



PARTICIPATORY COASTAL RESOURCE ASSESSMENT TRAINING GUIDE



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Evelyn T. Deguit
Rebecca P. Smith
William P. Jatulan
Alan T. White



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FROM THE AMERICAN PEOPLE



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Participatory Coastal Resource Assessment Training Guide

Evelyn T. Deguit
Rebecca P. Smith
William P. Jatulan
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Layout and graphics by Ysolde Collantes-Jatulan and Dexter Allen Besa.

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acronyms & abbreviations

BFAR	Bureau of Fisheries and Aquatic Resources
CLUP	Comprehensive Land Use Plan
CO	community organizer
CR	coral rubble
CRM	coastal resource management
DENR	Department of Environment and Natural Resources
DILG	Department of the Interior and Local Government
DOST	Department of Science and Technology
DSC	dead standing coral
FAO	Food and Agriculture Organization
FARMC	Fisheries and Aquatic Resources Management Council
FGD	focus group discussion
GPS	global positioning system
HRS	hard rocky surface
ICM	integrated coastal management
IEC	information, education and communication
LGU	local government unit
LHC	live hard coral
LSC	live soft coral
MAO	Municipal Agriculture Office
MCD	Municipal Coastal Database
MENRO	Municipal Environment and Natural Resources Office
MPDO	Municipal Planning and Development Office
NGA	national government agency
NGO	nongovernment organization
PAO	Provincial Agriculture Office
PCG	Philippine Coast Guard
PCRA	Participatory Coastal Resource Assessment
PENRO	Provincial Environment and Natural Resources Office
PN	Philippine Navy
PNP	Philippine National Police
PO	people's organization
PPDO	Provincial Planning and Development Office
RA	Republic Act
S	sand
SB	Sangguniang Bayan
SP	Sangguniang Panlungsod
TWG	Technical Working Group

preface & acknowledgments

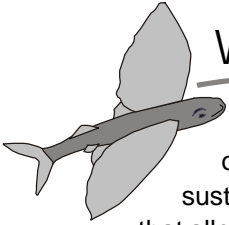
This *Participatory coastal resource assessment training guide* is the product of extensive experience of the Coastal Resource Management Project through its field implementation efforts from 1996 to 2004. It reflects the process that has evolved through use in many coastal communities in the Philippines. Its purpose is to help integrate the knowledge of local coastal resource users with the understanding of scientific experts to maximize the effectiveness of integrated coastal resource management (CRM) projects.

Participatory coastal resource assessment (PCRA) is considered to be an essential first step in the CRM planning and implementation process. By engaging community-based stakeholders in the resource assessment process, a level of interest is ensured in CRM planning and implementation that is essential for long-term success. The process is also educational and has the benefit of raising awareness of local stakeholders about the plight of their coastal areas and resources, a key ingredient to committed action for effective conservation.

This training guide is intended for community workers and coastal resource managers involved in community development for sustainable coastal resource use. All nongovernment organizations, academic groups, donor projects and others that assist local governments and communities in coastal conservation efforts, can benefit from this guide. The theme of this guide is participatory while at the same time it attempts to bring quality and rigor to the coastal resource assessment process so that results will add reliable and relevant information to CRM planning and truly empower its participants.

This guide is a sequel to the books: *Participatory coastal resource assessment: A handbook for community workers and coastal resource managers* (1998) by J.S. Walters, J. Maragos, S. Siar and A. White; and *Coral reef monitoring for management* (2001) by A. Uychiaoco, S.J. Green, M.T. de la Cruz, P.A. Gaité, H.O. Arceo, P.M. Aliño and A.T. White. Since that time, the PCRA experience has been refined through the inputs of many persons who have directed and participated in numerous PCRA trainings. A few of these individuals who deserve special mention include: Dr. Catherine Courtney, Dr. Elmer Ferrer, Dr. Liana McManus, Dr. Ron Senykoff and Dr. Fred Vande Vusse for their philosophical and material support in championing the need for PCRA as a planning tool in the Philippines; Ms. Yasmin Arquiza and Ms. Dolores Ariadne D. Diamante-Fabunan for their direct involvement in testing and improving the PCRA approaches at the community level; and, Ms. Ping Portigo, Mr. William Ablong, Mr. Stuart Green, Mr. Alexis Yambao, Mr. Howard Cafugauan, Mr. Lito Mancao, Ms. Manolita Morales, Ms. Reggie Blanco, Mr. Mario Gasalatan and Ms. Astrid Lim for inputting lessons from field implementation in the provinces of Bohol, Cebu, Negros Oriental, Davao del Sur and Davao Oriental, and other members of the PCRA training team, Mr. Jessie Floren and Ms. Emma Melana for providing inputs to improve the mangrove assessment method. Mr. Nygiel Armada and Mr. Cesar Luna likewise provided inputs and comments to enhance generation of fisheries data and information. Finally, all the community members and local government officials and others who have actively participated in PCRA over the years, all deserve recognition for making it a reality and in assisting with these important efforts to conserve Philippine coastal resources!

introduction



Why a PCRA Training Guide?

Participation and involvement of the stakeholder community in all phases and aspects of coastal resource management (CRM) is proven to be a major success factor in the sustainable use and management of coastal resources. Communities involved in activities that allow them to learn about resource management issues are more likely to support and implement decisions and solutions to coastal resource problems in their communities.

Participatory coastal resource assessment (PCRA) is the process of gathering and analyzing information involving the participation of local resource users in CRM planning and implementation. PCRA focuses on resource assessment from the perspective of local coastal resource users and integrates local wisdom and knowledge with technical and academic expertise in CRM.

This training guide is intended primarily for community workers and development managers involved in CRM and presents various methods and ways by which important environmental and social characteristics of a coastal area can be learned, recorded and better understood by the local stakeholder community.

The contents in this guide is based on earlier works on PCRA in the Philippines, particularly:

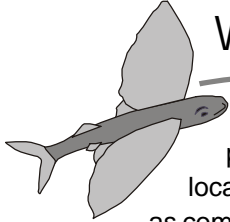
- **Participatory coastal resource assessment: A handbook for community workers and coastal resource managers** by J.S. Walters, J. Maragos, S. Siar and A.T. White (1998)
- **Participatory methods in community-based coastal resource management** by the International Institute of Rural Reconstruction (1998)
- **PCRA training manual** developed by D.A. Diamante-Fabunan and E. Deguit (1998)
- **Coral reef monitoring for management** by A. Uychiaoco, S.J. Green, M.T. de la Cruz, P.A. Gaite, H.O. Arceo, P.M. Aliño and A.T. White (2001)
- **Philippine coastal management guidebook series** of the Coastal Resource Management Project (CRMP) of the Department of Environment and Natural Resources (DENR *et al.* 2001).

This guide is also largely based on lessons learned from extensive implementation of the PCRA at the various municipal learning sites of CRMP–Philippines.

This guide serves the following purposes:

- to situate PCRA in the overall framework of CRM and the CRM planning process;
- to encourage participatory and multidisciplinary approaches in coastal resource assessment and planning;
- to describe various participatory techniques and methods that can be used to generate primary data as well as secondary information;
- to illustrate ways in which such tools as mapping, transects and trend diagrams produce spatial details about the coastal area for easier appreciation and understanding of issues;

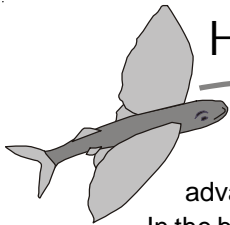
- to familiarize CRM practitioners/managers on how to analyze and consolidate the data generated; and
- to explain the various elements of writing up the PCRA report and how PCRA results can serve as inputs to the local coastal area profile and CRM plan.



Who will benefit from this Guide?

The main users of this guide will be the CRM practitioners/managers responsible for planning and implementing CRM. They could be staff of government offices (national and local), project implementers of donor-funded projects or nongovernment organizations as well as community leaders/members of resource management or people's organizations. The following may also find this guide useful:

- staff from cooperating agencies and institutions;
- researchers, teaching faculty of universities/colleges;
- students of CRM;
- training institutions or groups who work with communities; and
- others directly or indirectly involved in CRM.



How can the Guide be used and adapted?

The guide is envisioned primarily for use in a four-day PCRA training workshop. It is designed in such a way that trainers as well as training participants are able to take full advantage of the guide's learning contents, as well as the visual aids and worksheets provided. In the beginning chapters, participants are introduced to the coastal environment and its various ecosystems as well as to CRM and the CRM process. Step by step procedures on how to conduct field level habitat assessment, data collection through transect walks, community focus group discussions and key informant interviews, data processing and analysis are likewise detailed in specific chapters.

The guide can also be used as an educational material by CRM practitioners/managers to help initiate the CRM process.

- Selected chapters can be used for one or two-day orientation sessions on CRM.
- Information on coastal ecosystems, their benefits, economic values and importance to fisheries can be used as reference materials for public education programs on CRM.
- Any or all visual aids/illustrations can be used for other training, information and education purposes.
- The guide can serve as valuable reference material on the use of participatory methodologies in data gathering and analysis.

This guide is presented in three major chapters, with each chapter corresponding to a specific day in the proposed four-day training workshop. Each chapter in turn is composed of various topics that may correspond to various sessions in the PCRA training workshop.

Each topic/session carries descriptions of major content points, methodologies employed, materials and equipment needed and handouts/reference materials recommended. Also included in the guide is a CDROM of recommended Powerpoint presentations for use in the lectures/discussions.

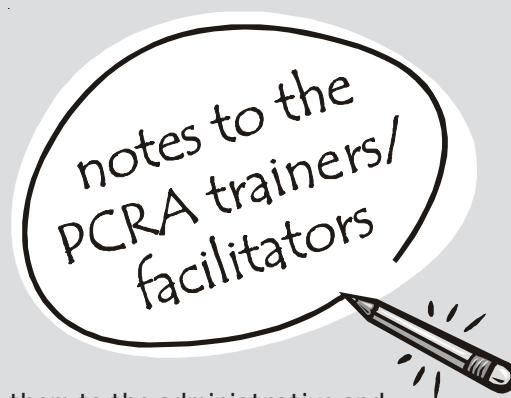
Trainers/facilitators have the flexibility to design the PCRA training workshop as they see fit. A recommended process flow of the four-day PCRA training workshop is found in Appendix A. “Notes to the PCRA trainers/facilitators” are included in each section that highlight the important roles of trainers in the PCRA process.

The *PCRA training guide* is broken down into the following chapters and topics:

Chapters/Topics Covered in the PCRA Training Guide

Chapter 1:	Introduction to the Coastal Environment, Coastal Resource Management (CRM) and Participatory Coastal Resource Assessment (PCRA) Registration/Introductions/Warm-up Activities The Coastal and Marine Ecosystems: An Overview The Philippine Coastal Zone: An Endangered Environment, Issues, Problems Introduction to CRM and the CRM Planning Process Introduction to PCRA
Chapter 2:	PCRA Tools and Methods Gathering Secondary Information and Interviewing Diagramming Community Mapping Transect Walks Habitat Assessments Fish Visual Census
Chapter 3:	Analyzing and Organizing Data into a Coastal Environment Profile How to Analyze and Organize PCRA Data Writing up the Coastal Environment Profile for CRM Planning
Appendices:	
A	Proposed Agenda of a Four-day PCRA Workshop
B	PCRA Socio-demographic Profile Interview Guide
C	Calendar Diagram Template
D	Trend Diagram Template
E	Transect Walk Matrix
F	Coral Reef Habitat Assessment Forms
G	Seagrass Habitat Assessment Transect Data Form
H	Mangrove Habitat Assessment and Regeneration Data Sheets
I	Fish Abundance Data Form
J	Proposed Coding Guide for Community Mapping

A PCRA training is best done with a team of three or four trainers or facilitators. In this way, demands of the training will be distributed among the team members. Ideally, there should be one trainer for every four to five trainees.



Where possible, involve participants in preparation for the training as this enhances their learning experience and exposes them to the administrative and logistics requirements of the training program. In addition, assign participants to serve as team leaders during the field work phase. It is advantageous to recruit team leaders from among the fisherfolk so they are then able to provide peer learning and coaching to fellow fishers.

Try to make the training venue accessible to the participants and ensure that the training time is acceptable to them. It is recommended that field level activities be conducted in the morning as generally at this time, energy level is high for participants. Also, schedule PCRA training sessions in times of good weather as rains and rough seas may dampen field activities and inhibit good resource assessment exercises.

The success of the PCRA training depends to a large extent on the level and engagement of the participants. Make the training as interesting and as "fun" as possible and ensure a participatory training environment is effected. Good warm-ups should contribute to the group-building process and make participants feel positive and relaxed. Make sure the warm-ups are not too competitive and that instructions for doing the activity are clearly understood. Generally, it is a good sign if participants are observed to be enjoying the activity and that they laugh a lot.

A proposed agenda for the four-day PCRA training workshop is found in Appendix A of this guide. Trainers/facilitators may use or adapt this proposed agenda as they see fit.

Prior to the conduct of the PCRA, courtesy calls and briefings must be made to the concerned local government officials/leaders regarding the objectives and expected outputs of the workshop. It is strongly encouraged that where appropriate, the PCRA be sponsored and endorsed by the local government in the area.

It is also useful that prior to the conduct of the PCRA, facilitators make an initial visit to the locality to get a general "feel" of the village and community. This can be undertaken to coincide with a visit to address any administrative arrangements with the local government. Such an initial field visit is an opportunity for trainers/facilitators to familiarize themselves with the important features/characteristics of the locality, as well as for the planning of the field activities called for in the PCRA. It is important that at this stage, and with the assistance of local partners, facilitators identify the specific sites to conduct the field activities as well as the possible key informants to be interviewed.

PCRA trainers/facilitators must encourage the active participation of the local government officials, people's organizations, women's groups, youth sector and community leaders not only in the conduct of the PCRA but also in the coordination of the activity. Not only can they provide important background information, they also help identify the selection of PCRA participants and other key informants with special knowledge of the sites and CRM issues and activities.

CHAPTER 1

Introduction to the
Coastal Environment,
Coastal Resource
Management
and Participatory
Coastal Resource
Assessment

CHAPTER 1

Introduction to the Coastal Environment, Coastal Resource Management and Participatory Coastal Resource Assessment



Learning Objectives:

At the end of this chapter, participants will be able to:

- understand and appreciate the importance of coastal and marine ecosystems to food, economic and environmental security;
- identify and appreciate the various threats to these ecosystems by human activities associated with development and population growth;
- understand the basic concepts and process of coastal resource management (CRM); and
- appreciate the participatory approach to coastal resource assessment and the critical role of the community in the CRM process.



Total Training Time:

6-8 hours



Materials and Equipment:

Overhead/powerpoint slides/flip charts, idea cards, Manila paper



Reading Materials:

Philippine coastal management guidebook series nos. 1, 3, 5 and 6

Participatory coastal resource assessment: A handbook for community workers and coastal resource managers

Activities/Topics Covered

- Introductions/warm-up activity
- Participatory activity # 1: Status of coastal resources in your locality
- The coastal and marine ecosystems: An overview
- Participatory activity #2: Group quiz
- The Philippine coastal zone: An endangered environment, issues, problems
- Participatory activity #3: Workshop group discussions on human impacts/problems in the coastal zone
- Participatory activity #4: Fish game/open access
- Introduction to CRM and the CRM planning process
- Introduction to PCRA



Registration/introductions/warm-up activities

Session Objectives:

1. to establish rapport among participants and make them feel relaxed and positive;
2. to prepare participants to contribute to the group-building process of the training;
3. to promote camaraderie and a sense of belonging within the training group; and
4. to identify the training/workshop expectations of the participants.

Guidelines for Warm-ups:

1. In warm-ups at the start of the day, every person should participate and speak. This makes it easier for participants to speak up in the large group later during the workshop.
2. Warm-ups should make participants relax and positive.
3. Instructions for each warm-up should be spoken clearly.
4. Physical exercises can be a warm-up.

Expectation and Commitment Setting:

It is best that expectations and commitments be leveled off before the start of the workshop and that the participants understand clearly what are expected of them for the duration of the training.

Appropriate attire, house rules and the training's process flow and schedule of activities must be clearly communicated to participants at this time. Participants must understand the nature of the field activities and the expected learning outcomes of these activities.

Participatory Activities for the Day:

A number of participatory activities for specific sessions have been developed to allow for better understanding and appreciation of the subject matters being discussed. These activities may be in the form of games, quizzes or group exercises that the trainers will facilitate before or after lecture/discussions. Processing of such activities is undertaken by the trainers/facilitators so as to emphasize the learning gains from these activities.

The proposed participatory activities are detailed in each day's session.



Participatory activity #1:
Status of coastal resources in your locality

Objectives:

- to acquire participants' initial observations/perceptions regarding the present condition of their locality's coastal environment;
- to obtain participants' perceptions regarding the causes of such conditions; and
- to establish consensus that something needs to be done to improve the state of the coastal environment.

Materials:

Manila paper, pentel pens, idea cards

Duration:

20-30 minutes

Activity:

1. Post a large-sized Manila paper on the board/wall with the following process question and matrix. Ask each participant to answer the process question and to come to the board to put a check mark on their chosen answer.

Process question: How would you rate the present condition of your coastal environment?

Habitat	Very good	Good	Fair	Poor	Issues and causes
Coral reefs					
Mangroves					
Seagrasses					
Beaches					
Rivers					

2. Process the responses. Which habitat had the most fair/poor answers?
3. Ask a few participants to explain their answers. Their responses will generate a list of problems/issues/causes of the decline.
4. Note their responses on idea cards, one issue/problem per card. Post the idea cards of issues/causes/problems on the board.
5. Ask participants to take a look at the list of issues/problems and how they feel about these. Generate consensus about the need to address these.
6. Tell participants you will review these responses again on day 3 of the training.



Lecture/discussion #1:

The coastal and marine ecosystems: An overview

Objectives:

- to understand and appreciate the importance of coastal and marine ecosystems to food, economic and environmental security.

Materials:

Overhead/Powerpoint slides

Duration:

1 hour (including open forum)

Note to Trainers:

Ask participants if corals are rocks, animals or plants, or whether seagrasses are weeds and what makes mangroves adapt to a saltwater habitat. Explore participants' understanding of these ecosystems. Expound these ecosystems' significance to food, economic and environmental security. It may be necessary to spend more time explaining the interconnectedness of these ecosystems and the role they play at various stages of the life cycles of some fish, shellfish and crustaceans.

Reference:

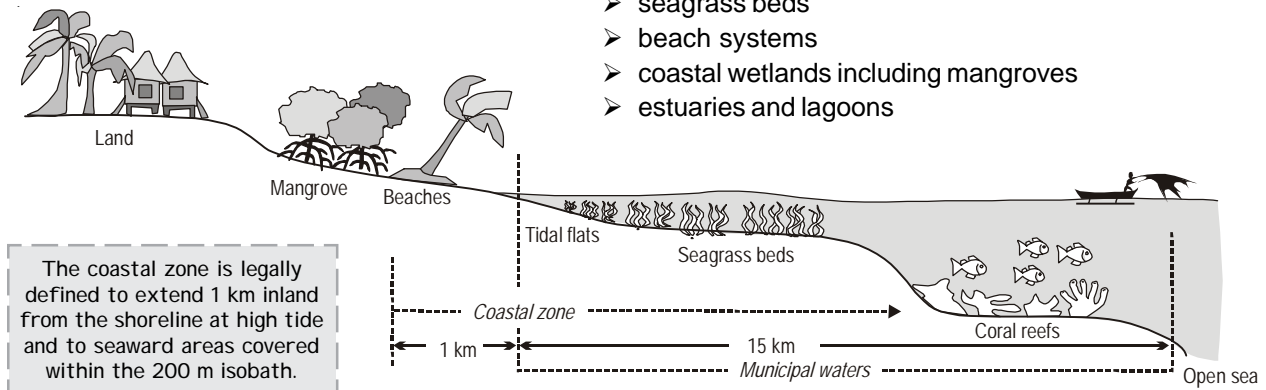
Philippine coastal management guidebook series nos. 1, 3, 5 and 6.

Key Content Points:

- Coastal ecosystems are critically important sources of food and livelihood and offer important economic and environmental benefits.
- Human activities associated with development and population growth threaten the sustainability of these ecosystems.
- Protection and management of coastal ecosystems offer important economic and environmental benefits.
- Local action is necessary and appropriate to manage growth and development in the coastal zone to ensure sustainable use and management of coastal and fisheries resources.

The coastal zone is the interface where the land meets the ocean. It includes the shoreline environment and the adjacent coastal waters. A typical coastal zone of a tropical country like the Philippines is diverse and generally has the following major ecosystems along its shallow coastlines:

- coral reefs
- seagrass beds
- beach systems
- coastal wetlands including mangroves
- estuaries and lagoons



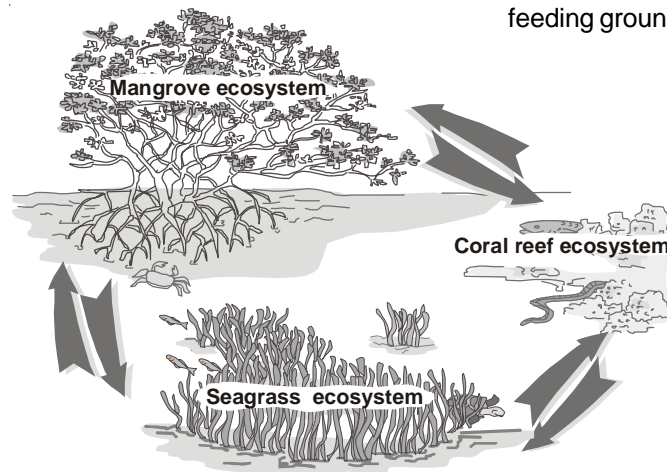
The coastal zone. (Modified from DENR *et al.* 2001)

While physically distinct, coral reefs, seagrass beds, beach systems and coastal wetlands (including mangroves) are interconnected and interdependent, with each playing a critical role in maintaining the viability and health of the entire coastal zone as well as the other ecosystems. They exchange energy, nutrients, species, habitat qualities and physical benefits.

They are likewise connected through large and complex food chains.

These food chains provide the links between habitats as organisms pursue their food. In many instances, fish and other organisms residing in one habitat often forage for food in another. For example, rabbitfish shelter in the reef's nooks and crannies and then graze among the seagrass beds.

After spawning, shrimp and milkfish use the mangroves for nurseries and feeding ground before leaving for deeper waters when mature.

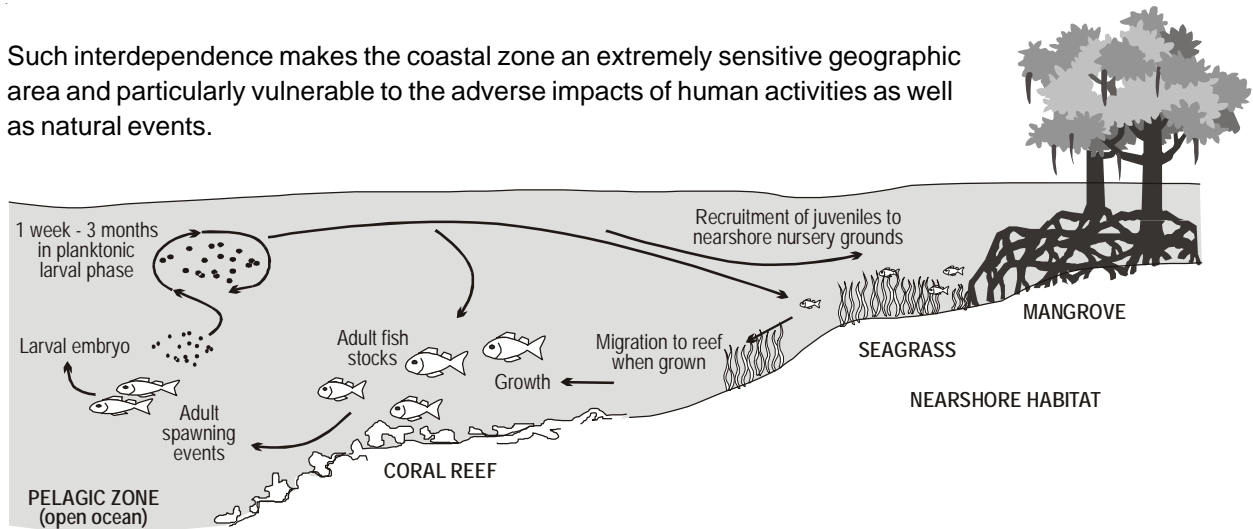


Millions of people throughout the world are highly dependent on coastal areas and seas for food, livelihood, recreation and economic development. Coral reefs, seagrass beds, mangrove forests, beaches, estuaries and lagoons are habitats to many fish and other marine life species at certain stages of their life cycles. Degradation of any one ecosystem impacts on the growth and productivity of these species.

Mutual contributions of tropical coastal habitats.

(Sullivan *et al.* 1995)

Such interdependence makes the coastal zone an extremely sensitive geographic area and particularly vulnerable to the adverse impacts of human activities as well as natural events.



Typical life cycle of coral reef fish species and interconnectivity of habitats. (DENR *et al.* 2001)

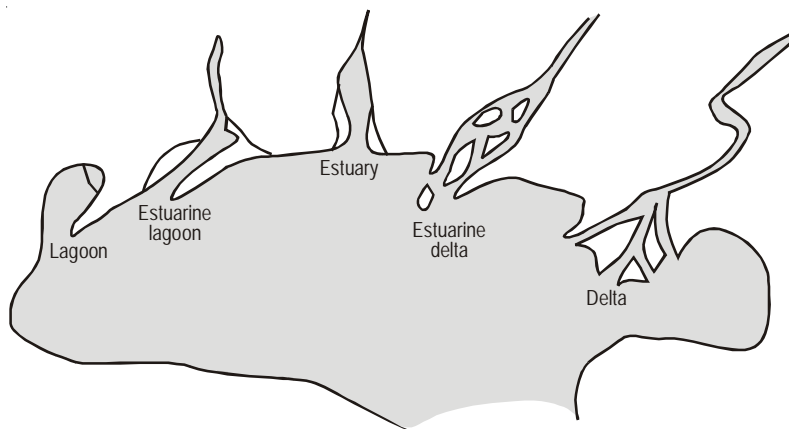
Habitats of the coastal zone

Key Content Points:

- During this session, participants will learn more about each of these ecosystems and their respective natural functions in nurturing coastal and marine life. Take time to explain the many benefits offered by these resources due to unusually high biological productivity and how these ecosystems support a wide variety of fish and other marine species as spawning, nursery and feeding grounds.
- Emphasize that despite their extraordinary value and importance, damage to these ecosystems continues and that pressures brought about by unplanned development and population growth have resulted in considerable habitat loss and subsequent decline of fisheries catch.

Estuaries, Lagoons and Bays. Estuaries are areas where freshwater and seawater meet and mix. These are shallow, semi-enclosed and sheltered coastal water bodies that play essential roles in the life cycles of economically important crustaceans, fish and shellfish, and often support a specialized fishery habitat as well as soft-bottom mudflats and communities.

They may be called lagoons, sloughs or bays, but all share the mixing of freshwater with the sea in a partially enclosed section of the coast and through tidal circulation, export nutrients and organic materials. They are also a focus for substantial economic activities such as harbors, fishing, recreation, mariculture, sand mining and sewage disposal sites.



A. WHITE

Estuaries are very productive ecosystems such as in Malalag Bay, Davao del Sur.

Examples of inlet types from lagoons to deltas. (Adapted from Day *et al.* 1989)



A. SIA

Mangroves harbor a diverse community of marine organisms

Coastal Wetlands. Coastal wetlands are important because they are home to a great variety of plants and animals, providing nursery and spawning grounds for many commercially valuable fish, shorebirds, migratory waterfowl and other types of wildlife. Wetlands play a key role in the hydrologic cycles by retaining and storing runoffs from heavy rainfall, slowing the flow of water to streams and rivers and reducing the chances of flooding. Along the coast, wetlands control shoreline erosion by absorbing the force of storm waves.

Mangroves. Mangroves are woody, seed-bearing plants adapted for life in brackish and waterlogged soils and have characteristic features that allow them to live in coastal marine environments. Highly adapted to seawater, they vary in size from shrubs to tall trees and are found along mudflats in the intertidal zones. The mangrove ecosystem is extremely productive and serves as feeding grounds, nursery grounds and refuges to many fish species, migratory birds and other marine organisms.

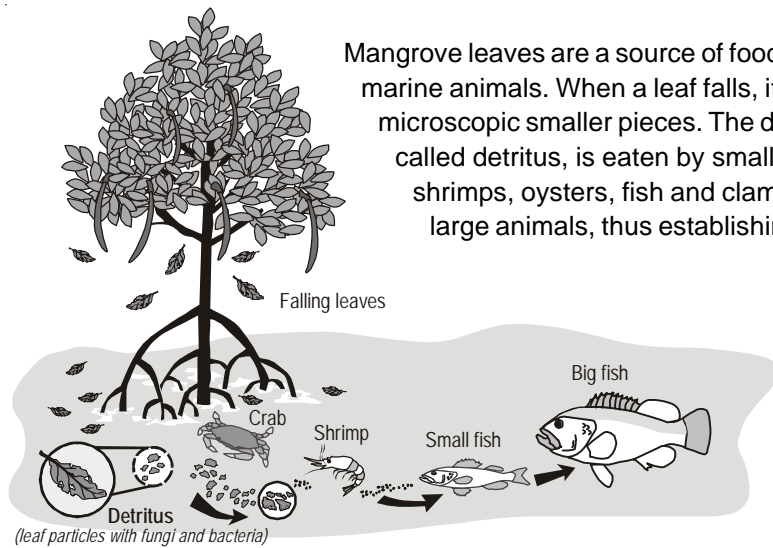


Rhizophora

Avicennia

Examples of two major mangrove genera (*Rhizophora* and *Avicennia*).

(Clark 1995)

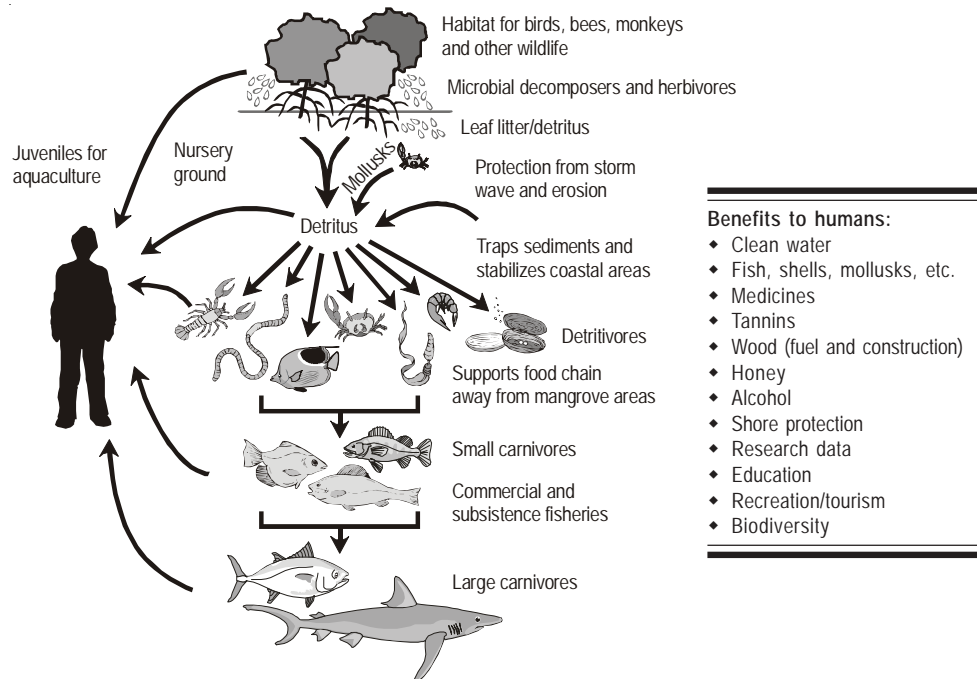


Mangrove leaves are a source of food for fish, shrimps and crabs and other marine animals. When a leaf falls, it breaks up and decomposes into microscopic smaller pieces. The decomposing plant matter, collectively called detritus, is eaten by small marine animals, such as crabs, shrimps, oysters, fish and clams. These animals in turn are eaten by large animals, thus establishing the food chain.

- One hectare of mangrove trees produces up to 3 tons of litterfall annually.
 - One hectare of healthy mangrove ecosystem produces about 1.08 tons of fish per year.
- (Schatz 1991)

Mangrove detrital food chain. (DENR *et al.* 2001)

For decades, wetlands, including mangroves were viewed as unproductive wastelands, as breeding grounds for mosquitoes and disease and were thus energetically converted to fishpond, residential, commercial, industrial and other uses. Such conversion usually necessitated that the wetlands are drained or filled, resulting in wetland loss and degradation of their natural functions.



