping fishers to document their local knowledge and expertise as well as CWs trying to get the local people involved in CRM.

Participant observation

The approach CWs take with local consultants just described for community entry also fits well with the method of participant observation. As in community entry, this handbook assumes that through previous training and experiences, CWs already have skills in participant observation. By actively living daily life in fishing communities, CWs can glean a great deal of information relevant to resource assessment. Many of the constraints and opportunities that are considered in CRM planning are more apparent, and their subtleties better appreciated, when the CW experiences them as a participant in the coastal resource system.

Good participant observation requires effective note-taking. CWs should always have a note pad and pen or pencil handy. An effective tactic is to jot abbreviated notes throughout the day as observations are made, and then use these notes to produce more detailed accounts at the end of each day. These notes should be periodically reviewed and systematically filed for use in the production of a coastal area profile.

Like the interviewing approach discussed in the following section, participant observation should be seen as a “meta-method,” one that can be applied in concert with any of the specific PCRA methods discussed below.

A stranger or a group of visitors (CWs, scientists) taking notes on a community resident or residents is sometimes viewed with reservation, suspicion, and resentment. This is especially true if the reasons for the note-taking are not well understood or if permission is not first granted after an explanation. To avoid suspicion or resentment, a “warming up” period should always precede participant observations involving notebooks, videos, and audio recorder. The idea of “civilized” scientists interviewing the “natives” is no longer acceptable in this age of telecommunications and rising community spirit and values. Appropriate precautions must be taken that community residents do not get the wrong impression from the participant observation methods used.

Interviewing individuals and groups

The methods described in the remaining sections of this chapter are all accomplished to some extent through interviews with individuals or workshops conducted with groups (primarily characterized as

Good communication allows all those involved in CRM to see the situation from different points of view.

group interviews). Interviews can be used to effectively accomplish two goals simultaneously:

1. to gather reliable information for resource assessment, and
2. to facilitate improved communication for community development and institutional strengthening.

Good communication allows all those involved in CRM to reach a common understanding, or at least see the situation from different points of view, thus greatly facilitating management planning decisions. The challenge for the CW is to communicate well with all those he or she comes in contact with. It is also the CW's job to help facilitate communication between all the people involved in CRM, from local resource users to national government officials. Good communication makes for accurate information and facilitates community development.

When interviews with individuals and groups are conducted while the other PCRA methods are being carried out, the specific objectives and information areas of concern vary from method to method. The overall improvement in communication and accuracy of information should however be a universal goal in all interview situations. In the initial stages, the communication is typically one-way, as the CW will be

the first to directly elicit information. As the process progresses, those being interviewed will themselves begin to learn about and from the interviewer, if not by asking questions directly, by inferring from the questions they are asked.

Furthermore, multi-channeled communication results in follow-up interviews where the CW asks for feedback on information gathered from other sources. The later PCRA activities, in which the CW refines the profile data by cycling through a group of stakeholders, often facilitate communication between all those involved in the process, with the CW serving as an intermediary and/or interpreter.

Although group interviews are less intimidating to communities and offer peer pressure to keep the story straight, it is sometimes best for CWs to first conduct interview work with individuals in the community, such as “key informants” or people who have been identified by local leaders as knowledgeable about coastal resources. A number of resource users having a wide range of specialties, such as spear fishing or fish farming, or having important knowledge over a long time span (elders) should be interviewed. This way, all local expertise can be drawn out. To help avoid the omission of small details, resource users from all over the management area should also be included.

Respect for the interviewee is essential. Respect your interviewee's time, personal opinions and intellectual property rights.

When CWs gain a basic understanding of the coastal resource system from the individual interviews, they can then initiate group activities. Group activities help improve the CWs' understanding and also raise the understanding of the workshop participants — and eventually the general public — of coastal resource management issues.

As all those that use this handbook are assumed to have had some training in conducting interviews, only a few more points need to be mentioned:

1. Respect for the interviewee is essential:
Respect your interviewee's time, personal opinions and intellectual property rights. Request permission to record interview data, even in notebooks, and especially when using video or audio recording equipment.
2. Always make a conscious effort to avoid judgment and bias. During the interview, record information exactly as the interviewee expresses it; there will be time for interpretation and analysis later.
3. Participatory action research is not the focus of this handbook, but it is every CW's concern to be aware of the importance of promoting a two-way flow of information between CWs and local

participants, and among participants themselves in group or workshop settings. Once local knowledge has been collected in an unbiased manner, CWs can begin sharing their understanding of various features of the coastal resource system with local fishers and eliciting local feedback. In a group setting, getting the group to arrive at a consensus on a particular piece of information usually requires that individual members share contrasting ideas and perceptions. Almost always, this entails changing and increasing local understanding and thus calls for considerable time and patience. To the extent possible, CWs should see themselves as learning together *with* the community, and not merely learning from or merely teaching local fishers.

Conducting household surveys

To be useful, surveys require more skills and knowledge than can be covered in this handbook. In many places, however, a good amount of survey work has already been accomplished by at least one NGO, or by a local or national government agency, and it may not be necessary to conduct a full survey. Even if the survey data are old, a quick sampling of a minimum of 10% of the households involved can help

CWs should see themselves as learning together with the community, and not merely learning from or merely teaching local fishers.

*Surveys are
most useful
when applied in
different ways
at different
times.*

illuminate significant changes in the community that have occurred since the survey was conducted. If no survey has been accomplished previously, some sort of survey may be required for PCRA to be really useful. In any case, all those involved in CRM should have a common understanding of the approximate values of important variables such as population, average cash and non-cash income, and especially the measures of coastal resource use, such as fish and seaweed harvests.

Surveys are most useful when applied in different ways at different times. At the start of a project, it is usually best to do a general survey, one that gives a broad overview of demography, livelihood, and community organizations, as well as general coastal resource information such as the types of resources harvested or cultured and their production amounts, the gears used in production, and the numbers of people involved in production. Later in the life of the project, more focused and specific surveys can be useful. By revealing the participants' exact preferences, attitudes and abilities, surveys at this point can help planners decide which projects and other interventions will work best in the community.

A guide to determining what exact information is important to glean from communities is presented in

the Appendix. Here, a Socio-Demographic Profile questionnaire and a Fishing Practices Survey form contain a comprehensive list of potential questions.

Identifying and classifying resources, habitats and other environmental factors

The identification and classification of coastal resources and other aspects of coastal communities is an absolute requirement for successfully completing the other methods of PCRA. If local resource users and professionals are to work effectively together, there must be a common understanding of what a certain local name or term corresponds to in the scientific world and vice-versa. For instance, confusion, and thus undesirable PCRA results, can occur when it has not been made clear what kinds of fish the general term *isdang bato* includes, or what exactly *bahura* means (see Definitions). In addition to common terms that have meanings that vary from place to place, there are often unique names used only in one locality. It is important therefore that the CW learns to properly present the information to outsiders.

In identifying the important elements of the coastal resource system, one is usually able to classify these elements to a certain extent and determine what structure links the various names and terms (Fig. 2.3).

This way, the CW gains insights into how local fishers perceive the coastal resource system and thus understands better the fishers' behavior — that is, their actions and decisions. For example, fishers in some communities might not consider *bakaw* (mangrove) to be a *yamang dagat* (literally: wealth or riches of the sea); if the CW is not aware of this, he or she may not be able to communicate his or her exact meaning when he or she uses the term *yamang dagat*. Or take one community where a *suno* is a kind of *lapu-lapu* (grouper), which is a kind of *isda* (finfish), which is a kind of *yamang dagat* (Fig. 2.3). If it is not clear to the CW that a *suno* is a kind of *lapu-lapu*, errors in estimating fish catches might occur, as the catch of *suno* reported by fishers might be counted as both a separate species and a part of the *lapu-lapu* catch.

The use of photographs or field visits to habitats are useful techniques to ensure that English and local terminologies refer to the same habitats. Habitat classification need not be hierarchical; initially, a listing will do. Later, with the use of diagrams and photos, features can be labeled and a better approximation of the habitat classification can be realized. Aside from the involvement of interpreters to ensure accurate communication, the assistance of natural scientists is also essential in gaining the necessary understanding

of the habitat regimes in each local area.

When classifying resources, uses, gear types, and conflicts or issues, it is best to approach each category sequentially at the start of the mapping exercise. The use of identification guides (especially on fish and shellfish) can help the CW to focus on the correct names for various resources. Uses and gear types need to be identified and described by the users; a field visit may be required to clarify the meaning of these terms.

Finally, a listing of issues should also be identified through mapping and interviews.

In summary, identification and classification should use the following sequence, from basic to more specific elements:

1. habitats
2. resources
3. uses (including gears), livelihood, opportunities
4. conflicts, issues or problems

These categories are also the key elements of the diagramming and mapping exercises to be described later.

When classifying resources, uses, gear types, and conflicts or issues, it is best to approach each category sequentially at the start of the mapping exercise.

RESOURCES

(Yamang Dagat)

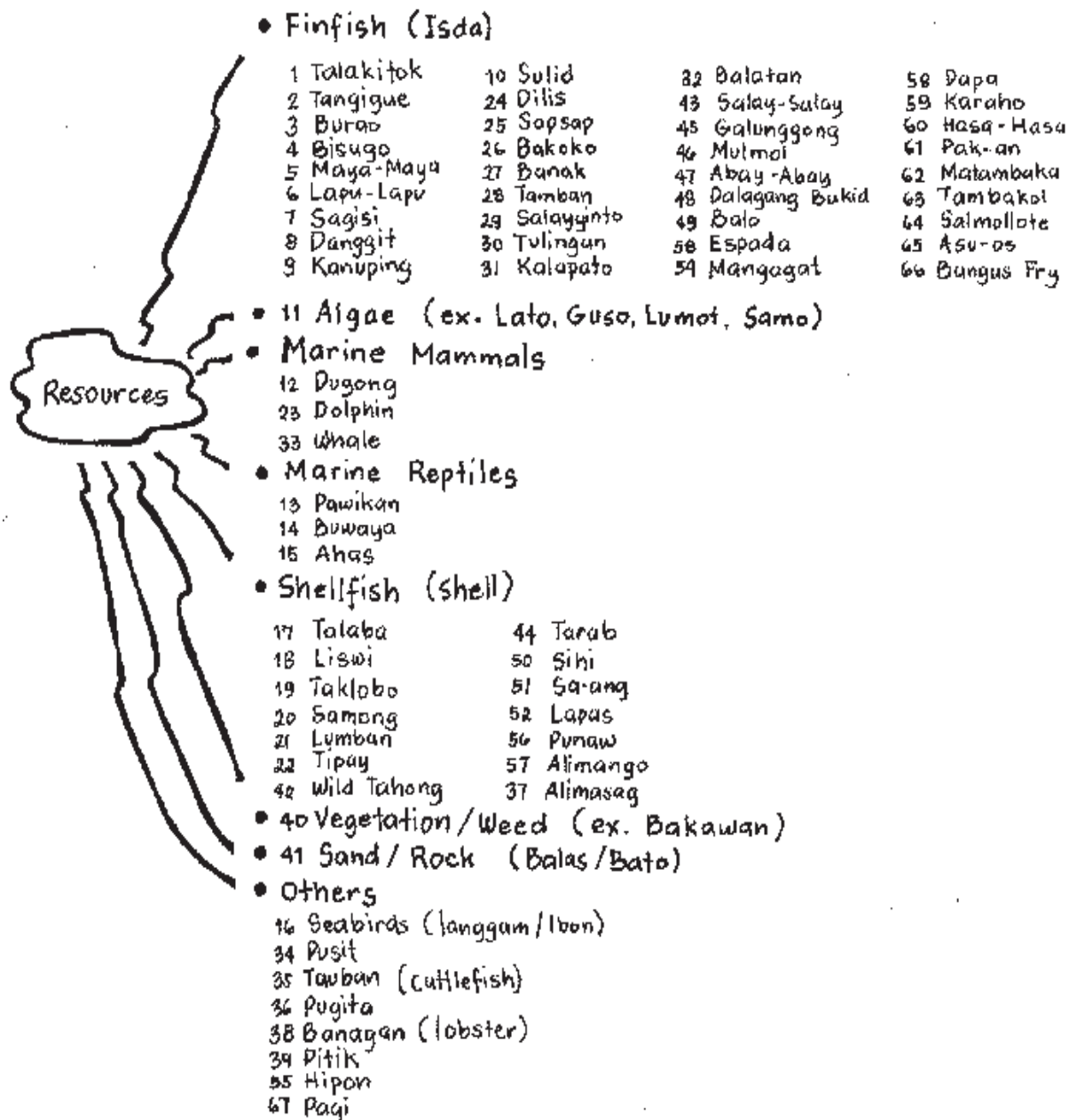


Fig. 2.3 Coastal resources of San Vicente, Palawan as identified by community participants.

The procedure for identifying and classifying environmental factors is relatively simple. It involves asking questions that progress from the most general to the most specific. This progression from general to specific is done to minimize any bias that may be introduced by the interviewer. Always remember that the initial focus of the interviewer should be on recording the knowledge of local stakeholders; there will be time later for interpretation and analysis of the data collected.

Before going into the interview proper, spend time simply listening to the local stakeholders discuss the coastal area and their livelihood. Visit the coastal area to further clarify terminology and concepts. Eventually, you should be able identify a set of terms that come up repeatedly and appear to be significant to the local knowledge system. Once you have collected several key terms from open-ended discussions, ask a series of successively more specific questions about these terms. This will help you learn more about the terms' local usage and the way they relate to one another.

If you are interested in identifying all the kinds of X that are important in a coastal community, this would be your first question:

1. *What kinds of X can one find in your area/ community?*

*Spend time simply
listening to the
local stakeholders
discuss the coastal
area and their
livelihood.*

***The tree diagram
that results from
carefully
documenting local
systems serves as
the key to
translating local
folk knowledge into
science.***

If A, B and C are identified as being kinds of X, then ask:

2. *What kinds of A are there? then: What kinds of B? and so on.*

To help in identifying and correlating local terms to scientific terms, one can ask:

3. *How does A differ from B, and C? and so on.*

After asking a number of these kinds of questions, you would be able to see a structure in the way the terms are related. You can draw a tree or cascade diagram that shows that A, B, and C are kinds of X, and that there are several kinds of As, Bs and Cs which appear to correspond to various scientific terms. The tree diagram that results from carefully documenting local systems serves as the key to translating local folk knowledge into science. In the example given above, *yamang dagat* is called the domain; it is the most general class to which the scientific equivalent of “coastal resource” belongs. *Isda* is a kind of *yamang dagat*. *Isda* is also a domain to which *lapu-lapu* belongs, which in turn serves as a domain for several specific kinds of *suno* (Fig. 2.3).