Mangroves and their ecological and economic benefits. (Modified from Berjak *et al.* 1977)

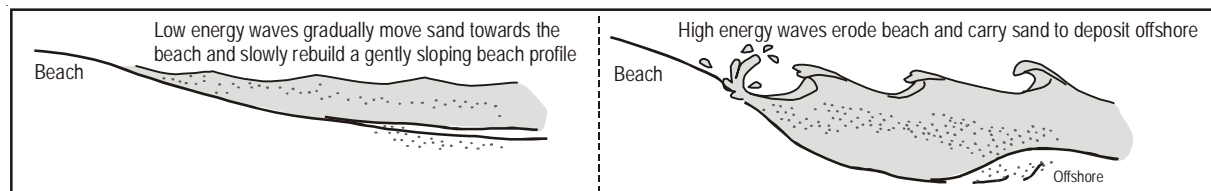
Beaches and Foreshore Areas. Beaches are defined as the non-vegetative part of the shoreline formed of loose materials, usually sand, that extend between the lowest seaward tide level and the inland limit of the average highest storm waves. They are dynamic landforms which features are constantly being shaped through the forces of wind and water. Their size and shape reflect the local balance between the deposition or accretion (gain) and erosion (loss) processes occurring at that particular time and location. Beaches often have an annual cycle where the storm season quickly erodes beaches and the calm season rebuilds them slowly.



A. WHITE

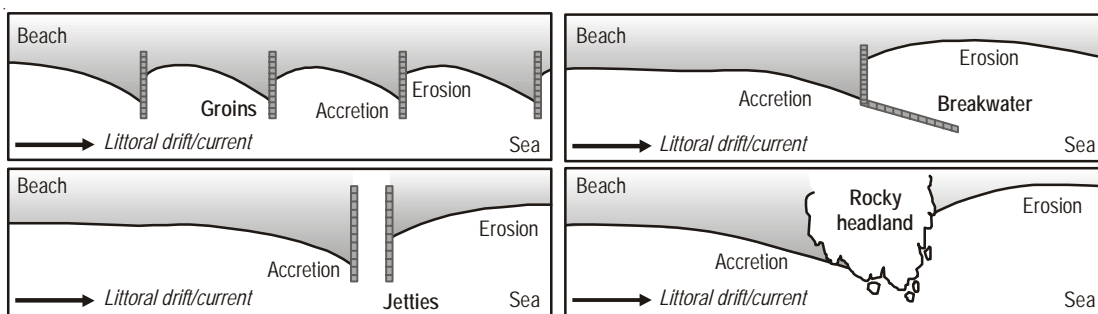
Pristine beach in Palawan.

Most small tropical islands have coral and sand beaches, i.e., beaches formed by coral reef growth and erosion. Forming an integral part of the reef communities, these beaches depend on healthy coral reefs for continued supplies of sand, at the same time supporting crustaceans, mollusks and some worms. Undisturbed beaches also serve as nesting places for turtles. Beaches are the focal point of coastal tourism since many tourist activities depend on clean beaches.



Seasonal variations in beach erosion and accretion. (DENR *et al.* 2001)

Beaches are greatly affected by the longshore movement of materials paralleling the shoreline. A series of parallel groins placed close together may actually push the littoral sand transport offshore so that it works only from tip to tip of the groins. As such, all the beaches then suffer as the sand stays offshore, and never gets to the beach.



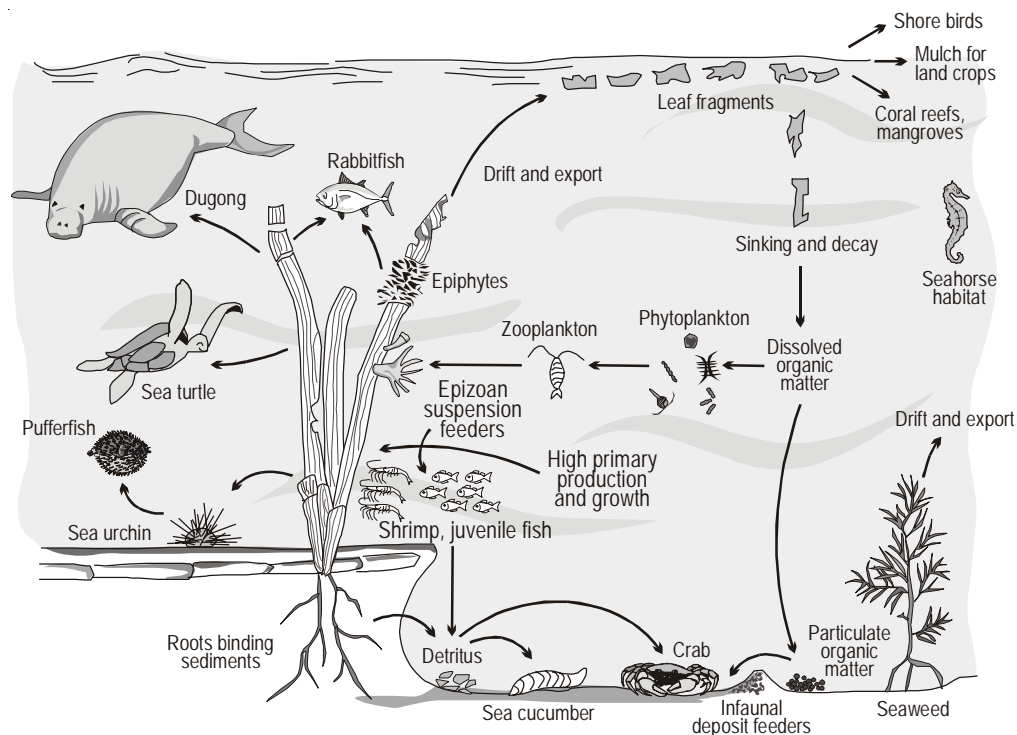
Examples of down-drift erosion resulting from hard engineering solutions and headlands as seen from aerial view. (Clark 1995)

Seagrass Beds. Seagrasses are seed-producing marine plants that occur in shallow, nearshore waters, the only group of submerged flowering plants in tropical and marine environments. Thriving in the shallow waters lining the shore, they have adapted life in saline waters with a root system that can withstand wave action and a reproductive system that distributes pollen by water. They are normally found in areas where light can easily penetrate (shallow, clear and calm waters) enabling photosynthesis to occur. Seagrass beds are often found between coral reefs and mangrove areas, colonizing the soft, shallow and sandy-muddy bottom.



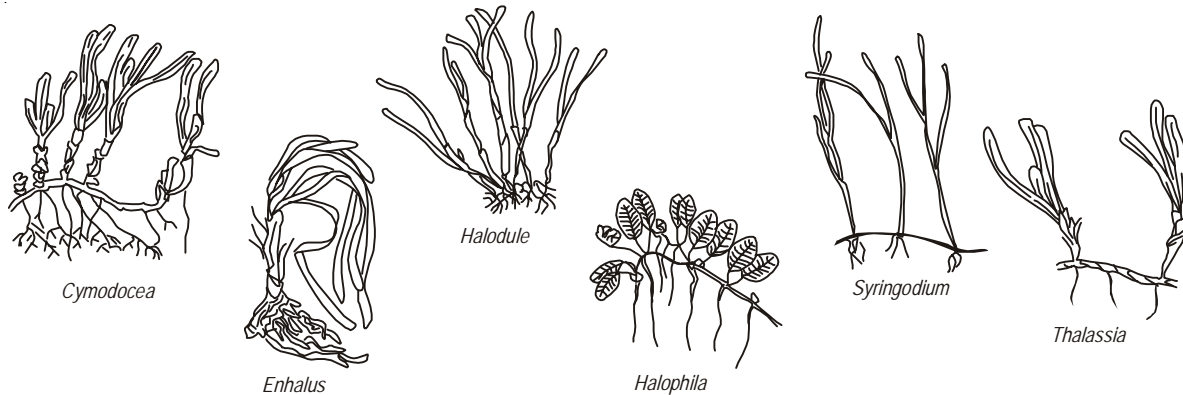
Seagrasses contribute to nutrients cycle within the ecosystem.

Seagrasses have very high primary productivity that helps support and provides nutrients and physical habitat to a variety of organisms. Their main role as a nutrient source occurs when the dead seagrass decomposes and releases its nutrients to the water. Important fish species such as rabbitfishes (siganids), rely completely upon the seagrasses. Shrimps, sea cucumbers, sea urchins, seahorses, crabs, scallops, mussels and snails are economically important and abundant. Many resident and transient species also use the seagrass for refuge, spawning and nursery activities.



Food chain in Philippine seagrass ecosystems. (Fortes 1989)

Largely taken for granted, seagrasses perform many important functions. They stabilize and hold bottom sediment even under the force of hurricanes and storms. They provide shelter and refuge for adult and young marine animals, many of which are commercially important. They provide food for fish, sea turtles and other marine animals, including the endangered Dugong and the Green sea turtle.



Types of seagrasses commonly found in the Philippines. (White 2001)

- Seagrass beds harbor a rich assemblage of marine organisms that all contribute to the important role of seagrasses in the marine ecosystem.
- Seagrass beds support at least:
 - 172 species of fish
 - 46 species of invertebrate
 - 51 species of seaweeds
 - 45 species of algal epiphytes
 - 1 species of sea turtle
 - 1 species of Dugong



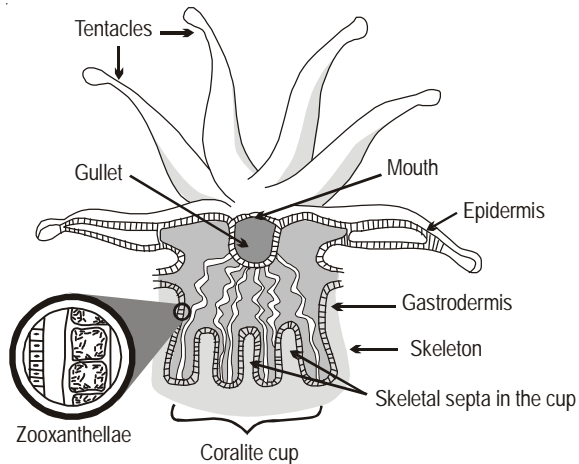
Reefs support hundreds of species of fish.

E. CU UNJIENG

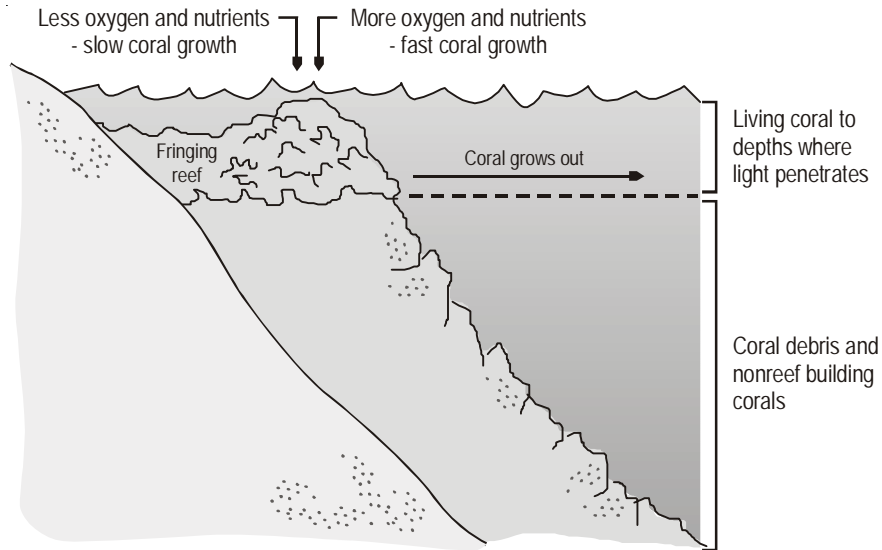
Coral Reefs. Contrary to the general belief that corals are plants or even rocks, corals are actually tiny animals called polyps that live in colonies underwater, either in patches or in extensive reefs.

Each colony is composed of thousands of tiny polyps. Polyps secrete salivary calcium carbonate material that hardens to form the rigid structural mass or skeletons of the reefs. Inside the polyps are many single-celled algae called zooxanthellae, which are capable of photosynthesis, thus providing an energy source for both the algae and the coral. It is the algae that give corals their varied colors.

The coral colony grows as one polyp buds off another polyp. The polyps build a united skeleton which gives the colony the strength to withstand waves and storms. Coral reefs occur along shallow, tropical coastlines where the marine waters are oxygenated, clear, warm, and free from sediments and pollutants.

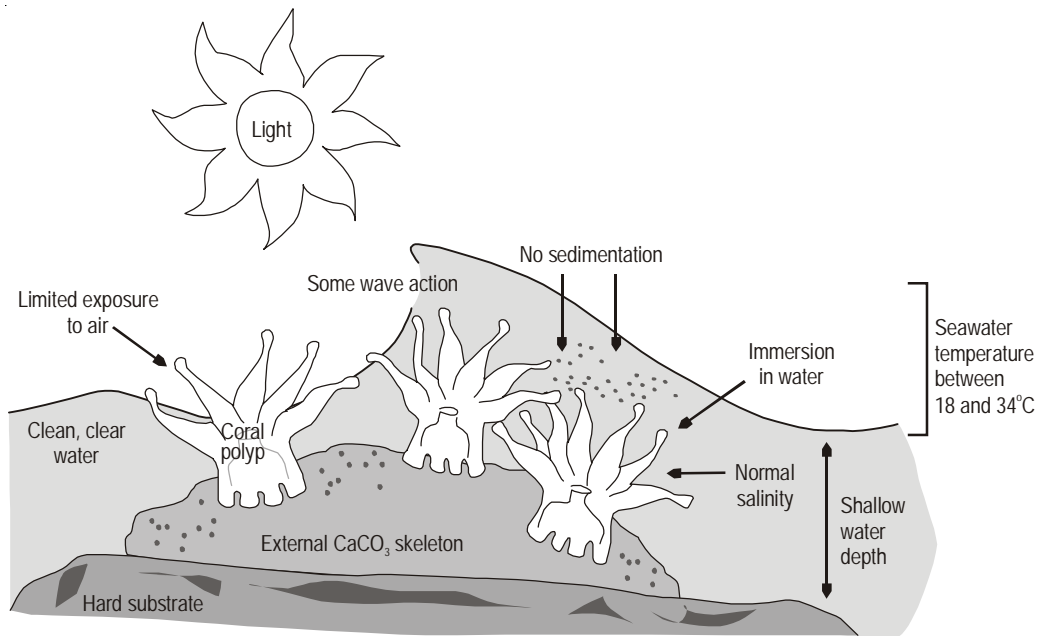


Parts of a coral polyp. (White 1987)



Formation of a typical fringing coral reef. (White 1987)

The actual reef consists of large and rigid structural mass of calcium carbonate formed by the cemented skeletal remains resulting from the successive growth and development of reef-building corals. As the colony grows, it provides structure and niches that serve as homes for many different organisms including fish, sea snakes, mollusks, marine worms, crustaceans, algae and sponges. It is this ability to provide diverse structure that supports the vast biodiversity associated with reefs.



Requirements for healthy coral reef growth. (White 1987)

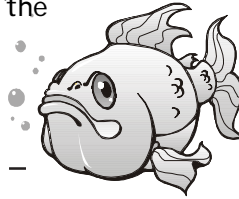
Considered as the “rainforests of the sea”, coral reefs are among nature’s most spectacular and beautiful creations and rank as one of the most complex and diverse ecosystems in the world. They are home to a dazzling array of marine life consisting of nearly a million species. Up to 3,000 species may co-exist on a single reef, where the density of fishes can be 100 times the ocean average. Coral reefs are extremely efficient in capturing nutrients and sunlight and then cycling them for use by many different organisms. They are also an essential protein source for fish and other marine food products.

Philippine coral reefs host:

- more than 2,000 species of fish
- 5,000 species of clams, snails and other mollusks
- 488 species of corals
- 981 species of bottom-living algae
- thousands of other marine organisms

Coral reefs grow slowly, from a few millimeters to several centimeters per year depending on the species. Once destroyed, it may take 10 - 50 years for a coral reef to recover from damage such as that caused by dynamite and poison fishing. Some reefs do not recover at all.

It is estimated that 1 km² of healthy coral reefs can produce up to 20 tons of fish per year. Destroyed reefs on the other hand only produce less than 4 tons of fish per square kilometer per year.





Participatory activity #2:

Short quiz: How well do you know your coastal habitats?

Objectives:

- to assess participants' level of awareness/knowledge regarding the various coastal ecosystems and to clarify if any, existing misconceptions/misunderstandings regarding these ecosystems; and
- to serve as "ice breaker" before another lecture discussion.

Materials:

Manila paper or acetates with the quiz questions, idea cards, pentel pen, some tokens (e.g., stickers that can serve as rewards for those participants with correct answers)

Duration:

15-20 minutes

Guidelines for Activity:

1. Assume the role of a popular quizmaster. Explain to participants that the short quiz is a group test on what they know about the coastal ecosystems.
2. Divide the participants into groups and provide them with idea cards.
3. Post the questions in Manila paper, on the board or through an overhead projector. Use multiple choice, true or false, or fill-in-the-blank questions.
4. Read aloud the questions one at a time. Participants are given a maximum of 2 minutes to respond. Ask participants to choose the correct answer by writing on the idea cards the group's collective answer.
5. After 2 minutes per question, call on participants to raise and show their respective group's response. Score and tally each group's answers.
6. Correct/clarify as necessary any wrong answers given.
7. The group with the most correct answers wins.

Suggested Questions:

1. Corals are:
a) Rocks b) Animals c) Plants
2. Coastal ecosystems are physically distinct and therefore not interconnected. True or False?
3. Coastal wetlands are largely muddy, unproductive areas and are better off converted into reclamation or landfill sites. True or False?
4. The following fish species are completely dependent on seagrass beds for the entire duration of their life cycle:
a) Grouper b) Rabbitfish (siganids) c) Milkfish

5. Along the coast, this ecosystem protects the shoreline by absorbing the force of storm waves and controlling erosion from the uplands.
a) Coral reefs b) Lagoons c) Mangroves
6. This ecosystem particularly needs sunlight, warm temperatures and clean and clear water to thrive.
a) Seagrass beds b) Coral reefs c) Estuaries
7. It is estimated that 1 km² of healthy coral reef produces up to ____ tons of fish per year.
8. Seawalls and groins are always helpful and highly recommended to contain beach erosion. True or False?
9. Turtles lay their eggs on:
a) Anywhere b) Coral reefs c) Seagrass beds d) Beaches
10. One hectare of healthy mangrove ecosystem produces about ____ tons of fish per year.
a) More than 1 ton b) Less than half a ton c) More than 3 tons
11. The Philippine coastal zone is legally defined to extend ____ kilometer(s) inland from the shoreline:
a) 1 kilometer b) 2 kilometers c) 5 kilometers
12. Physically distinct coral reefs, seagrass beds, beach systems and coastal wetlands are however interdependent and interconnected. True or False?
13. Wetlands are largely not productive, thus, efforts to convert these into development areas are highly justified. True or False?



Lecture/discussion #2:

The Philippine coastal zone: An endangered environment, issues, problems

Objectives:

- to inform participants about the present status of the Philippine coastal environment; and
- to enhance participants' appreciation of the need for management interventions to arrest if not reverse ongoing environmental decline.

Materials:

Overhead/Powerpoint slides

Duration:

1 hour (including open forum)

Note to Trainers:

Encourage participants to share their feelings about present developments in their coastal areas. Emphasize that historically, planning for the coastal zone as well as fisheries management have been largely neglected, but that it is not too late to begin efforts to rationalize their current and future uses.

Key Content Point:

- This particular session seeks to familiarize participants with the present status of the Philippine coastal environment and its continuing challenges. Its purpose is not to discourage coastal development outright, but to explain the need to balance development objectives with community objectives and natural resource protection. Poorly managed coastal development can severely erode not only environmental security but also the quality of life and "sense of place" of communities as well as give rise to recurring resource use conflicts.

Impacts on coastal and fisheries resources may be felt from activities conducted at the highest mountain peak to the coastal and marine waters. All over the world, human impacts on coastal resources continue to intensify as increased population pressures on land and in the sea are degrading fisheries, coral reefs, seagrasses and mangrove areas that serve as basis for food security, economic development and biodiversity conservation.



Various economic activities and their impacts on the coastal environment. (DENR *et al.* 2001)

Coastal waters comprise only about 12% of Philippine waters, but this is where highly diverse and productive habitats serving as critical life-support systems for a multitude of aquatic living resources are found. However, over the last 20 years, coastal areas in the Philippines have come under increasingly severe threats due to human activities. Coastal ecosystems and their natural ability to produce are being overexploited to the point of causing permanent damage to them. The coastal situation in the Philippines mirrors global trends where unsustainable use of natural resources, pollution and habitat destruction are resulting in significant, if not irreversible, loss of the ocean and the coastal life support systems.

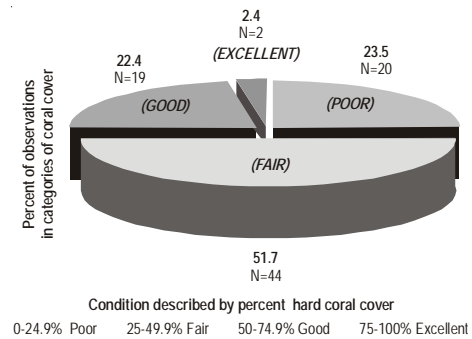
The following information on the Philippines is illustrative of present issues/problems in the coastal zone.

Coral reef degradation

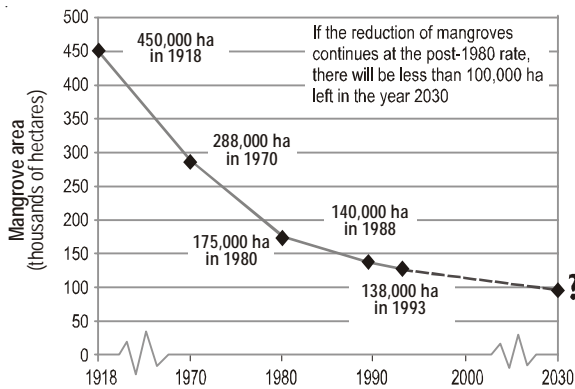
In the last 20 years, coastal areas in the Philippines have come under increasingly severe threats. Surveys in the 1980s and 1990s have shown that more than 75% of the coral reefs in the country have been degraded.

Status of Philippine coral reefs at 14 localities (85 reef samples).

(Gomez *et al.* 1994)



Mangroves in trouble



Decline of mangrove resource in the Philippines.

(DENR 1988; White and de Leon 2004; White and Cruz-Trinidad 1998)

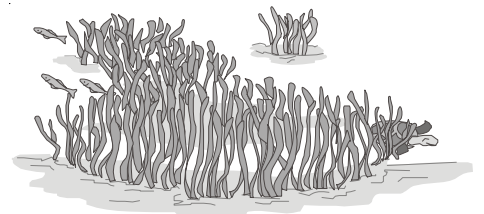
Mangrove resources are in no better condition than coral reefs in the Philippines. National laws prohibit the cutting of mangroves. Nevertheless, this ecosystem continues to decline at a rate of approximately 2,000 to 3,000 ha/year.

Production of firewood, charcoal and building materials often was the initial incentive to cut trees, followed later by conversion to fishponds. The most rapid decrease in mangrove coverage occurred during the 1960s and 1970s when national policies encouraged the expansion of aquaculture.

Loss of seagrass beds

Seagrass beds are also fast disappearing, with such loss attributed to the following:

- land use activities, such as encroachment in the habitat through reclamation and improper shoreline development including the construction of structures that impede natural water movement;
- use of destructive fishing gears that scour and scrape the seagrass beds;
- sedimentation and siltation from upland areas; and
- introduction of water borne pollutants from domestic and industrial wastes.



The coastal habitats and ecosystems of prime importance such as coral reefs, seagrass beds, mangrove forests, estuaries and beaches are all under increasing threats from human development and resource extraction activities so that their natural productive functions are becoming impaired. As these systems are destroyed and lost, they will not easily come back. These losses directly translate to declining fish catch and loss of income and livelihood for many coastal families.

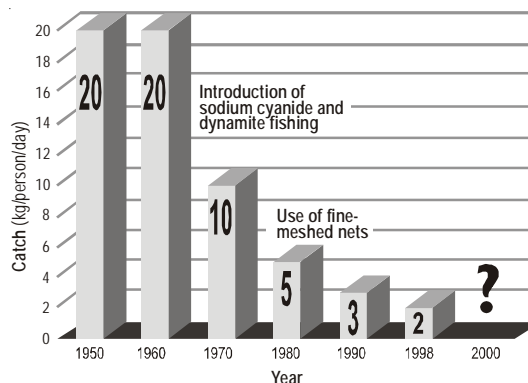
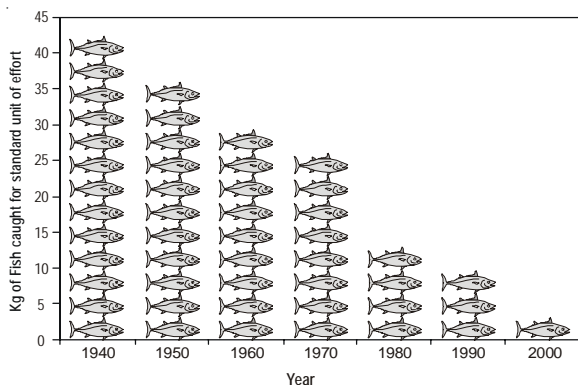
Declining fish catch

Fisheries are culturally, economically, socially and ecologically important to Filipinos. They contribute significantly to income, employment, foreign exchange earnings, and nutrition, with fish and other marine and aquatic products providing approximately 50% of the animal protein in the Philippines.

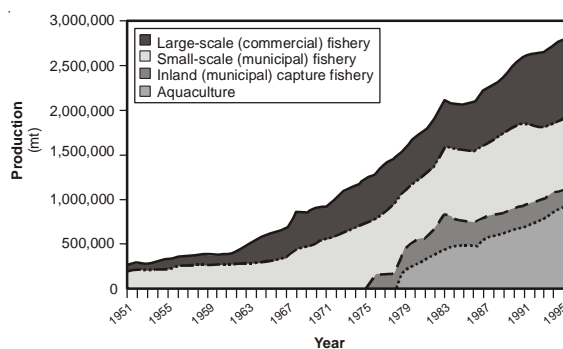
Philippine fisheries resources, however, are rapidly being depleted, as evidenced by the decline of fish catch around the country. Fisheries scientists report that as early as the late 1960s, the country had reached the maximum economic yield of its demersal fish stocks (bottom-dwelling species such as groupers (*lapulapu*) and snappers (*maya-maya*). Studies also show that catch of small pelagic fisheries (midwater-dwelling species) such as scads and sardines indicate overfishing and decline per unit effort.

Fisheries resources in the Philippines have surpassed sustainable levels of catch. Most studies show that all important fisheries are overfished and capture fisheries have stagnated (Pauly 1988; Russ 1996). Demersal and pelagic fish stocks in the Philippines today are 10-30% of their original levels when compared to 50 years ago in the 1940s.

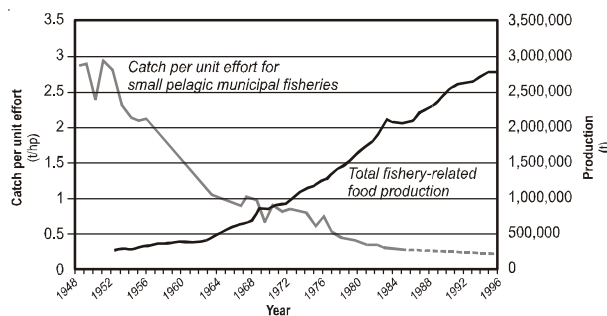
In the Philippines as in many countries elsewhere, fishers are catching fewer and fewer fish each year and sinking deeper into poverty.



Trend in estimated daily fish catch per municipal fisher for Olango Island, Cebu. (CRMP 1998)



Fisheries-related food production for 1951-1996.



Trend in catch per unit effort for municipal small pelagic fisheries since 1948 and total fisheries production. (Dalzell *et al.* 1987; Silvestre and Pauly 1989; Dalzell and Corpuz 1990; BFAR 1997)

Average catch of fish per unit effort since 1940s for fishers using hook and line from six provinces around the Philippines. (Arquiza 1999; Green *et al.* 2000; Valle *et al.* 2000; De Jesus *et al.* 2001; Sotto *et al.* 2001; Yambao *et al.* 2001)

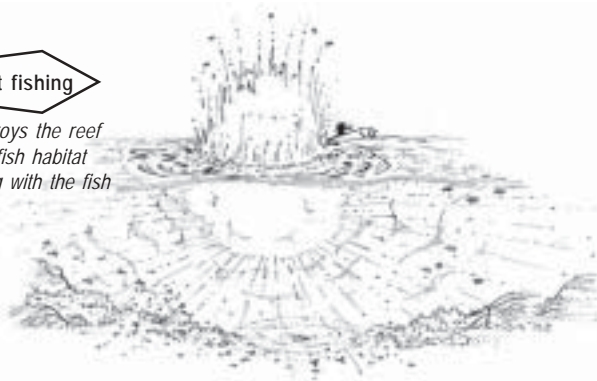
Illegal/destructive activities

The destruction of coastal habitats and decline of fisheries are due to a large extent to the proliferation of illegal and destructive activities such as:

- blast fishing and use of poisons, superlights, *muro-ami*, fine-meshed nets in fishing;
- intrusion of commercial fishing in municipal waters;
- conversion of mangroves and seagrass habitats to land or other uses resulting in decline of nearshore catch;
- marine sand and beach mining/quarrying;
- harvesting of banned species including corals, whale sharks, manta rays, giant clams and endangered marine species;
- non-observance of shoreline setback regulations resulting in damaging construction activities and development in the coastal zone;
- inappropriate tourism activities/development;
- pollution; and
- loss of marine biodiversity.

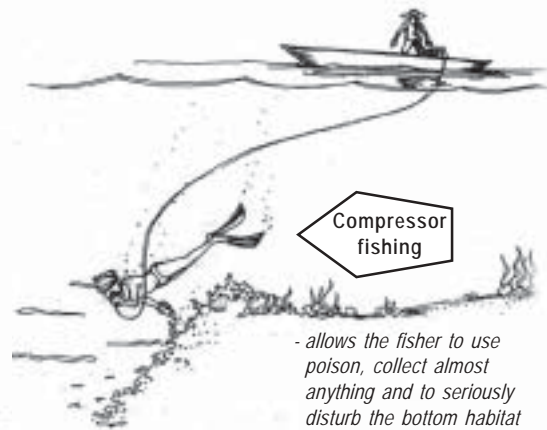
Blast fishing

- destroys the reef and fish habitat along with the fish



Compressor fishing

- allows the fisher to use poison, collect almost anything and to seriously disturb the bottom habitat



Common fishing gear (nationally or locally) in the Philippines and the potential damage caused by the gear.

(Adapted from Smith *et al.* 1980)



The lack of management measures and continued open access fishing result in overfishing and overexploitation of fish stocks.

In most fisheries throughout the world, just about anyone has the right to fish. Fish stocks have generally been considered common property, open to exploitation by anyone with a boat and gear. Generally, in open access regimes, there is no exclusivity or limits to resource use.

In the past decades, the number of fishers and fish farmers both at commercial and subsistence levels continues to grow. According to the United Nations Food and Agriculture Organization (FAO), the total worldwide has more than doubled in the past 25 years (FAO 2001).

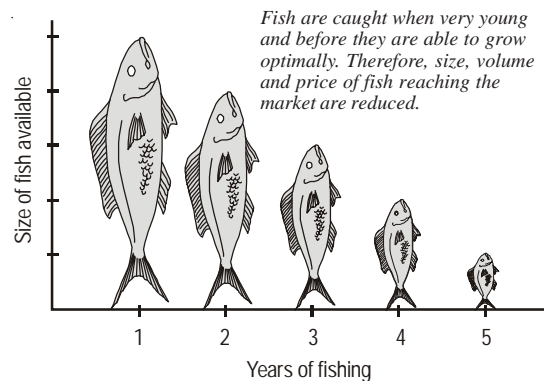
In the Philippines as elsewhere in the developing world, population growth and lack of other livelihood or employment activities in both upland and coastal areas strongly rebound to increased fishing pressure.

The open-access regime that prevails in marine capture fisheries contributes significantly to overfishing and the subsequent decline in fish stocks.

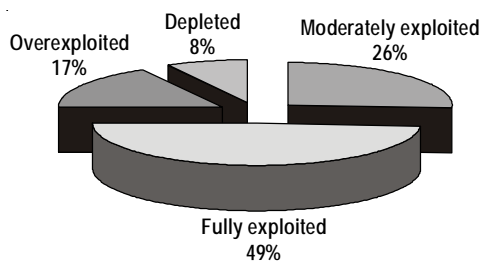
Overfishing

Overfishing is a major factor contributing to the decline in fisheries. According to fisheries scientists, the increased fishing activity has gradually undermined the health of many marine fish stocks. In 1994, the FAO estimated that about 74% of the world's marine fish stocks had been exploited, overexploited or depleted.

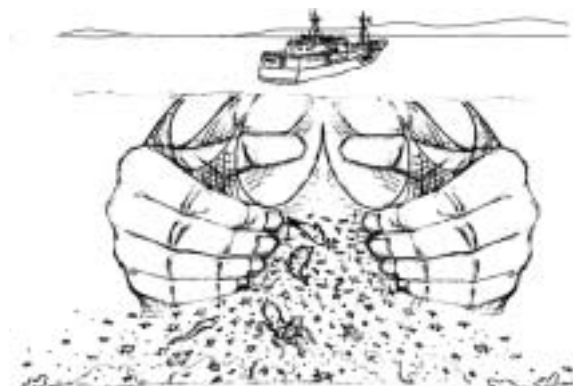
Overfishing occurs when the quantity of fish harvested causes a net reduction of the fish population, thereby limiting production from fish stock for the future. For so long now, fish are caught much faster than their ability to replenish themselves. Such biological stress puts at risk the productivity and sustainability of marine capture fisheries.



Growth overfishing.



Level of exploitation of world's major fisheries. (FAO 2001)



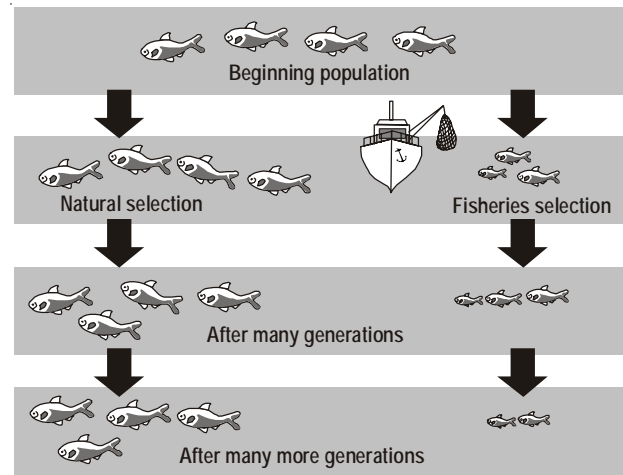
Current technologies give us the ability to catch everything in the sea. (Green *et al.* 2003)

Excessive fishing results in an ecological imbalance and eventual changes in the fishery causing ecosystem overfishing. Because fish have all been caught or significantly reduced, the ecosystem therefore is no longer fully functional and is less productive.

In recent years, there has been a clear shift in the types of fish caught around the world, wherein traditionally targeted stocks of larger, slower growing species have declined.

A consequence of overfishing is the loss of high-value fishes and in their place, the progressively increased catches of low-value fish—small species that are low on the food chain.

The impact from overfishing is initially subtle, but the end result is fewer fish and lower reproductive capacity of remaining fish.

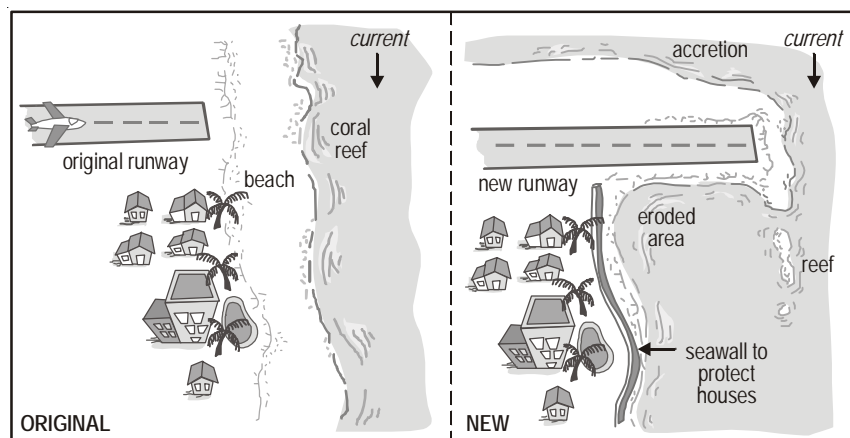


Long-term impacts of overfishing. (Bohnsack 1994)

Inappropriate coastal development

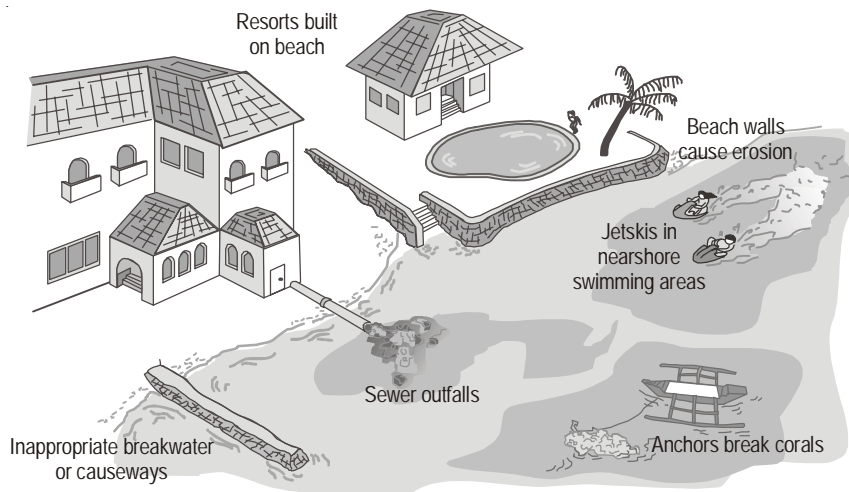
Coastal development in the Philippines has resulted in the loss of beaches, foreshore land areas and nearshore coastal habitats for a wide variety of conflicting human uses including industry, construction, dump sites, boat landings, tourism and recreation.

Both direct and indirect effects of coastal development have been severe on coastal resources. Any construction that modifies the shoreline will invariably change currents, wave action, tidal fluctuations and the transport of sediments along the coast. Fill or land reclamation activities also result in the permanent loss of marine habitat, while excavation and dredging permanently alter habitats and displace indigenous ecosystems, such as mangroves, seagrasses, coral reefs and beaches.



Extension of airport runway interferes with sand movement, Dumaguete City.

(Hüttche *et al.* 2002)



Frequent environmental impacts of tourism development and activities on the coastal zone. (Hüttche *et al.* 2002)

Unplanned and inappropriate tourism development can also result in adverse impacts. A very prevalent problem is the encroachment of tourism-related construction on beaches altering wave action and sand movement.

Resource use conflicts

Coastal areas all over the Philippines are being developed rapidly because people like to live and do business near the sea. The consequence is that beaches, foreshore land areas and nearshore coastal habitats are in demand and are being utilized for a wide variety of conflicting human uses including industry, construction, dumping, boat landings, tourism and human settlements. An increasingly common situation is the displacement of fishing communities as a result of such development activities.



Commercial-sized fishing vessels often compete with small-scale fishers in municipal waters.



Nearshore fisheries support many thousands of coastal dwellers through livelihood and food.

Another example is the recurring resource use conflict over the use of municipal waters by commercial and small-scale fishers. While commercial fishing is strictly prohibited within municipal waters by Philippine national laws, intrusion of large, highly efficient commercial fishing vessels is prevalent. One result of this conflict is decreasing catches. Local management regimes that clarify and limit user rights will improve sustainability of fisheries.

Pollution and loss of water quality

Beaches, foreshore and wetlands often serve as receptacles for solid waste and sewage. Often, the garbage and sewage is dumped into a river, stream or drain, which in turn are carried by water currents and dumped into these coastal areas. Agricultural and industrial runoffs as well as wastewater from intensive aquaculture are also critical threats to the health and productivity of coastal ecosystems.



Improper waste disposal is becoming a major problem.

About 50% of the coastal and marine pollution in the Philippines comes from runoff and land-based discharges. The trends in coastal and marine pollution in the country are not encouraging with the incidence of pollution-related problems increasing dramatically over 20 years ago. Algal blooms are occurring more frequently causing red tide events that kill or make shellfish and some fish species toxic.

Erosion, sedimentation, accretion



A. WHITE

Illegal logging and improper site development have resulted in erosion of lands and subsequent sedimentation of wetlands and foreshore areas.

Resort and port development and construction of seawall and groins along the coastline causes erosion of the shoreline as sediment transport pathways are altered or blocked. Urban development affects the hydrologic cycle, including groundwater recharge and surface runoff, by creating non-porous surfaces that stop infiltration of rainwater.

Shoreline erosion causes a real loss of land.

Growing population and deepening poverty

Coastal areas in the Philippines are experiencing rapid population growth, due, in part to migration to coastal areas and lack of reproductive health programs. Increasing population and poverty have put additional pressure on resources, subsequently resulting in increasing environmental damage, overfishing and alarming degradation of habitats. Present experience indicates that as the population density increases, the quality of life and integrity of the environment correspondingly decline for the average person living in the coastal areas.

Population growth in coastal areas exacerbates resource use conflicts in many ways. In the Philippines, the coastal areas are under increasing pressure from rapid population growth of 2.4% per year and the consequent concentration of development activities in the coastal strip. More than 60% of the Philippine population lives within what are considered coastal areas, wherein all major cities are coastal and large industries are located close to the sea.

The most significant challenge is to limit population growth so that gains from development and environmental management are not eroded or reversed by the increasing pressure of overpopulation.



The average Filipino family has more than 5 members.



Participatory activity #3:

Workshop group discussions on human impacts/ problems in the coastal zone

Objectives:

- to enhance participants' awareness of the range of human activities impacting on the coastal zone; and
- to make participants start thinking of the need to address issues/problems affecting the coastal zone and the coastal environment.

Materials:

Manila paper, pentel pens

Activity:

1. Prepare beforehand, the matrix below in Manila papers, corresponding to the desired number of participant groups.
2. Using the groups formed earlier in the participatory activity #1, ask participants to discuss and check the appropriate boxes in the matrix. Upon completion, participants post their respective Manila papers on the board or wall provided.
3. As facilitator, briefly go through each group's responses at plenary and time permitting, ask participants to expound on their responses.

Duration:

15 minutes

Process Question:

To what extent are the following activities/situations happening in your locality?

Activity	Often	Sometimes	Not happening
Smaller-sized fishes being caught			
Increasing conflicts and discussions between different fishing sectors over resource use			
Use of illegal fishing methods/gears a. dynamite fishing b. cyanide c. compressor fishing d. poison fishing e. fine-meshed nets			
Fishers traveling longer distances to catch fish			
Cutting of mangroves for firewood, house construction and other domestic uses			
Intrusion of commercial fishing in municipal waters			
Disappearance of once-abundant fishes			
Conversion of mangroves to fishponds			
Presence of seawalls/coastal construction on foreshore and beach areas			
Siltation			
Domestic wastes in coastal areas			
Agricultural runoffs in coastal areas			
Marine sand mining/quarrying			



Participatory activity #4: Fishing game/open access

Objectives:

- to introduce participants to the present state of the Philippine coastal environment;
- to demonstrate the concept of open access fishing; and
- to make participants aware of the need for management interventions to ensure sustainable use of coastal and marine resources.

Materials:

- At least 40 pieces of cut-out drawings of fishes, shells and other marine organisms in various sizes and shapes



- Bond paper signs indicating the following:
 - Marine Protected Area
 - Seagrass /Shell Sanctuary
 - Mangrove Protected Area

Duration:

20-30 minutes

Activity:

1. This activity must be discreetly set up before the start of the training day.
2. Choose 3 areas and post the bond paper signs — Marine Protected Area, Seagrass/ Shell Sanctuary and Mangrove Protected Area — in each of the area.
3. Out of the 40 cut-out fishes, choose 10 of the largest and most colorful cut-out fishes, large shells, etc., and visibly post these within the designated sanctuary/protected areas.
4. Hide the remaining 30 pieces of the cut-out drawings of fishes, shells and other marine organisms in different areas of the training room, under tables, chairs, behind curtains, etc.
5. The facilitator tells the group that everyone is going fishing and that those who “caught” the most number of fishes will win.
6. Closely observe the behavior of the participants during the game.

Processing:

1. Share observations with the participants. It is most likely that participants will be scrambling around, turning down chairs, peeking under tables and snatching the fishes posted on the sanctuary/protected areas.
2. Ask participants to share their observations.
3. Point out that if the training area was physically a coastal habitat, such a habitat would now be destroyed due to the “frenetic” activity of fishing.
4. Explain briefly that this game demonstrates how open access fishing works, where everyone can fish anywhere, anytime.
5. Ask participants what would happen if such “frenetic” fishing activities continue.
6. Relate their responses to what is happening now in the Philippines, wherein the coastal environment is “crying” for management.



Lecture/discussion #3:

Introduction to coastal resource management and the CRM planning process

Objectives:

- to introduce participants to the concepts, principles and process of coastal resource management (CRM);
- to promote participants' awareness on the objectives and benefits of CRM; and
- to make participants aware of the governance mechanisms inherent in CRM and the roles and functions of relevant government agencies both national and local.

Materials:

Overhead/Powerpoint slides

Duration:

45 minutes

Key Content Points:

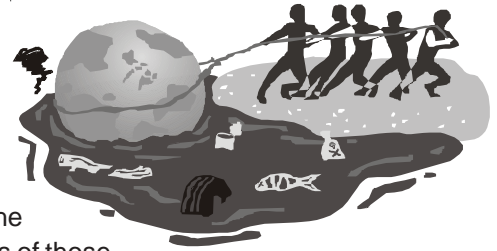
- CRM is first and foremost about addressing varied, wide-ranging and often interconnected issues that directly or indirectly impact coastal areas.
- CRM provides the tools for slowing down, if not reversing the negative impacts of uncontrolled use of these resources.
- CRM is best accomplished by a participatory process of planning, implementing and monitoring sustainable uses of coastal resources through collective action and sound decision-making.
- By involving resource users and focusing on local level responsibility, the communities have more ownership of the resources, issues and problems and their corresponding solutions.

CRM is above all else, managing people and human activities so that their negative impacts on the coastal environment are minimized. It is a dynamic process that seeks to rationalize the use and development of coastal resources to ensure that present human needs are provided while coastal environments and habitats are protected and managed for future and sustainable use.

CRM is anchored on the principles of sustainable development. The ultimate objective of CRM is to improve the quality of life of people in the coastal communities while ensuring the integrity of the coastal environment.

What are the guiding principles of CRM?

- CRM is participatory. All stakeholders have a say in the management of a resource on which they depend, and have a major role, responsibility and share in the resource management and decision-making process.
- It is a process of governance — wherein a level of government continues to assume responsibility for overall policy, enabling legislation, enforcement, other assistance/coordination functions, and works with local resource users and stakeholders.
- Social, cultural and economic objectives are an integral part of the management framework. Particular attention is paid to the needs of those who depend on the resource and to equity and participation.



In more specific terms, CRM is the process of planning, implementing and monitoring the sustainable use of coastal resources through participation, collective action and sound decision-making. It is a consultative, multisectoral and multidisciplinary process that encourages the participation and cooperation among individuals and communities to achieve the conservation and sustainable use of the coastal zone and its resources.

Key issues addressed by CRM

Key issues that can be addressed by CRM include:



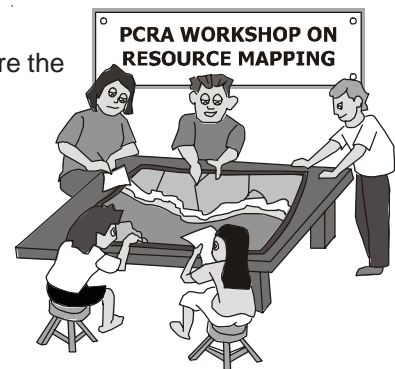
- degradation of coastal habitats;
- open access to fishery resources;
- increased fishing pressure to unsustainable levels;
- destructive/illegal fishing practices;
- coastal law enforcement;
- loss of marine biodiversity;
- inappropriate tourism and coastal/shoreline development practices; and
- resource use conflicts

These above-mentioned problems necessitate the use of integrated and collaborative management approaches incorporating the tenets of multisectoral collaboration or co-management and community participation.

Involving communities in CRM

It is important to recognize that local fishers and community members are the real day-to-day managers of coastal resources and nearshore fisheries.

CRM is not just about managing coastal resources, but also managing the human element: people in the communities that impact and depend on resources in the coastal zone. Highly dependent on coastal resources and nearshore fisheries as sources of food and livelihood, they have the most to lose if these resources are not managed in a sustainable way.



CRM is best accomplished by a participatory process of planning, implementing and monitoring sustainable uses of coastal resources through collective action and sound decision-making. By involving resource users and focusing on local level responsibility, the communities have more ownership of the resources, issues and problems and their corresponding solutions.

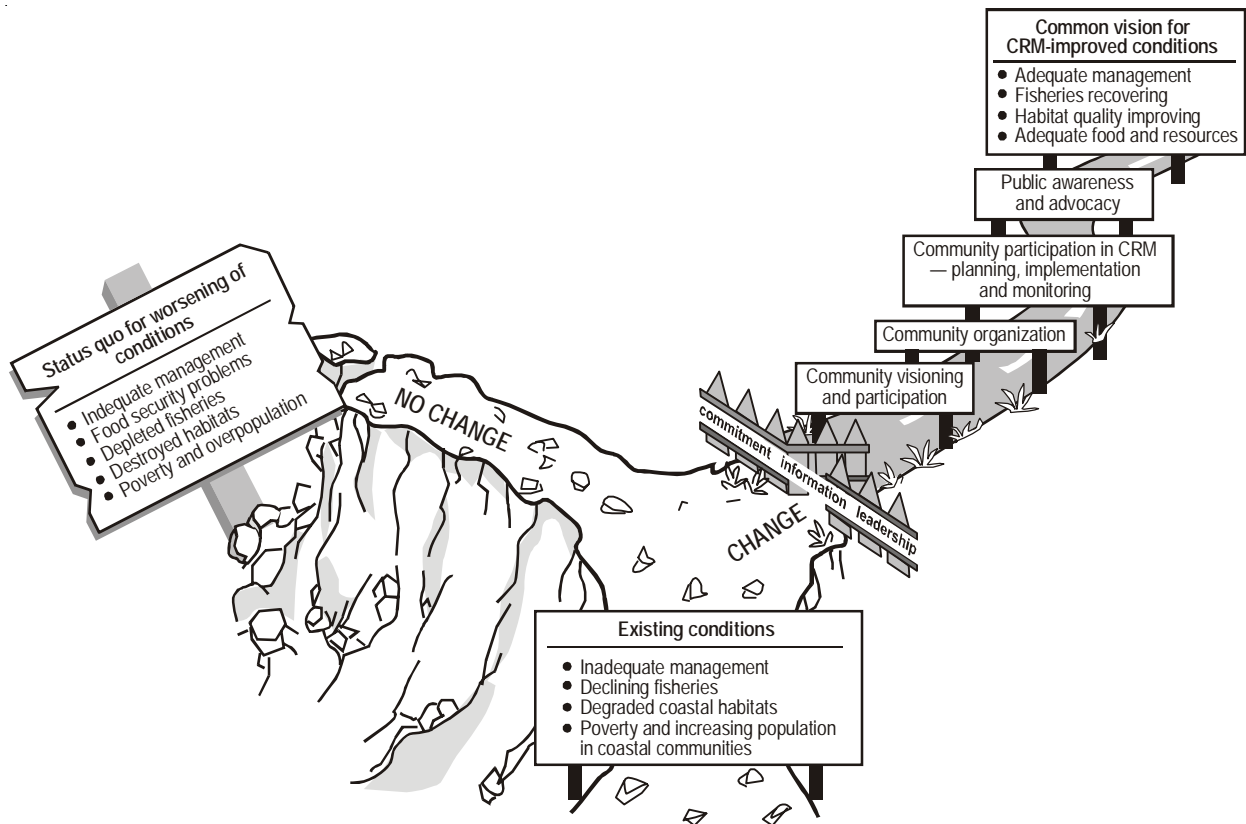


The major activities that have to be conducted to involve communities in the CRM process include the following:

- identification of stakeholders and formation of partnerships;
- community organization and mobilization;
- community participation in the planning process; and
- information, education and communication (IEC).

Local fishers are often aware of the degraded state of their marine resources but feel helpless to change the situation. Community organization is a process that uses interactive and participatory problem-solving techniques, capacity building, and the empowerment of the community members to identify problems and find solutions to coastal resource issues.

Community organization and participation is a most important element in CRM.



Required inputs for establishing a common vision for CRM at the community level. (DENR *et al.* 2001)

Role of the local government units

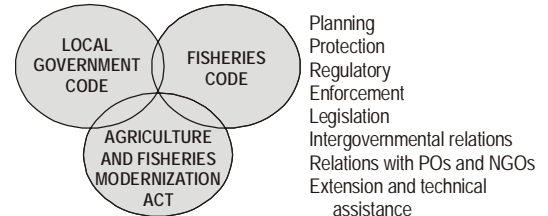
In the Philippines, the primary mandate for managing municipal/coastal waters out to a distance of 15 km from the shoreline has been devolved to the local government unit (LGU) under the 1991 Local Government Code (Republic Act [RA] 7160) and more recently defined in the 1998 Fisheries Code (RA 8550).

Local government plays a pivotal role as the last safety net for the recovery of coastal and marine resources in the Philippines. However, LGUs cannot discharge this mandate without the support of national government agencies (NGAs), nongovernment organizations (NGOs), coastal communities, academe, private and other sectors.

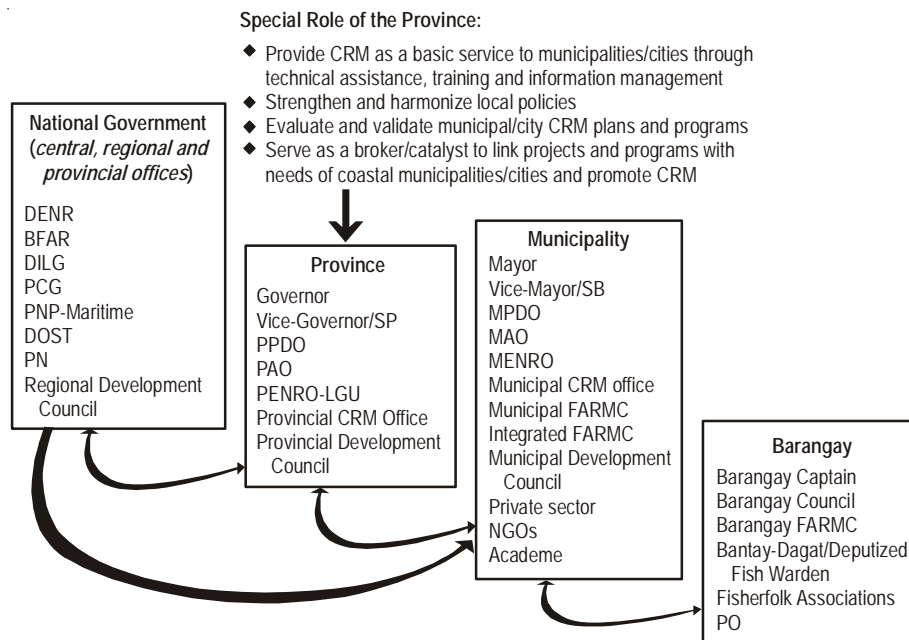


Coastal management must be a basic service of local government and incorporates all the local government powers and responsibilities including planning, protection, legislation, regulation, revenue generation, enforcement, intergovernmental relations, relations with people's organizations (POs) and NGOs, and extension and technical assistance.

LGU Mandate for CRM

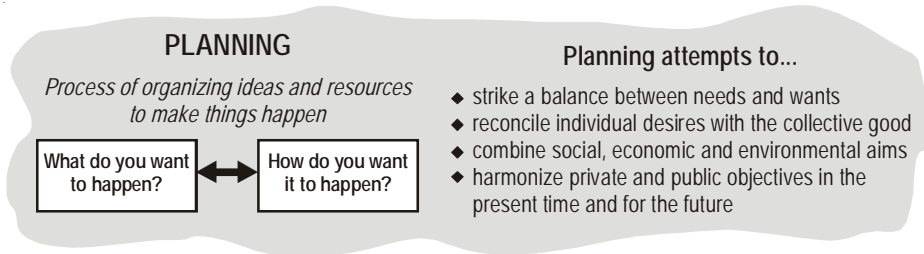


Agencies responsible for managing coastal resources are:



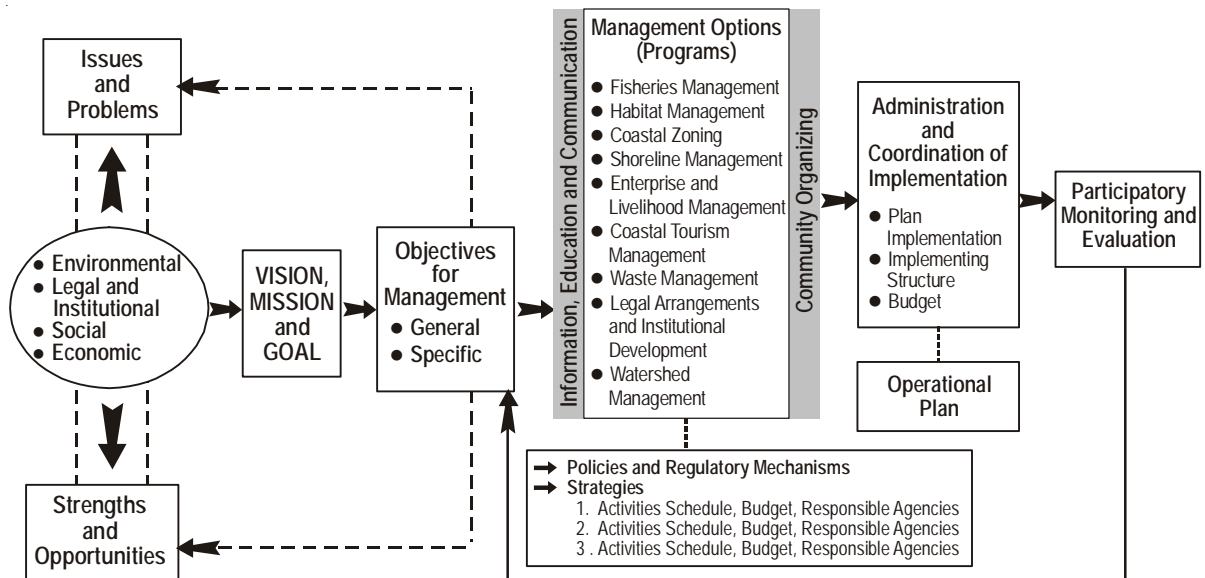
This devolution of authority to LGUs effectively sets up collaborative management regimes in which government and communities can work together to manage resources. The capacity of local government to deliver coastal management as a basic service depends to a large extent on local leadership, community participation, inter-LGU cooperation, and on support mechanisms from NGAs, NGOs, academe and the private sector. Each sector plays a vital role, but all must work together toward the common goal of coastal management.

The CRM planning process



Planning is a way of organizing the attention, resources and energy of government agencies, resource user groups, NGOs and others on the coastal issues that matter the most to the community. Planning at all levels of local government, including barangay, municipal, city and provincial, is essential in guiding regular and appropriate investments in CRM.

CRM planning defines the process and framework under which issues are prioritized, policies are defined, action programs implemented and informed decisions are made by the local government for sustainable use of coastal resources. Planning is essential in reconciling and aligning socioeconomic development and land use plans of local government while at the same time ensuring the integrity of the coastal and marine environment.

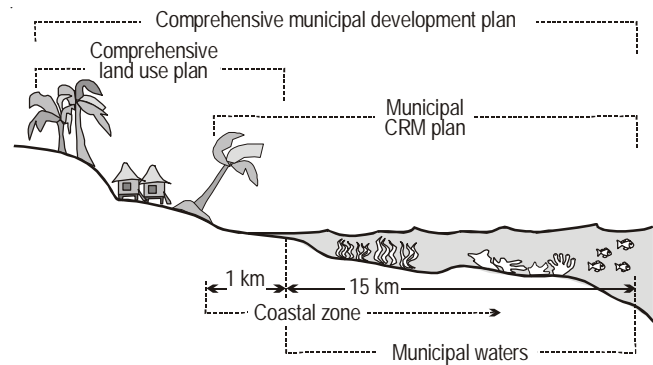


Strategic planning on CRM for LGUs.

The CRM planning process emphasizes the iterative nature of the planning cycle, in which both government and nongovernment partners participate in planning and implementation. The other key element in the process is the need for a strong foundation of good information in which to base the ultimate plan and field activities. The information base may begin with existing data, but then may be expanded by additional data collection as strategic research needs are identified and fulfilled.

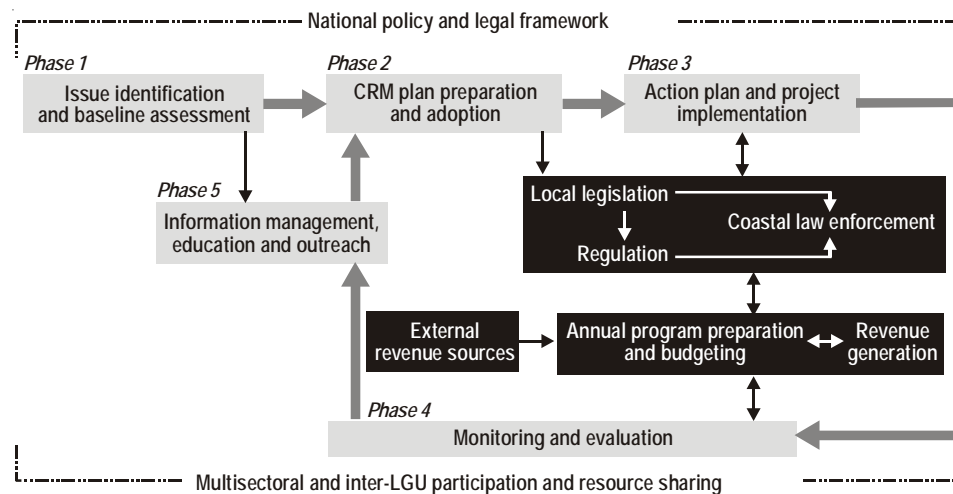
The following are the benefits of CRM planning to LGUs:

- guides local chief executives on priority issues to be addressed;
- establishes local legislative agenda for municipal, city and provincial councils;
- provides direction to technical staff on actions to be taken to address priority issues;
- provides a framework for making informed decisions about coastal and marine resource use;
- provides continuity during changes in political administration; and
- contributes to long-term sustainability of economic development activities.



Spatial coverage of a municipal CRM implementation.
(DENR *et al.* 2001)

The steps in the coastal management process adapted for local governments shown in the figure below are basic and essential prerequisites to successful CRM. These steps can all be facilitated and partially supported by local governments together with their partner communities. Overall, the CRM process is one of collaboration among various sectors and stakeholders.



The coastal management planning process being adapted for Philippine local government.
(DENR *et al.* 2001)

In summary, LGUs must develop and implement plans to manage coastal resource use to sustain food production and economic benefits. Planning provides the framework and process to chart the course of coastal resource rehabilitation and sustainability.

The first step in the CRM planning continuum is issue identification and baseline assessment, of which participatory coastal resource assessment is a key modality.



Lecture/discussion #4:

Introduction to participatory coastal resource assessment

Objective:

- To introduce participants to the concepts, characteristics and benefits of participatory coastal resource assessment (PCRA) and the various PCRA tools/methods.

Materials:

Overhead/Powerpoint slides, transect sampling ropes or tapes, snorkeling equipment, waterproof data slates with pencils, paddlers' boats, data record books and 1 m² quadrat made of bamboo poles

Duration:

30 minutes

Reading Materials/References:

Philippine coastal management guidebook series nos. 1, 3 and 4

Participatory coastal resource assessment: A handbook for community workers and coastal resource managers

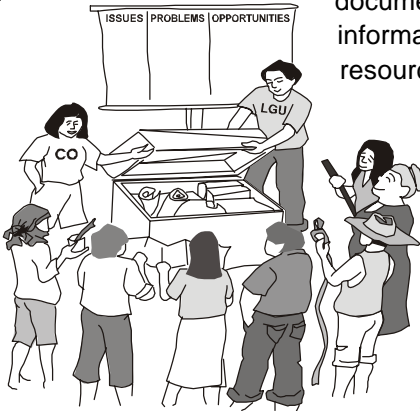
Participatory methods in community-based coastal resource management, Vol. 2

Key Content Points:

- An essential element of successful CRM is active participation by the entire community including day-to-day resource users (fisherfolk), local government, national government, nongovernment organizations (NGOs), academe, private sector and other stakeholders.
- PCRA is an effective process of gathering information from local residents that involves the community in data collection.
- PCRA serves not only as a research tool for the coastal stakeholders, but also as a hands-on educational experience about the coastal environment they will help manage.
- PCRA results are important inputs to CRM planning.
- It is strongly encouraged to conduct PCRA at regular intervals to monitor habitat and fisheries conditions as well as current resource uses and practices.