Once the local system is understood, it is important to find as many scientific equivalents as possible. This requires a discussion of the unique features of each

domain. Refer to photographs, pictures and actual samples or specimens to find out what local names correspond to in English and scientific naming systems. Browse through a book of photographs or drawings — this is useful in the identification and classification process, especially for living resources such as fish. Study samples of fish and other resources if these are available. Although photos and pictures are usually quite effective, samples are even better for identification purposes.

The general process of identification and classification can be applied to numerous elements of the coastal community beyond the coastal resources themselves. For example, for mapping exercises described in the next section to be effective, the local system of naming directions, habitats, land cover, and sea floor substrate must be elucidated. The procedure can also produce some interesting results when socioeconomic aspects, such as types of livelihood or production methods, are discussed.

Once a domain, such as *mga uri ng pinamamahayan o pinaninirahan ng mga yamang dagat* (types of coastal resource habitat), has been classified, it may be useful to discuss what makes each member of that domain unique, or what

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Habitat	Bakawan (mangrove)	Aplaya (beach)	Hibasan (tidal flat)	Damuhan (seagrass bed)	Bahura (reef / shoal)	Ilalim (deep water)
Management parameter						
Mga likas na kayamanan (natural resources)	alimango, tamilok, shells, manla	resort, shells, alimango (mangrove crab), pandan (<i>Pandanus</i>), niyog (coconut), nipa (<i>Nypa fruticans</i>)	hermit crab, tayong (sea urchin), balatan (sea cucumbers), shells, alimango (crabs)	seaweeds, fish - danggit, gono, banak, pusit banyaw-banyaw, bantol	isda (finfish), pugita (octopus), shells, banagan (lobsters), balatan (sea cucumbers)	isda (finfish)
Mga uri ng hanapbuhay, mga pagkakataon (types of livelihoods, opportunities)	pangisdaan (fishery), bahayan (place for houses), pantalan (pier location), gatong (firewood)	harvest and sell above, gawa ng banig, etc. (making mats, etc.) coco products, pawid (roof shingles), wine	sell balatan (sea cucumbers, dried)	harvest and sell above	harvest and sell above	harvest and sell above, fish deep reefs with compressor (not recommended)
Mga suliranin (problems, issues)	bawal magputol (cutting is illegal), nik-nik (biting flies/midges)	losing nyog (losing coconut trees)	none	more human disturbances of panti (gill net), bantol (stonefish)	sodium cyanide fishing, blast fishing, tubli (poisonous root used to catch fish), lagtang (poisonous plant)	trawlers, blast fishing, sodium cyanide fishing, tubli (poisonous root used to catch fish), lagtang (poisonous plant)

Fig. 2.4 Sample transect diagram from PCRA in San Vicente, Palawan.

distinguishes the different classes. One way of representing these distinguishing features is through a transect diagram (Fig. 2.4). Transect diagrams are representations of geographical cross-sections of coastal ecosystems or habitats ranging from deep water to beaches and mangrove areas. Along the horizontal axis of the transect are the habitats. Along the vertical axis are places to list resources, economic opportunities, and problems associated with each habitat.

When producing a transect diagram with fishers, prepare the diagram beforehand by drawing a grid and writing in the habitats already identified along the top and headings for resources and other factors down the left side. Then, before actually asking the fishers to fill in the diagram, explain to them how the diagram works. To illustrate, for *mga uri ng pinamamahayan o pinaninirahan ng mga yamang dagat*, for example, several classes have been identified in one community (Fig. 2.3). Using these classes in constructing a transect diagram helps produce information that is important to consider in CRM planning.

Transect diagrams also provide another spatial dimension to the mapping exercises described below. In the vernacular, transect diagrams may be likened to “fish eye” views of the habitats within a region.

Transect diagrams are representations of geographical cross-sections of coastal ecosystems or habitats ranging from deep water to beaches and mangrove areas.

Participatory mapping helps to point out spatial details and new information on features whose conditions vary over space or whose locations vary over time.

Mapping

Maps are some of the most important tools used in planning and implementing CRM projects. Without maps, it would be difficult to understand the many variables essential in planning. With maps, the extent and condition of resources and habitats can be represented and analyzed, zones for various uses can be plotted out, and infrastructure and other interventions can be spatially optimized and the localities for possible problems, issues, and conflicts identified. Moreover, spatial patterns of settlement, income levels, and other social variables can reveal opportunities and obstacles for CRM.

As with other PCRA activities, participatory mapping helps to point out spatial details and new information on features whose conditions vary over space or whose locations vary over time. Maps are also important visual media, allowing more effective communication between the stakeholders involved in CRM. They often help when verbal communication is constrained by differences in language, background, education and worldview. Indeed, mapping is one of the most appreciated and successful strategies for eliciting information from local resource users. The old saying “A picture is worth a thousand words” is, without question, true for the use of maps in CRM. All active coastal resource users must therefore understand maps and their spatial value.

Maps are most useful when they can be compared to maps of other areas and to maps of different scales. When the format of maps made through PCRA is consistent, such comparisons can show important similarities and differences between different management areas. Another advantage of a consistent or standardized mapping format is that maps of small areas, e.g. *sitios* (villages), can be combined or joined together to produce maps of a larger management area, such as an entire bay.

One format that has been used successfully divides the elements to be mapped (on one map) into five basic categories: habitats, resources, uses, issues, and other features. Habitats are shown as shaded areas. The next three categories are depicted on maps where they are known to occur as arabic numerals, letters, and letters with arabic numerals, respectively (in preparing the map for presentation and distribution, letters and numerals can be replaced with icons or symbols). The last category can be depicted as shapes or lines depending on the nature of the feature to be mapped. Table 2.1 lists examples of features that fall under these categories. Example maps are shown in Figures 2.5 and 2.7.

PCRA mapping can be divided into three basic types: sketch mapping, drawing over base maps, and field mapping. The standardized mapping format

*PCRA mapping
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field mapping.*

Table 2.1 Standardized format for PCRA mapping and sample elements.

ELEMENTS	FORMAT
Habitats (e.g. estuaries and lagoons, coral reefs, mangroves, seagrass beds, beaches)	Various colors used to shade areas on maps where habitats are reported to exist (Table 2.2)
Resources (e.g. mammals, reptiles, finfish, invertebrates [shellfish, crustaceans, etc.], seaweeds)	Arabic numerals (1, 2, 3...) placed over the location/s where the individual resources are reported to be found (Table 2.3)
Uses (e.g. gill net, spear fishing, reef gleaning, tourism, aquaculture)	Capital letter codes (T for traditional fishing etc.) placed over the location/s where individual uses are reported to take place (Table 2.4)
Issues (e.g. blast fishing, commercial fishing, pollution, mangrove clearing)	IS plus an Arabic numeral (1, 2, 3...) placed over the location/s where issues are reported to exist (Table 2.5)
Other Features (boundaries of sanctuaries, use zones, municipal/barangay jurisdictional boundaries, roads, freshwater sources, artificial reefs, islands, river mouths, deep channels)	Various colors and line styles (dashed, dotted, solid and others) used to depict the location of other important features of the management area

shown in Table 2.1 can be used in all three types. CWs can conduct mapping activities either with an individual or a group. The basic procedures are the same with individuals as with groups, except that group activities have the added consideration of group dynamics that can work either for or against — or both for *and* against — the success of the activities. At this stage, the local ways of referring to resources, places and habitats should already be known to CWs. The classification system in Table 2.1 can be used in all mapping

exercises to minimize confusion and maximize local input.

Sketch mapping. Sketch maps are freehand drawings that can reveal much about both the coastal areas represented in the maps and the people who draw them (Fig. 2.5, Fig. 2.6). They can be particularly useful in the early stages of PCRA. Since these maps start as a blank piece of paper, they provide the least biased view of how fishers perceive their surroundings; they provide, in other words, a glimpse of the fishers' "mental maps" of the coastal environment.

Sketch maps are easy to make. Provide a large, blank piece of tabloid (28 cm x 43 cm) or larger size paper, marking pens, and a comfortable place to draw. Many people tend to start drawing at a scale that is too large for the size of the paper provided, so they run out of room to draw all the area they intend to. To compensate for this, use a light-colored pencil to draw a box on the paper, leaving wide margins on all sides. Tell the mapper to try to keep his drawing inside the box and use the margins only if necessary.

Fishers often find it easiest to draw first those features of the coastal area that are most familiar to them, e.g. the way from their home to the market or to their fishing grounds. Distinct geographical features,

Sketch maps provide the least biased view of how fishers perceive their surroundings.

such as bays, river mouths and islands, are also good starting points. When prompted to draw these features, fishers typically draw the coastline first and then add other features such as reefs, mangroves, rivers, roads, and settlements voluntarily or with prompting from the CW. To avoid confusion, use the local ways of referring to resources, places and habitats. Coastlines are best drawn in black ink with other colors (e.g. red, green, brown) being most easily recognized as reefs, mangroves, roads and other features (Fig. 2.5).

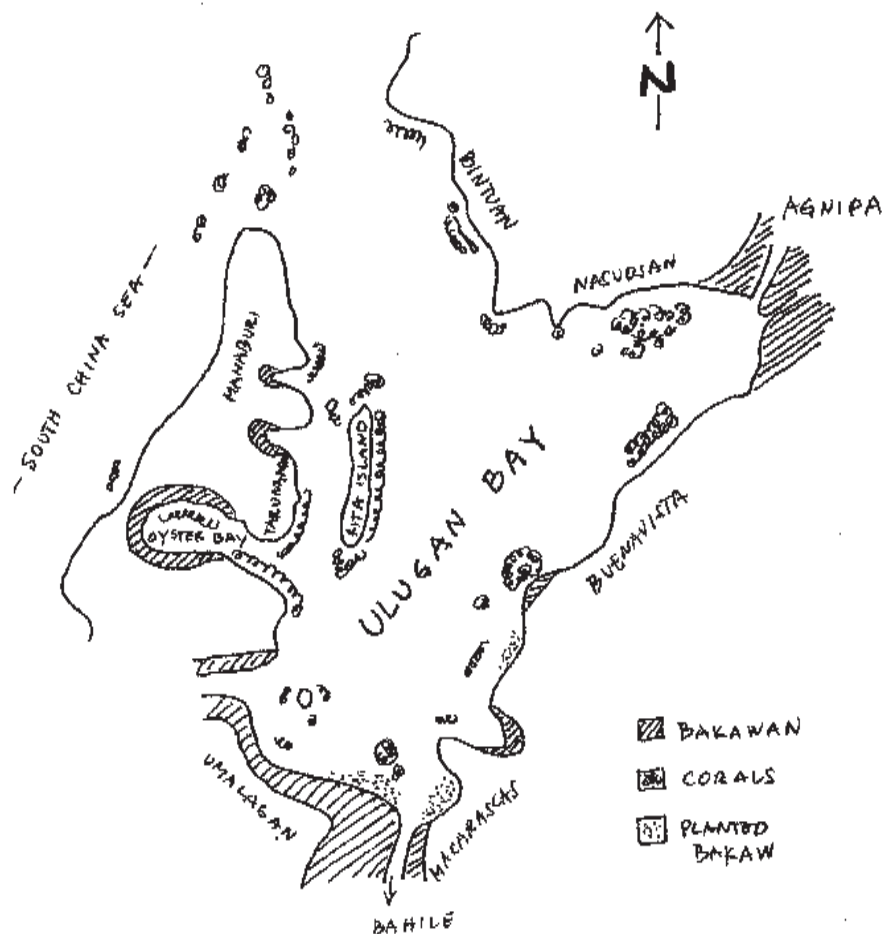


Fig. 2.5 Sample sketch map from PCRA in Ulugan Bay, Palawan.

Sketch maps are most useful in locations or cases where base maps and aerial photos are not available and where there is a lack of knowledge or understanding of local resource users' perception on habitats and resource uses. Sketch maps also offers perspective on those elements that are most important to the local communities participating in the sketch mapping exercises.

Drawing on base maps. A base map is a map of selected features such as coastlines, roads, and villages. It serves to orient the mapper to the area and provides a consistent scale for the mapper to draw in additional features such as reefs, mangroves, fishponds, fishing grounds, and locations of stationary fishing gears such as *baklad* (fish corrals). Base maps are often produced by government geological or navigation agencies. If the precision and the scale used are adequate, these maps serve as the best vehicle for accurately representing a variety of environmental elements such as habitats, uses, resources, issues and conflicts.

Using a map produced by NAMRIA or other professional mapping agency as a guide, prepare the base map in advance of the mapping activity, ideally on a tabloid-size tracing paper. The basic goal is to

*Base maps
serve as the best
vehicle for
accurately
representing a
variety of
environmental
elements.*

It is usually best to discuss the base map with the fishers before mapping starts.

produce a spatial guide to the area, leaving out those features that the fishers can fill in. A base map with predrawn black lines representing coastlines, rivers and roads and general bathymetry is generally sufficient to orient the mapper, allow useful comparison between maps, and ensure largely unbiased mapping of important features such as those listed in Table 2.1.

The best map scales to use depend on the size of the area to be mapped. For mapping barangay coastal waters, the best maps to trace have scales that range from 1:5,000 to 1:50,000; for mapping at the municipal level, 1:30,000 to 1:100,000 scales are probably the best. NAMRIA produces a series of topographic maps at a scale of 1:50,000 – these are the best available for creating base maps. The agency’s nautical charts, available at a various scales, are also useful.

It is best to choose a scale that allows each distinct coastal area unit to be mapped to fit a tabloid-size sheet of paper. At a scale of 1:50,000, a coastal area measuring 15 km by 25 km fits well on this paper size. Smaller areas can use a scale of 1:5,000 to 1:20,000, while larger areas will require a scale of 1:100,000.

Many maps from which base maps are traced, e.g. NAMRIA topographic sheets, show more details than those required in the PCRA base map. Details such as

locations of reefs and mangroves (except for bathymetric contours), for example, should not be traced onto the base map, or it will defeat the purpose of the mapping activity, which is to learn what local fishers know about the coastal environment and not what is reported by professional mapping agencies. The maps drawn by the fishers can be compared later with those done by professional cartographers.