CRM planning and PCRA

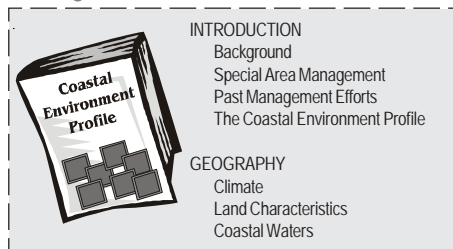
CRM planning as a basic service of local government must be based on sound information on the condition and use of coastal and nearshore fisheries resources. Coastal environment and nearshore fisheries profiles and subsequent management plans are based on assessment and compilation and analysis of a great deal of information about coastal and fisheries resources, resource use activities and characteristics of resource users. Some of this information will come from official maps and documents and from studies by experts. However, a significant amount of information can and should come from coastal residents, and in particular, resource user groups such as the fisherfolk.



PCRA is an effective process for gathering information from local residents that involves the community in data collection. The “local knowledge” provided by user groups is a critical component of the background information for planning. Data gathered from resource assessment activities make up the coastal environment profile of an area. Done well, a coastal environment profile greatly facilitates—and is essential to—formulating and implementing a CRM plan.

The coastal environment profile provides basic descriptive information on the current status of coastal habitats in the area, some fisheries data as well as information regarding social, economic and political factors/issues that may have a bearing on CRM planning and implementation in the locality. The profiles also serve to summarize and prioritize management issues confronting the area and the local resource user communities.

One of the important outcomes of the PCRA process:
COASTAL ENVIRONMENT PROFILE



A coastal environment profile is a document that presents secondary information and primary data gathered from resource assessment activities in an organized and integrated form.

It is essential for good planning and implementation.

PCRA consists of a range of information gathering techniques, including document reviews, household surveys, resource mapping and interviews. The focus of the PCRA is the actual systematic observation of the conditions of the coastal habitats and resources and translating these observations/findings into coastal resource maps, diagrams, graphs and other visual forms that are easily understood by the local people and other stakeholders. These techniques are particularly valuable because they:

- produce spatial details about the coastal area, such as the locations of small, but productive reefs that are not usually revealed in assessments conducted by outside experts;
- generate information about important events that occur during a short or irregular period, such as seasonal fish spawning aggregations that are almost impossible for outside assessment experts to discover independently; and


- add specific details to general information generated by experts, such as providing specific descriptions of the relative condition of habitats.

While the CRM planning team is generally responsible for organizing the data gathering process and the preparations of a coastal environmental profile, much of the actual data gathering can be done by community members, NGO staff and local government unit representatives.

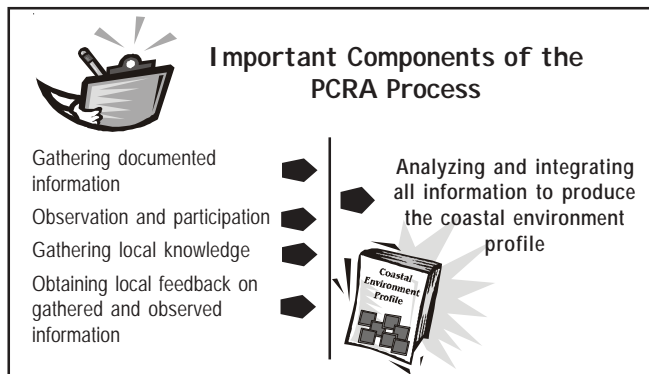
PCRA Framework and Benefits

PCRA = resource assessment from the perspective of local users, integrating local wisdom and knowledge with technical expertise

- Generates information for CRM planning purposes
- Resource management made more participatory
- Community empowerment
- Ensures vital inputs from multiple stakeholders
- Useful in CRM project performance monitoring and evaluation
- Tool to achieve objectives of CRM



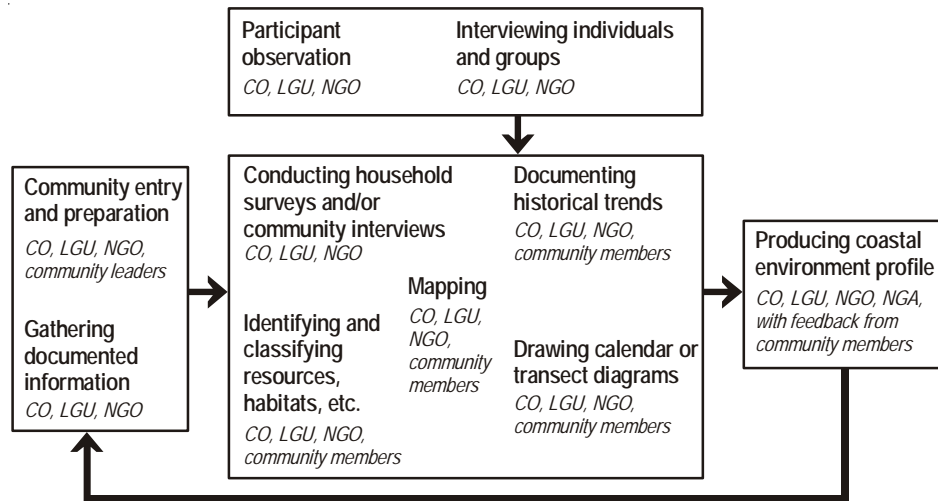
PCRA serves not only as a research tool for the coastal stakeholders, but also as a hands-on educational experience about the coastal environment they will help manage. Through PCRA, local coastal resource users are conscientized regarding the declining state of their marine and coastal environments, the issues, problems and causes for such decline, and the need for individual and collective action to help address these.



PCRA offers the following beneficial outcomes:

- Their participation allows resource users to become more aware of the status of their resources, issues and problems associated with the decline of these resources.
- Their participation allows resource users to participate actively in subsequent phases of the CRM process and contribute to decisions that will be supported by the community.
- PCRA is not only a research tool, it also serves as an educational tool that takes participants through the analytical and critical thinking stages regarding their coastal resources, subsequently resulting in informed decision-making and action.
- PCRA helps mobilize the community's sense of collective ownership and responsibility for the problems and issues of their coastal environment as well as the appropriate solutions to address these.

The following are the interrelated methods of PCRA and the important players such as community organizers (COs) and others:



Limitations of PCRA

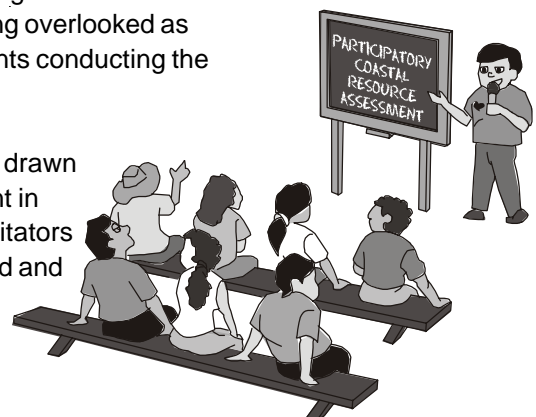
PCRA is a most useful tool for collecting information about the conditions of coastal habitats in a relatively short period of time. However, as any research methodology, it has its limitations such as in the following:

1. Information derived from the habitat assessment component of the PCRA is at best indicative of the condition of the coastal habitats in the area. It allows for generalization of overall local conditions and pinpoints specific problem areas that need short and long-term solutions. Its findings and outputs are also sufficient to serve as basis for action and local policy decisions. However, if a more specific inquiry is a primary concern (e.g., coral taxonomy, fish stock assessment, water quality and hydrological analysis, etc.), PCRA needs to be triangulated and complemented with more in-depth resource assessment methodologies.



2. PCRA is a way of organizing people for collecting and analyzing information in a relatively short period of time and in a cost-effective manner. While group interviews and key informants can be major sources of information, there are well known dangers of the less vocal members of the community and the “non-influentials” being overlooked as sources of information. It is important for PCRA participants conducting the interviews to be sensitive to such indications.

3. Facilitators must be aware that not all PCRA participants drawn from the local community may be immediately conversant in conducting interviews and focus group discussions. Facilitators need to exert some effort to validate information generated and to complement such PCRA data gathering with follow-up interviews and focus group discussions.





CHAPTER 2

Participatory Coastal Resource Assessment Tools and Methods

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Participatory Coastal Resource Assessment Tools and Methods

Learning Objectives:

- to introduce participants to the various participatory coastal resource assessment (PCRA) tools and methods;
- to illustrate ways in which various PCRA tools and methods produce primary information and spatial details about the coastal area for easier appreciation and understanding of issues;
- to enable participants to practice the use of the following PCRA methods in actual field settings — interviews, transect walks, habitat assessment for coral reefs, seagrass beds and mangroves, and fish visual census; and
- to guide and coach participants on the use of these methods and assess gaps and weaknesses, if any.



Total Training Time:

16 hours (including practice sessions/ field work)



Materials and Equipment:

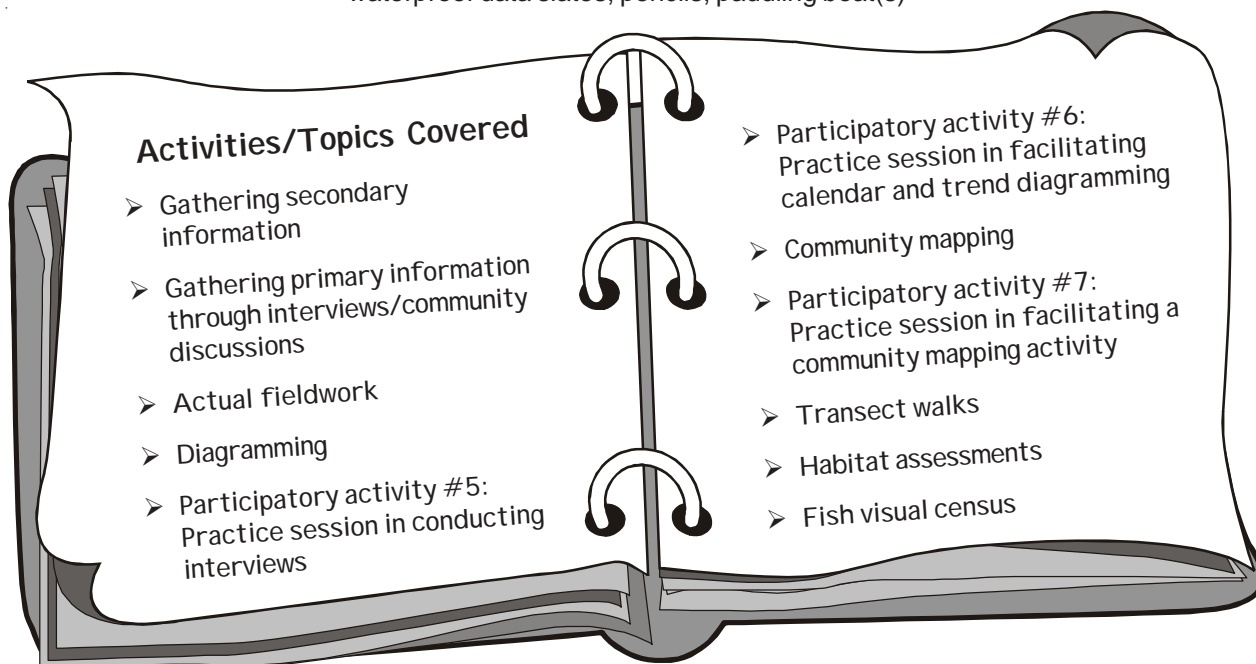
Interviews and community mapping: Village (barangay) base map, notepads, pencils, interview guide, crayons, masking tape

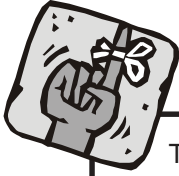


Transect walks: Village (barangay) base map, transect walk matrix forms, pencils

Habitat assessment: Goggles/mask or snorkeling gear, 100-m transect ropes, quadrats, waterproof data slates, pencils, compass, paddling boat(s)

Fish visual census: Goggles/mask, snorkeling or scuba gear, 100-m transect ropes, waterproof data slates, pencils, paddling boat(s)





Note to Trainers:

This session is focused on the following PCRA methods — gathering secondary information, interviews, diagramming, resource mapping, transect walks, habitat assessments (corals, mangroves and seagrass) and fish visual census.

Explanation and discussion on these PCRA methods may be undertaken in simultaneous working groups or in plenary. It is strongly recommended that practice sessions be conducted prior to sending PCRA participants to the field.

Inform participants that they will be out in the field for practice sessions and actual fieldwork in the succeeding days. Split participants into the following groups:

- interview, diagramming and community mapping group;
- transect walk group;
- coral reef assessment group;
- seagrass assessment group;
- mangrove assessment group; and
- fish visual census group.

Participants choose which group they want to join. However, members of the coral reef and seagrass assessment and fish visual census groups must know how to swim and be comfortable staying in the water for long periods of time.

Advise participants to:

- wear casual clothing (clothes may get really dirty and wet);
- bring a change of clothes;
- wear appropriate/comfortable shoes (e.g. mud boots for mangrove assessment);
- bring goggles if not comfortable with snorkeling equipment; and
- be on time.

Logistics must be finalized several days before the PCRA. Remind facilitators to ensure all materials for the fieldwork are complete and ready, including the availability of paddling boat(s) for the coral reef/seagrass assessment. Food arrangements should also be ensured. Additional food must be prepared to accommodate community participants especially for the interview and community mapping groups. Appointments with key informants and groups must likewise be confirmed before the actual conduct of the interviews. Each group must have a selected or assigned team leader.



Lecture/discussion #5:

Gathering secondary information and interviewing

Key Content Points:

- Secondary data are information that have already been gathered or published for some other purpose. Generally, they are faster to collect and less expensive than primary data.
- It is always useful to begin any research or study by gathering relevant secondary data.
- The time involved in searching secondary data is ordinarily much less than that needed to complete primary data collection.
- Secondary data can play a substantial role in the exploratory phase of research.
- In PCRA, secondary sources can be extremely useful in defining both the population and the locality being assessed.

Why Gather Existing Information?

Often, a great deal of good information already exists, so this will:

- serve as an initial introduction to the locality and the community;
- provide baseline information which could serve as basis for assessing early CRM actions/ interventions in the area;
- lessen data duplication; and
- help identify data gaps.

Sources of Secondary Information

The following institutions/agencies can provide significant information/data:

- National and local government agencies (development plans, land use plans, cadastral maps, census data, fisheries data)
- Nongovernment organizations (NGOs) (documentation of past and current development projects in the area, national and local situationers, case studies, etc.)
- Academic and research institutions (researches, theses, habitat assessment, resource and ecological surveys, water quality assessment, socioeconomic profile)



How are Secondary Data Collected:

There is no detailed methodology for gathering written/documented information. Different means could be employed like, letter writing, making telephone calls, visiting offices and libraries, interviewing officials, teachers, scientists and researchers. Community members may be tasked to collect data already available in the village/barangay or the municipality, while local government unit (LGU) participants could gather general information from the national agencies, donor-funded projects or nongovernment organizations.



It is essential to keep detailed records of the sources of secondary information and to attribute as appropriate, these sources and references.

While the benefits of using secondary information are numerous, it has its shortcomings. Among these are:

1. reliability and accuracy of data provided;
2. relevance of old information (except as baseline for comparison);
3. existence of possible data bias; and
4. dependability of research methodologies employed.

There is a need, therefore, to evaluate the quality of both the source of the data and the data itself. Where possible, use multiple sources of secondary information to cross-check or verify information.

In PCRA, a valuable source of reliable secondary information is the Municipality's Comprehensive Land Use Plan (CLUP). It is an important document that summarizes the municipality's socio-demographic profile, geographical and physical attributes, local economy, as well as existing land use and zoning plans. Also useful at the province level is the Provincial Comprehensive Land Use Plan.

A number of municipalities have likewise adopted the Municipal Coastal Database or MCD. The MCD which is a collection of information on the coastal and fisheries resources in the area as well as coastal resource management (CRM) activities undertaken by the municipality. It is ideal that the MCD should be updated periodically by each LGU to reflect changes in indicators used and provide a measure to evaluate plan implementation and enforcement.



Gathering information through interviews

Interviewing is a method of gathering data/information by asking questions. There are two parties involved in this process: (1) the interviewer(s) - the person(s) asking the questions, and (2) the respondent(s) - the person(s) who provide the information/data.



The aims of a PCRA interview are to:

- gather reliable information for resource assessment;
- facilitate improved communication for community development and institutional strengthening;
- understand the perspective of others in the community; and
- find out what is important to the community.

The following data/information may be obtained from interviews:

- Socioeconomic data
 - ✍ occupation/livelihood
 - ✍ income
 - ✍ household composition
 - ✍ housing condition
 - ✍ health
 - ✍ education
 - ✍ others
- Knowledge, attitudes and perceptions about the coastal environment
- Existing coastal habitats and fisheries resources
- Perceived status of these resources
- Community activities and existing organizations in the community
- Existing livelihood/resource management projects in the community
- Assessment of trends in fish catch
- Perceived changes in fisheries resources
- Existing infrastructure projects/coastal development activities
- Perceived problems, concerns and issues
- Proposed solutions to these problems



Interviews may be **structured** or **semi-structured**.

Structured interviews: Composed of specific set of questions outlined in a specific sequence, often with closed-ended or multiple choice options for responses.

Semi-structured interviews: Generally composed of a combination of closed-ended and open-ended questions, with a lot of follow-up or probe questions, a semi-structured interview usually involves a set of guide questions or discussion points. Because the information is obtained primarily through a set of prepared questions, the design of the interview schedule must be prepared beforehand and with care.



In addition, the interviewer may combine these guide questions with new questions that can arise during the interview. The information generated is therefore not limited to a set of predetermined questions but evolves with new information provided by the respondents. Group interviews or focus group discussions serve to provide primary data or socioeconomic information regarding the community. However, they may not be as useful for discussions of sensitive or controversial information. Semi-structured interviews when cross-checked with other information can provide an excellent situationer of the area.

What tools or instruments can be used to guide the interview?

- ◆ Interview questionnaire
- ◆ Interview guide
- ◆ Focused group discussion guide
- ◆ Use of diagrams, graphs



It is most useful in CRM when the information collected and analyzed help managers to understand the past, present and potential usefulness of coastal resources in a particular community as well as the specific issues/problems that impact on the sustainable use and management of these resources.

Types of Questions to Ask

Descriptive questions - require the informants to describe activities or issues (*Describe how your fishing methods and fish catch have changed over the years*).

Structural questions - elicit a response that indicates how well the informant understands the complexity of the situation (*What effect has the degraded condition of the reef had on your livelihood?*).

Contrast questions - provide an opportunity for the informant to compare and contrast situations in their world. (*How would you compare the quality of life in the village now with 10 years ago?*).

Probing questions - give the informant an opportunity to analyze situations and look for underlying causes (*Why do you think the fish catch has declined?*)

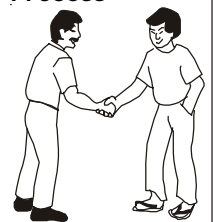
In the PCRA, participants assigned to conduct these interviews are provided with an interview guide or questionnaire that outlines the questions to be asked and the specific data to be acquired. It is also strongly recommended that representatives from the women and youth sectors be included as PCRA participants and as key informants in interviews. The proposed PCRA interview guide can be found in Appendix B.

The following are the respondents in interviews:

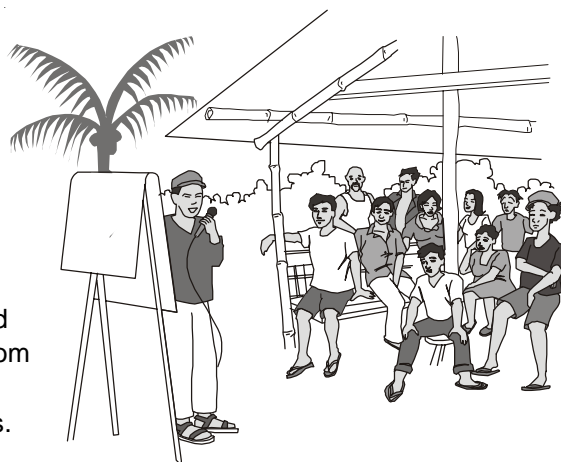
- **Individuals/key informants and opinion leaders.** Since in PCRA, it is not possible to speak with everyone in the community, selected community members who are able to provide information on particular subjects based on their knowledge, skills or experience are especially sought to provide information. Key informants are valuable sources of information. Identifying the key players in the community that can provide information about the area can be undertaken with the assistance of the local government, village officials, NGOs or academe working in the locality. It must be noted, however, that identification of these respondents may be sometimes dictated by political affiliations, so where possible, effort must be made to seek out other key informants to triangulate the information generated, particularly those on sensitive or controversial issues.
- **Groups or specific sectors in the community.** Group interviews have their advantages. Significant information like fishing practices, fishing gears, health data, community issues and concerns are better generated through group interviews given the familiarity of the villagers with one another, thereby making it easier for them to confirm or challenge their responses. Group interviews also facilitate the opportunities for dialogues among those interviewed.
- **Participants in focus group discussions (FGDs).** FGDs are conducted to discuss specific topics or issues in detail. A small group of people (4 to 10) who are knowledgeable or interested in the topic are invited to participate in the discussions. FGDs are generally effective to generate information about specific topics or issues. A facilitator is chosen to ensure the discussion does not stray too far from the intended topic and that no one participant

The Interview Process

- Beginning
 - ✎ introduction
 - ✎ ask permission
 - ✎ state purpose
 - ✎ set time frame
- Interview proper
 - ✎ actual asking of questions
- Closing



dominates the discussion. A documentor is also necessary to ensure that data/information generated during the discussion are noted down. Group interviews/FGDs require more advance planning and preparation than individual interviews.






PCRA generally conducts group interviews or FGDs. It would also be most useful to complement information generated from the interviews with such data gathering tools as timelines, seasonal calendars as well as trends and transect diagrams.

Practice sessions/actual fieldwork. PCRA participants assigned to do the interviews must be given training to enable them to collect useful data. Role-playing is an effective tool to introduce participants to interviewing skills. It is recommended that practice sessions be conducted in the training venue. Participants must first get a feel of how to do interviews before being sent out to the field.

Be aware that not all participants may be immediately conversant in conducting interviews and FGDs. Facilitators need to exert effort in selecting interviewers as well as in validating information generated. It is recommended that PCRA be complemented with follow-up interviews and FGDs by the more experienced members of the team.

Following are some of the more important guidelines when conducting interviews:

Interviewing Guidelines: Before the Interview

 DO'S	 DON'TS
<ul style="list-style-type: none"> ➤ Inform concerned local leaders about the PCRA activity and the need to conduct interviews. Set a date, time and place most convenient to the respondents. ➤ Obtain a broad overview of the area and the community so that you are able to select a representative sample of interviewees. ➤ Prepare for the interview. Review interview guide/questionnaire. Be informed about the topic. ➤ Identify persons to be interviewed beforehand and schedule appointments. State the purpose of the interview. ➤ Be sensitive to cultural practices and if possible, make the interview as discreet as possible. ➤ Arrange for a translator if you do not speak the local language/dialect of your respondents. ➤ Be aware of the daily schedule of community members. Schedule interviews so they do not interfere with respondents' important activities. ➤ Assess length of time needed to complete the interview. ➤ Ensure all the materials needed for the interview are in order. 	<ul style="list-style-type: none"> ➤ Arrive at a community without previous agreed-upon arrangements with local leaders. ➤ Conduct interviews in an "ambush" manner. ➤ Call attention to your arrival through the use of fancy vehicles, nonconformist attire and loud behavior. ➤ Be unprepared with your interview materials (e.g., you have to send out someone to make copies of your interview guide or to buy pencils or notebooks because you forgot to bring these). <div data-bbox="938 1627 1393 1873" style="border: 1px solid black; padding: 5px;"> <p>Skills needed to interview</p> <ul style="list-style-type: none"> ➤ Questioning ➤ Observing ➤ Listening ➤ Focusing and guiding ➤ Recording ➤ Establishing rapport  </div>

During the Interview



- Conduct interviews in the language of the respondent(s); if you are not conversant in the language, bring an interpreter.
- Begin with the traditional greeting and properly introduce yourself/ members of your team and the purpose of the interview.
- Advise respondents as to the length of time expected to complete the interview.
- Express to respondents that you are there to learn from their insights and experiences.
- Conduct interview informally and mix questions with discussions.
- Be open-minded and objective.
- Be respectful and sensitive.
- Be sensitive to nonverbal language.
- Establish rapport and build trust with your respondents by showing interest in what is important for them.
- Ask easy questions before the more difficult ones.
- Use indirect questions for sensitive aspects such as income, education, ownership, etc.
- Ask open-ended questions so that they require explanations, rather than a "yes" or "no".
- Make questions short and easy to understand and ask these clearly and one at a time.
- Show interest and encouragement when asking for additional information.
- Record only what is being said.
- Finish the interview politely and thank the respondents' sincerely.



- Go direct into the interview proper without the traditional amenity of getting respondents' permission for the interview.
- Assume that respondents have all the time in the world for the interview.
- Use tape/video recorders without the permission of the respondents.
- Unnecessarily interrupt discussions between respondents and other members of your team.
- Use leading questions and volunteering your own opinions.
- Make conclusions and finish the sentences of respondents, even if they have difficulty expressing themselves.
- Encourage a few to monopolize discussions.
- Ask vague questions.
- Lecture to respondents.
- Argue with respondents.
- Indicate any signs of disbelief to responses given.
- Allow interview(s) to go too long.
- Ask insensitive questions.
- Abuse the respondents' hospitality.
- Discourage alternative views and opinions.
- Be gender-insensitive.
- Do any inappropriate behavior.



After the Interview



- “Clean-up” your notes on the interview the soonest possible time as you may quickly forget the information provided.
- Test your understanding of the issues/problems by validating these in subsequent interviews with other respondents.
- Note down your observations and add any general information you may have gathered in the course of the interviews.
- Record only what is being said and what you see.
- Note down “quotable quotes” from respondents that you can use in your reports.
- If you don't speak the local language, use an interpreter's services to ensure you have correctly noted the responses.
- Ensure completed notes/responses/questionnaire guides are properly identified for easy retrieval in report writing.

Actual fieldwork



Note to Trainers/Facilitators:

1. Arrangements as to the time and place of the interviews must be made beforehand.
2. If interview group is large, break them into two teams as too large a group may intimidate respondents. A facilitator must be assigned to work with each group.
2. Emphasize to participants that data/information generated from these interviews will be organized and analyzed to serve as inputs to a coastal environment profile of the area.
4. Monitor closely the conduct of the field interviews. Set a time in between interviews to provide feedback to the group regarding the conduct of the interviews.
5. Include women and children. Interact with members of the community. Be culture and gender-sensitive. Take note of the do's and dont's in interviewing.
6. Review fieldwork data with the team. Incorporate as appropriate suggestions of team members to improve conduct of interviews.



Participatory activity #5: Practice session in conducting interviews

Objectives:

- to expose participants to the interview method in PCRA;
- to familiarize participants on the range of information to be collected; and
- to identify weaknesses/data gaps if any.

Materials:

Interview guide, notepads and pencils

Duration:

3 hours

Note to Trainers/Facilitators:

Familiarize participants on the range of information to be collected in PCRA. Practice sessions and subsequently actual field interviews must focus on questions that will:

- help generate a socio-demographic profile of the area;
- collect information on existing habitats and fisheries resources that will serve as inputs to a coastal resource map of the locality; and
- collect information on fisheries practices and activities that will serve as inputs to trend or calendar diagrams.

Facilitators must enable all PCRA participants to do the practice sessions and actual field activity.

Activity:

1. Break the interview group participants into two subgroups or teams and assign them to role play the following:
 - Team 1: Conducting group interviews to collect socio-demographic data as well as information on existing coastal habitats, fisheries resources and fishing activities to serve as inputs to a coastal resource map of the community.
 - Team 2: Conducting group interviews to collect information on fisheries resources and use, as well as perceived environmental changes, problems, issues and concerns
2. Ask each team to assign themselves to the following roles:
 - Interviewers
 - Respondents
 - Observers
3. Use the PCRA interview schedule found in Appendix B, particularly the following practice/process questions:
 - Questions 1-23 (Team 1)
 - Questions 24-27 (Team 2)
4. Review with the participants the “do’s and dont’s” in interviewing.
5. Explain to participants the use of the local base map for community mapping.

6. Tell observers to keep quiet and note carefully what is being said and any nonverbal communication observed.
7. Facilitators must also make their own observations.
8. Ask the teams to arrange themselves in circles and to practice conducting the type of interviews assigned to them.
9. After each round of practice, ask participants to change roles and conduct another practice session.
10. After the session, bring the teams together and discuss the observations.
 - Did the interviewers follow the guidelines?
 - Which guidelines did they ignore?
 - Other main results.



Lecture/discussion #6:

Diagramming

Key Content Points:

- Visual-based participatory techniques are important tools for enhancing understanding of issues/problems.
- Diagramming is a means of presenting information visually to illustrate spatial and time-based information.
- It provides a good way of presenting and analyzing information without having to go into complicated detail.
- Diagrams work best in context-specific situations and for presenting localized information.
- Visual construction of information provided by diagramming helps to simplify data organization and analysis.
- However, its limitations include the possibility of overlooking differences of opinion and perspective when drawn in group settings, and may not adequately capture culture-based information and beliefs.
- Need to be complemented with other information-generating techniques such as in-depth interviews or participant observations to cross-check and validate diagramming results.
- The more common diagramming techniques in PCRA include calendar/seasonal diagrams and trend diagrams or time lines.

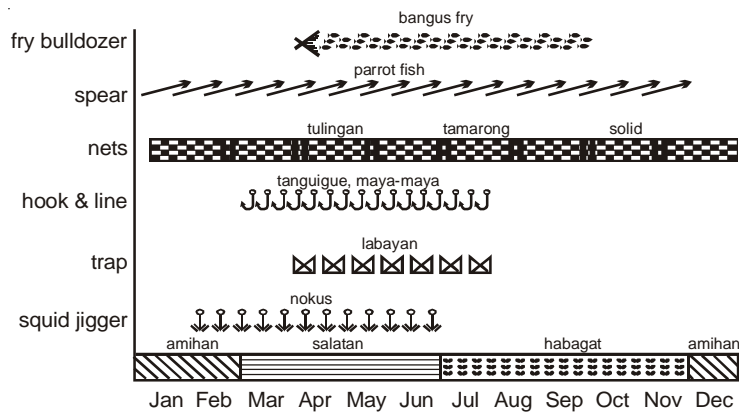
Calendar and trend diagrams show the status of resources, condition of the coastal area, fishing practices, etc. with respect to time. As a PCRA tool, diagramming is often conducted within the interview context because the data to be presented in diagrams as well as the actual drawing of the diagrams by the PCRA participants are done during the group/community interviews or discussions.

Calendar Diagram

Calendar diagrams are very useful means of generating information about seasonal trends within the community and identifying or documenting cyclical patterns or changes in any one of more variables in an annual or cyclical periods. These variables may include temperature, wind intensity and direction, rainfall levels, seasonal production, fish-catch, fishing gears used, labor requirements, expenditures, etc. The calendar emphasizes qualitative information focusing more on periods (usually lasting a few days or more) than events (that usually last a day or less). The periods are based on experiences from previous years.

Best undertaken in the context of group interviews or discussions, calendar diagrams show simple line graphs to show seasonal increases or decreases and trends shown are generally rough, qualitative ones. Quantification of information is rarely required and the finished calendar diagram is useful in highlighting changes or key milestones over a period of time.

Participants to this activity should be representatives of the different sectors of the community, e.g., fishers, children and youth, community elders, gleaners, village officials, people's organizations (POs), women, etc. Most importantly, the role of women must be emphasized because although most fishers who go to sea are men, women play a valuable role in gathering useful information for community-based CRM. For social and economic data, women are usually excellent sources of knowledge, since typically they play prominent roles as fish buyers and vendors, and as financiers of fishing businesses. Women are also best sources of information regarding feasibility of various fishing methods, market conditions for various coastal resources, gleaned activities and other aspects of the local economy.

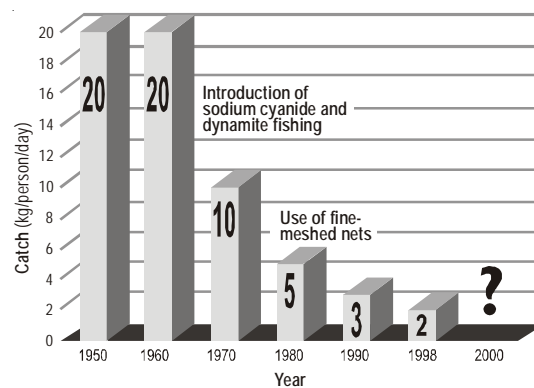


Sample calendar diagram on seasonality, fishing gear and fish catch.

Trend Diagram

A trend diagram illustrates in graphical manner the community's perception of how the condition of their coastal area or community has changed over time. By looking at certain variables that are considered important to the community (e.g., population, fish catch, mangrove condition, fishing practices, etc.) and helping them to plot these on the vertical axis against time in years along the horizontal axis, the community is able to see the "trend" of the assessed variable(s) through time. The advantage of this tool is that it provides clear and visual presentation of the changes through time although the limitation lies in the fact that data provided by the community are largely based from individual experiences, or personal recall, and hence may be subjective.

Since a trend diagram's focus is on time lines, e.g., what happened in the past years, it is important to have as respondents, local participants with extensive knowledge of the history of the place and who have been engaged in fishing or other fishing related activity for the longest period of time. However, although preferred key informants in this activity are elders, the presence of younger generation including the children, is encouraged to allow for the valuable transfer of information from one generation to another.



Sample trend diagram of fish catch.



Participatory activity #6:

Practice session in facilitating calendar and trend diagramming

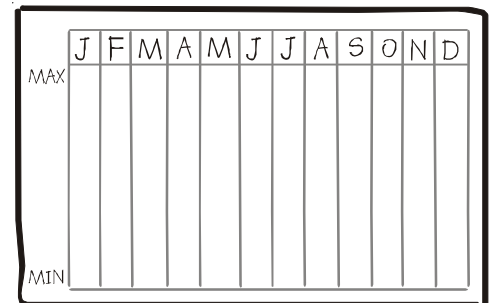
Objectives:

- to familiarize the participants on the use and significance of trend and calendar diagram in gathering temporal data about community life and its people;
- to develop or enhance facilitation and data gathering skills of the participants; and
- to identify advantages and disadvantages of the methods.

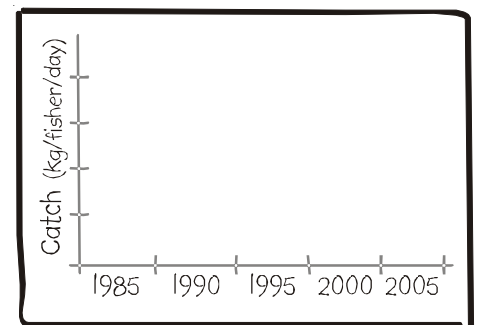
Note to Trainers/Facilitators:

- Emphasize to participants that trend and calendar diagrams are better gathered during community interviews or discussions.
- It is important that the diagram templates are already prepared before the diagramming activity is conducted. For the calendar diagram, prepare the blank calendar preferably on a Manila paper. 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 participants will later draw on the diagram.
- For the trend diagram, make sure that the unit of measurement and other parameters used in establishing trend are consistent through time. For example, if the unit of measurement used is average kilo of fish caught per day per fisher using hook and line, this should be consistently used per year interval.
- To determine the year interval for the trend diagram, this will depend on the time span that the participants can recall. For example, if many of the participants can still provide substantial data about the variables being considered in a span of 40 years, then the facilitator can determine a time interval of 10 years. But if the participants can only provide information for the past 20 years, then a 5-year interval would be in order.

Calendar Diagram



Trend Diagram



Activity:

1. Break the group into two subgroups. Subgroup 1 will simulate the calendar diagramming session, while subgroup 2 will simulate the trend diagramming session.
2. For each subgroup, a facilitator will be assigned while the rest of the members will play the role of the community participants. For the facilitation of the calendar and trend diagramming, refer to Question # 22 of Appendix B for guidance.
3. Each subgroup will be asked to role play the session assigned to them, while the other subgroup observes and notes their observations.
4. After the two groups have presented, processing of the activity will follow. Each subgroup will be asked to feedback their observations of each others' presentations. Facilitator will then wrap up discussion and give short input on tips in facilitating the calendar and trend diagramming.



Lecture/discussion #7:

Community mapping

Key Content Points:

- Mapping is a visual technique of presenting information on the coastal and marine resources in the area that can be easily understood by community members. Maps can also reveal much about the socioeconomic conditions and how participants perceive their community.
- Such maps generally serve to reflect the locations/boundaries of villages, coastal and fisheries resources, forests, agricultural and urbanized lands, water resources as well as their present uses and key activities including corresponding issues and problems.
- Oftentimes maps are drawn by the PCRA participants on a large sheet of Manila paper. The process of making the map and the usually spirited participation and discussions that occur are important outputs of the exercise.
- The use of a village (barangay) base map is important to closely approximate the spatial patterns and other characteristics being revealed in the map.
- Facilitators must encourage participants to contribute to the mapping process by asking simple, open-ended questions.
- Community-produced maps can eventually be subjected to ground truth checking as well as be digitized for future reference. It is strongly recommended that a copy of the finished map be provided/presented to community members or the LGU.

Maps are some of the most important tools 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 conditions of resources and habitats can be laid out and analyzed in a spatial and visual manner. By laying the various zones, resources, infrastructures, development activities, opportunities, threats and issues on the map, the community is able to situate the condition of their coastal area in a visual and tangible manner. Moreover, spatial patterns of settlement, income levels and other social variables can reveal opportunities and obstacles for CRM.



As with other PCRA activities, community mapping helps point out spatial details and new information on features which conditions vary over space and which locations vary over time. Maps are also important visual media, allowing more effective communication between and among stakeholders involved in CRM.

Various information that can be mapped

1. Boundaries
2. Roads
3. Settlements
4. Other infrastructures
5. Natural resources
6. Land use
7. Zonation
8. Other special interests

Standard Features of a Map

1. Title - What is the map all about? Resources? Land Uses? Topography?
Example: Resource Map of Barangay Gilutongan
2. Location - Shows where a particular place the map is located. In this example, Brgy. Gilutongan is located in Gilutongan Island, Cordova, Cebu.
3. Scale - In the example below, each unit (1) represented in the scale of 1:7,500 means that 1 cm on the map equals 7,500 cm in reality.
Example: 1:7,500
4. Legend - Using legends allow the user to denote the important details in a manner that will both consume less space on the map itself and would allow for easy recall .
Examples: T- traditional fishing method
IV - Issue on blast fishing
Dark green color - mangrove
5. North Orientation - This is a universally accepted manner of presenting maps to facilitate understanding among many users, thus aiding in the planning process. In many instances, however, fishers prefer situating their maps with respect to the sea. When this happens, just allow the community participants to draw the map according to their preferred orientation but the facilitating organization should process the map accordingly for a wider audience presentation.
6. Author(s)/Publisher(s) - The authors would be the participants. Publishers may be those who sponsored the activity.
7. Year of Publication - In a PCRA map, the exact date would be more informative.



Sample of a community-drawn coastal resource map of Badian, Cebu.



Sample of a digitized coastal resource map of Gilutongan Island, Cordova, Cebu.



Community-mapping participants.



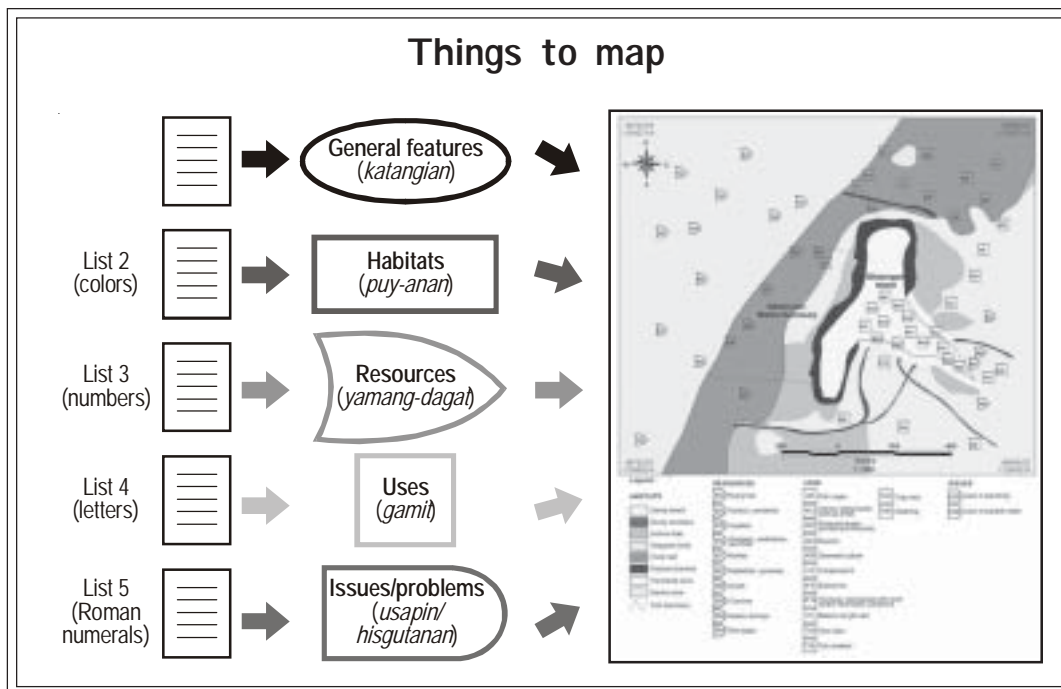
Participatory activity #7: Practice session in facilitating a community mapping activity

Materials:

Base maps or existing spot map of the community to be mapped, Manila paper or tracing paper, pentel pens, crayons, sign pen, pencils, masking tape and table (where base map is placed for participants to do the mapping activity)

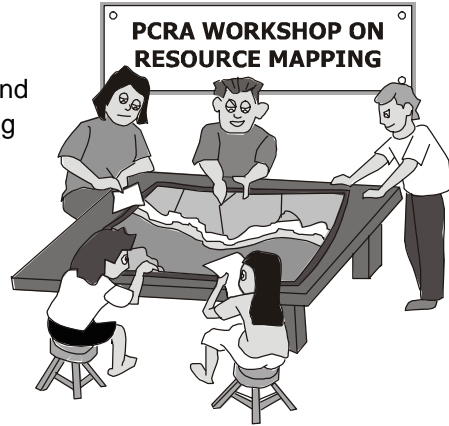
Activity:

1. Prepare a base map. A base map is an outline of the area (e.g., a sitio, a barangay, or the whole municipality) together with its boundaries. The base map may be produced in different ways. One, people in the community can fashion the map themselves. In which case, this may not be drawn to scale. Simply indicate “not drawn to scale”. This does not pose any problem either since the data can be transferred to a scaled map later on. The important thing is that the data, spatially represented on a map, come from the perspective of the community.
2. To facilitate the production of the map, a coding system must be developed before the conduct of the PCRA. CRMP, for example, has already developed a coding system for its learning areas, which proved to be helpful in facilitating understanding of the data plotted on the map. The coding system used is found in Appendix J.
3. Arrange with the community representative(s) where the venue for the mapping activity will take place. Most often the barangay hall, multipurpose center, waiting shed, or even a chapel may serve as the venue for the activity. It is important that there is available table big enough for the community participants to mill around and work on plotting important information on the base map.



4. Tape the base map to the table, explain the base map and orient participants on the mapping activity following the mapping sequence below:

- **General information/feature** - this may include landmarks in the community (e.g., plaza, rivers), road network, social infrastructure (e.g., day care center, multipurpose center, school, church), boundaries, etc.
- **Habitats** - These are usually mapped using crayons or color pencils using the following color code:



Habitats Color Code	
Mangrove - dark green	Coral reef - red
Seagrass - light green	Estuary - violet
Beach area /sand bar - yellow	Marine waters - light blue
Rocky shoreline - brown	Passes/channels/deep ocean - dark blue
Mudflats - black	Terrestrial area - light yellow
Inshore flats - orange	

It is important that the color coding for the habitats is already prepared ahead of time and written on a Manila paper or easel sheet with crayons or colored pencils corresponding to the color codes already attached opposite the habitat to be mapped. This will lessen confusion among participants as to what specific colors to be used from among the boxes of colored pencils or crayons.

- **Resources** - These are usually mapped after the habitats. Resources are elements (e.g., fish, shell fish, wood, etc.) that provide food and other materials derived from the coastal ecosystem that are of tangible value to the local communities. These could also include ecologically important species that are found in the area, e.g., sea snakes, crocodiles, birds, etc. An arabic numeral code is used for resources, with each type assigned a number. Local names may be used but effort could be exerted by the assisting organization in finding the equivalent common or scientific name. This is necessary for common understanding especially if the intended future users extend beyond the community residents and local fishers.

Sample Code for Resources
1 - Anchovies
2 - Tuna
3 - Shells (clams)
4 - Dolphins
5 - Sea turtles
6 - Sea cucumbers
7 - Sea birds

- **Uses, livelihood, opportunities** - These include sites or locations (e.g., fishing gear areas, gleaning sites, marine protected areas, sacred sites, rehabilitation area, etc.) where activities are conducted or where opportunities or functions provide existing or potential benefits to the community. It is suggested that a letter coding system be used, assigning a letter to each type of “use”. Keep in mind, however, that some letters can be confused with numbers (which are the codes used for resources) and should not be used, for example, the letter “O” can be mistaken for number “0” and the letter “l” for the number “1”.

Sample Code for Uses, Livelihood, Opportunities

- A - traditional gleaning
- B - hook and line area
- C - seaweed farm
- D - fish drying area
- E - marine protected area
- F - lighthouse
- G - fish port

- **Problems, issues, and conflicts** - These are the last to be mapped because these require the earlier elements to be mapped first before some problems and issues could be identified. Furthermore, problems and issues are information that may not be easily expressed by community participants because of their sensitive nature and may even involve some participants or community members related to the participants. Roman numeral coding system may be used for problems, issues and conflicts.

Sample Code for Problems, Issues, Conflicts

- I - Blast fishing
- II - Lack of land tenure
- III - Beach erosion
- IV - Mangrove cutting
- V - Commercial fishing intrusion
- VI - Lack of alternative livelihood
- VII - Organizational conflicts

5. After all the elements have been mapped, provide time for the participants to present their outputs to the big group, and invite other PCRA participants who were not involved in the mapping activity to give comments or add more information to the map. Write names of the community participants and incorporate other information to finalize the map and get group consensus and approval.



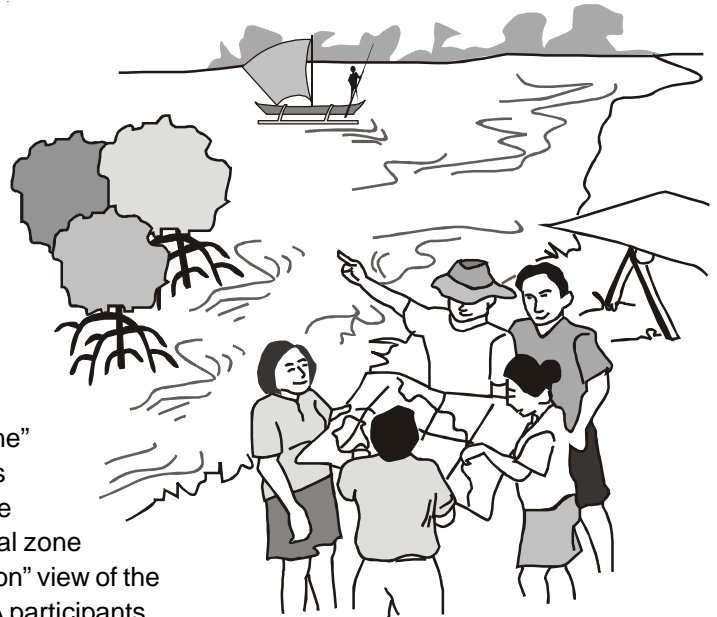
Lecture/discussion #8:

Transect walks

Transect walks are walks taken by PCRA participants across the community in order to observe the people, village surroundings, land and coastal resources, resource uses and practices as well as issues and problems. Transect walks provide an overall view of the community and help identify issues that may merit further investigation. Observations and information resulting from these walks are then noted in a transect diagram.

A transect diagram as used in the PCRA shows the profile of the assessed coastal locality or barangay — from the terrestrial part of the coastal area out to the sea. These generally include the lowland or settlement area, beach and foreshore areas, wetlands or tidal flats, mangroves, seagrass beds, coral reefs and open sea. Since the coastal zone is defined to include land areas that are influenced by marine factors, the terrestrial zone is also covered in the transect walks.

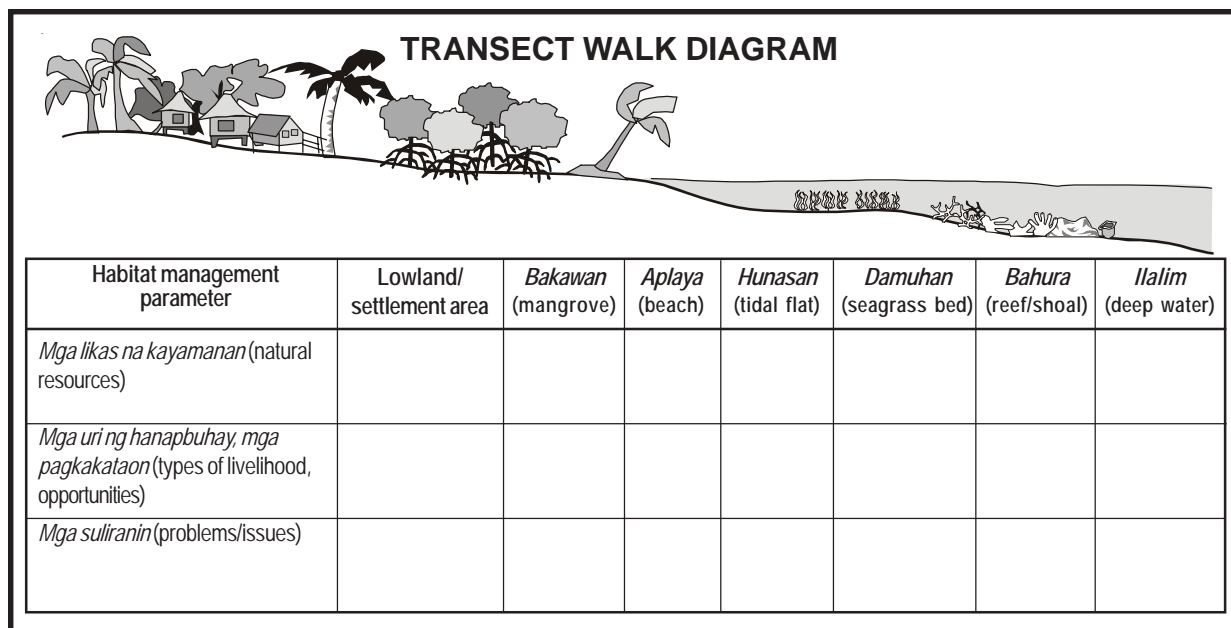
Transect walks are planned by drawing a “transect line” through a map of the community to reflect the various elements or components of the coastal zone. The line goes through or “transects” all elements of the coastal zone providing a geographic representation or “cross-section” view of the community. In undertaking the transect walks, PCRA participants follow the line on the map during their walk in order to observe the various habitats, characteristics, uses, problems/issues and opportunities as illustrated below. As important sources of information, it is strongly recommended that villagers join the participants in the transect walks and that participants maximize the time spent with community members to generate information about the locality’s coastal zone and fisheries resources.



Transect Diagram

Observations resulting from the transect walks provide the information recorded in the transect diagrams. This diagram affords the user the advantage of studying several parameters along two dimensions. Arranged in succeeding rows are resources, their uses, related problems and/or issues and related opportunities, defined along certain geographic divisions (e.g., terrestrial, beach, mangrove, seagrass, reef, deep sea) found in the vertical axis. All these together with the inclusion of the terrestrial part help show the interplay of factors that manifests itself in the current status of the various resources along several gradients.

It may be necessary that in addition to the transect walk, a boat ride is taken by the team to get a broader perspective of the coastal and fisheries resources. The need for a boat ride should have been identified and arranged prior to the actual conduct of the PCRA.



Sample transect walk diagram.



Transect Walk Guidelines

- Review the transect matrix with the PCRA group participants to familiarize them with the observation method of collecting information. If there is sufficient time, conduct a transect walk practice session within or around the training venue so as to sharpen their observation skills. Encourage participants to pay attention to detail. Do not allow them to go on field without a practice session, and a run-through of the transect matrix.
- If the group is too large, divide the group into subgroups or teams, with each team tracing a different route from the others through the community. Each team's route should cover all the zones identified in the transect diagram. Encourage local community members to join the teams in these transect walks.
- Remind the teams to interact with the community as they go through the walks and to observe appropriate behavior at all times.
- Instruct participants to return to the training site after completing the transect walk. When everyone has returned, ask each one to share his/her observations. Review the transect matrix as filled up by the participants. Discuss differences and similarities with each group.



Lecture/discussion #9:

Habitat assessments

Key Content Points:

- Habitat assessment is a process designed to evaluate the condition and status of environmental habitats, such as coral reefs, mangrove forests and seagrass beds.
- The habitat assessment component of the PCRA concentrates on these three major ecosystems/resources.
- The PCRA looks into the current conditions and relative abundance of these coastal resources using a simplified scientific method that involves the use of transect lines and, where necessary, quadrats in the assessment process.
- In all three habitats, a transect will be utilized. Here, a transect line is taken to mean either the imaginary or actual line drawn along the desired area of study, guiding the user in terms of direction and spatial boundaries of the study area.
- Quadrats are effective tools to determine abundance/condition of the assessed habitat in terms of percentage cover observed. It is ideal for use among community members who may not be too experienced with assessment methodologies.
- For seagrass and coral reef assessment, there are three possible methods that can be used: the snorkel survey, the point intercept and the manta tow.
- Percentage cover of the assessed habitat is determined through actual observations of the assessed area using the habitat rating criteria.
- PCRA participants must be familiar with, if not competent in estimating percentage covers. It is strongly recommended that practice sessions estimating percentage covers be undertaken prior to actual fieldwork.
- Data sheets for recording these observations must be prepared beforehand and copied onto the waterproof slates.
- The general rule in PCRA is that assessment methodologies as well as collection, organization and analysis of data should be within the capacity of the community members in terms of their abilities to conduct these and the resources available to them.

Assessment of corals and seagrasses are usually taken underwater and data recorded on a waterproof slate. Using a habitat rating criteria, participants record their observations on the slate and provide as much as possible the closest approximation of the observed percentage cover of the assessed habitat.



Underwater slates are easy to use.



Using a transect line in mangrove habitat assessment.

Assessment of mangroves on the other hand, involves calculating the density per quadrat by counting the number of each species of mangroves found in each quadrat. Percentage estimations per quadrat are then computed to arrive at a close approximation of the percentage cover of the assessed habitat.

Before going into more detail regarding the various habitat assessment methods used in the PCRA, a note about the use of transect lines and quadrats.

Use of transect lines and quadrats

The line may be an abaca rope, a nylon string or a fancy transect made of fiberglass. The important thing is that the line serves its purpose.

If the line to be used is not the commercial kind, it pays to calibrate the lines beforehand with 1-m intervals.

In cases where the habitat starts beyond the shoreline, which happens more often in nature, take note of the distance between the shoreline and where the habitat begins and simply start laying the transect line perpendicular to the shoreline in the case of seagrasses, and parallel to the shoreline in case of corals. To ensure that the transect will be straight, the user may choose to utilize landmarks as a guide or use the triangulation methods, a compass or even a geographic positioning system (GPS).

Quadrats are useful in gathering quantitative data regarding the condition or abundance of a habitat in a more systematic way. With a quadrat, a square area is marked off and the abundance or percentage cover of the assessed habitat within the square is determined or calculated.

The size of the quadrat varies with the habitat. Generally, a quadrat measures 1 m x 1 m. The quadrats used may be the kind that academics use (aluminum or PVC pipes with smaller grids inside), or simply of small tree branches or bamboo poles tied together.

Placement of the quadrat follows the transect line and is laid down in pre-determined specific intervals.

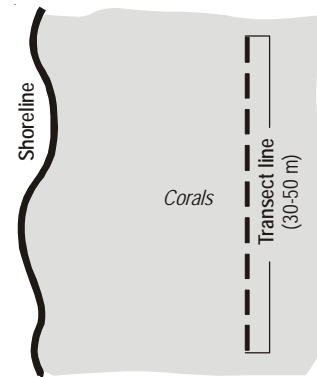
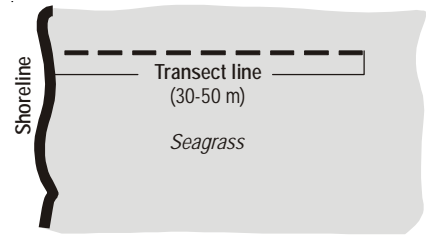
In addition, take note of the following:

1. Transect line intervals going seaward or along the coastline could measure 30–100 m each, depending on the length of the village (barangay) coastline and the initially observed expanse of coral or seagrass habitat. The transect is laid at a point where the habitat starts and ideally, should end where the length of the habitat ends. If the line to be used is not the commercial kind, it pays to calibrate the lines beforehand with 1-m intervals.

2. The use of quadrats are highly recommended in PCRA, particularly where participants are relatively inexperienced in conducting habitat assessments.

Quadrats of 1 x 1 m are established every 10 m along the transect line to serve as the representative samples of the assessed habitat. The number of quadrats needed to be established is dependent on the length of coastline and the number of transect lines placed.

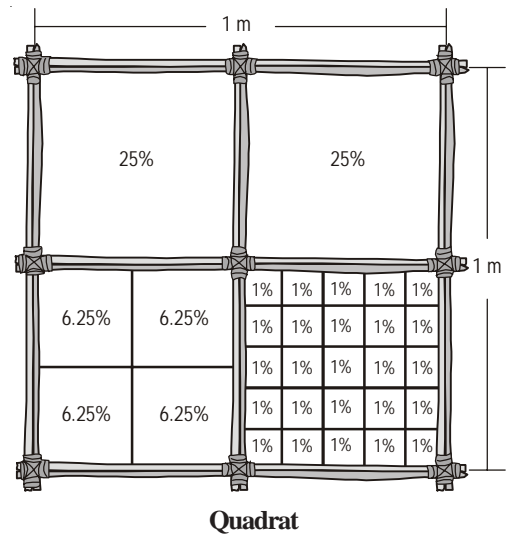
3. If commercially made quadrats are not available, one can improvise using locally available materials. Usually the most applicable are split bamboo poles which are connected at the ends by wires or ropes to form a 1 x 1 m square. The square in turn is divided into four subsquares



Quadrat method.

or quadrats for stability and easy percentage estimation. Such subdivision of quadrats makes estimations of the percentage cover of the assessed coral or seagrass habitat components easier.

4. While any distance and representative number of transect lines and quadrats can be agreed upon when undertaking PCRA, it is recommended that a suitable number of transect lines and numbers of quadrats be used to serve as samples of the assessed habitats.
5. It is recommended that practice sessions be conducted in the use of these quadrats prior to actual field activity to give participants a better grasp of estimating percentage cover.



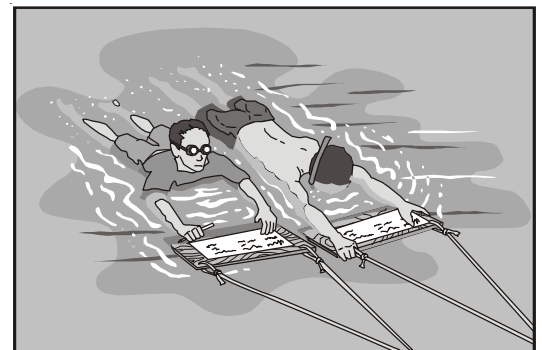
Assessment methods

For seagrass and coral reef assessment, there are three possible methods that can be employed using the transects. These are the **manta tow**, **snorkel survey** and the **point intercept**. A discussion on the “how-to’s” of these methods will be subsequently detailed in the latter part of this chapter.

Manta-tow Method

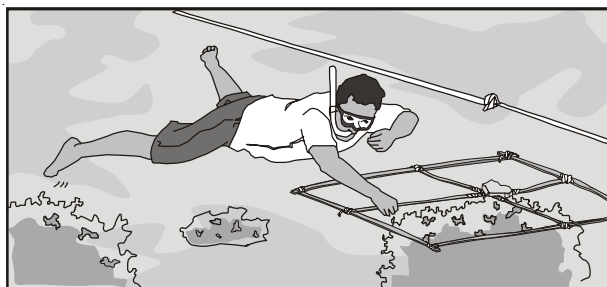
A manta tow survey is the observation of an underwater area of good visibility by a snorkeler who is being pulled by a small boat. As in the snorkeler’s survey, manta tow participants note their observations on the condition/abundance of the assessed habitat at specific intervals.

Manta tows are useful methods in generating a “big picture” of the area as the use of a boat allows the snorkeler to cover longer distances. One should conduct manta tows before doing more detailed surveys (e.g. quadrat/transect method, point intercept).



Snorkel Survey

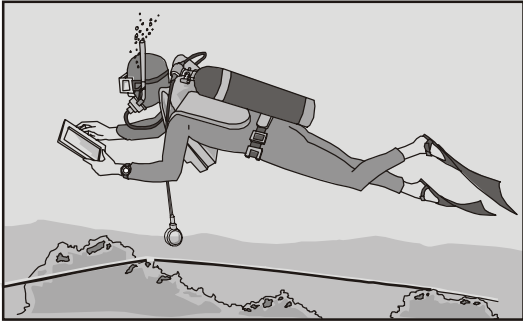
Using snorkeling equipment or goggles, a PCRA participant lays a transect line on the bottom part of the assessed area and record its depth. The snorkeler swims over the transect and estimates the percentage cover of the assessed habitat within 1 m on either side of the transect. Estimations of the habitat’s percentage cover are done throughout the length of the transects.



This method may also employ the use of quadrats to estimate percentage cover of the assessed habitat. Quadrats are most helpful tools to community members who may not be as conversant or experienced in estimating percentage covers. Quadrats are laid down on the sea floor at specific intervals, following the transect line.

Point-Intercept Method

This method is generally used to more precisely estimate the relative abundance of living and nonliving things on the reef bottom observed within a defined area (Uychiaoco *et al.* 2001). It is used by more experienced researchers to record all observed benthic life forms underneath each 0.25 m interval along the transect line.



A 50-m transect line is laid parallel to the shoreline and should be kept at the same depth. When a large obstacle is encountered such as a rock or coral reef formation, the line must be passed around the obstacle, instead of over it, to maintain the same depth.

When using scuba, a 6-7-m depth is standard. Readings are taken every 25 cm along the line and entered into the data sheets. Observations and recordings are taken from one end of the line to the other.

Coral reef habitat assessment

Key Content Points:

When conducting habitat assessments for coral reefs, it is important to establish the following:

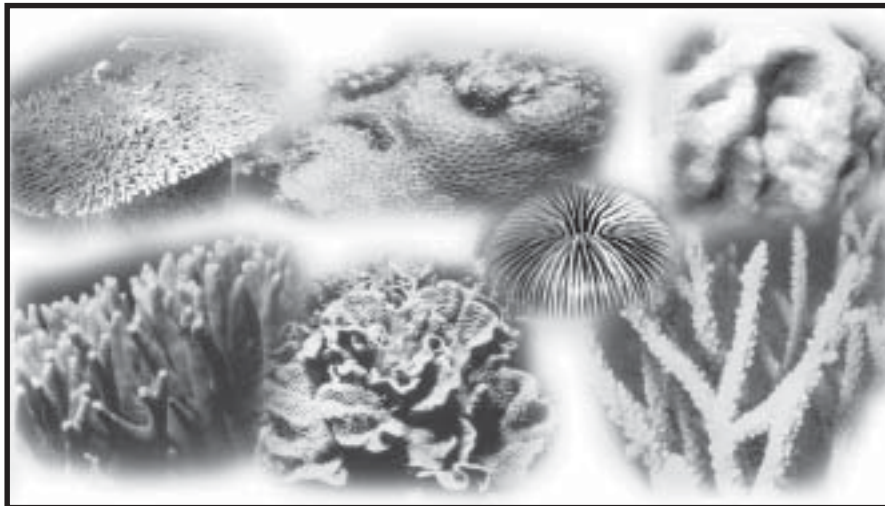
1. First determine what type of reef the area under study has (e.g., slope, wall, pinnacle, etc.) for the purposes of future studies as well as to determine what the best survey methods can be for the area assessment. The manta tow is the more appropriate method to be used at this stage.
2. In many instances, PCRA participants, using snorkeling equipment or swimming goggles, can simply swim seaward from the shoreline and observe the sea bottom profile and the changes in depth and sea life on the floor. The profile is then drawn onto a slate board and included later in the mapping information. Which survey method to use in conducting the habitat assessment is then guided by such a profile.
3. The PCRA generally employs the snorkel method and is complemented by the point intercept method, using SCUBA.
4. In locations where beach and diving resorts are present, the participation of the resorts' management and diving staff is strongly encouraged. Experience shows that in many places, interactions between these two sectors are minimal, and sometimes, adversarial. The PCRA can serve as a window of opportunity for these two important sectors to work and learn together about the ecosystems they aim to protect.
5. Familiarize participants in the proper use of transect lines and quadrats and the habitat rating criteria. Conduct practice sessions on how to estimate percentage cover using these tools. Emphasize as well the importance of keen observation skills.
6. Prior to going out into the field, participants must know how to use and enter data into the data form sheets provided for the assessment.
7. Remind participants to observe safety measures at all times. For the coral reef habitat assessment team, choose only those participants who are comfortable and confident staying long periods in the water.