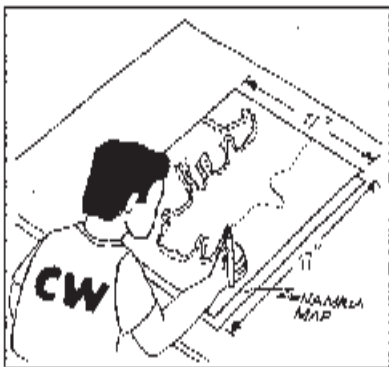
After completing the base map, make several photocopies (also tabloid size) that can be drawn over by participating fishers. Orient participants before the mapping begins. Most fishers quickly understand the exercise, but mapping the coastline, especially mangroves, can sometimes be confusing. It is therefore usually best to discuss the base map with the fishers before drawing starts (Fig. 2.6).

Tape the map to a table, then cover with mylar tracing paper in preparation for mapping the elements. Begin with the mapping of habitats (including mangroves); this eliminates confusion regarding the location of the shoreline. Because habitats take up distinct areas, it is best to shade each type using color pencils. Most maps from which base maps are traced have coastlines that define the area above water at low tide — this should be explained to the fishers before they start. Explain that mangrove swamps, sand

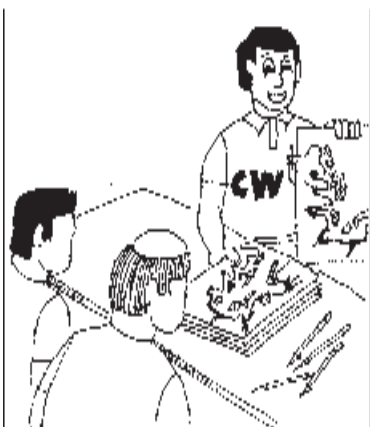
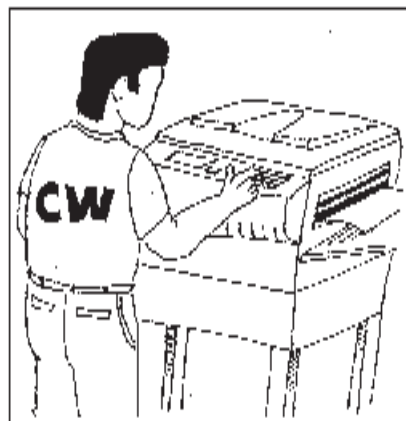
For mapping barangay coastal waters, the best maps to trace have scales that range from 1:5,000 to 1:50,000.

For mapping at the municipal level, 1:30,000 to 1:100,000 scales are probably the best.

Create master or original base map by tracing coastlines, roads, and rivers from a NAMRIA or other map.



Make several photocopies (28 cm x 43 cm) of the original base map.



Discuss map and compare with maps from other sources.



Explain base map and orient fishers on mapping activities.

Let fishers draw features of the coastal environment based on their local classification system.

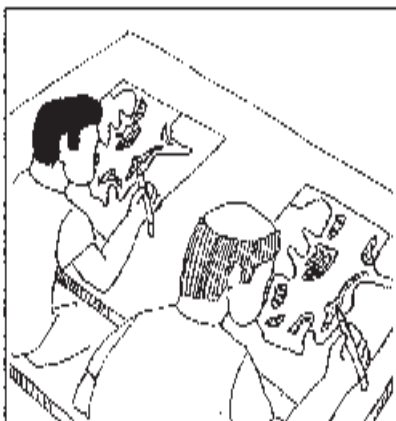


Fig. 2.6 Procedure for drawing on base maps.

bars, and other features exposed at low tide are all on the “inside” or inland side of the coastline and should be drawn accordingly.

It is useful to arrive at a set color scheme and codes that all participants will use for all the features mapped. Recall the necessity of choosing features to be mapped that arise from previously determined local classification systems for coastal resources, habitats, and other factors. In drawing the maps, it is especially important to use colors to differentiate all the various local classes. Using colors can help differentiate the location of reefs, rocks and other resources, and the relative condition of resources and habitats. For example, reefs with relatively higher live coral cover can be differentiated from those without live coral cover, or mangroves with significant remaining old growth can be distinguished from those having mostly secondary growth. Following the standardized mapping format previously discussed, numbers, letters and symbols can be used to indicate locations associated with various resources, uses, and issues.

Five types of mapping elements that are generally accepted and understood in CRMP project areas include:

It is useful to arrive at a set color scheme and codes that all participants will use for all the features mapped.

1. **General information.** This may include coastline, islands, bathymetry, topography, roads usually found on most maps published by the government. To help orient the local map producers on the scale and precise location of additional map elements, include general information and label key features on the maps.
2. **Habitats.** These are usually mapped next using color pencils to color-code the different habitats (e.g. light green for seagrass, yellow for beach, brown for rocky shoreline). (Table 2.2)

Table 2.2 Color codes used in PCRA maps of CRMP Learning Areas.

Habitats - color codes (12)	
Mangrove	- dark green
Seagrass	- light green
Beach	- yellow
Rocky shoreline	- brown
Mudflats	- black
Inshore flats	- orange
Coral reef	- red
Estuary	- blue
Marine waters	- light blue
Passes/channels/deep ocean	- dark blue
Offshore sandbar	- yellow green
Terrestrial area	- light yellow

3. **Resources.** These are usually mapped after the habitats. Resources are elements (e.g. fish, shellfish, rock, wood) that provide food and other materials of tangible value to local

communities. An arabic numeral code is used for mapping resources, with each type assigned a number. For large resource areas, arrows can extend the range of resources beyond the location on the map where a number is placed. A large variety of resources may require knowledge of names and reference to guide books (Table 2.3).

4. **Uses, livelihood, opportunities.** These include sites (e.g. fishing gear areas, gleaning sites, mining areas, mangrove cutting, sacred sites, shore protection, parks) where activities are accomplished or where opportunities or functions provide potential benefits to communities. It is best to use a letter coding system, assigning a letter to each type of “use”. Keep in mind, however, that some letters can be confused with some numbers and should not be used (for example, the letter “O” can be mistaken for the number “0”, and the letter “I” for the number “1”). (Table 2.4)
5. **Problems, issues and conflicts.** These are last to be mapped because they logically follow the mapping of resources and uses, and because they are the most abstract of the mapping elements. The capital letters “IS” followed by a number may be used to represent

*Mapping is
best handled
as a group
exercise.*

Table 2.3 Common coastal and marine resources and suggested numerical codes.*

Resources		
Birds, Mammals and Reptiles (1-100)		
ENGLISH	LOCAL	FAMILY
Crocodiles	buaya	Crocodylidae
Dolphins	lumod, balakiki, lumba-lumba, mayahon, kabang	Delphinidae
Dugong	dugong	Dugongidae
Seabirds	kanaway, tirik, tabon, yuho, talingting, manaol, lapay, ok-ok, du-ong	
Sea snakes	tangkig	Hydrophiidae
Sea turtles	pawikan	Cheloniidae
Whales	balyena, bongkaras	Balaenopteridae
Fish (101-300)		
Anchovies	bolinao, boris, dilis, libud, tuakang	Engraulidae
Angelfish	alibangbang, baro-baro, boray-boray, paruparo	Pomacanthidae
Anglerfish and frogfish	noog-noog	Antennariidae
Anthiases, basslets	minyat-minyat	Serranidae
Archerfish	ananabing, anunuput, ataba, bang-ga, kataba	Toxotidae
Bandfish	upos-upos	Cepolidae
Barracudas, seapikes	lusod, rompe kandado (large-sized), tursilyo	Sphyraenidae
Batfish, leaffish	bayang, dahong-gabi, dalipugan, muray-muray	Ephippidae
Bigeyes, bullseyes	baga-baga, bocao, buan-buan, matahari	Priacanthidae
Billfish (swordfish, spearfish, marlins, sailfish)	malasugi, dogso, liplipan, lumod, mayaspas, pahabela	Xiphiidae, Istiophoridae
Blennies	pawog, tiki-tiki, tanghaw, tingo-tingo	Blenniidae
Bonefish	bidbid, tigi	Albulidae
Butterflyfish	paruparo, alibangbang, saguranding	Chaetodontidae
Cardinalfish	bungka, dangat, mo-ong, parangan, suga	Apogonidae
Clownfish, anemone fish	bantay-butbut, mangkot, palata	Pomacentridae
Conger eels	banusak, obod, ogdok, palos, pindanga	Congridae
Cornetfish	dahog-tubo, droal, sunugan, tihul-tihul, tubo-tubo	Fistulariidae
Croakers	abo, alakaak, dulama, ibot, kabang, lagis, silay	Sciaenidae
Damselfish	baro-baro, ulan-ulan, puyong dagat, pata, bika-bika	Pomacentridae
Dolphinfish	dorado, lumbag, marang, pandawan	Coryphaenidae
Dottybacks	hingasan, tingasan	Pseudochromidae
Dragonets	bugo, banto, noog-noog, talimusak	Callionymidae
Eagle rays and cow-nosed rays	pagi-manok, palimanok, paol, bulik, banugan	Myliobatidae, Rhinopteridae
Eel blennies	batad, tamayo	Congrogadidae
Eel-tailed catfish	alimusang, balibot, hito, patuna, sumbilang	Plotosidae
Emperor breams	bagangan (young), bitilya, katambak, kirawan, madas, dugso, bakuktut, sapingan	Lethrinidae
False trevallies	algodon, pagapa, papaga, pelyan, rigudon	Lactariidae
False whittings, blanquillos	banghutun, matang dagat	Malacanthidae
Flagtails	aligaman, buan-buan, bulan-bulan, ramagan	Kuhliidae
Flatfish (soles, halibuts, flounders)	tambiki, palad, dalidali, tampal, dapa, kalangkao, malapalad, papang sinilas, hagudila, dapang bilog	Soleidae, Psettodidae, Cynoglossidae, Bothidae,
Flatheads	dapang kawayan, tatampal	Paralichthyidae
Flying fish	isdang buwaya, sunog, sunongan, lubalab	Platycephalidae
	aliponghok (fingerling), antulihaw, bangsi, barongoy, bolador, eliu, laniu	Exocoetidae

*Arabic number ranges are suggested for each group of resources, specific numbers can be assigned to a particular resource at the time of mapping.

Fork-tailed catfish	bongoan, kanduli, tabangongo, tabanko	Ariidae
Fusiliers, bananafish	bilason, butlogan, dalagang bukid, sinao-an, sulid	Caesionidae
Garfish, needlefish	balo, dugso, doal, mangansing, batalay, sinao-an	Belonidae
Goatfish	saramulyete, senok (young), tiao, timbungan	Mullidae
Gobies, sleepers	biya, tambo-tambo, tiao, senok (young)	Gobidae, Eleotrididae
Groupers, seabasses, perchlets	lapulapu, kugtong (large sized), suno, señorita, tingag, tirang, dolit, lilig, taleti-on, kobe, turnutulin, garopa	Serranidae
Guitarfish, shovelnose rays	bariwan, pating-sudsud	Rhinobatidae
Hairtails, cutlass fish	balila, liwit, lahing, espada, langkoy	Trichiuridae
Halfbeaks	bamban, buging, kasusuwit, sasa, sausid	Hemiramphidae
Hammerhead sharks	bingkungan, kodosan, kurosan	Sphyrnidae
Hardtails	atulay, adlo, kalapeon, pakan, oriles	Carangidae
Hawkfish	katambak-buak, ngisi-ngisi, ungo-ungo	Cirrhitidae
Jacks, cavallas, crevalles, trevallies, darts	damis, tawa-ay, baho-olo, salay-salay, barilason, pampano, talakitok, lagidlid (young), pagapa, makaagum, trakito, bitilya, badlon, mamsa tabangka	Carangidae
Jawfish		Opistognathidae
Leatherjackets	salindato, yapis, lari	Carangidae
Lizardfish	kalaso, salantiki, talho, tiki-tiki, bubule	Synodontidae
Manta rays, devil rays	sanga, mantihan, piantaihan, salanga	Mobulidae
Milkfish	banglis, banglus, bangus, awa, sabalo	Chanidae
Mojarras, silver biddies	batuhan, batuhanan, batuhanon, malakapas	Gerreidae
Monos, silverbat fish	muray-buray, duhay, kambing-kambing	Monodactylidae
Moonfish	bilang-bilong, chabita, habas, sapatero, tabas	Menidae
Moorish idols	alibangbang, sagurading, kalmin-kalmin	Zanclidae
Moray eels	hagmag, hangit, hawig, ogdok, pananglitan	Muraenidae
Mudskippers	talimusak, tamasak, tambasakan	<i>Periophthalmus</i> , <i>Boleophthalmus</i>
Mulletts	balanak, banak, gagapan, gapang, pili, gisao	Mugilidae
Parrotfish	aliyakyak, bon-ak, bungalog, loro, mulmul	Scaridae
Pomfrets, butterfish	pampano, kambing-kambing, sandatan	Formionidae, Stromateidae/Carangidae
Porcupine fish	butete, duto, karatungan, tagutuman, utik	Diodontidae
Pufferfish	boriring, butete, langigidon, tikong, tinga-tinga	Tetraodontidae
Rabbitfish, spinefeet	danggit, kitung, layap, samaral, tagbago	Siganidae
Remoras	parikitugit, parakitugit, parakit, banka, kini	Echeneididae
Rudderfish, drummers	hak, lupak, ilak	Kyphosidae
Runners	salmon, lapi, bansikol, solinaw	Carangidae
Sardines, herrings, sprats gizzard shads	tamban, tunsoy, toy, haol-haol, helos, kabasi mararapad, lupoy (fry), siliniasi (fry)	Clupeidae
Sawfish	taghan, tagan, gabsan, ihong gabsan	Pristidae
Scads	galunggong, borot, matangbaka, hagumaa, gutlob	Carangidae
Scorpionfish, lionfish, turkeyfish, stonefish	bantol, gatasan, lalong, lawag, lawong, lolong, ngisi-ngisi, noog-noog, tunok	Scorpaenidae
Seabasses, sandbasses sea perches, barramundi	bulgan, katuyot, matang pusa, apahap	Centropomidae
Sea breams, porgies	bisong tabo, gapas-gapas, mahuwana, kuwa	Sparidae
Seahorses, pipefish	kabayo-kabayo, hingiki sa buaya, hingiki, dagum-dagum, kulbog	Syngnathidae
Sea-haarders, bonnetmouths	inlis, lubintador, uan-uan	Emmelichthyidae
Sergeant majors	kapal, puong dagat, preso-presno	Pomacentridae
Sergeantfish, cobias	dalag dagat, kume, pandawan, tase, gile	
Sharks	bagis, iho, lahos, lahoy, pating, tanguiguihon	Lamnidae
Shrimpfish, razorfish	isdang laring-laring, sipul-sipul	Centriscidae