The coral reef habitat consists of eight different possible components. These are:

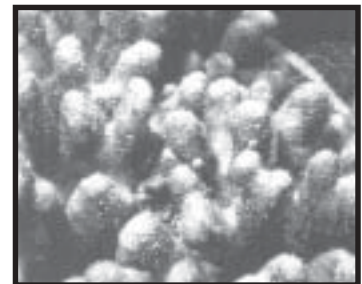
- **Live hard coral (LHC)** - coverage of stony or hard corals on the bottom or part of the bottom
- **Live soft coral (SC)** - coverage of soft corals attached to the bottom
- **Dead coral (DC)** - recently dead coral still attached and recognizable at the bottom (recognizable at the bottom in original upright position, color usually white with no living tissue)
- **Dead coral with algae (DCA)** - corallites still visible, skeletal structure can still be seen but algae dominate the structure (often appears greenish to brownish)
- **Plants** - composed of sea grasses and algae
- **Other animals** - include other benthic organisms which are more or less permanent dwellers in the substrate such as sponges, clams, ascidians, anemones, etc.
- **Coral rubble/rock (CR)** - loose broken fragments of stony corals, consolidated hard bottom or large blocks of hard reef materials not attached or easily moved around.
- **Sand/silt (S)**



Dead coral*
(white with no living tissue)



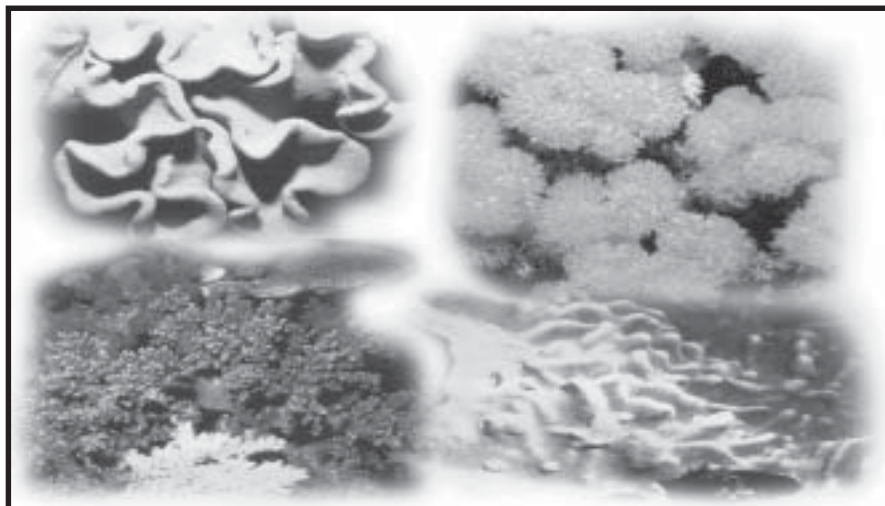
Hard corals*



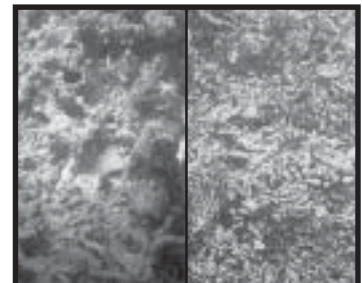
Dead coral with algae
(corallites still visible)



Sand/silt*



Soft corals*



Rock/rubble*
(rubble: coral fragments)

*Photos taken from Uychiaoco *et al.* 2001

The goal of the assessment is to measure coral cover percentages within the assessed area through observation and rational estimations of each habitat component. Percentage cover of each component can range from 0 to 100% depending on the observer. Estimations of the percentage cover may be undertaken with actual or approximated quadrats.

Percentage cover will not only refer to the living corals (hard and soft corals) but also the substrate (dead standing corals, coral rubble, hard rocky surface, sand). PCRA participants then use their observation skills to determine the percentage cover of each of these components within an established quadrat. The quadrat (whether actual or approximated) serves as a sampling station of the assessed habitat area.

All data are then entered into a transect data form. Details of how to organize and analyze these data will be discussed in the next chapter.

Actual fieldwork

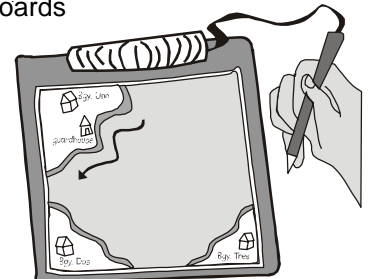
Manta tow method

Materials:

Pumpboat and fuel, snorkeling equipment/swimming goggles, manta board, map of the area, stopwatch, 17 mm rope, waterproof slate with pencil, megaphone with siren and life jacket

Activity:

1. Study the map of the area to be surveyed and note the significant landmarks and features that will help identify the specific locations being surveyed. Inspect the manta boards and ensure that these are safely tied to the boat.
2. Group the participants into pairs or “observer buddies” who will take turns doing the manta tow. Encourage participants to wear life jackets during this activity.
3. Assign a team leader who will provide directions to the observers. This task could also be the function of the trainer/facilitator. It is most helpful if the team leader is provided a whistle or a megaphone with a siren that will signal the observation stops made during the survey. The team leader and observers must agree on the specific signals they will use to stop, start, hasten or slow down the towing.
4. Assign one team member to document the various tow locations covered. Generally, community members are quite familiar with certain landmarks or features and will be the main source of information for these locations. The documentor usually sits at the front of the boat with his/her location map and is responsible for noting the specific tow numbers, location characteristics or GPS coordinates.
5. Ask the participants to position themselves behind the manta boards. When the observers give the signal to start the survey, the team leader starts the stopwatch and clocks the tow at 2 minutes.
6. The participants are towed parallel and over the reef edge along the area to be surveyed. The 2-minute tow generally provides an area view of up to 10 m wide, depending on depth and water clarity.



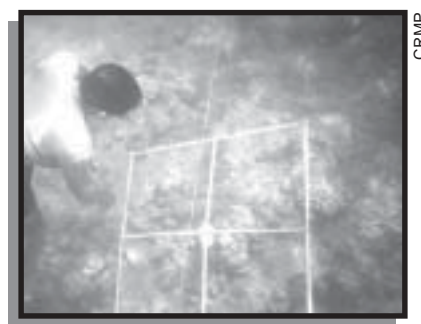
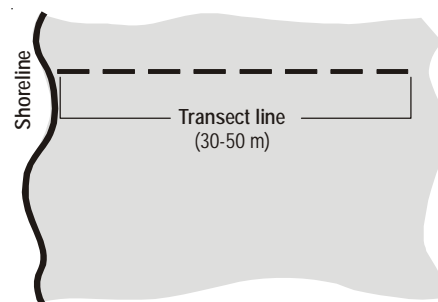
Snorkel survey method

Materials:

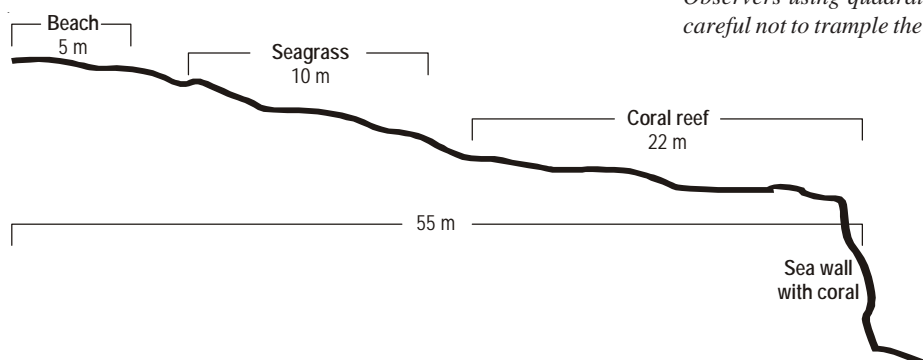
Transect line (30-50 m), snorkeling equipment/swimming goggles, waterproof slates, pencil, life jacket and transect data form for coral habitat assessment

Activity:

1. Use the buddy system when conducting the survey. One participant can be assigned to do the estimations of the percentage cover, while the other can note these estimations as well as other observations on the waterproof slate board.
2. Calibrate the transect lines every 5 m.
3. Prior to conducting the actual survey, it is important to first determine the profile of the habitat being assessed.
 - From the shoreline, lay a 30-50 m transect outward toward the sea perpendicular to the shoreline.
 - Walk/swim along the transect line until the end of the coral habitat to determine the profile of the water side to the coast. This is used to classify the reef type of the area (e.g., slope, wall, pinnacle, etc.).
 - As the water gets deeper, snorkeling equipment can be used and the PCRA participants simply swim seaward from the shoreline, observe the sea bottom profile and record the depth as well as the sea life/marine organisms observed. These observations are then drawn onto a slate board and included later during the session on resource mapping.
4. Establishing the profile of the coral habitat also guides trainers/facilitators in establishing the number of transects to be used. It is important that when laying down transects, these follow the contour of the assessed habitat. If the assessed coral reef area is large, break the group into teams and use the buddy system when conducting the survey. Generally, the interval between transects is between 5-10 m.

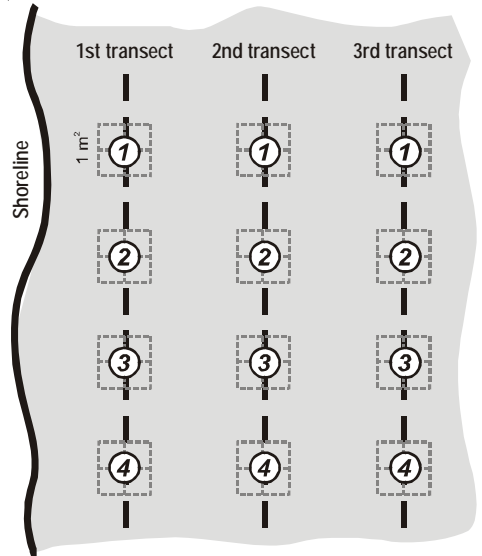


Observers using quadrats must be careful not to trample the reef flat.



Example of a coral reef profile using a perpendicular transect to the shoreline.

- Using the buddy system, participants lay down the transect lines (20-50 m) parallel to the shoreline and at a consistent depth. The number of transects used is determined by the expanse of the assessed habitat. When the tides are low, the types of corals found in the assessed area are clearly visible and can serve as guide as to where the transects should be.
- Participants walk/swim following the transect starting at the point where the coral habitat begins. While floating on the surface of the sea above the sampling points, the participants visualize a 1 m² area, 1 m on each side of the transect, and estimate the percentage cover of each coral reef component/substrate within the area that would total 100%. Estimations of percentage cover on each 5-10 m intervals are undertaken and recorded onto a waterproof slate until the entire 50 m transect has been observed. This gives the participants a total of 10 readings per transect.
- In the PCRA, it is highly recommended that actual quadrats be used in the snorkel survey. Quadrats measuring 1 x 1 m are established every 5-10 m along the transect line to serve as the representative samples of the coral reef habitat. The number of quadrats needed to be established is dependent on the expanse of the habitat and the number of transect lines placed.



CORAL REEF HABITAT ASSESSMENT TRANSECT DATA FORM											
Date: _____						Location/area covered: _____					
Transect no.	Quadrat no.	LHC (Live hard coral)	SC (soft coral)	DC (dead coral)	DCA (dead coral with algae)	Plants (algae, seagrass)	Other animals (sponges, clams, etc.)	Rubble/ rock	Sand/ silt	Total	Other observations (casues of coral damage, other invertebrates, water visibility, etc.)

Sample coral reef habitat assessment transect data form.

Point intercept method

Materials:

Properly certified divers, boat and fuel, scuba diving gear, 50 m transect line (marked 25 cm), waterproof slate with pencil and nylon string with fishing weight

Activity:

1. Study the map of the area to be surveyed. Identify sampling stations.
2. Group participants into pairs or "observer buddies." One can serve as the observer, while the other acts as the recorder/documentor. Assign each pair to one transect line each.
3. Ask participants to copy onto their waterproof slates the required data form for this method. A sample of this form is found below.
4. Using scuba, observers/researchers lay down the 50 m transect line parallel to the shoreline. Generally, when using scuba, a 6-7 m depth is standard.
5. Readings will be taken every 25 cm along the line, from one end to the other. A 50 m transect line provides a total of 200 sampling points. For each type of substrate or benthic life form observed at every 25 cm, the observer/recorder should mark it as one point in the substrate type on his slate. For instance, if live hard coral is observed under the first 25 cm mark, then 1 is given to live hard coral. By the end of the 50 m line, there should have been a total of 200 points awarded to the whole 50 m line.
6. To assist observers in doing the point intercept method, a line with an attached weight may be used and dropped alongside each 25 cm point. Such weight is most useful to more precisely determine the point intercept. In using the weight, utmost care must be taken to avoid coral damage caused by the weight.
7. The documentor/recorder marks the transect number and records the observation onto the waterproof slate. Additional slates may be needed if more transects are conducted.
8. The data generated from the point intercept survey are then copied onto the data forms for subsequent summarization as well as computation for percentage covers. Details of data organization and analysis for the point intercept method will be discussed more in the next chapter.



A. WHITE

Scuba transects require trained divers.

POINT INTERCEPT METHOD DATA FORM

Site name: _____ Municipality/province: _____ Date: _____
 Observer: _____ Transect no. _____ Depth: _____

Benthic lifeforms/coral reef components	Number of sampling points found	Estimated percentage cover
Live hard coral		
Live soft coral		
White dead coral		
Dead coral with algae		
Turf algae		
Fleshy microalgae		
Coralline algae		
Sponges		
Other animals		
Seagrass		
Rubble		
Rock		
Sand/silt		

Sample point intercept method data form.

Seagrass Habitat Assessment

Key Content Points:

1. Seagrass habitat assessment is highly similar to coral reef assessment and the quadrat size used is 1 x 1 m. The transects and quadrats are laid where the seagrass habitat begins, and end where the observed habitat ends. Intervals between transects and between quadrats are determined by the size and expanse of the habitat.
2. The PCRA for seagrass generally employs the snorkel method.
3. Participants must be familiar with the various seagrass species as species identification is an important component of the PCRA. Trainers/facilitators must work closely with PCRA participants in this activity.
4. The Philippines has 16 known species of seagrass, the second highest in the world next to Australia's 23.
5. In assessing seagrasses, extra efforts have to be taken to note observations, e.g. existing threats, water quality, organisms found, extent of seagrass damage and its probable cause(s), etc.

Actual fieldwork

Materials:

Transect line (20-50 m), 1 x 1 m quadrats, snorkeling equipment/swimming goggles, waterproof slates with attached pencils, laminated illustrations/photos of seagrass species and transect data form for seagrass habitat assessment

Activity:

1. Document beforehand the specific locations where the surveys/assessments are to be conducted. Consult fisherfolk and community members prior to the actual conduct of the survey.
2. Assemble the PCRA participants assigned to do the seagrass habitat assessment and conduct a practice session on seagrass species identification as well as on estimating percentage cover.
3. When conducting the survey, PCRA participants lay down the transect line perpendicular to the shoreline. The transect line is generally 20-50 m in length and calibrated every 5-10 m.
4. After the transect lines have been established, the participants lay down the 1 x 1 m quadrats that have been further subdivided into 4 grids to represent 25% per grid.
5. Length/interval and numbers of transects employed are determined by the size and expanse of the seagrass habitat. The important thing to bear in mind is that the surveyed area represents a random sample of the assessed habitat. Transect lines vary in length — 20-50 m, and the more commonly applied intervals between transects are 10-20 m. On the other hand, intervals between quadrats are generally 5-10 m.



Quadrats make substrate estimates more accurate.

CRMP

Mangrove habitat assessment

Key Content Points:

1. In mangroves, the area of investigation is 10% of the total mangrove forest and as in coral and seagrass habitat assessments, transect lines and quadrats will be used.
2. However, unlike coral or seagrass assessment which seeks to determine percentage cover, in mangrove assessment, PCRA participants calculate/ estimate the percent crown cover, number of regeneration per square meter, average height of trees and number of species observed.
3. Longer transects and larger quadrats are called for. Transect lines may run from 20-100 m, depending on the size or expanse of the mangrove habitat. Quadrats measuring 10 x 10 m are also called for.
4. The number of transects as well as the interval between transects and between quadrats will depend on the expanse of the mangrove forest. Since the area of investigation is generally 10% of the total mangrove stands, the number of transect lines and quadrats are approximated to cover this sample area.
5. Each transect should extend seaward or perpendicular to the shoreline and should start where the mangrove habitat starts, and ends where the habitat ends.
6. PCRA participants must be oriented to the different species of mangroves and mangrove guide provided during the conduct of the survey. The guide must carry the local as well as scientific names of the species.

Materials:

Transect lines (20-50 m), nylon lines to establish 10 x 10 m quadrats, data forms for mangrove habitat assessment, pencils, appropriate attire (mud boots, shoes, etc.) and field guide to mangrove species

Activity:

1. Determine beforehand the specific locations to be surveyed.
2. Assemble participants assigned to conduct the mangrove habitat assessment. Ensure that they are in appropriate attire, as mangrove areas are muddy, and more often than not, littered with various forms of wastes and garbage.
3. Familiarize participants with the various mangrove species locally found in the area. Since local names may vary from area to area, it is important to ensure that a standardized identification of the local name of each species be established. DENR's Field Guide to the Identification of Some Mangrove Plant Species in the Philippines is most useful.
4. The assessment starts with the PCRA participants choosing a starting point from which to lay down the strip transect. Typically, the transect starts from the portion of the shoreline where



CRMP

Mangrove transects are wet but fun!

the mangrove habitat begins. Mangrove assessment generally requires a team of 4-5 members as the area to be surveyed requires longer transects and larger quadrats.

- Extend the 50 m transect line seaward or perpendicular to the shoreline, at the right angle to the inland edge of mangrove area. Set up a strip transect by establishing a series of 10 x 10 m quadrats along the transect line, center, right or left position of the transect line; the position of the transect line; the position of the quadrats should be consistent throughout the survey. There will be no interval between the 10 x 10 m quadrats unlike coral or seagrass transects.

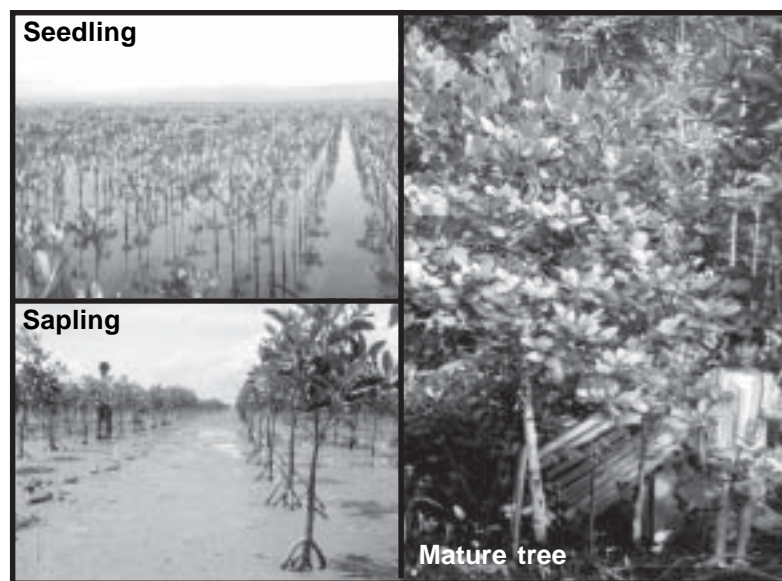
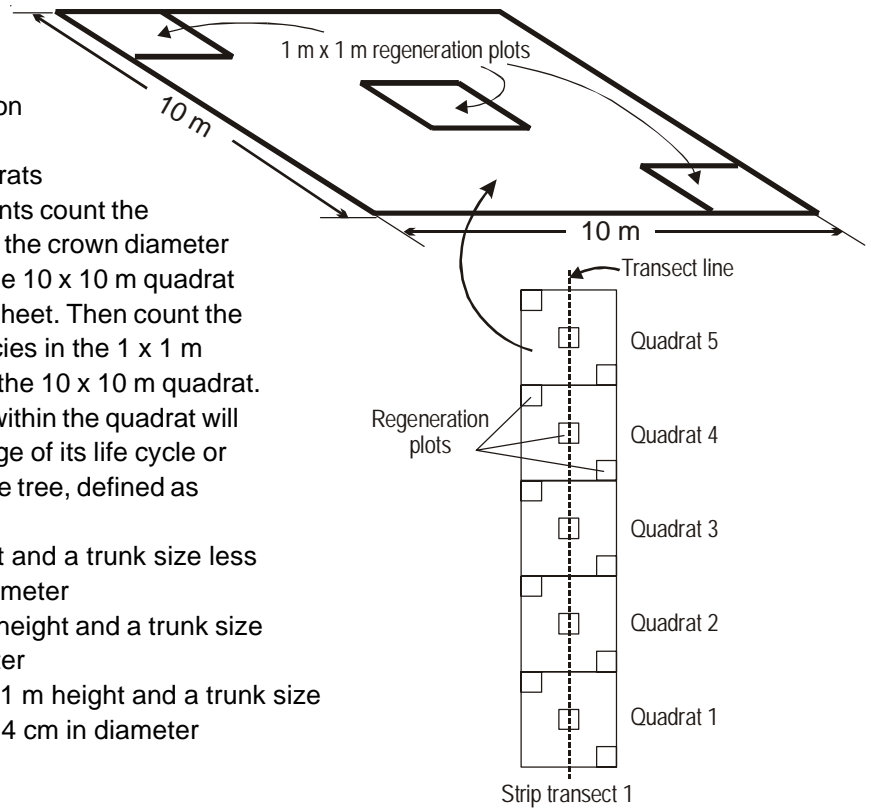
Within the 10 x 10 m quadrats establish 3 smaller quadrats of 1 x 1 m equally distributed as regeneration plots.

- With the strip transect and quadrats established, the PCRA participants count the number, estimate the height and the crown diameter of mature trees per species in the 10 x 10 m quadrat and record these onto the data sheet. Then count the seedlings and saplings per species in the 1 x 1 m regeneration plots that is within the 10 x 10 m quadrat.
- Each kind of mangrove located within the quadrat will be counted according to the stage of its life cycle or age: seedling, sapling and mature tree, defined as follows:

seedling - up to 1 m height and a trunk size less than 4 cm in diameter

sapling - greater than 1 m height and a trunk size of 4 cm in diameter

mature tree - greater than 1 m height and a trunk size greater than 4 cm in diameter



Mangrove trees at different stages of maturity.

If the growth of mangroves is irregular, determine the breast height by any of the following:

➤ Measure just above swelling

➤ Measure above irregular growth

- Once the mangrove species and their corresponding growth stages found in the quadrats have been determined, participants record such data on a waterproof slate and later transcribed onto a data sheet for better organization. Additional observations about the substrate as well as condition of the environment of the assessed mangrove areas must likewise be attended to.
- Following is the mangrove assessment data sheet.

DATA SHEET FOR MANGROVE ASSESSMENT						
Transect no. _____			Location _____			
Recorder: _____			Site		Barangay	
Date _____			Municipality		Province	
Quadrat no.	Tree no.	Substrate	Species	Total ht. (m)	Crown diameter (2 readings)	Observations (disturbance, threats, uses, cuttings, garbage, fauna)

DATA SHEET FOR MANGROVE REGENERATION				
Transect no. _____		Location _____		
Recorder: _____		Site		Barangay
Date _____		Municipality		Province
Quadrat no.	Plot no.	Species	Count	Remarks (average height, status, etc.)
1	1			
	2			
	3			
2	1			
	2			
	3			

- Mangrove condition is rated in terms of percent crown cover, regeneration per square meter, average height of mature trees and environment condition.

Fish visual census

(Adapted from Coral Reef Monitoring for Management by Uychiaoco *et al.* 2001)

Key Content Points:

1. Fish visual census is the identification and counting of fishes observed within a defined area. It is used to estimate the variety, numbers and even sizes of common, easily seen, easily identified fishes in areas of good visibility. This information may reflect the health of the fish stocks within the surveyed coral reef areas.
2. Participants must be familiar with the various reef fishes. Where possible, a laminated fish identification guide should be prepared for participants' reference during the conduct of the fish visual census.
3. During the fish count, generally the faster moving fishes are counted before the slower moving fishes are counted. Each transect covers an area of 500 m² (50 m x 10 m width). Total counts of both observers are transcribed onto the data form.

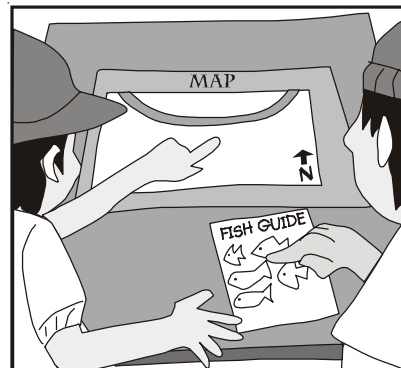
Actual fieldwork

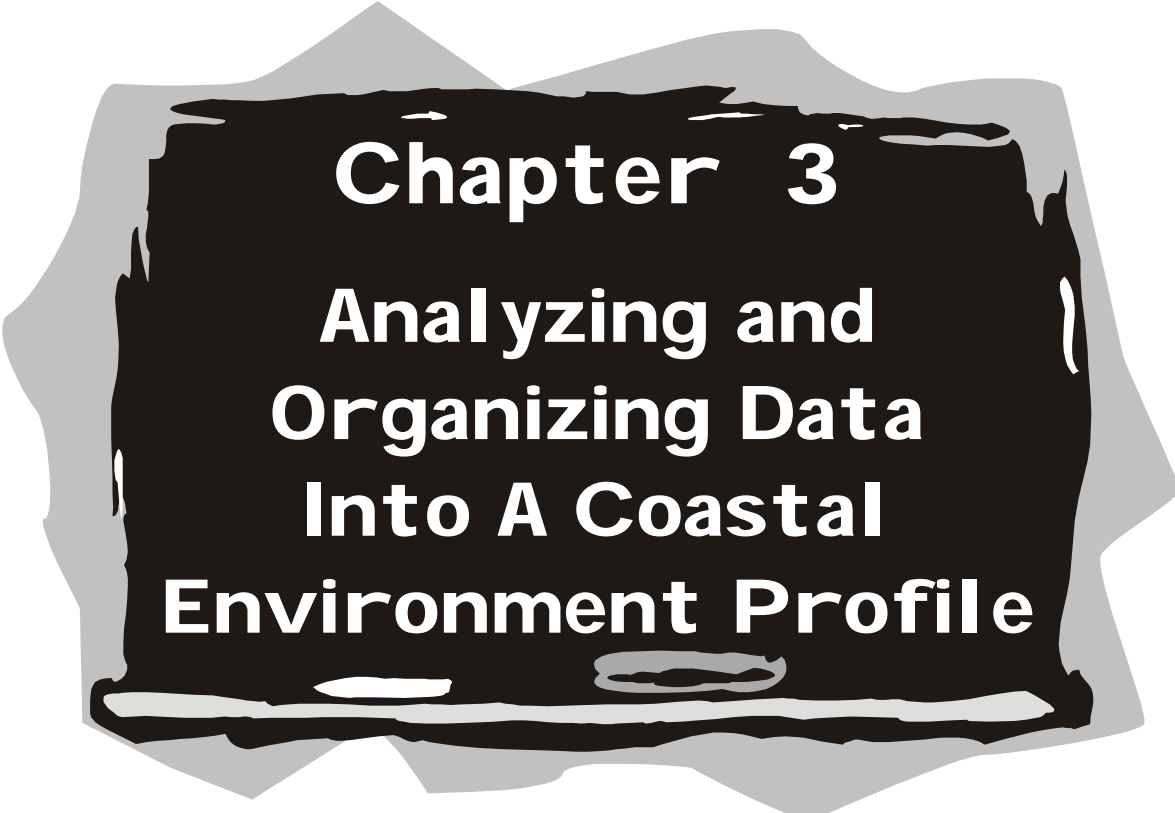
Materials:

One or two 50-m lines each marked every 5 m, underwater slates with attached pencil, laminated fish identification guide, goggles or mask and snorkel, fins, life jackets and boat

Activity:

1. Select the sampling stations and fish types to be censused. Prepare the data form onto the slates and draw columns for the different size classes.
2. Lay the 50 m transect line on a constant depth contour. Record the depth.
3. Wait 10-15 minutes for the disturbed fishes to return. Be careful not to disturb the fishes during the census.
4. Starting at one end of the line, each observer floats on each side of the transect line while observing 5 m to his side of the transect and forward to the next 5-m mark. Both observers swim to and stop every 5 m along the line to record the counts of fish per size class until the transect is completed.
5. Classify the various transects according to your purpose for data summarization, e.g., reef zones or types, time of sampling, management or use zones, intensity of impacts and the like. List the transects by groups along the upper portion of the summary form.
6. List the fish groups of fish types (by groups) along the left side of the summary form. Total the counts of the different size classes for each type of fish per transect.





Chapter 3
Analyzing and
Organizing Data
Into A Coastal
Environment Profile

CHAPTER 3

Analyzing and Organizing Data into a Coastal Environment Profile



Learning Objectives:

At the end of this chapter, the participants will be able to:

- demonstrate the skill in analyzing PCRA data gathered using different PCRA tools;
- appreciate the use of tables, diagrams, maps, graphs and other visual tools in presenting data;
- appreciate the importance of PCRA data as necessary inputs to the coastal environment profile and as bases for CRM planning; and
- identify the contents of a coastal environment profile.

Total Training Time:



4-6 hours (should be conducted after the field activity)

Materials and Equipment:



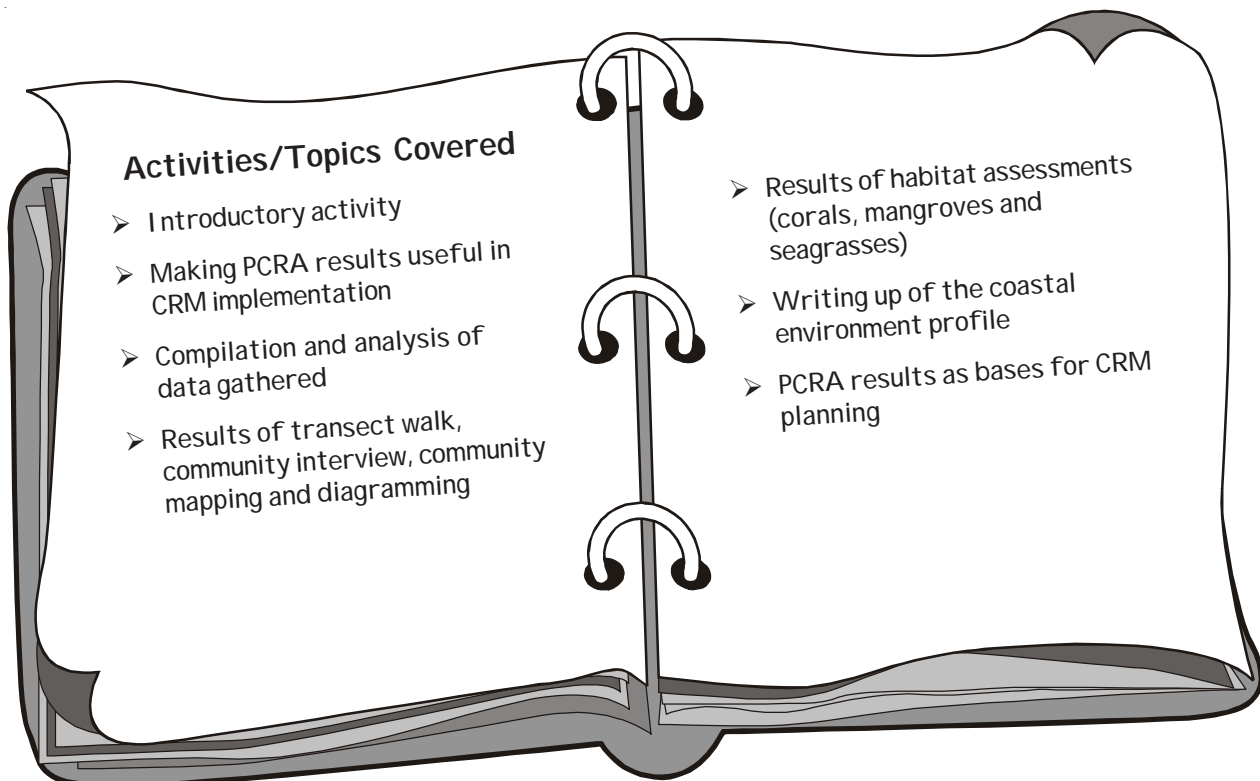
Overhead projector, acetates, Manila papers, masking tapes, pentel pens (different colors)

Reading Materials:



Participatory coastal resource assessment: A handbook for community workers and coastal resource managers

Coral reef monitoring for management





Note to Trainers:

- The sessions and activities discussed in this chapter presuppose that the data gathering or field activities have already been done and the participants have the raw data with them. Usually this activity is done late in the afternoon until evening after the field exercise was conducted in the morning and the participants were given enough time for wash-up and short rest early in the afternoon.
- Make sure that the participants have already rested well enough from the field activity so that energy level is maintained and data processing work is better facilitated.
- Have all the materials ready for participants' use.



Participatory activity #8: Workshop on analyzing and organizing data

Objectives:

- to enhance participants' skills in organizing and analyzing data;
- assist participants produce PCRA data outputs presented in charts, diagrams, maps, etc., that are easily understood by the larger community; and
- for participants to present the analyzed data to the bigger PCRA group for validation.

Duration:

3 hours

Activity:

1. Start the activity with a game “Arrange yourselves...” (see box). After the game, relate this to the importance of data analysis to any data gathering activity. Have all the materials ready for participants’ use.

Group game: “Arrange yourselves...”	
<p>Steps:</p> <ol style="list-style-type: none"> 1. Divide the group into 2 (or 3) teams each with equal number of members. 2. Ask them to form one single line for each team. 3. Tell them that they are to arrange themselves accordingly. 4. The first team to arrange themselves correctly will shout “Ocean!” 5. The facilitator will check if they have arranged themselves correctly, and if they did, they will get 1 point. If not, the other team(s) will have a chance to win. 6. The team with the most number of points will win. 	<p>Possible categories</p> <ul style="list-style-type: none"> ☺ Age, from youngest to oldest ☺ First letter of the family name or first name ☺ Birthday, from January to last day of December ☺ Height from shortest to tallest ☺ Hair length, from shortest to longest ☺ Number of letters of their complete names ☺ Etc.

2. Process the experience by asking participants about the relevance of the game to the topic at hand. Emphasize the importance of processing raw data and convert these into coherent information that could be used as bases for future action and decision-making.
3. Discuss with the participants the objectives and expected outputs of the activity.
4. Review the field assessment groupings. During the field assessment, the following would have been the groupings (or any variations of the groupings):
 - interview group and community mapping
 - transect walk
 - seagrass assessment
 - coral assessment
 - mangrove assessment

Make sure that all groups have their raw data with them.

5. Provide brief inputs on the importance of the PCRA data in CRM planning and how to organize and analyze the data. Give time frame. Agree on time for plenary presentation.
6. Each group will be provided with the materials they need. The remaining time will be used by the groups to organize their data, come up with generalization/conclusion and write these on Manila papers or acetates for plenary presentation.
7. On agreed-upon time for plenary regrouping, call participants back to the plenary venue. Process the experience. Let each team present its outputs to the bigger group.
8. Let the big group validate analyzed data presented by each team.



Lecture/discussion #10:

How to analyze and organize PCRA data

Objectives:

- to orient participants on the tools used to process/analyze PCRA data; and
- to strengthen participants' appreciation of the PCRA as a participatory process.

Materials:

Overhead/Powerpoint slides

Note to Trainers:

1. This input is given as introduction to the workshop described above. Input time should be limited to about 20 minutes only.
2. Have rating criteria and matrix ready to aid participants in their workshop.

Key Content Points:

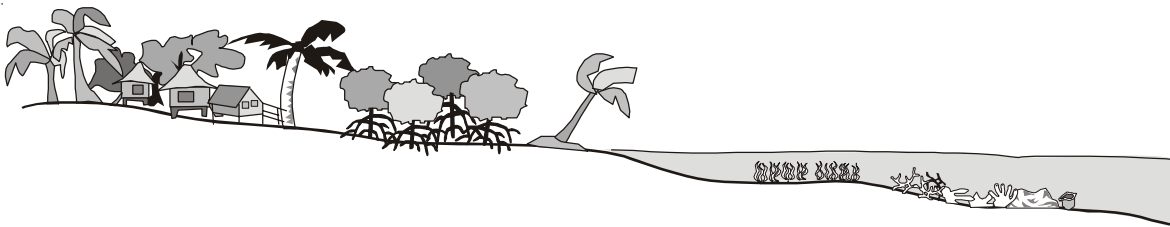
- With the volume of raw data gathered from community interviews, transect walks, habitat assessment, there is a need to organize and process these data so that these could be presented in a summarized, orderly and visual manner.
- Data from community interviews have to be presented in a descriptive manner, e.g., ranking of problems/issues in the community, listing of most common livelihoods, etc.
- Socio-demographic and economic data could be presented in percentages and averages if secondary data are available, e.g., sex ratio as recorded in the latest National Statistics Office or barangay/municipal survey, average age of fishers as indicated in the fisher registry, etc.
- Trends and seasonality of fishery-related information and activities could be presented in trends and calendar diagrams.
- For analyzing habitat assessment and fishery-related data, follow a step-by-step process until a conclusion about the status of the habitats is reached.
- Data about location and expanse of habitats, uses, resources, problems and issues could be spatially presented in a map and validated by the community participants.
- Analyzed data from PCRA and secondary sources will serve as inputs to the development of the coastal environment profile which will then serve as basis for CRM planning.

Analyzing and organizing PCRA data

Data gathered from the field by the PCRA participants are usually recorded as bullet points, running notes, etc., specifically in the case of the interview. In the case of habitat assessment methods, raw data are recorded on the slate board and noted on each quadrat and transect. For example, in the coral assessment, a slate board may record 10 quadrats per transect with 5 transects conducted in one coral reef area. This could also be true to seagrass and mangrove assessments. With the volume of data recorded on the slate board, there is a need to organize and process these to draw important information about the area under study. These information are expressed in the form of conclusions and findings which would immediately give the users and managers of these resources the current condition of the area and prompt them to take action to better manage or protect these resources. The following are guides in processing and analyzing data from different PCRA methods:

a. Results of transect walk

If the data of the transect walk activity are recorded on the transect walk diagram/matrix by each member of the group, ask the group to consolidate their data into one matrix making sure that each observation is validated by the group. It is important to refer to other groups, e.g., the habitat assessment group for additional information of other coastal zonation like some observations of the seagrass group on the condition of the area so that these could be incorporated in the matrix.



Habitat management parameter	<i>Bakawan</i> (mangrove)	<i>Aplaya</i> (beach)	<i>Hunasan</i> (tidal flat)	<i>Damuhan</i> (seagrass bed)	<i>Bahura</i> (reef/shoal)	<i>Ialim</i> (deep water)
<i>Mga likas na kayamanan</i> (natural resources)	<i>Alimango</i> , <i>tamilok</i> , shells, <i>manla</i>	Resort, shells, <i>alimango</i> (mangrove crab), <i>pandan</i> , <i>niyog</i> (coconut), <i>nipa</i> (<i>Nipa fruticans</i>)	Hermit crab, <i>tayong</i> (sea urchin), <i>balatan</i> (sea cucumbers), shells, <i>alimango</i> (crabs)	Seaweeds, fish - <i>danggit</i> , <i>gono</i> , <i>banak</i> , <i>pusit</i> , <i>banyaw-banyaw</i> , <i>bantol</i>	<i>Isda</i> (finfish), <i>pugita</i> (octopus), shells, <i>banagan</i> (lobsters), <i>balatan</i> (sea cucumbers)	<i>Isda</i> (finfish)
<i>Mga uri ng hanapbuhay, mga pagkakataon</i> (types of livelihood, opportunities)	<i>Pangisdaan</i> (fishery), <i>bahayan</i> (place for houses), <i>pantalan</i> (pier location), <i>gatong</i> (firewood)	Harvest and sell above, <i>gawan ng banig</i> , etc. (making mats, etc.), coco products, <i>pawid</i> (roof shingles, wine)	Sell <i>balatan</i> (sea cucumbers, dried)	Harvest and sell above resources	Harvest and sell above resources	Harvest and sell above, fish deep reefs with compressor (not recommended)
<i>Mga suliranin</i> (problems/issues)	<i>Bawal magputol</i> (cutting is illegal), <i>nik-nik</i> (biting flies/midges)	<i>Pagputol ng niyog</i> (cutting of coconut trees)	Gleaning activities damage newly grown corals	More human disturbances of <i>panti</i> (gill net), <i>bantol</i> (stonefish)	Sodium cyanide fishing, blast fishing, <i>tubli</i> (poisonous root used to catch fish), <i>lagtang</i> (poisonous plant)	Trawlers, blast fishing, sodium cyanide fishing, <i>tubli</i> (poisonous root used to catch fish), <i>lagtang</i> (poisonous plant)

b. Results of field interviews, trend and calendar diagrams






If data from community interviews are gathered through group discussions and community interactions using an interview or focused discussion guides, data analysis will be more qualitative in nature. The use of percentages, frequencies and averages, as in the case of average income, fish catch, etc., could be presented if secondary data are available. If these types of data are gathered from estimates of the group and duly validated by the participants during the interview, it is important to note how these quantitative data were gathered. Community perceptions, like how resources have declined or increased over time are presented as trend diagram, and some seasonal activities and events are presented as calendar diagram (see figures on p. 52).

c. Results of community mapping

The resource map is a consolidation of the information gathered from different PCRA methods. The output of the mapping activity will then be finalized by incorporating data that were gathered from the transect walk, coral, mangrove and seagrass assessment groups. By doing so, data discrepancies may be filled in and a more comprehensive data may be reflected in the map. Make sure that the legend is complete and as much as possible, some efforts should be extended by the assisting organizations to provide some glossary of common English names equivalent to local names which most often vary from one place to another.

d. Results of coral reef habitat assessment

Manta tow method - Data gathered from the manta tows are recorded on the slate board and ready for analysis. Copy the data from the slate board into the manta tow data form and convert the percentage estimates of coral cover into its score on the five-point scale below.

Score	% Cover	Symbol
1	0-10%	
2	11-30%	
3	31-50%	
4	51-75%	
5	76-100%	

When the manta tow data form is filled up, plot the scores for each tow segment on the corresponding position on the manta tow map. Use scores to group tow segment areas into sectors. Draw a circle around each set of continuous and similar hard coral scores on the map. You may also use the other scores (soft coral, dead coral, etc.) and observations to help group areas into sectors.

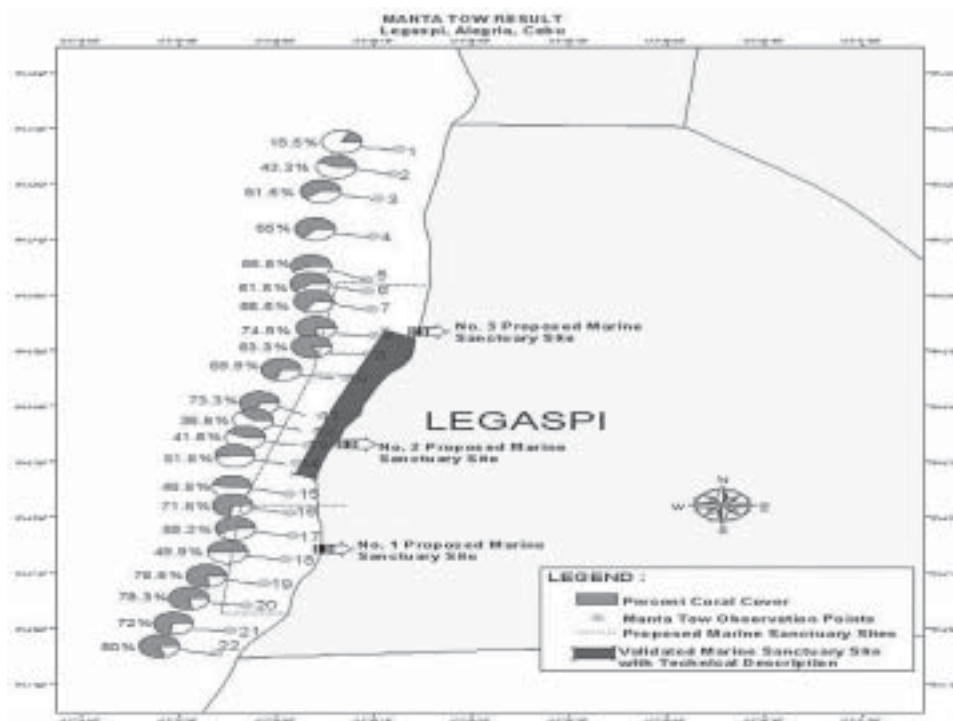
Manta Tow Data Form

Site name: _____

Date: _____

Tow no.	Location	LHC	SC	DC	DCA	Sand/silt rubble	Total	Notes, observations
1	From church to house of Pepe	15	10	25	25	25	100	presence of diamena
2	From Pepe's house to <i>balete</i> tree	10	10	30	15	35	100	
3	From <i>balete</i> tree to Vina's Resort	20	15	10	10	45	100	coral rubbles
4	From Vina's Resort to marine sanctuary guardhouse	30	20	10	10	30	100	some patches of seagrasses
5	From marine sanctuary guardhouse to school	35	20	10	15	20	100	sea urchins
6	From school to Mayor's house	20	15	15	10	40	100	
7	From Mayor's house to Pablina's Resort	40	25	10	10	15	100	
8	From Pablina's Resort to the "Cliff"	50	30	10	5	5	100	mostly staghorn corals
9	From the "Cliff" to "Tubod"	30	15	10	15	30	100	
10	From "Tubod" to barangay wharf	15	5	30	25	25	100	

Note: All figures in percent.



A manta tow data map.

Snorkel survey method - Raw data per transect which are recorded on the slate board will be transferred to the data summary form. First, get the average percentage of each habitat component (e.g., live hard coral cover) per transect by adding the observations per quadrat and dividing the sum by the number of quadrats per transect. Once the average percentages of each habitat components per transect are derived, add all the averages per transect and divide the total percentages by the number of transects actually observed. Below is a step-by-step process of coral transect data processing.

CORAL REEF HABITAT ASSESSMENT TRANSECT DATA PROCESSING

Getting the average % cover:

T no.	Q no.	LHC (live hard coral)	SC (soft coral)	DC (dead coral)	DCA (dead coral w/ algae)	Plants (algae, seagrass)	Other animals (sponges, clams, etc)	Rubble/ rock	Sand/ silt	Total	Other observations (causes of coral damage, other invertebrates, water visibility, etc.)
1	1	20	20	0	10	10	10	15	15		
	2	20	20	0	10	5	10	20	15		
	3	5	20	0	25	10	5	25	10		
2	1	20	20	0	10	10	20	10	10		
	2	20	5	15	20	15	15	5	5		
3	1	15	5	20	20	5	15	10	10		
	2	20	25	0	20	10	5	10	10		
	3	20	30	0	0	10	10	15	15		

STEP 1: Take the averages of each component, per transect

T no.	Q no.	LHC (live hard coral)	SC (soft coral)	DC (dead coral)	DCA (dead coral w/ algae)	Plants (algae, seagrass)	Other animals (sponges, clams, etc)	Rubble/ rock	Sand/ silt	Total	Other observations (causes of coral damage, other invertebrates, water visibility, etc.)
1	1	20	20	0	10	10	10	15	15	100	
	2	20	20	0	10	5	10	20	15	100	
	3	5	20	0	25	10	5	25	10	100	
		15	20	0	15	8.3	8.3	20	13.3	100	
2	1	20	20	0	10	10	20	10	10	100	
	2	20	5	15	20	15	15	5	5	100	
		20	12.5	7.5	15	12.5	17.5	7.5	7.5	100	
3	1	15	5	20	20	5	15	10	10	100	
	2	20	25	0	20	10	5	10	10	100	
	3	20	30	0	0	10	10	15	15	100	
		18.3	20	6.7	13.3	8.3	10	11.7	11.7	100	

STEP 2: Add the averages by component from each transect

	LHC	SC	DC	DCA	Plants	Other animals	Rubble/rock	Sand/silt
	15	20	0	15	8.3	8.3	20	13.3
	20	12.5	7.5	15	12.5	17.5	7.5	7.5
	18.3	20	6.7	13.3	8.3	10	11.7	11.7
Total:	53.3	52.5	14.2	43.3	29.1	35.8	39.2	32.5

(Continued)

(Continued)

STEP 3: Divide the totals of the averages of each component by the number of transects in the survey

Total # of transects: 3	LHC	SC	DC	DCA	Plants	Other animals	Rubble/rock	Sand/silt	
	53.3/3	52.5/3	14.2/3	43.3/3	29.1/3	35.8/3	39.2/3	32.5/3	
Average % cover:	LHC	SC	DC	DCA	Plants	Other animals	Rubble/rock	Sand/silt	Total
	17.8	17.6	4.7	14.4	9.7	11.9	13.1	10.8	100

Adapted from: Municipality of Moalboal, Cebu 2002.

Rate the coral condition using the coral reef rating chart below:

Habitat Rating Criteria for Hard Coral Cover

Condition	Criteria
Excellent	76-100% coverage
Good	51-75% coverage
Fair	26-50% coverage
Poor	0-25% coverage

Point intercept method - The data generated from the point intercept survey which are recorded on slate boards are copied onto the data forms for subsequent summarization as well as computation for the percentage cover. This is how the point intercept data form would look like per transect:

POINT INTERCEPT METHOD DATA FORM

Site name: _____ Municipality/province: _____ Date: _____
 Observer: _____ Transect no. 10 Depth: _____

Benthic lifeforms/coral reef components	Number of sampling points found	Estimated percentage cover
Live hard coral	/// // // // // // // // //	21
Live soft coral	// // // I	8
White dead coral	--	0
Dead coral with algae	// // // // // I	13
Turf algae	--	0
Fleshy microalgae	// //	6
Coralline algae	// I	3
Sponges	--	0
Other animals	// // // //	8.5
Seagrass	// //	5
Rubble	// // // // //	12.5
Rock	// // // // // III	14
Sand/silt	// // // III	9

To get the estimated percentage cover = $\frac{42 \text{ live hard coral observed}}{200 \text{ observation points}} = 21\%$
 (50-m transect line with observation every 25 cm)

From the data form per transect, copy the percentages of each type of lifeform to the summary form. Sum subtotals for each benthic lifeform for each transect group. Divide the total percentages by the number of transects actually observed. Write these on the column for averages. Below are sample summary data showing the results of 10 50-m transects using point intercept method.

POINT INTERCEPT METHOD DATA SUMMARY FORM														
Site name: Gilutongan Marine Sanctuary							Municipality & province: CORDOVA, CEBU							
Zone/sector:	Outside						Inside							
Month and year:	November 1999						November 1999							
Transect no:	1	2	3	9	10			4	5	6	7	8		
Types/groups	Sub-total					Total	Avg.	Sub-total					Total	Avg.
Live hard coral	44.0%	28.0%	56.5%	41.0%	15.3%	184.8	37%	65.0%	58.5%	24.1%	42.5%	38.5%	228.6	45.7%
Soft coral	0.0%	0.0%	0.0%	0.0%	0.5%	0.5	0%	0.5%	0.0%	0.0%	0.5%	0.0%	1.0	0.2%
White dead coral	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0%	0.0%	0.0%	4.0%	6.5%	1.0%	11.5	2.3%
Dead coral with algae	4.0%	5.0%	9.0%	7.0%	2.6%	27.6	6%	9.0%	12.0%	13.6%	18.0%	12.0%	64.6	12.9%
Sponges	0.0%	0.0%	0.0%	0.5%	0.5%	1.0	0%	2.0%	1.0%	1.5%	2.0%	1.0%	7.5	1.5%
Other animals	0.0%	0.0%	0.0%	0.0%	0.5%	0.5	0%	1.0%	0.0%	1.5%	0.0%	0.5%	3.0	0.6%
Turf algae	0.0%	0.0%	7.5%	0.0%	0.0%	7.5	2%	0.0%	0.0%	0.0%	0.0%	0.5%	0.5	0.1%
Fleshy macroalgae	11.5%	27.5%	0.0%	0.0%	0.5%	39.5	8%	0.0%	0.0%	0.0%	0.5%	0.0%	0.5	0.1%
Coralline algae	0.5%	0.0%	0.0%	0.0%	0.5%	1.0	0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.5	0.1%
Seagrass	0.0%	0.0%	0.0%	0.0%	2.6%	2.6	1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.0%
Rubble	6.0%	9.5%	6.5%	5.0%	0.5%	27.5	6%	9.5%	9.5%	17.1%	9.5%	14.0%	59.6	11.9%
Rock	14.5%	15.0%	9.5%	4.0%	6.6%	49.6	10%	8.0%	7.0%	5.5%	3.0%	2.0%	25.5	5.1%
Sand/silt	19.5%	15%	11.0%	42.5%	69.9%	157.9	32%	5.0%	12.0	32.2%	17.5%	30.5%	97.2	19.4%
Invertebrates														
Diadema	7	21	2	5	3	38	7.6	?	92	6	6	?	104	35
Sea cucumber	1	0	1	2	2	6	1.2	?	0	2	1	?	3	1

Source: Uychiaoco et al. 2001.

e. Results of seagrass habitat assessment

At the end of the assessment, the data on the waterproof slates are transcribed onto data sheets for proper organization and summarization. The calculations used to determining percentage cover are similar to corals, except that there is no need to equate all component of the habitat to 100%. The percentage of existing seagrass cover observed in the respective quadrats will serve as the representative sample of seagrass cover in the area. Total percentage cover observed per quadrat are then summed up to represent the percentage of the total seagrass cover.

To determine the status or condition of the assessed seagrass habitats, the following criteria for evaluation is employed.

Status/ classification	Criteria for evaluation	Management priority
Pristine seagrass beds	High or low species diversity bordering land masses or islands far removed from human habitations, disturbed only by the normal intensity of natural elements; often form thick assemblages in shallow waters	High priority for protection and management
Disturbed seagrass beds	High or low diversity beds occupying bays and coves, near human habitation; these beds receive constant impacts of human activities such as slight to moderate physical disturbance and various kinds of pollution that are not severe enough to eliminate or kill the seagrasses	High priority for minimizing the existing human impacts in the area
Altered seagrass beds	Low species diversity, permanently and completely changed or converted into other coastal uses like fish ponds, land fill or heavily impacted by sedimentation and physical damage	Low priority for management unless rehabilitation is still possible in area
Emergent seagrass beds	Low species diversity, largely controlled by extreme physico-chemico conditions such as low levels of salinity or variations thereof within the natural environment	Medium priority for management and conservation depending on controlling conditions

Source: Fortes 1989.

SEAGRASS HABITAT ASSESSMENT TRANSECT DATA PROCESSING

Getting the average % cover:

Transect no.	Quadrat no.	Species	% cover	Substrate	Other observations
1	1		0	Sandy	Shell, <i>bakay-bakay</i>
	2		0	Rocky	<i>Bakay-bakay</i>
	3	<i>Halophila</i>	25	Rocky, muddy	
	4		0	Sandy, muddy	
	5		0	Rocky	<i>Panas</i>
2	1		0	Sandy, rocky	
3	1		0	Sandy, rocky	Murky
	2	<i>Halodule</i>	12	Sandy, rocky	leaves covered with silt
	3	<i>Halodule</i>	55	Sandy, rocky	-do-
	4	<i>Halodule</i>	40	Sandy, rocky	-do-
	5	<i>Halodule</i>	25	Sandy, rocky	
		<i>Thalassia</i>	5		

STEP 1: Take the average % cover of each transect by dividing the total per transect by number of quadrats

Transect no.	Quadrat no.	Species	% cover	Substrate	Other observations
1	1		0	Sandy	Shell, <i>bakay-bakay</i>
	2		0	Rocky	<i>Bakay-bakay</i>
	3	<i>Halophila</i>	25	Rocky, muddy	
	4		0	Sandy, muddy	
	5		0	Rocky	<i>Panas</i>
			$25/5 = 5\%$		
2	1		0	Sandy, rocky	
			$0/1 = 0\%$		
3	1		0	Sandy, rocky	Murky
	2	<i>Halodule</i>	12	Sandy, rocky	leaves covered with silt
	3	<i>Halodule</i>	55	Sandy, rocky	-do-
	4	<i>Halodule</i>	40	Sandy, rocky	-do-
	5	<i>Halodule</i>	25	Sandy, rocky	
		<i>Thalassia</i>	5		
			$137/5 = 27.4\%$		

General observation: Low species diversity with observable impacts of human activities e.g. destroyed leaves and stems caused by scissor net used for shrimp or shell gathering.

STEP 2: Add the averages from each transect.

% cover
5
0
27.4
32.4
Total:

STEP 3: Divide the totals of the averages of each component by the number of transects in the survey.

Total # of transects: 3	% cover	Average % cover:	% cover
	32.4/3		10.8

Adapted from: Municipality of Moalboal, Cebu 2002.

f. Results of mangrove habitat assessment

At the end of the PCRA field activity, participants should now have filled-up data sheets for mature mangrove trees and regeneration count. The data obtained will now be used in the analysis of the condition of the mangrove area surveyed. In the analysis, it is important to know the value of the percent crown cover, regeneration per square meter and average height. Also, the environmental condition of the mangrove area which were gathered through observations form part of the analysis. The following formula will be used in deriving the information required for the analysis:

$$\text{Percent crown cover} = \frac{\text{Total crown cover of all trees}}{\text{Total area sampled}}$$

$$\text{Regeneration per m}^2 = \frac{\text{Total regeneration count}}{\text{Total no. of regeneration plots}}$$

$$\text{Average height} = \frac{\text{Total height of all trees recorded}}{\text{Total number of trees recorded}}$$

The condition of the mangrove area is classified into four categories namely, excellent, good, fair and poor. The table below shows the criteria of the mangrove area with their corresponding condition.

Condition	Criteria
Excellent	76% and above in % crown cover 1 regeneration per m ² Above 5 m in average tree height Undisturbed to negligible disturbance
Good	51-75% crown cover <1 - 0.76% regeneration per m ² <5m - 3m average height of trees Slight disturbance and few cuttings
Fair	26-50% crown cover 0.50 - 0.75 regeneration per m ² <3m - 2m average height of trees Moderate disturbance and noticeable cuttings
Poor	0-25% crown cover <0.50 regeneration per m ² <2m average height of trees Heavy disturbance/cuttings/pollution, rampant conversion to other uses, nearly destroyed

See example below:

DATA SHEET FOR MANGROVE ASSESSMENT						
Transect no. <u>1</u>		Location <u>Mahayahay</u> <u>Duhaylungsod</u>				
Recorder: <u>Renclar de los Reyes</u>		Site <u>Talibon</u> <u>Bohol</u>				
Date <u>April 11, 2003</u>		Municipality <u>Talibon</u> Province <u>Bohol</u>				
Quadrat no.	Tree no.	Substrate	Species	Height (m)	Crown diameter (average of 2 readings*)	Observations (disturbance, threats, uses, cuttings, garbage, fauna)
1	1	Muddy	<i>Bakauan babae</i> (<i>Rhizophora mucronata</i>)	6	2	Crabs, birds, seasnake, undisturbed
	2	Muddy	<i>Bakauan lalaki</i> (<i>Rhizophora apiculata</i>)	5	1.5	
	3	Muddy	<i>Pagatpat</i> (<i>Sonneratia alba</i>)	6	2	
	4	Muddy	<i>Bakauan babae</i> (<i>Rhizophora mucronata</i>)	5	2	
	5	Muddy	<i>Bakauan lalaki</i> (<i>Rhizophora apiculata</i>)	4	1.5	
2	1	Muddy	<i>Pagatpat</i> (<i>Sonneratia alba</i>)	5	1.5	Shells, undisturbed
	2	Muddy	<i>Bakauan lalaki</i> (<i>Rhizophora apiculata</i>)	4	1	
	3	Sandy	<i>Bungalon</i> (<i>Avicennia marina</i>)	6	1.5	
	4	Sandy	<i>Piapi</i> (<i>Avicennia lanata</i>)	5	1.5	
	TOTAL				46	

- ♦ Crown diameter (2 measures) - the average of the crown width at the widest point and a second width measurement made 90° to the diameter at the widest point.
- ♦ To get the **total crown diameter** = 2 + 1.5 + 2 + 2 + 1.5 + 1.5 + 1 + 1.5 + 1.5 = 14.5
- ♦ Crown cover is calculated using the formula $\frac{\pi}{4}d^2$ or $0.7854d^2$ (d as the total crown diameter)
- ♦ To get the **total crown cover** = $0.7854 \times (\text{total crown diameter})^2 = 0.7854 \times (14.5)^2 = 165.13 \text{ m}^2$
- ♦ To get the **average height** = $\frac{\text{Total height of all trees recorded}}{\text{Total number of trees recorded}} = \frac{46}{9} = 5.11 \text{ m}$
- ♦ To get **percent crown cover** = $\frac{\text{Total crown cover of all trees}}{\text{Total area sampled}} = \frac{165.13}{2 \text{ quadrats} \times 100 \text{ m}^2} = \frac{165.13}{200} = 82.57\%$

DATA SHEET FOR MANGROVE REGENERATION

Transect no. 1

Location Mahayahay Duhaylungsod

Recorder: Renclar de los Reyes

Site Barangay

Talibon Bohol

Date April 11, 2003

Municipality Province

Quadrat no.	Plot	Species	Count	Remarks (average height, status, etc.)
1	1	<i>Bakauan lalaki</i> (<i>Rhizophora apiculata</i>)	2	Other seedlings were not seen due to high tide
		<i>Pagatpat</i> (<i>Sonneratia alba</i>)	2	
	2	<i>Bungalon</i> (<i>Avicennia marina</i>)	2	
		<i>Pagatpat</i> (<i>Sonneratia alba</i>)	1	
	3	<i>Piapi</i> (<i>Avicennia lanata</i>)	1	
2	1	<i>Pagatpat</i> (<i>Sonneratia alba</i>)	2	
	2	<i>Piapi</i> (<i>Avicennia lanata</i>)	1	
	3	<i>Bungalon</i> (<i>Avicennia marina</i>)	1	

$$\text{Regeneration per m}^2 = \frac{\text{Total regeneration count}}{\text{Total no. of regeneration plots}} = \frac{2 + 2 + 2 + 1 + 1 + 2 + 1 + 1}{6} = \frac{12}{6} = 2$$

RESULTS SUMMARY:

1. % crown cover = 82.57%
2. Average height = 5.11 m
3. Regeneration per m² = 2

Therefore, the mangrove area with the data used in the example above is in excellent condition.

g. Results of the fish visual census

Data from fish visual census will be recorded on the fish abundance data form reflecting observations per transect. The data in all the transects conducted will then be transferred to the data summary form. As indicated in Chapter 2, the group could choose a few fish types of significance to the area being assessed and come up with their fish graphing form. Below are examples of filled up forms for the fish visual census:

FISH ABUNDANCE DATA FORM					
Site: Tuka I (buffer zone)			Municipality and province: Kiamba, Sarangani		
Transect no.: 10		Depth (m):	Coordinates: 5°59.10' N, 124°36.71'E		
Date (month/day/year): 3/20/99		Time:	Left observer: Ben Banquil		Right observer: Andre Uychiaoco
Habitat notes:			Horizontal visibility: (m): 3.5	Angle of slope: 15-20°	Transect orientation (NEWS): East
Family	Species	Record number of fishes per size class			
		1-10 cm	11-20 cm	21-30 cm	Specify sizes for >30 cm
<EPI NEPHELI NAE> groupers; <i>lapu-lapu</i>		2			
Barramundi cod; <i>senorita</i>					
<LUTJANI DAE> snappers; <i>maya-maya</i>		12			
<HAEMULI DAE> sweetlips; grunts; <i>lipti</i>					
<LETHRI NI DAE> emperors; <i>katambak</i>		1			
CARANGI DAE jacks; trevallies; <i>talakitok</i>					
CAESI ONI DAE fusiliers; <i>dalagang bukid; solid</i>					
NEMI PTERI DAE coral breems; <i>silay</i>		4			
MULLI DAE goatfishes; <i>timbangon</i>		7	2		
BALI STI DAE triggerfishes; <i>pakol</i>		11			
CHAETODONTI DAE butterflyfishes; <i>alibangbang</i>		24			
POMACANTHI DAE angelfishes; <i>adlo</i>					
LABRI DAE wrasses; <i>labayan</i>		26			
Humphead wrasse; <i>mameng</i>					
[SCARI DAE] parrotfishes; <i>molmol</i>		4			
Bumphead parrotfish; <i>taungan</i>					
[ACANTHURI DAE] surgeonfish; <i>indangan</i>		33			
[SIGANI DAE] rabbitfishes; <i>kitong; danggit</i>			1		
[KYPHOSI DAE]* rudderfishes; <i>ilak</i>			1		
POMACENTRI DAE damsel fish; <i>palata</i>		670			
ANTHII NAE fairy basslets; <i>bilang-bilong</i>		12			
<i>Zanclus cornutus</i>					
Moorish idol; <i>sanggowanding</i>					
sharks					
rays					
sea turtles					
others	cardinalfish	6			
	filefish	3			
	soldierfish	3			
	flutemouth		1		

Legend: <fishes> = major reef carnivores; [fishes] = major reef herbivores, fishes = fishes which are indicators of hard corals

Source: Uychiaoco et al. 2001.