Sicklefish	bayang, kalmin-kalmin, kilyong, mayang, pasyon	Drepanidae
Silversides	langaray pako, guno	Atherinidae
Slipmouths, ponyfish	laway-laway, lumu-an (large sized), palangan (large sized), parutpot	Leiognathidae
Snake eels	igat, ogbok, ukdok	Ophichthyidae
Snake mackerels	aswang, langpoy	Gempylidae
Snappers, sea perches	aha-an, auman, lagan, mangagat, maya-maya	Lutjanidae
Soapfish	lumoan	Grammistidae
Spadefish, scats	kitang, kikiro, langkia, ngisi-ngisi	Scatophagidae
Squirrelfish and soldierfish	sigá, baga-baga, ganting, suga-suga	Holocentridae
Stingrays, skates, electric rays	pagi, dahonan, pantikan, kiampao	Dasyatidae, Rajidae, Torpedinidae
Surgeonfish, tangs, unicornfish	alibangbang, bagis, bakwak, bongkokan, indangan, kadlitan, kalmin-kalmin, labahita, mungit, pelason, saguranding, songhan, tudlo-an	Acanthuridae
Sweepers	tabas, sundang-sundang	Pempherididae
Sweetlips and grunts	bakoko, kanwo, olay-balay, pasinko, lipte, agoot, alatan	Haemulidae
Tarpons	awa-awa, buan-buan, bulan (small-sized)	Megalopidae
Tenpounders	alho, bidbid, bidbir	Elopidae
Therapons, tigerfish	bugaong, gonggong, langbu, bungao, dukuson	Theraponidae
Threadfins	kumehan, mamale, mamaleng bato, midbid	Polynemidae
Threadfin breams, spinecheeks	bisugo, lambado, lagao, sagisi-on, bakay, silay	Nemipteridae
Tilefish	bisugong kabayo, tangaron, matang dagat	Branchiostegidae
Triggerfish and filefish	pakol, pugot, saguk-suk, sulaybagyo, ampapagot	Balistidae, Monacanthidae
Tripletails	kapkap bato, ligad	Lobotidae
Tripodfish	sungay-sungayan, sulay-bagyo, musi	Triacanthidae
Trumpetfish, flutemouths	droal, dahug-tubo, tubo tubo, sunugan, tihul-tihul	Aulostomidae
Trunkfish, boxfish	tabaong, tabayong, obuluk	Ostracionidae
Tunas and mackerels	tulingan, bariles, bankulis, alumaan, tangigue, hasa-hasa, burao, kabalyas, tambakol, pirit, karao	Scombridae
Whale sharks	balilan, iho-tiki, tuki-tuki, tawiki	Rhincodontidae
Whitings, sillagos	asohos, oso-os	Sillaginidae
Wolf herrings	ballila, balira, parang-parang	Chirocentridae
Wrasses	bagondon, bugok, bungat, ipos-ipos, labayan, lakhoy, lamon-lamon, lupit, maming	Labridae
Shells (301-400)		
Abalones	kapinan, lapas	Haliotidae
Ark shells	batotoy, suod-suod, tipay	Arcidae
Auger shells	sungkod-sungkod, honsoy-honsoy	Terebridae
Bubble shells	poki, buan-buan, litub, lumo, wasay-wasay	Bullidae
Carditas	tikud-tikud	Carditidae
Cockles	bisong-bisong, bug-atan, imbao, kasing-kasing, litub, pagapan	Cardiidae
Comb oysters, oysters	basa, sali-ot (small), sisi	Ostreidae
Conches	balo-balo, bao-bao (small), sa-ang, habasan	Strombidae
Cone shells	habasan, liswi	Conidae
Coral snails	tanghuwa	Magilidae
Cowries	katipan, lumban, poki, buwao	Cypraeidae
Dolphin shells	taktakon	Angariidae
Egg shells	poki	Ovulidae

Fig shells, pear shells	tanghuwa	Ficidae
Frog shells	guba-guba	Bursidae
Giant clams	basa (small), hagdanan, sali-ot (small), taklobo, tilang	Tridacnidae
Harp shells	sinaw	Harpidae
Helmet shells	budyong	Cassidae
Horn shells	pao-pao	Potamididae
Jewel boxes	tikud-tikud	Chamidae
Melon shells, volute shells	kibol	Volutidae
Miter shells	amo-amo, anikad, aninikad, guyod, paitan	Mitridae
Moon shells	buan-buan	Naticidae
Mussels	bahong, tahong, tahong-tahong	Mytilidae
Olive shells	dalinasan	Olividae
Pearl oysters, wing oysters	amahong, talaba, tipay	Pterridae
Pen shells	tarab	Pinnidae
Periwinkles	saka-saka, guba-guba, torong-torong	Littorinidae
Rock shells	guba-guba	Thaididae
Scallops	paypay, tipay	Pectinidae
Slit shells, turret shells	sungkod-sungkod	Turridae
Spindle shells	sungkod-sungkod	Fasciolaridae
Staircases, sundials	lagang	Architectonidae
Thorny oysters	tikud-tikud	Spondyliidae
Top shells	amongpong (small), samong, tandok	Trochidae
Tritons	tambuli	Cymatiidae
Tun shells	tanghuwa	Tonnidae
Turban shells	lumban, pidjong-pidjong, piyong-piyong, nasa	Turbinidae
Venus shells	bugatan, halaan, imbao, punaw	Veneridae
Whelks	nasa	Buccinidae
<u>Other invertebrates (401-500)</u>		
Coconut crabs	alikway, tatus	Coenobitoidea
Cuttlefish	baghak, kobotan, kolambutan, tauban	Sepiidae
Large shrimps and prawns	hipong puti, lukon, pasayan, sugpo	Penaeidae
Mantis shrimps	kamuntaha	Squillidae
Mud/mangrove crabs	alimango	Portunidae
blue crabs	alimasag, kasag, lambay, masag	
Nautilus	lagang	Nautilidae
Octopuses	kugita, pugita, tabugok	Octopodidae
Sea cucumbers	balat, balatan, bat, trepang	Holothuridae
Sea urchins	tuyom	Diadematidae
	suwaki	Toxopneustidae
Shovel-nosed/slipper lobsters	banagan	Therididae
Small shrimps	alamang, balao, hipon	Sergestidae
Spiny rock lobsters	banagan	Palinuridae
Squids	nokus, noos, pusit	
giant red squids	alopapa, dalopapa	Loliginidae
Starfish	koros-koros, padpad, dap-ag	Oreasteridae

T28	Pole and lines	T38	Set longlines
T29	Pull nets	T39	Skimming nets
T30	Purse seines	T40	Snares
T31	Push nets	T41	Spears
T32	Rakes and dredges	T42	Stop seines
T33	Reef seines	T43	Trammel nets
T34	Ring nets	T44	Trap nets
T35	Round haul seines	T45	Troll lines
T36	Scoop seines		
T37	Scoops		

Illegal Fishing/Uses (IF1-IF50)

IF1	Drive-in net with bamboo/tree trunk scare devices (<i>kayakas</i>)	IF12	Harvest of manta rays
IF2	Drive-in net with weighted scarelines (<i>muro-ami</i>)	IF13	Harvest of marine turtles and eggs
IF3	Electrofishing	IF14	Harvest of milkfish (60cm and over)
IF4	Explosives	IF15	Harvest of triton shells (<i>tambuli</i>)
IF5	Fine mesh nets (less than 3 cm) for unexempted species	IF16	Harvest of whale sharks
IF6	Fishing in closed areas (e.g. fish sanctuaries, limitation on baby trawls, etc.)	IF17	Not honoring closed seasons
IF7	Fishing without license	IF18	Other gears (banned by local legislation, like baby trawls, modified Danish seines, beach seines, compressors, etc.)
IF8	Harvest of dolphins	IF19	Pantukos (<i>tuckseine</i>) with torch and/or flammable substance
IF9	Harvest of giant clams (<i>taklobo</i>)	IF20	Poisons/obnoxious substances
IF10	Harvest of helmet shells (<i>budyong</i>)	IF21	Superlights within municipal waters
	Harvest of <i>kapis</i> (<i>Placuna placenta</i>) <80mm using mechanical rakes, dredges and motorized boats	IF22	Unauthorized commercial fishing within municipal waters

Legal but controversial fishing methods (perceived as destructive/depletive) (C1-C10)

C1	Beach seines
C2	Compressors
C3	Drive-in nets with various scaring devices
C4	Modified Danish seines
C5	Other drag nets
C6	Trawls

Other Uses and Activities (A1-A50)

A1	Airports
A2	Anchorage
A3	Banana plantations
A4	Breakwaters
A5	Coconut farms
A6	Drainage canals
A7	Educational reservations
A8	Fish cages
A9	Fish landings
A10	Fish pens
A11	Fishponds/shrimp ponds
A12	Historical sites
A13	Human settlements/built-up areas
A14	Industrial estates
A15	Lighthouses/beacons
A16	Limestone quarries
A17	Mangrove plantations

A18	Mangrove timber cutting	
A19	Military stations/bases	
A20	Mineral extraction	
A21	Navigation channels	
A22	Nipa harvesting	
A23	Nipa plantations	
A24	Oil refinery/depots	
A25	Orchards	
A26	Port/pier/wharf/marina	
A27	Power stations	
A28	Protected areas (formal and informal)	A29
Public laundry areas		
A30	Public parks/plazas	
A31	Research stations	
A32	Resorts	
A33	Rice paddies	
A34	Roads, bridges	
A35	Salt beds	
A36	Sand and gravel extraction	
A37	Seawalls	
A38	Seaweed culture	
A39	Shellfish culture	
A40	Waste dumps/outfalls/effluent discharges	
A41	Watchtowers/observation platforms	

Table 2.5 Common CRM issues and suggested codes (IS1-IS100).

IS1	Abandoned/unproductive fishponds	IS30	Lack of legislation
	Beach/shoreline erosion	IS31	Lack of organization
IS3	Breakage of corals	IS32	Lack of security of tenure of land and/or home lot
IS4	Closed access to sea	IS33	Lack of social services
IS5	Coliform pollution	IS34	Landslide
IS6	Coral bleaching	IS35	Loss of rare/endangered species
IS7	Coral extraction	IS36	Low awareness
IS8	Crown-of-thorns epidemic	IS37	Low prices of fishery products
IS9	Declining fish catch	IS38	Mangrove conversion
IS10	Decreased estuary circulation	IS39	Mangrove overharvesting
IS11	Defoliation/loss of vegetation	IS40	Nipa overharvesting
IS12	Destructive fishing	IS41	Oil spills
IS13	Deterioration of aesthetic quality	IS42	Overfishing
IS14	Diversion of fresh water	IS43	Pesticide pollution
IS15	Dredging	IS44	Piracy
IS16	Encroachment on the fishing ground by outsiders	IS45	Reclamation
IS17	Eutrophication	IS46	Red tide
IS18	Fish diseases	IS47	Salt water intrusion
IS19	Fish kills	IS48	Shellfish contamination
IS20	Fishing gear conflicts	IS49	Siltation
IS21	Flooding	IS50	Smuggling
IS22	Heavy metal pollution	IS51	Theft of fishing gears and accessories
IS23	High cost of fishing inputs	IS52	Upland erosion
IS24	Hunting	IS53	Use conflicts
IS25	Illegal fishing	IS54	Use rights conflicts
IS26	Illegal fishponds	IS55	Waste dumping
IS27	Increased estuary salinity	IS56	Water turbidity
IS28	Lack of alternative livelihood activities	IS57	Weak organization
IS29	Lack of law enforcement	IS58	Wildlife trade

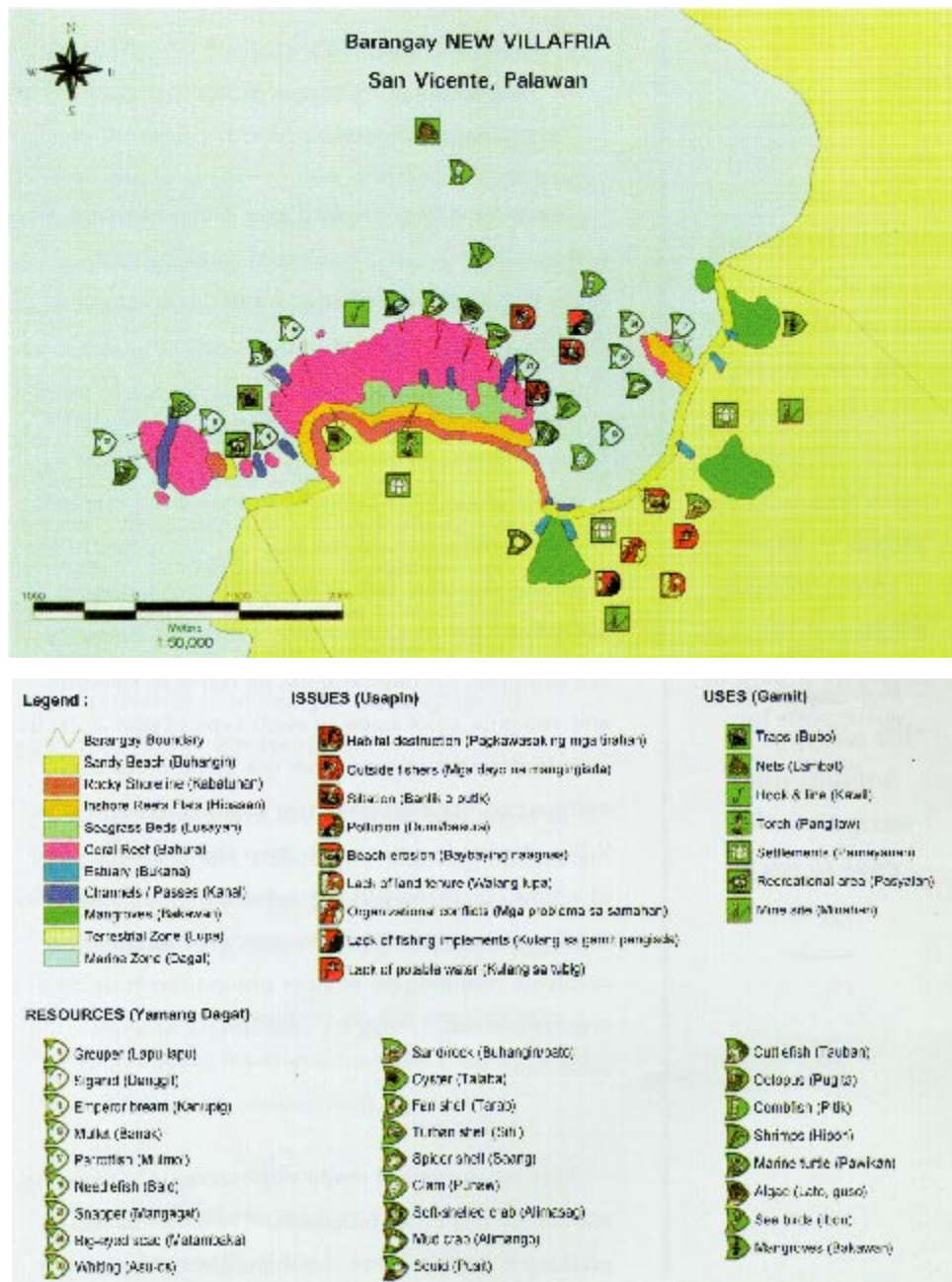


Fig. 2.7 Completed map for one barangay from PCRA in San Vicente, Palawan which has been digitized in a computer program using symbols for resources, uses and issues.

=====
*For habitats,
list all types of
habitats and
assign a color
code to each
type.*
=====

the issues. (Table 2.5). A finished map is shown in Figure 2.7 which uses symbols.

Mapping is best handled as a group exercise. Peer pressure and group consultation lead to better understanding of terminology and more accurate location of map elements.

Place the base map on a table (Fig. 2.6). Take away all chairs to provide as much open space as possible around the table. This allows the mappers to move freely around the map as they perform the mapping exercise. Before mapping each category, review the list of all elements within the category. For example, for habitats, list all types of habitats and assign a color code to each type (Table 2.2). Be sure that no two types have the same color code and that colors are distinct to avoid confusion later. When the list is completed, map the elements, one at a time, preferably in the order that they appear in the list. In cases where few resource users are involved, mapping by smaller groups, such as on a one-on-one basis, may be appropriate or even essential.

Making signboard maps or posters. For planning, education and other purposes, it is often useful to produce a large map of the management area on a signboard or poster. Signboard maps are

usually produced in a group setting after fishers have finished drawing over the tabloid-size base maps. The exercise is similar to that of drawing over base maps, except that the base map used is much larger and usually prepared in a different way. Signboard maps should be at least 120 cm x 120 cm and are best made of marine plywood with a 2.54 cm (1 inch) or larger trim or frame around the edges to give it strength and durability. It is best to hire a professional signboard artist to prepare the signboard base map, but a resourceful CW or community member can also handle the job (Fig. 2.8). Since it is impossible to trace through a signboard, the lines of the map must be transferred from a reference map using a “scaling” or grid technique. Follow the steps below:

1. On a tabloid-size (28 cm x 43 cm) sheet of paper, prepare a base map showing coastlines and a few other features, such as rivers and roads, to help orient the participant mappers.
2. Draw a grid of squares on the map so that each square measures no more than 2.54 cm x 2.54 cm (1 square inch).
3. Calculate a multiplication factor by dividing the length of the longest side of the base map into the length of the longest side of the area in

Signboard maps should be at least 120 cm x 120 cm and are best made of marine plywood with a 2.54 cm (1 inch) or larger trim or frame around the edges to give it strength and durability.

Locally drawn maps can add critical details and locally significant and relevant features that make them useful for CRM planning purposes.

which the map is to be drawn on the signboard (leave space on all the edges of the signboard for a border).

4. Multiply the size of the squares on the paper base map by the multiplication factor to calculate the corresponding size of the squares to be drawn on the signboard. For transferring a tabloid-size base map onto a 120 cm x 120 cm signboard, one can draw a grid of 2.54 cm x 2.54 cm squares on the base map and a corresponding grid of 6.4 cm x 6.4 cm squares on the signboard. (120 cm divided by 43 cm is 2.8, which can be rounded down to 2.5 to leave room for a border; 2.5 multiplied by 2.54 cm equals 6.4 cm).
5. Draw the square grid on the signboard using the size of the squares just calculated (e.g. 6.4 cm x 6.4 cm).
6. Going square by square, copy the lines on the base map into the squares on the signboard using the lines of the squares as guides to the placement of the map features.
7. Once the basic lines have been drawn on the signboard, paint of various colors can be used

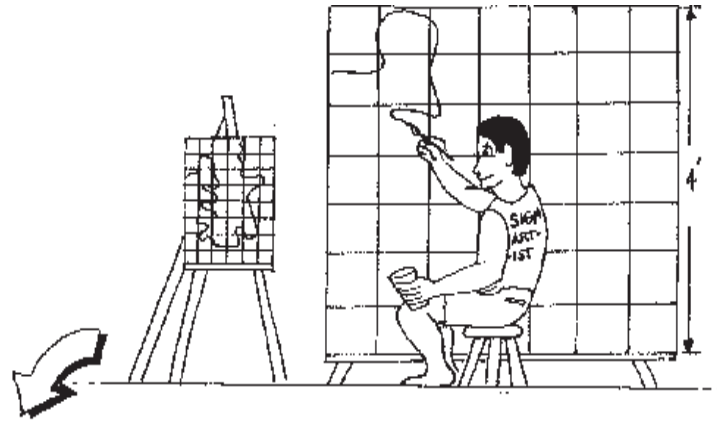
to fill in the map, for example, light green for seagrass and green for mangroves.

Once the signboard base map has been prepared in the manner described above, fishers can begin painting the features they have mapped on their paper base maps. The job is made easier if the fishers tape their paper base maps on to a corner of the signboard base map, so that they can easily glance from one map to the other as they paint (Figure 2.8). Fishers typically are good painters and usually have little trouble transferring the features of one map to another. Enamel paints, available from most hardware stores, are best for the job.

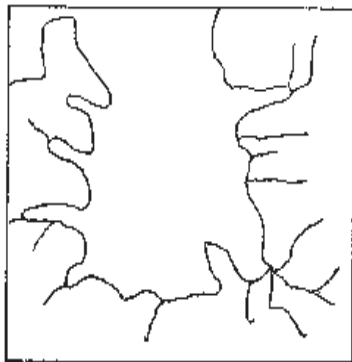
Refining maps drawn by fishers. Once local fishers and other coastal resource users have completely drawn all the various features on the base maps, all of the details from existing printed information sources such as the NAMRIA maps can be shown to participants and compared to the maps the fishers have just drawn. Since most fishers are quite good mappers, comparing their maps to the NAMRIA maps is usually a positive experience as they see the strong similarity between their maps and the maps produced by experts.

While the similarity is often striking, much can be gained from examining the differences between the

Use previously prepared paper base maps as guide for fishers to map elements on the signboard base map.



Create base signboard map using "scaling technique".



The process of producing a signboard map can help mobilize and strengthen fishers' participation in CRM.

Fig. 2.8 Procedure for making a signboard map.

The mapping process in pictures...



Fishers individually shade mangrove areas on photocopied base maps with color felt-tipped pens. (Palawan 1995)



Fishers identify and classify reef fish, while others (background) collectively map mangrove areas. (Palawan 1995)



After base maps have been drawn over, fishers compare the maps they created with existing maps, such as this nautical chart. (Palawan 1995)



An example of the group mapping technique where several fishers draw while others discuss and offer guidance and suggestions. (Palawan 1997)



PCRA facilitators discuss habitat color code with participants. (Palawan 1997)



Many hands make light work. (Palawan 1997)

A great deal of useful information can be generated by field checking or ground truthing maps prepared by fishers and professional cartographers.

local and expert maps. As with all PCRA results, look for new or different information on spatial details (such as small patches of mangrove), details on features that vary over space (such as old growth vs. previously logged mangrove), and features that vary over time (such as locations of seasonal fish aggregations).

Once fishers see expert maps in comparison to their own, they will often wish to amend the maps they have drawn based on features of the expert maps that they think are more accurate. This should be encouraged as long as the original maps drawn by the fishers are retained for reference, and as long as the fishers truly believe, based on their own knowledge and experience, that the expert map is more accurate in terms of the features they wish to correct. What usually results from the verification and correction process are maps that are composites of expert and local perceptions and often more accurate and useful than either map considered separately. Expert maps can help with producing exact scales, overall distributions and consistent locations, while the locally drawn maps can add critical details and locally significant and relevant features that make them useful for CRM planning purposes.

Field map verification and ground truthing.

This method is useful with individuals or small groups after at least some drawing over base maps has been accomplished. The basic idea is to move around in the management area, either on foot or in vehicles (boats, jeeps, etc.), to verify and further refine various maps that have resulted from earlier exercises (Figure 2.9). For example, the areal distribution and quality of coastal habitats, e.g. mangroves and coral reefs, can be verified and/or modified by comparing maps to field survey results. Useful mapping can be accomplished with the use of the global positioning system (GPS) technology, which allows one to know, relatively accurately, one's geographical location or coordinates. The use of relatively simple and cheap hand-held GPS units is encouraged.

Even without the benefit of GPS technology, a great deal of useful information can be generated by field checking or ground truthing maps prepared by fishers and professional cartographers (Fig. 2.9). In many situations, it can be assumed that the positions on the maps of roads and other landmarks are relatively accurate. If this is the case, using these landmarks, one can navigate around the area knowing one's approximate location on the ground relative to one's position on the map, and thereby place other features on the map as these are found and examined.

Useful mapping can be accomplished with the use of the global positioning system (GPS) technology, which allows one to know, relatively accurately, one's geographical location or coordinates.

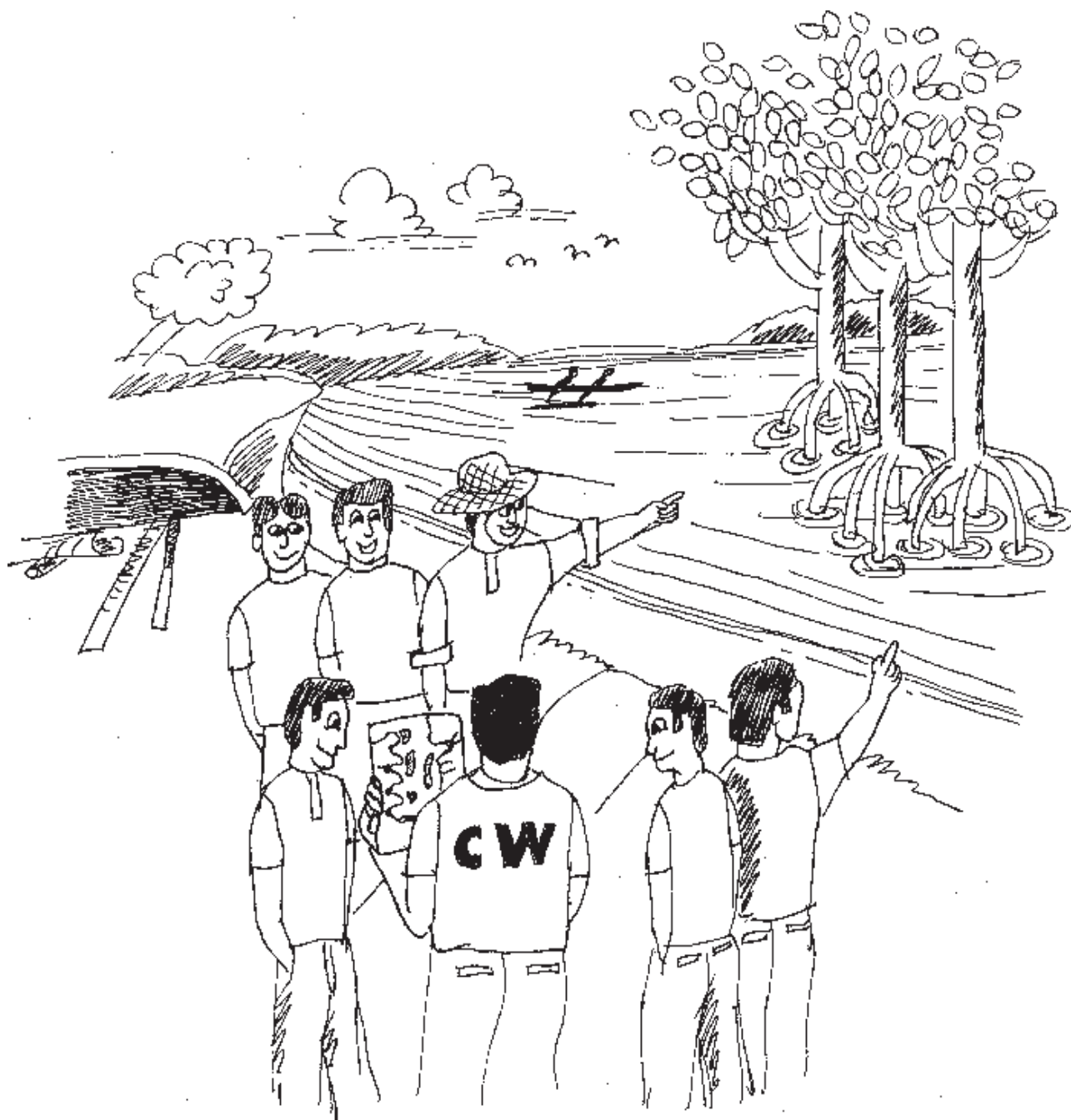


Fig. 2.9 Participatory field mapping allows fishers to further refine and ground-truth their maps.

Triangulation is one technique which uses landmarks to get a rough estimate of one's location; it involves taking compass readings from the location of interest on various surrounding landmarks in the field and then drawing lines through the landmarks on the map that correspond to the compass readings. The place where these lines converge or come closest to converging on the map is the approximate location. Seek assistance from NGO and government partners and counterparts for a more detailed description of — or assistance with — this activity.

Diagramming

Diagrams are another way of representing spatial information using a different set of dimensions from that used in maps. Seasonal and trend diagrams rely on sketching resources in the dimension of time. Transect diagrams allow sketching in two dimensions — vertical and horizontal — and provide an additional dimension to mapping which includes information on the two “horizontal” dimensions (length and width) or, more specifically, in a geographical context. The same process is followed as for mapping. First, list the elements to be diagrammed to ensure there is agreement and then draw each element on the diagram.

Diagrams are another way of representing spatial information using a different set of dimensions from that used in maps.

Drawing calendar diagrams

Calendar diagrams depict changes in certain variables over an annual cycle. They are useful in visualizing weather patterns (e.g. temperature, wind intensity and direction, rainfall levels) and understanding how resource use activities change through their yearly cycles. Seasonal production peaks and labor requirements are effectively represented in calendar diagrams (Fig. 2.10).

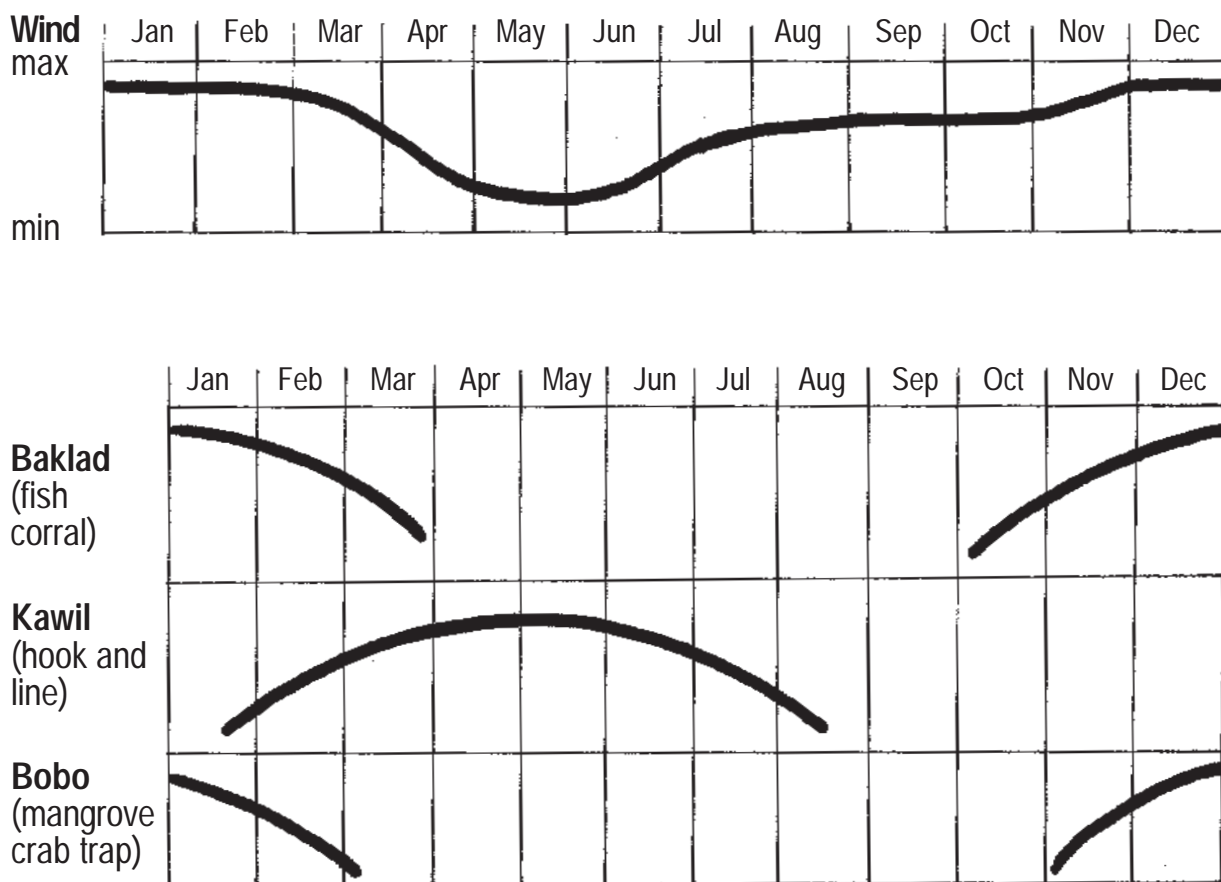


Fig. 2.10 Sample calendar diagrams: peak seasons for important gears used in Ulugan Bay as affected by wind patterns.

Before working with fishers, prepare blank calendars. Separate the months by drawing vertical lines on the calendar. Draw the dividing lines so that they are dark enough to be seen but not so dark that they could block out the horizontal lines and curves that the fishers will later draw on the diagram. As with all PCRA diagrams, take time to introduce to the fishers the format first, explaining how the position of the line or curve represents the intensity of the variable being measured over the course of a year.

Documenting historical trends

By understanding the past, one can glimpse the future. In PCRA work, possibilities for potential productive uses are usually revealed in discussions of past practices and productivity (Fig. 2.11). Since many areas already suffer from overfishing and, consequently, depressed total catch levels, the only real indication of maximum possible economic yield comes from past experience when overfishing was not yet a problem. By understanding the ways habitats have changed over time, such as the years and extent in which mangroves have been cleared or reefs have been blasted, one can better understand the present condition of coastal habitats.

*By understanding
the ways habitats
have changed over
time, ...one can
better understand
the present
condition of
coastal habitats.*

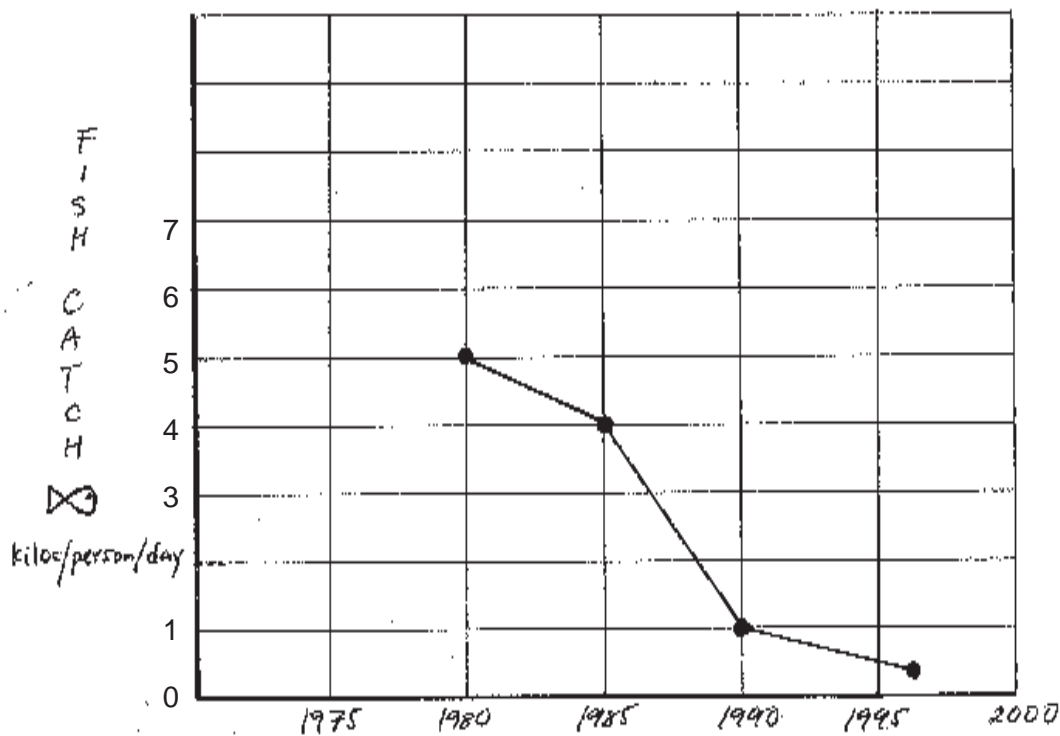


Fig. 2. 11 Sample trend diagram from the Sarangani PCRA training workshop (1997).

The methods used to document the past center around storytelling or *pakikipagkwentuhan*. All that is required is a knowledgeable local person who feels free to reminisce about the way things were in years gone by as well as discuss more recent conditions and events. Ask the local stakeholder not only about what happened in the past, but also about why he or she thinks it happened the way it did. This often generates insights into what the current constraints are, e.g. an increase in population led to overfishing, or rapid land clearing for agriculture resulted in siltation.

It is important to draw out qualitative and quantitative information regarding historical trends and their causes. Whenever possible, ask the local consultant to be specific about years and numbers. Fish harvest information is most useful when presented in units of kg per fisher per day. Relatively good indications of decline in fishery productivity can be attained by asking consultants to report the average catch per day in the past and the present, compare the situation then and now, and then comment on reasons why the apparent decline has occurred.

It is useful to conduct this exercise repeatedly over the course of the assessment as the opinions of local consultants can evolve and/or become more detailed as the other methods are applied. The results of documenting historical trends usually serve as key starting points for the identification and discussion of problems and opportunities for CRM during the production of the coastal area profile (Chapter 3).

The role of women in PCRA

Although most fishers who go to sea are men, women play a valuable role in gathering useful information for community-based CRM. Women typically make up half of the local population and are often highly involved in

Whenever possible, ask the local stakeholder to be specific about years and numbers.

Often, women are the best sources of information regarding the economic feasibility of various fishing methods, market conditions for various coastal resources.

coastal resource use as reef gleaners and fry gatherers, and in other shore-based harvesting practices. For social and economic assessment, women are usually excellent sources of knowledge, since they typically play prominent roles as fish buyers and vendors, and as financiers of fishing businesses. Often, women are the best sources of information regarding the economic feasibility of various fishing methods, market conditions for various coastal resources, and other aspects of the local economy. Encourage women to participate in PCRA activities to the maximum extent possible, taking care, however, not to force local consultants into socially uncomfortable situations. In many communities, there will be little problem with women and men participating simultaneously in group exercises, but there are places or situations where it might be more appropriate to have separate sessions for men and women. If segregation must be done, take measures to ensure that it does not diminish equality and the usefulness of the information produced by the female participants.

Ethical and political considerations

When gathering information, pay special attention to the individuals' "intellectual property rights." Know when not to persist with a line of questioning that

begins to infringe on what a local consultant considers to be “private matters”. Locations of especially productive fishing spots, for example, may be regarded by fishers as “trade secrets” on which their livelihood depends.

Sensitivity to different cultures is an important asset to have in PCRA. Watch out for verbal and non-verbal cues which indicate the persons’ discomfort with the questions asked. Ensure that local stakeholders understand clearly what they can expect from the PCRA process. Do not create expectations that may not be realized. If it is not absolutely certain that future funding is available, for example, make sure that the fact is effectively communicated to the community. Be realistic about the potential of PCRA to lead to further management efforts. Strive to avoid misunderstandings regarding the future that can lead to disappointment. Disappointment can make communities skeptical, if not outright critical, of future management efforts. Finally, beware of being “used” by certain community members to achieve selfish political and economic objectives. Careful research and the use of neutral informants are necessary to minimize the presence and influence of individuals, e.g. local politicians, commercial fishers and land developers, who have vested interests that might not be compatible with the collective good of the community.

*Disappointment
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management
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Chapter 3

MAKING PCRA RESULTS USEFUL IN CRM PLANNING



The results of PCRA serve various purposes. They are used in producing baseline information (in the form of coastal area profiles) essential for CRM planning. They are also used to measure performance indicators for project monitoring and evaluation. These two applications are discussed below. Other applications, such as in community development and empowerment, warrant further study and development by CWs as they apply the PCRA methods.

The coastal area profile is one of the most important outcomes of PCRA.

Producing a coastal area profile

The coastal area profile, a document which presents the results of PCRA field methods in ways that will assist CRM planning decisions, is one of the most important outcomes of PCRA. The basic descriptive information provided by profiles is useful, but the value of a good profile lies also in the compilation and analysis of the information it provides. One kind of information — for example, decreased levels of live coral cover — must be considered in relation to other kinds of information — for instance, low fish harvest and high siltation rates — to help ensure that the process results in meaningful conclusions which point to problems and opportunities for CRM. Often, ecological and other environmental factors must also be considered in association with socioeconomic variables, thus providing useful conclusions regarding such factors as the conditions of various habitats, potential for fisheries production, and social constraints that hinder the CRM process.

A profile should be produced using a process that facilitates and encourages feedback from local resource users (Fig. 3.1). A good general procedure is to conduct a preliminary analysis of the PCRA results and produce a draft profile for community review, feedback, verification and correction. In an appropriate setting with community members, the main points and findings of the draft profile can be presented and

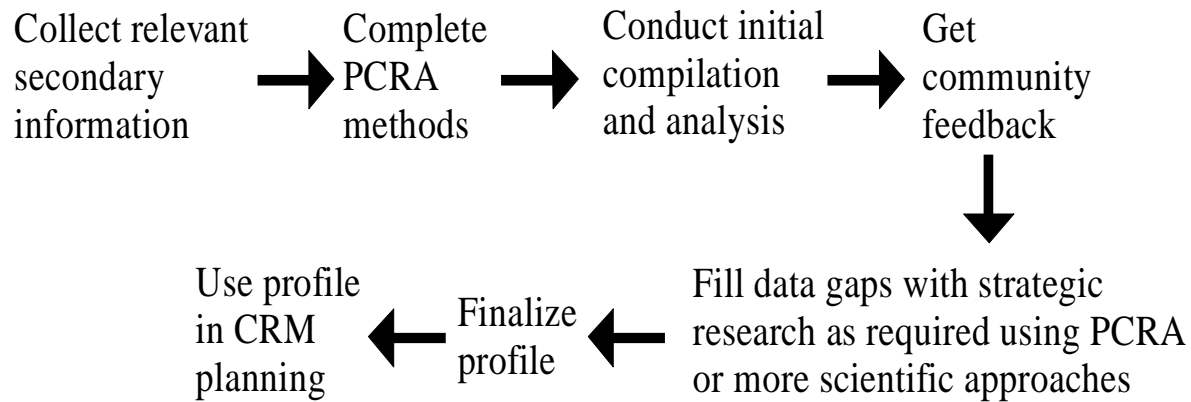


Fig. 3.1 Steps in producing a coastal area profile.

reviewed. It is helpful to explain the analyses of findings concerning constraints and opportunities, since fishers can validate or question many of the basic assumptions. Once fishers have validated the findings of the field assessment activities and the subsequent analysis, you can then take the local feedback into consideration in producing the final version of the profile.

Using the finalized profile in CRM planning completes the process of making PCRA useful in CRM (Fig 1.1). This is when local feedback can help, since local resource users are more likely to consider in their planning decisions information that they helped generate than information that comes from outside sources. If other stakeholders have also had significant input, a profile can serve as the common reference for all involved in planning. If all

When the final version of the profile has been completed, distribute copies to all stakeholders and begin motivating them to join in CRM planning.

stakeholders feel their knowledge and opinions are considered, the profile can also help catalyze the planning process. When the final version of the profile has been completed, distribute copies to all stakeholders and begin motivating them to join in CRM planning.

An outline for a comprehensive coastal environmental profile is presented in Table 3.1.

Presenting numerical information. Interviews and

Table 3.1 Outline for the coastal environmental profile of CRMP Learning Areas.

List of Tables
List of Figures
List of Acronyms and Abbreviations
Acknowledgments
I. Introduction
A. location
B. physiognomy or any short description of the area/geography
C. historical background
D. summary of issues
E. objectives
F. scope
G. general definitions, if any
II. Physical Features <i>(include data by municipality, use maps or tables or any visual where appropriate)</i>
A. land area
B. topography
C. hydrology
D. soil
E. land uses
F. climate
III. Natural Resources <i>(should have visuals; include species, area,</i>

condition)

A. mineral resources

B. forest resources

C. coastal resources

1. mangrove

2. seagrass

3. coral

4. seaweed (*if present; may also be included in fisheries*)

5. fisheries

6. others (*beaches, endangered species, etc.*)

IV. Socio-Political Setting (*include tables, charts, graphs, etc.*)

A. political/administrative boundaries

B. demographics (*per municipality*)

1. population size, density, distribution and growth rate

2. household (*number, members/nuclear or extended*)

3. age and gender composition

4. urban and rural distribution

5. education

6. labor and/or employment, income

7. religion and/or ethnic groups

8. dialects

C. health, sanitation and medical care

D. settlements (*type and ownership*)

E. roads, transportation and communication, other related infrastructure or support systems (*e.g. cooperatives, fishing ports*)

V. Economic Sector (*per municipality, per barangay when appropriate*) — *use maps, tables, charts, figures*

A. fisheries

1. capture fishes

a) capture methods (*fishing gear, types of boats and no., ownership*)

b) no. of fishers

c) catch per unit effort

d) catch per species (*weight*) per gear

e) historical trends in catch levels and composition (*species caught, market value, production levels*)

2. aquaculture

a) cadastral maps to depict fishpond areas by municipality/*barangay*

b) areas eligible for reversion

c) mariculture types and production levels by municipality/

barangay

d) historical trends in production

B. tourism

1. classification and location of existing and potential tourist areas
2. no. of employees per activity
3. revenues generated
4. description of environmental, social, cultural impacts

C. industry

1. types of industry and location
2. no. of employees per industry
3. revenues generated
4. description of environmental, social, cultural impacts

D. others (*e.g. agriculture, forestry*)

similar parameters as above

VI. Institutional and Legal Framework

A. introduction

B. current state of the Philippine Coastal Zone Law (*includes related policies/laws*)

C. local government (*provincial, municipal, barangay, other GOs*)

1. types, structures
2. development plans/activities or projects
3. budget allocated for ICM

D. non-governmental organizations involved in ICM

1. names
2. types of activities
3. funding levels
4. future plans

E. community organizations

1. names
2. types of activities
3. funding levels
4. future plans

VII. Management Issues and Opportunities (*include stakeholders and appropriate analyses*)

A. environmental

B. economic

C. political/institutional

household surveys can generate a huge amount of numerical or quantitative data. These data must be compiled and then presented in a way that is easy to understand and is relevant to CRM planning.

Two important methods of presenting numerical information in coastal area profiles are tables (Fig. 3.2) and bar graphs or histograms (Fig. 3.3). When using tables, you can combine different kinds of primary data, such as the number of fishers in each community divided by the annual catch in each community, to produce additional informative values

Interviews and household surveys can generate a huge amount of numerical or quantitative data.

Community	Total catch metric tons (mt)	Catch (mt)	Catch as % total	No. of fishers	Ave. total catch per fisher (mt/yr)
Tarunayan	163.3	2.9	1.8	160	1.02
Manaburi	91.8	54.9	59.8	55	1.67
Umalagan/Pier	48.7	22.1	45.4	32	1.52
Nasuduan	43.6	22.9	52.5	40	1.09
Makirawa	14.7	10.6	72.1	37	0.40
Martape	13.5	6.3	46.7	13	1.04
Buenavista Centro	12.0	3.1	25.8	19	0.63
Mandaragat	10.5	5.6	53.3	59	0.18
Bagong Sikat	5.0	1.8	36.0	25	0.20
Tagnipa	2.7	2.4	88.9	5	0.54
Masagana	1.0	0.5	50.0	10	0.10
Tagabinet Centro	0.8	0.4	50.0	3	0.27
Pagkakaisa	0.4	0.2	50.0	6	0.07
Baruang	0.2	0.1	50.0	1	0.20
Total / Average	408.2	133.8	32.8	465	0.88

Fig. 3.2 Sample table of numerical data showing fish landed in Ulugan Bay by community (Ulugan Bay Foundation, Inc. survey data, 1992).

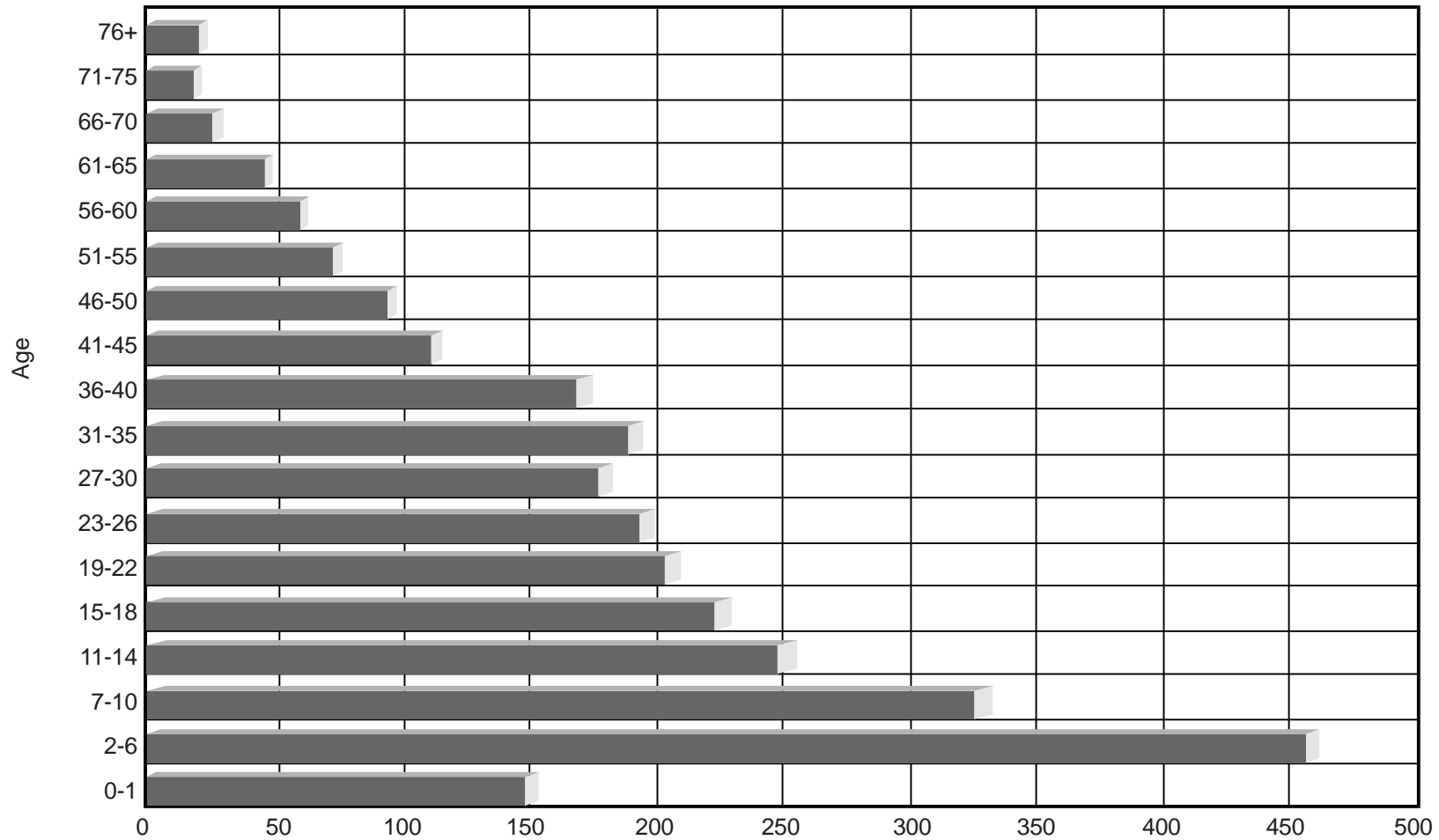


Fig. 3.3 Sample bar graph showing age distribution of Ulugan Bay residents (Ulugan Bay Foundation, Inc. survey data, 1992).

such as average annual catch per fisher.

It is also helpful to present numerical data as a percentage of a total value, e.g., the percentage of the total catch each community produces. Bar graphs and other graphs have two axes or dimensions, which make numerical information more visually informative. The size of the bar in a bar graph visually shows the magnitude of important values and facilitates comparison, for example, between the number of dependent children in an area and the number of adults who are responsible for their support.

Making composite thematic maps. After completing PCRA mapping methods, the CW will have a large collection of various kinds of maps. For the purpose of producing a coastal area profile, it is often helpful to create new maps by combining and refining the maps made by local resource users, and combining locally produced maps with maps produced by experts such as NAMRIA. For instance, one can combine group-produced maps of mangroves and group-produced maps of coral reefs with a map that shows locations of scientific study sites to produce a thematic map of selected coastal habitats and study site locations (Fig. 3.4).

The simplest way to make thematic maps is to trace

It is often helpful to create new maps by combining and refining the maps made by local resource users, and combining locally produced maps with maps produced by experts such as NAMRIA.

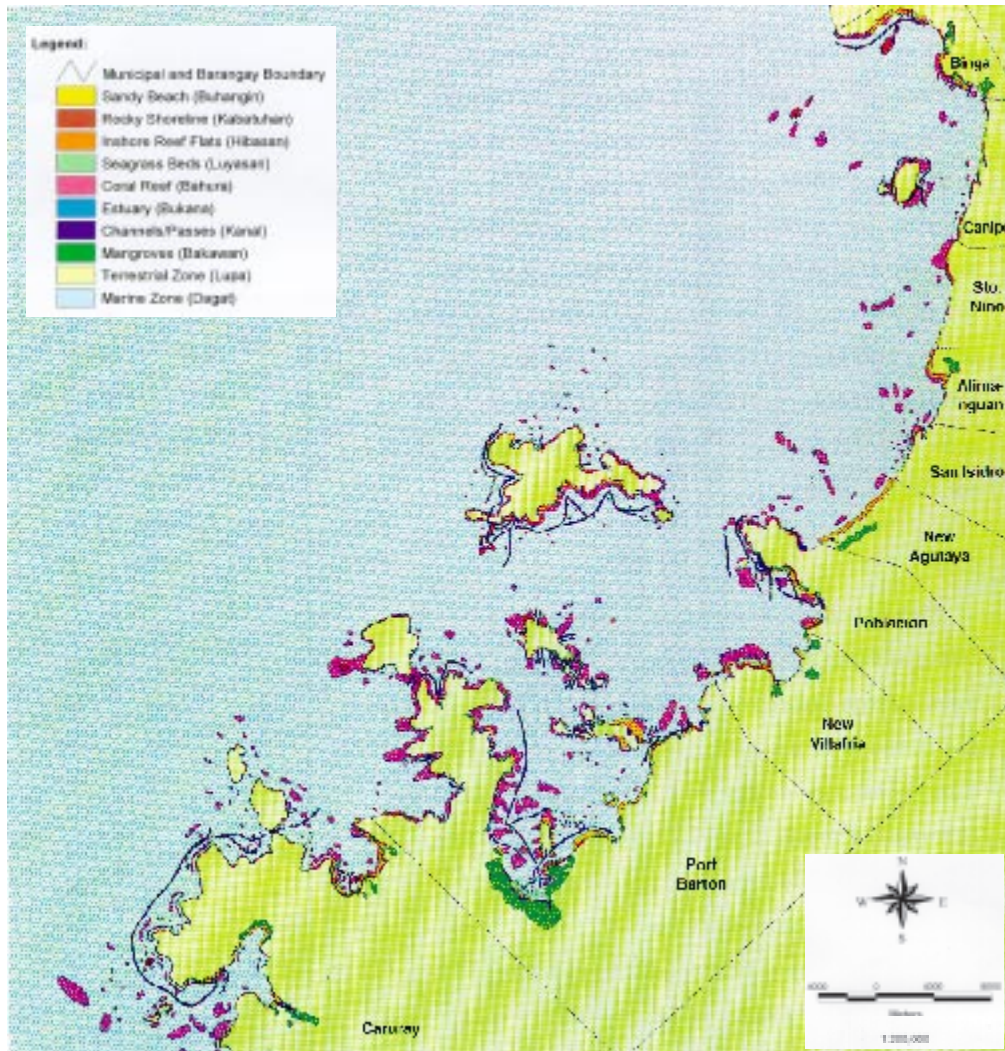


Fig. 3.4 Sample thematic map made by compiling several individual maps, including maps produced by local fishers using PCRA methods showing mangroves, coral reefs and other features of San Vicente, Palawan.

onto a single piece of paper elements from two or more separate maps having different elements. Maps drawn to different scales can be redrawn to a common scale using the grid or “scaling” technique. To present signboard maps in a coastal area profile, use photographs, or reverse the grid or “scaling” procedure to reduce the maps to a size that would fit the format of the profile.

Other useful diagrams. Numerous other kinds of diagrams can be used to visually present verbal and/or numerical data collected through PCRA methods. One

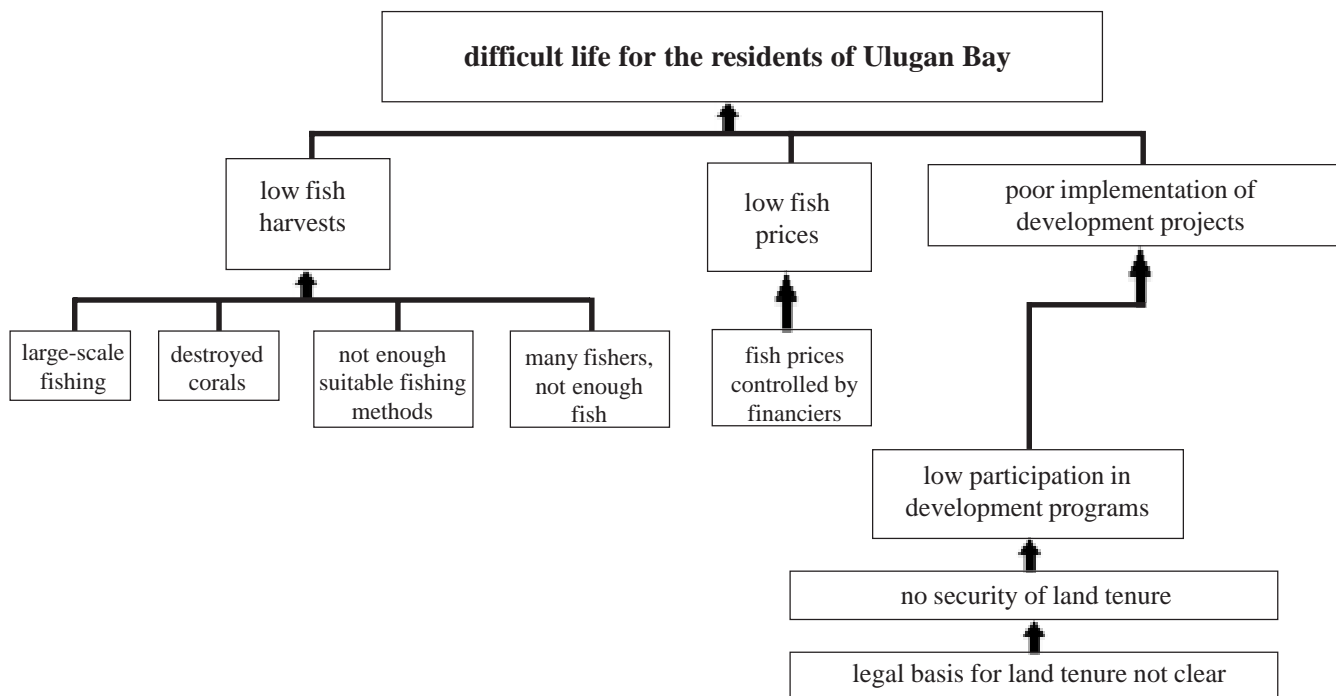


Fig. 3.5 Sample flow diagram showing current situation for coastal resource users of one barangay in Palawan.

useful diagram is a “box and arrow” or flow diagram which shows the relationships between various components, factors or conditions of the coastal resource system (Figure 3.5). These diagrams are often helpful in showing cause-and-effect relationships. They are usually based on discussions on historical trends and the causes of these trends.

Evaluating coastal resource management opportunities, constraints, issues. When enough data have been compiled and presented in useful forms, these data can be integrated and analyzed for the purpose of promoting CRM. This is best accomplished by analyzing, both individually and collectively, all PCRA results. The analysis should always be guided by two questions:

1. What aspects of the PCRA results suggest various opportunities or potential for maintaining or improving CRM and sustainable coastal development?
2. What aspects of the PCRA results indicate problems or obstacles for CRM and sustainable coastal development?

This process often involves drawing connections between a number of diverse factors. The strong inter-

relatedness of natural and social phenomena must be considered. Typically, opportunities for improved CRM reflect the potential for profitable enterprises based on coastal resource production, such as mariculture, while the constraints involve a mixture of biophysical and social conditions that hinder the realization of this promised profitability.

The key to effectiveness in management lies in identifying real, feasible economic opportunities, and in elucidating the true, fundamental constraints.

Constraints and problems relate to the past; opportunities relate to the future. Unlike the past, the future offers a variety of options or choices; the pros and cons of each choice should be examined for future CRM systems. Often, the best choice is not clear, and it might be necessary to leave a variety of options open. The analysis must also often go through several cycles or iterations before a sufficiently deep and accurate understanding is obtained. Participatory discussion and feedback sessions are useful, especially when used with flow diagrams such as the one depicted in Fig. 3.5. Flow diagrams can help show the relationships between various environmental and social conditions that are revealed through PCRA.

After the opportunities and constraints are analyzed as discussed above, a set of fundamental CRM issues should be developed. CRM issues are the primary

The key to effectiveness in management lies in identifying real, feasible economic opportunities, and in elucidating the true, fundamental constraints.

When the PCRA results are carefully analyzed, most CRM issues can be related to human behavior.

factors that must be addressed for CRM to be successful. When possible, these issues should take a positive form and mention the specific opportunities that could be realized once they are addressed. It may be difficult to always make issue statements with real positive elements, however, since constraints often outnumber opportunities and existing constraints often cloud the possibilities for an improved situation.

When the PCRA results are carefully analyzed, most CRM issues can be related to human behavior. CRM issues usually involve unwise human activity in coastal areas and indicate problems in the coastal resource regime or operative system of rights and responsibilities regarding coastal resource use. Other issues might be better characterized as stemming from an absence of positive behavior and not as arising from negative actions. Common issues include open access coastal resource regimes, conflicts between resource users, destructive harvesting methods, and degraded coastal habitats. Once the fundamental CRM issues have been identified, recommendations can be made to initiate the planning and implementation phases of CRM.

Making recommendations. Coastal area profiles typically conclude by presenting a set of recommendations intended to serve as initial considerations for CRM planning. Recommendations

are made to address the identified CRM issues. An accurate understanding of the fundamental issues will help in prescribing appropriate recommendations. Often, an issue must be attacked from a number of fronts simultaneously. Thus, to address the issue of open access, a number of activities might be recommended, ranging from institutional strengthening to enterprise development. Good recommendations are highly specific. Instead of recommending enterprise development in general, specific details regarding feasible enterprise options, scales and timetables should be given. Accuracy and specificity can be improved with local participation and feedback as the recommendations are developed.

Project monitoring and evaluation

PCRA methods can be quite useful in defining parameters for CRM project performance (or impact) monitoring and evaluation. If you intend to use PCRA methods for this purpose, the monitoring and evaluation indicators specific to the project should be considered before any field work is conducted. Most projects have environmental, ecological, socioeconomic and institutional indicators that can be measured through PCRA. These indicators commonly have unique formats, sources and units. Thus, when project monitoring and evaluation is important, the

indicator system should serve as a primary guide in determining the type and form of information gathered during PCRA.

PCRA should not, however, be seen merely as a tool for project monitoring and evaluation. Much of the real value of PCRA lies in providing information for initial CRM planning and implementation. While indicators measure the success of a CRM effort, a great deal more information is needed to make monitoring and evaluation successful. The greater value of PCRA is realized when it facilitates initial and subsequent decisions regarding actual project activities and interventions.

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*All references are available through the Coastal Resource Management Project office in Cebu or the International Center for Living Aquatic Resources (ICLARM) library in Manila.

Socio-demographic Profile Questionnaire

Name of Barangay: _____

1. Name of Respondent: _____

2. Household Members:

2.1. Tell me about the people who are now living in your household. (Include respondent)

Name	Position in the family	Sex	Age	Civil Status	Educational level	Occupation	Estimated monthly income contributed to the family

2.2. Tell me about your family members who live outside the household but still consider your house their home.

Name	Position in the family	Sex	Age	Civil Status	Educational level	Occupation	Estimated monthly income contributed to the family

3. Housing.

3.1. Ownership. Is your house _____ owned? _____ rented? _____ how much?
 _____ not owned? (specify) _____

3.2. If owned, how did you acquire it? _____ inherited _____ bought _____ built

3.3. Type of dwelling: _____ *nipa/cogon* hut _____ wood/bamboo with GI roof
 _____ concrete (cement) _____ others (specify) _____

3.4. Furniture/appliance ownership: ___ radio ___ sala set ___ gas stove ___ bed
 ___ sewing machine ___ T.V. ___ refrigerator ___ others (specify) _____

3.5. Lighting facility: _____ kerosene lamp _____ petromax/gas-operated
 _____ generator-operated _____ others (specify) _____

3.6. Toilet facility: _____ Antipolo type _____ water sealed _____ flush type
 ___ no toilet (specify where waste is disposed)

4. Economic Data.

4.1. What is your main source of income?

- fishing
 farming
 business (specify _____)
 animal husbandry
 if no source of income, what is your source of living?

 others, specify _____

4.2. What are your other sources of income?

4.3. Property ownership

4.3.1. Land

- owned, how big? _____
 not owned, but leased _____, how much a year _____
 tenant, what is the sharing system? _____

4.3.2. Fishing gear

- motorized boat (specify number _____)
 banca (specify number _____)
 nets (specify types of nets _____)
 other fishing gears (specify _____)

4.3.3. Animals owned

- carabao, how many _____
 cattle, how many _____
 chickens, how many _____
 horses, how many _____
 ducks, how many _____
 pigs, how many _____
 goats, how many _____

4.4. Credit facility

4.4.1. If you need to borrow money, where do you usually go?

- relatives *suki* neighbors/friends pawnshop
 credit coop loan sharks ("5/6") banks
 others (specify _____)

4.4.2. How is repayment done?

- specified period of time, with interest rate (specify rate _____)
 no specific period of time, without interest rate
 other arrangements (specify _____)

4.5. Income-generating projects

4.5.1. Is your family or a member of your family engaged in income-generating projects? yes no

4.5.2. If yes, what projects? _____

4.5.3. Who in your family is/are mostly engaged in this? _____

7. Membership in Organization.

Household Member	Name of Organization	Position	Type of Organization
Husband	1.		
	2.		
	3.		
Wife	1.		
	2.		
	3.		
Daughter(s)			
	1.		
	2.		
Son(s)			
	1.		
	2.		
	3.		

8. Is there any organization/group, NGO or government agency in your barangay with environmental programs?

_____ yes _____ no

8.1. If yes, what is/are these? Please indicate environmental programs and services for each. _____

9. Problems and Issues.

9.1. What are the problems and issues faced by your family? How do you think these problems may be solved?

Problems

Proposed solutions

9.2. What are the problems and issues faced by your community? How do you think these problems may be solved?

Problems

Proposed Solutions

10. How do you perceive the situation in your coastal community now?

11. How do you envision your coastal community to be five years from now?

Sample Survey – Fishing Practices

Date of Interview : _____

Name of Barangay : _____

Name of Respondent : _____

1. Gear Ownership. Do you own any of these?

Fishing Gear	YES	NO	indicate if owned, shared, or leased	How many
1. a. Banca				
1. b. Pumpboat				
1. c. Nets				
•				
•				
•				
1. d. Fish Traps				
1. e. Others (specify)				
•				
•				
•				

2. Fishing Methods. Do you use any of the following fishing methods? How often?

Fishing Method	Often (at least 3 times a week)	Seldom (Specify how often)	Good?	Bad?	Why?
2.1. hook & line					
2.2. nets					
•					
•					
•					
2.3. trawling					
2.4. <i>muro-ami</i>					
2.5. <i>kayakas</i>					
2.6. fish traps					
2.7. spearing w/o compressor					
2.8. spearing with compressor					
2.9. others (specify)					
•					

3. Fishing Skills. What particular fishing method are you or your family skilled in?

Respondent _____

Father _____

Son(s) _____

Brother(s) _____

4. Fishing Practices.

4.1. Indicate your fishing activities at a typical time of day.

Time of the Day	No. of hours spent	Who do you go fishing with?	Kind of gear used	Kind of fish caught	Ave. no. of kilos	How much is sold (%)?
Morning						
Afternoon						
Evening						

4.2. Normally, how many times a week do you go out to fish? _____

5. Fishing grounds and seasons. Name the different seasons for fishing and indicate your normal fishing grounds for each season.

Season for fishing	Fishing ground (Indicate the area)	How far are these from shore?	Fishes caught

6. Who usually comes from outside to fish in your fishing grounds?

6.1.

From where?	How often?	How many?	How long?	What methods?

6.2. What do you think about these outsiders who come to fish in your fishing grounds?

7. Gleaning activity.

7.1. Who in your household glean on the reefs?

Who?	What time of the day?	For how long?
_____	_____	_____
_____	_____	_____
_____	_____	_____

7.2. What do you find in these reefs?

_____	_____	_____
_____	_____	_____
_____	_____	_____

8. Marketing of Fish Catch.

8.1. What are the existing market outlets for your fish catch in

- a. Your barangay? _____
- b. Other localities _____
(pls. specify) _____

8.2. Do you maintain a regular buyer/middleman (suki) for your catch?

_____ yes _____ no

If yes, what other personal or economic needs are provided by your "suki"?

8.3. What difficulties/problems have you encountered with your "suki"?

8.4. If you don't maintain a regular buyer, to whom do you usually sell your fish?

8.5. Who is usually responsible for selling your fish catch?

8.6. In cases where you have excess fish catch or at times when the price of fish is very low, what do you usually do with your catch?

_____ sell despite low price _____ give to neighbors, friends, relatives
_____ consume everything _____ process fish (specify) _____

9. Expenditures from fishing.

9.1. How much money do you owe for your boat or other gears?

9.2. How much money do you spend each week on gas, oil, or fuel for boat?

9.3. How much money do you spend for other maintenance (e.g. nets)?

10. Destructive fishing methods.

10.1. Do you observe some destructive fishing methods being done in your seas?

_____ Yes _____ No

10.2. If yes, what are these?

10.3. Why do you think they do these? _____

10.4. If no, why not? _____

11. **Perceived changes in marine resources.** What differences do you see between the present and the past (10 years ago) with regard to:

Changes in:	Better Now	Better Years Ago	No change	Why?
Fish size				
Fish abundance				
<i>Tridacna</i> abundance				
Sea turtle abundance				
<i>Lapu-lapu</i> abundance				
Coral abundance and diversity				
Other organisms				

12. **Perceived Problems.** Name at least three of the biggest problems with fishing here, their causes and possible solutions that you could think of.

Biggest problems in fishing	Possible causes	Possible solutions
1.		
2.		
3.		
4.		
5.		



Residents all help pull a beach seine, Port Barton



Group participation and result, Ulugan Bay

The essence of participatory coastal resource assessment is *learning by doing*.

The more that coastal resource stakeholders become involved in the assessment, planning and management process, the greater the opportunity for sustainable outcomes.



This publication and related ones such as the **Legal and Jurisdictional Guidebook for Coastal Resource Management in the Philippines** are available from the Coastal Resource Management Project, 5/F Cebu International Finance Corporation Towers, cor. J. Luna and Humabon Streets, North Reclamation Area, Cebu City, Tel. nos. 232-1821 to 22, 412-0487 to 89, 412-0645, Fax no. 232-1825, CRM Hotline 232-1823, E-mail prccebu@usc.edu.ph, Website <http://www.oneocean.org>