DATA SUMMARY FORM

Site name: Tuka Reef (Barangay Poblacion)		Municipality and province: Kiamba, Sarangani																
Zone/sector:	Outside								Inside									
Month and year:	March 1999								March 1999									
Transect no.:	1	2	3	9	10				4	5	6	7	8					
Types/groups	Subtotal							Total	Ave.	Subtotal							Total	Ave.
Groupers	5	0	2	3	2		12	2.4	5	2	3	2	6		18	3.6		
Snappers	5	0	1	2	13		22	4.4	3	7	4	1	1		16	3.2		
Sweetlips	1	0	0	1	0		2	0.4	0	0	0	0	0		0	0		
Emperors	0	0	2	0	1		3	0.6	16	0	5	1	1		23	4.6		
Jacks	0	0	1	2	0		3	0.6	0	0	1	10	1		12	2.4		
Fusiliers	13	0	0	35	0		48	9.6	0	0	1	0	0		1	0.2		
Spinecheeks	1	0	2	14	4		21	4.2	12	0	14	3	2		31	6.2		
Goatfishes	22	18	21	36	9		106	21.2	7	23	16	5	0		51	10.2		
Triggerfishes	33	20	41	36	11		141	28.2	9	15	21	34	27		106	21.2		
Butterflyfishes	82	43	54	49	24		252	50.4	21	55	50	24	58		208	41.6		
Angelfishes	26	16	21	15	0		78	15.6	9	45	20	12	4		90	18		
Wrasses	69	65	83	272	26		515	103	30	619	239	64	128		1080	216		
Parrotfishes	11	8	0	2	4		25	5	2	12	13	2	51		80	16		
Surgeonfishes	122	74	44	118	43		401	80.2	61	215	227	33	264		800	160		
Rabbitfishes	5	0	1	0	0		6	1.2	1	10	9	2	2		24	4.8		
Damselfishes	1032	1157	1420	617	670		4896	979.2	868	972	686	662	439		3627	725.4		
Fairy basslets	13	18	3	45	12		91	18.2	4	1	12	9	1		27	5.4		
Moorish idol	3	2	2	6	0		13	2.6	1	12	11	0	3		27	5.4		
Cardinalfishes	76	0	0	0	6		82	16.4	3	0	2	2	1		8	1.6		
Filefishes	3	0	7	0	3		13	2.6	0	0	0	7	2		9	1.8		
Soldierfishes	38	1	9	0	3		51	10.2	9	0	10	0	10		29	5.8		
Hawkfishes	3	2	0	0	1		6	1.2	0	0	5	0	0		5	1		

Source: Uychiaoco *et al.* 2001.

FISH ABUNDANCE GRAPH

Fish type Visayan English	October 1998		March 1999		November 1999		March 2000		March 2001		
	Inside sanctuary	Outside sanctuary	Inside sanctuary	Outside sanctuary	Inside sanctuary	Outside sanctuary	Inside sanctuary	Outside sanctuary	Inside sanctuary	Outside sanctuary	
Lapu-lapu Grouper											
Labayan Wrasse											
Lipi Sweetlip											
Kalambak Emperor											
Solid Fusilier											
Timbungon Goatfish											
Silay Bream											
Alibangbang Butterflyfish											
Indangan Surgeonfish											
Kilong Rabbitfish											
Bawbaw Needlefish											
Malmol Parrotfish											
Samok Mojarras											

Legend (fish observed per 500 m² survey area):

	1 - 5 fish		126 - 625 fish
	6 - 25 fish		More than 626 fish
	26 - 125 fish		

Sources: Coastal Resource Management Project (CRMP) / University of the Philippines - Marine Science Institute (UP-MSI), Community-based monitoring team includes representatives of the Municipality of Cordova, Barangay Gilutongan, DENR Region VII, BFAR Region VII, the University of San Carlos - Marine Biology Section (USC-MBS), and International MarineLife Alliance - Philippines.



Lecture/discussion #11:

Writing up the coastal environment profile for coastal resource management planning

Objectives:

- to familiarize participants with the steps in producing a coastal environment profile;
- to facilitate participants' appreciation of stakeholder involvement in all the stages of coastal environment profile preparation; and
- to orient participants with the generic outline of the coastal environment profile.

Materials:

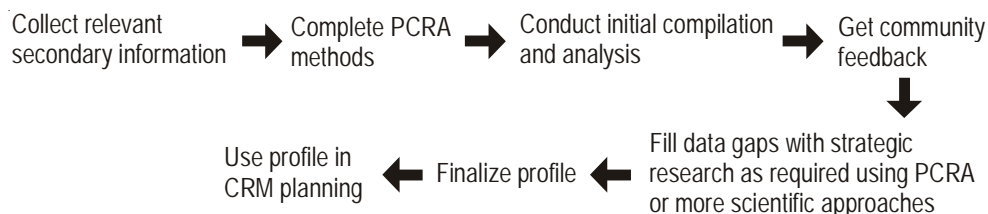
Overhead/Powerpoint presentation

Reference:

Participatory coastal resource assessment: A handbook for community workers and coastal resource managers

Data gathered from PCRA serve various purposes. First, these are the primary bases for the development of the coastal environment profile which are essential for CRM planning. They are also used to measure performance indicators for project monitoring and evaluation. Other important functions also include: consciousness-raising tool for the community, and point of entry for organizing the community for CRM.

The coastal environment profile is a document which presents the results of PCRA field methods in ways that will assist CRM planning decisions of PCRA. Admittedly, this process may need higher level of understanding about the current condition of the coastal area as well as a more polished writing skill, hence, not all PCRA participants may be actively involved in the actual writing of the profile. To ensure involvement of the PCRA participants in the writing, a Technical Working Group (TWG) from among the participants may be organized to do the actual write up of the profile. It is very important, however, that the profile be produced using a process that facilitates and encourages feedback from the community. The process in producing it involves the following steps:



The written coastal environment profile will then initiate the process of CRM planning. The level of planning will vary according to the need and scope of the area considered for management.

An outline for the comprehensive coastal environment profile is as follows:

- 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** (*include data by municipality, use maps or tables or any visuals where appropriate*)
 - A. land area
 - B. topography
 - C. hydrology
 - D. soil
 - E. land uses
 - F. climate
- III. Natural Resources** (*should have visuals; include species, area, 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** (*includes 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 appropriated*) — use maps, tables, charts, figures
 - A. fisheries
 - 1. capture fisheries
 - 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 and composition*)
 - 2. aquaculture
 - a. cadastral maps to depict fishpond areas by municipality/barangay
 - b. areas legible 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
 - D. others (*e.g., agriculture, forestry*)
similar parameters 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 government organizations*)
 - 1. types, structures
 - 2. development plans/activities or projects
 - 3. budget allocated for ICM
 - D. nongovernment 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

A stylized, hand-drawn graphic of a book cover. The cover is black with the word "REFERENCES" written in white, uppercase, sans-serif letters. The edges of the book are irregular and jagged, suggesting a rough or torn paper texture. The book is set against a light gray shadow.

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Appendices

- A. Proposed Agenda of the Four-day Participatory Coastal Resource Assessment Training Workshop
- B. Participatory Coastal Resource Assessment Socio-Demographic Profile Interview Guide
- C. Calendar Diagram Template
- D. Trend Diagram Template
- E. Transect Walk Matrix
- F. Coral Reef Habitat Assessment
 - Transect Data Form
 - Manta Tow Data Form
 - Point Intercept Method Data Form
- G. Seagrass Habitat Assessment Transect Data Form
- H. Mangrove Habitat Assessment Data Sheet
Mangrove Habitat Regeneration Data Sheet
- I. Fish Abundance Data Form
- J. Proposed Coding Guide for Community Mapping

appendix A

Proposed Agenda of a Four-day Participatory Coastal Resource Assessment Training Workshop



Note to Trainers:

The following proposed agenda is meant to provide a cohesive flow to the conduct of the PCRA training. However, the schedule may be subject to changes or adjustments, particularly as these relate to the fieldwork activities. Such factors as tide levels, weather conditions and participants' preferences may warrant the incorporation of changes/adjustments in the workshop flow.

Such flexibility may also be necessary in actual PCRA work. While PCRA training can be quite intensive to allow for as much subject coverage as possible, actual conduct of PCRA may necessitate adjusting the conduct of activities to suit the pace and temperament of community members. Remember to provide for rest periods in between field activities, and be conscious of the absorptive capacity of participants not only for classroom lectures/discussions but also for actual implementation in the field.

Day 1: Introduction to the Coastal Environment, CRM and PCRA

- 8:00 AM Registration/introductions/warm-up activities
- 9:00 Participatory activity #1: Status of coastal resources in your locality
- 9:30 Lecture/discussion # 1: The coastal ecosystems: An overview
- 10:30 Break
- 10:45 Participatory activity #2: Short quiz: How well do you know your coastal habitats?
- 11:30 Lecture/discussion #2: The Philippine coastal zone: An endangered environment, issues, problems
- 12:15 PM Lunch
- 1:15 Participatory activity #3: Workshop group discussions on human impacts/problems in the coastal zone
- 2:00 Participatory activity #4: Fishing game/open access
- 2:30 Lecture/discussion #3: Introduction to CRM and the CRM planning process
- 3:00 Break
- 3:15 Lecture/discussion #4: Introduction to PCRA: Use of secondary information, interviews, calendar and diagramming
- 4:15 Participatory activity #5: Practice sessions in conducting interviews
Participatory activity #6: Facilitating calendar and trend diagrams
- 5:00 Synthesis/Adjournment
Instructions for next day's activities

Day 2: Introduction to PCRA Field Methods: Practice Sessions and Actual Fieldwork

- 8:00 AM Warm-ups/recap of previous day's activities
- 8:30 Participatory activity #7: Practice session on facilitating a community mapping activity
- 9:30 Lecture/discussion #8: Transect walks
- 10:00 Break

- 10:15 Lecture/discussion #9: Conducting habitat assessments: Use of transect lines and quadrats; PCRA assessment methods
- 11:15 Practice sessions in the use of transect lines and quadrats
- 12:00 NN Lunch
- 1:00 PM Actual fieldwork: Participants break into the following groups:
 - Interview and community mapping group
 - Transect walk group
 - Coral reef assessment group
 - Seagrass assessment group
 - Mangrove assessment group
 - Fish visual census group
- 3:30 Break
- 3:45 Group meetings after first round of field practice to assess progress
- 4:30 Instructions for next day's activities
- 5:00 Adjournment

Day 3: Actual Fieldwork (continuation) and Introduction to Organizing Field Data

- 8:00 AM Assembly/reflection/discussions on yesterday's activities
- 9:00 Participants break into the following groups for continuation of field work:
 - Interview and community mapping group
 - Transect walk group
 - Coral reef assessment group
 - Seagrass assessment group
 - Mangrove assessment group
 - Fish visual census group
- 11:30 Group meetings to assess progress
- 12:00 NN Lunch
- 1:00 PM Warm-ups
- 1:15 Participatory activity #8: Data processing game
- 2:00 Lecture/discussion #10: Analyzing and organizing PCRA data
- 2:30 Participants break into groups to do analysis of fieldwork data:
 - Interview and community mapping group
 - Transect walk group
 - Coral reef assessment group
 - Seagrass assessment group
 - Mangrove assessment group
 - Fish visual census group
- 4:00 Group meetings to assess progress
- 4:30 Synthesis/adjournment

Day 4: Presentation of Results of Fieldwork: Writing up the Coastal Environment Profile for CRM Planning

- 8:00 AM Assembly/reflections/discussions on yesterday's activities
- 9:00 Presentation of PCRA fieldwork results:
 - Interview and community mapping group
 - Transect walk group
 - Coral reef assessment group
 - Seagrass assessment group
 - Mangrove assessment group
 - Fish visual census group
- 11:00 Lecture/discussion #11: Writing up the coastal environment profile for CRM planning
- 11:30 Synthesis/next steps
- 12:00 NN Closing program
- 12:30 PM Lunch/adjournment

appendix B

Participatory Coastal Resource Assessment Socio-demographic Profile Interview Guide (Suggested Guide for Group Interview or Focus Group Discussions, Key Informant Interview for Trend and Calendar Diagrams, and Community Mapping)

1. Name of the barangay: _____
2. Name of the municipality: _____
3. Land area in has (specify whether barangay or municipality) _____
4. Length of coastline in kms (specify whether barangay or municipality) _____
5. Name of respondents/participants:

Name	Position, organization/ sector	Name	Position organization/sector
1.		16.	
2.		17.	
3.		18.	
4.		19.	
5.		20.	
6.		21.	
7.		22.	
8.		23.	
9.		24.	
10.		25.	
11.		26.	
12.		27.	
13.		28.	
14.		29.	
15.		30.	

6. Household data
 - Number of households in the barangay: _____
 - Average number of children in the family: _____
 - Average family size (include all those who are living in the house): _____
 - Educational attainment of family members (average/typical):
 - ◆ Fathers: _____
 - ◆ Mothers: _____
 - ◆ Children: _____
 - How many families have toilets: _____
 - How many families do not have toilets: _____
 - How many families are engaged in fishing: _____

7. Population and reproductive health

- What is the total population of the barangay? _____
- Percentage of community age:
 - Children: _____
 - Youth: _____
 - Adults: _____
 - Elderly: _____
- What percentage of the population practice family planning method? _____
- What are the most common family planning method being adopted by couples in the barangay? _____

8. Type of housing materials:

Percent of houses that have:

- Type of roof: _____ tile _____ GI sheets _____ nipa/cogon grass
- Type of walls: _____ tiled _____ cement _____ nipa/coconut fronds/bamboo
 _____ wood/plywood
- Window: _____ glass _____ wood _____ bamboo/ nipa/coconut fronds
- Floor: _____ wood _____ cement _____ tile _____ dirt
 _____ vinyl _____ bamboo

9. Source of water

- _____ river/spring _____ dug well _____ jetmatic pump/artesian well
- _____ communal faucet _____ piped water

10. Migration pattern (As perceived by respondents)

- Was there an increase or decrease of population living in the area for the past year? _____
- If there was an increase, from where? If a decrease, where have people migrated? _____

11. Occupational structure

Major occupations in the community	Estimated percentage of the population in this occupation	Estimated monthly income from such occupations	Who usually does this (male, female, children or combination)
1.			
2.			
3.			
4.			
5.			

12. Religion/faith:

- What percentage of the community are:
 - ◆ Catholics: _____
 - ◆ Protestants: _____
 - ◆ Muslims: _____
 - ◆ Seventh-day Adventists: _____
 - ◆ Iglesia ni Cristo: _____
 - ◆ Jehovah's Witnesses: _____
 - ◆ Baptists: _____
 - ◆ Others: _____

13. Community infrastructures (please list)

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

14. Environment-friendly enterprises or livelihood projects

- List coastal environment-friendly enterprises/livelihood projects existing in your area

Name of project	Beneficiaries/participants	Assisting organizations
_____	_____	_____
_____	_____	_____
_____	_____	_____

15. People's organizations (POs) or management organizations (e.g., FARMCs, etc.) existing in the community

People's Organizations (POs)	When established	Formal or informal	Main functions/area of concern

16. Influential stakeholders

Coastal activity	Influential stakeholder group	Comments/remarks
Fishing		
Gleaning		
Tourism		
Marine transportation		
Residential development		
Organizing fishing community		
Mangrove management		
Mariculture/aquaculture		

17. Perceptions of resource conditions

	Percent (%) of participants that describe current resource conditions as:				
	Very good (1)	Good (2)	Neither good nor bad (3)	Bad (4)	Very bad (5)
Mangroves					
Coral reefs					
Seagrass beds					
Beaches					
Freshwater					
Upland forest					
Fishery					

18. Coastal activities

- List coastal zone uses/activities taking place in the community. Indicate whether done by the community residents or outsiders.

_____	_____
_____	_____
_____	_____
_____	_____

19. List all major aquaculture and mariculture activities undertaken in your barangay/municipality

Types of mariculture/ aquaculture project/activities	No. of owners/operators and from where

20. Coastal law enforcement

- 20a. What are the existing law enforcement groups/agencies in your community (Bantay-Dagat, fish warden, police, Coast Guard, etc.)

20b. Perceived level of enforcement

- Ask participants to rate level of enforcement of CRM-related rules, laws in the community.
_____ (1 = No enforcement, 5 = Very strong enforcement)

20c. Compliance

- Ask participants to rate level of compliance to existing CRM-related rules, laws.
_____ (1 = No compliance, 5 = Full compliance)

21. Existing activities in the area which are destructive or causing damage to your coastal area

_____	_____
_____	_____
_____	_____

Which of these are illegal?

Perceived threats

_____	_____
_____	_____
_____	_____

22. Awareness on CRM

- Are there existing programs/activities in your barangay about CRM?
- If yes, what are these?
- In your assessment, what percentage of the barangay has learned/knew of existing programs/activities?
- What is the level of community participation with regard to activities and programs on CRM?
_____ (1 = No participation, 5 = Full participation)

23. What are your suggested coastal management solutions to these problems?

24. Fishery Resources Conditions, Management, and Potential

(Note: Key informant respondents maybe taken from the interview group. It is important that the KIs here are actual fishers preferably those who have been using different types of gears. As much as possible, the KIs should be those fishers who have been fishing in the area for a longer period of time)

24a. Top ten fishes, crustaceans, mollusks

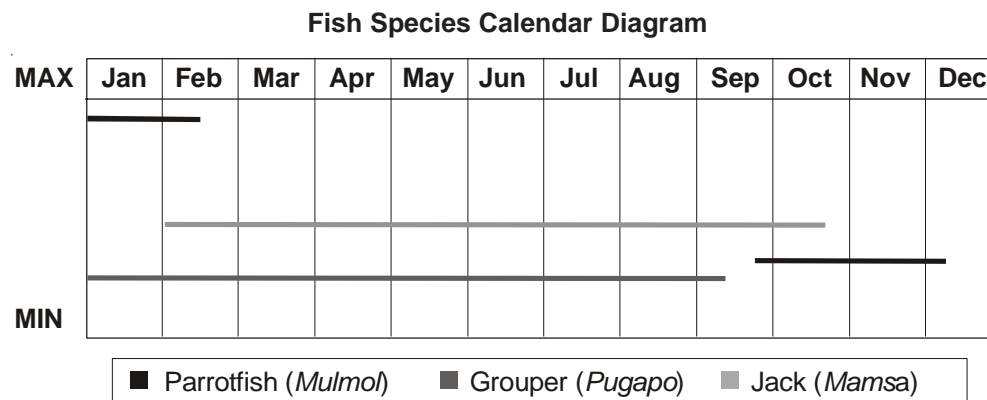
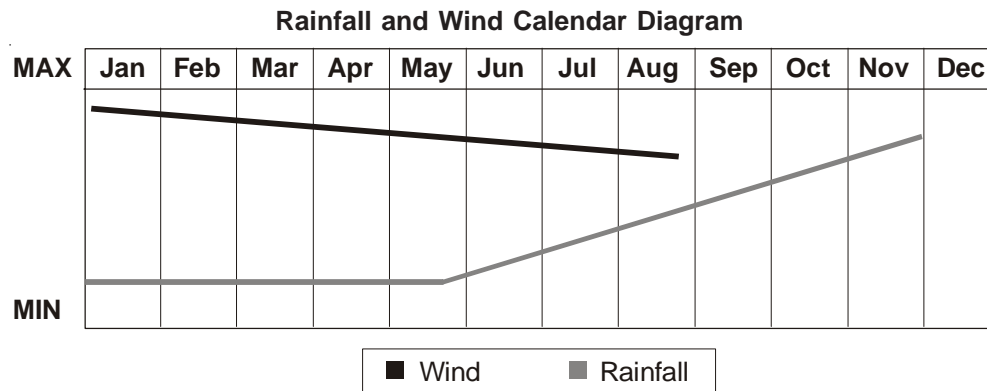
PRESENT		PAST	
List top 10 fishes, crustaceans, mollusks	Approximate number of pcs in 1 kilo?	List top 10 fishes, crustaceans, mollusks	Approximate number of pcs in 1 kilo?
Other marine organisms (algae, agar, etc.)			

24b. List the fishery resources or marine organisms that used to be present before but are currently no longer found or just rarely caught

Fishery resources/marine organism	When were these present?

27. Calendar diagram. Using the calendar diagram template, ask the participants to illustrate in the diagram situation of fishing activity, fishery activity, fishery and other socioeconomic conditions. The types of information that could be included in the calendar diagram are wind pattern, seasonality, type of fishes caught during certain seasons or months, type of gear used during a certain season/month, issues/problems occurring in specific time of the year, etc.

Examples:



Note: Calendar diagram of fishing gears and seaweed production should also be gathered.

28. Use patterns, resources, problems, and issues (community mapping activity)
(Note: Maybe done by key informants within the interview group)

Using community mapping activity, use base map to indicate (with the use of the PCRA codes for resource use) location of use pattern, e.g., fishing, water sports, tourism development, residential, commercial, aquaculture, navigational lanes, conservation areas, marine protected areas, etc.

Sample of data that could be mapped are the following:

- a. Coastal Habitats (coral reefs, mangrove areas, seagrass beds, estuaries, etc.)
- b. Resources, e.g., coastal birds, marine mammals (e.g., dugong, dolphins, etc.), reptiles, types of fish, shells, invertebrates (sea urchins, starfish, sea cucumber, etc.), algae, etc.
- c. Coastal uses (see above instruction)
- d. Problems and issues concerning the use and management of the coastal area
 - ♦ It is suggested that items **a to d** be listed and ranked and put top at most top 10 items on the map to avoid crowding.

appendix C

Calendar Diagram Template

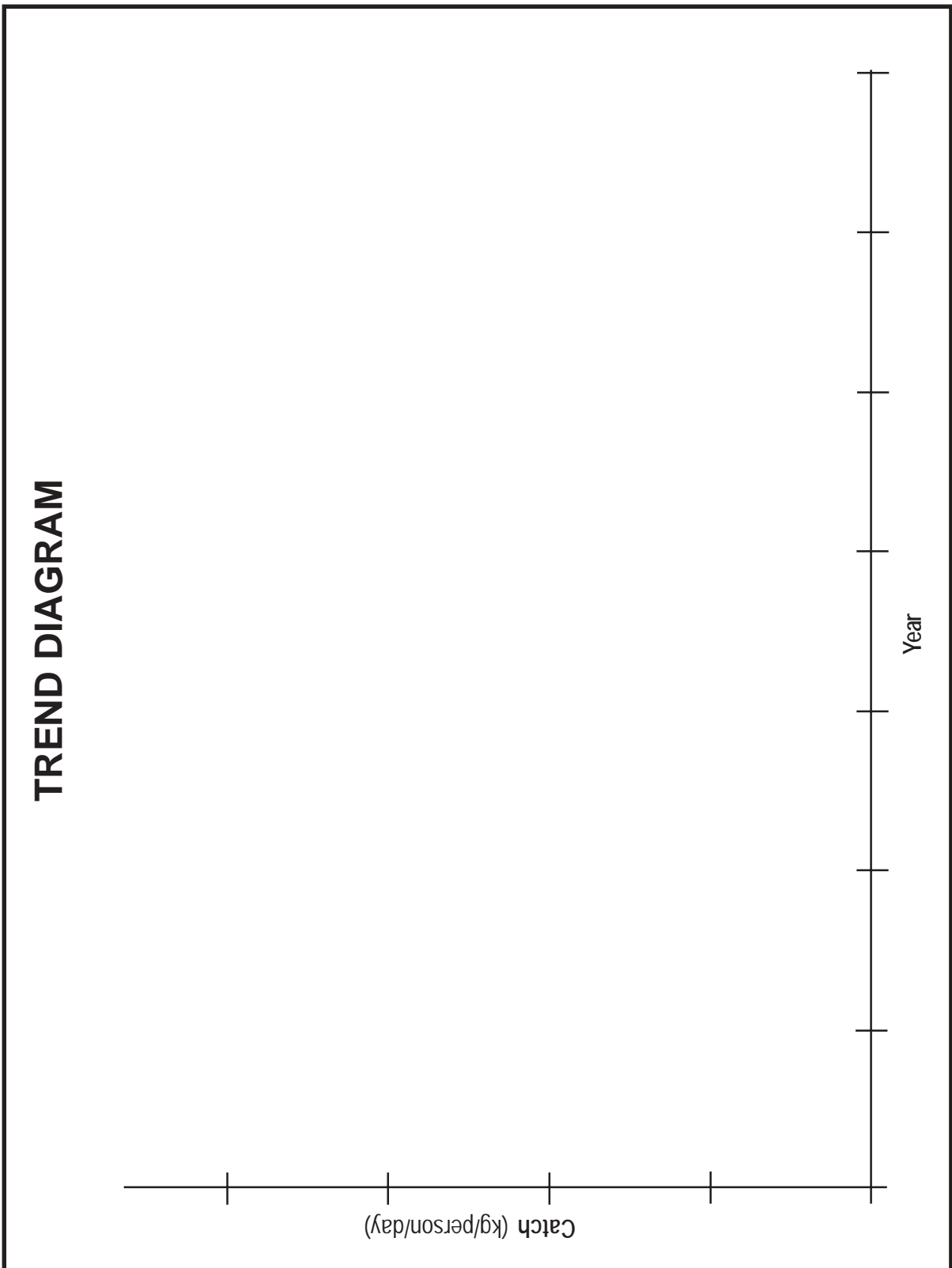
CALENDAR DIAGRAM	JAN	
	FEB	
	MAR	
	APR	
	MAY	
	JUN	
	JUL	
	AUG	
	SEP	
	OCT	
	NOV	
	DEC	

MAX

MIN

appendix D

Trend Diagram Template



appendix E

Transect Walk Matrix

TRANSECT WALK DIAGRAM		Ilalim (deep water)	Bahura (reef/shoal)	Damuhan (seagrass bed)	Hunasan (tidal flat)	Aplaya (beach)	Bakawan (mangrove)	Lowland/ settlement area	Habitat management parameter
									<i>Mga likas na kayamanan</i> (natural resources)
									<i>Mga uri ng hanapbuhay, mga pagkakataon</i> (types of livelihood, opportunities)
									<i>Mga suliranin</i> (problems/issues)

appendix J

Proposed Coding Guide for Community Mapping*



Note to Trainers:

- This coding guide has already been field-tested and adopted by many municipalities especially within CRMP's learning areas. Trainers and CRM practitioners, however, are free to modify, enhance or improve it to fit local situations and the specific purpose for which the mapping activity is being undertaken.
- To avoid overcrowding of data on the map, it is suggested that data for each mapping aspect be limited to the top 20 in the list. For example, for resources, while diversity of species may still characterize coastal resources in some areas, limiting the list to the first 20 most economically and ecologically important species may still prove to be practical for future planning purposes.
- At the end of the mapping activity, it is still important to include a legend of the codes used on the map. This should be reflected at the bottom section of the map.

Proposed coding guide for habitats, resources, uses and problems/issues

I. Color code for habitats

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

*Adapted from Walters *et al.* 1998

II. Resources

Use number codes starting with 1 until all the major economically and ecologically important resources in the area are included in the map.

English name	Local name	Family name
Birds, Mammals and Reptiles		
Crocodiles	<i>buaya</i>	Crocodylidae
Dolphins	<i>lumod, balakiki, lumba-lumba, mayahon, kabang</i>	Delphinidae
Dugong	<i>dugong</i>	Dugongidae
Seabirds	<i>kanaway, tirik, tabon, yuho, talingting, manaol, lapay, ok-ok, du-ong</i>	
Sea snakes	<i>tangkig</i>	Hydrophidae
Sea turtles	<i>pawikan</i>	Cheloniidae
Whales	<i>balyena, bongkaras</i>	Balaenopteridae
Fish		
Anchovy	<i>bolinao, boris, dilis, libud, tuakang</i>	Engraulidae
Angelfish	<i>alibangbang, baro-baro, boray-boray, paruparo</i>	Pomacanthidae
Anglerfish and frogfish	<i>noog-noog</i>	Antennariidae
Anthias, basslet	<i>minyat-minyat</i>	Serranidae
Archerfish	<i>ananabing, anunuput, ataba, bang-ga, kataba</i>	Toxotidae
Bandfish	<i>upos-upos</i>	Cepolidae
Barracuda, seapike	<i>lusod, rompe kandado (large-sized), tursilyo</i>	Sphyraenidae
Batfish, leaffish	<i>bayang, dahong-gabi, dalipugan, muray-muray</i>	Ephippidae
Bigeye, bullseye	<i>baga-baga, bocao, buan-buan, matahari</i>	Priacanthidae
Billfish (swordfish, spearfish, marlin, sailfish)	<i>malasugi, dogso, lipipan, lumod, mayaspas, pahabela</i>	Xiphiidae, Istiophoridae
Blenny	<i>pawog, tiki-tiki, tanghaw, tingo-tingo</i>	Blenniidae
Bonefish	<i>bidbid, tigi</i>	Albulidae
Butterflyfish	<i>paruparo, alibangbang, saguranding</i>	Chaetodontidae
Cardinalfish	<i>bungka, dangat, mo-ong, parangan, suga</i>	Apogonidae
Clownfish, anemone fish	<i>bantay-butbut, mangkot, palata</i>	Pomacentridae
Conger eel	<i>banusak, obod, ogdok, palos, pindanga</i>	Congridae
Cornetfish	<i>dahog-tubo, droal, sunugan, tihul-tihul, tubo-tubo</i>	Fistulariidae
Croaker	<i>abo, alakaak, dulama, ibot, kabang, lagis, silay</i>	Sciaenidae
Damsel fish	<i>baro-baro, ulan-ulan, puyong dagat, pata, bika-bika</i>	Pomacentridae
Dolphinfish	<i>dorado, lumbag, marang, pandawan</i>	Coryphaenidae
Dottyback	<i>hingasan, tingasan</i>	Pseudochromidae
Dragonet	<i>bugo, banto, noog-noog, talimusak</i>	Callionymidae
Eagle ray and cow-nosed ray	<i>pagi-manok, palimanok, paol, bulik, banugan</i>	Myliobatidae, Rhinopteridae
Eel blenny	<i>batad, tamayo</i>	Congrogadidae
Eel-tailed catfish	<i>alimusang, balibot, hito, patuna, sumbilang</i>	Plotosidae
Emperor bream	<i>bagangan (young), bitilya, katambak, kirawan, madas, dugso, bakuktut, sapingan</i>	Lethrinidae
False trevally	<i>algodon, pagapa, papaga, pelyan, rigudon</i>	Lactariidae
False whiting, blanquillo	<i>banghutin, matang dagat</i>	Malacanthidae
Flagtail	<i>aligaman, buan-buan, bulan-bulan, ramagan</i>	Kuhliidae
Flatfish (sole, halibut, flounder)	<i>tambiki, palad, dalidali, tampal, dapa, kalangkao, malapalad, papang sinilas, hagudila, dapang bilog, dapang kawayan, tatampal</i>	Soleidae, Bothidae, Psettodidae, Cynoglossidae, Paralichthyidae

English name	Local name	Family name
Flathead Flying fish	<i>isdang buwaya, sunog, sunogan, lubalab aliponghok</i> (fingerling), <i>antulihaw, bangsi, barongoy, bolador, eliu, laniu</i>	Platycephalidae Exocoetidae
Fork-tailed catfish Fusilier, bananafish Garfish, needlefish Goatfish Goby, sleeper	<i>bongoan, kanduli, tabangongo, tabanko bilason, butlogan, dalagang bukid, sinao-an, sulid balo, dugso, doal, mangansing, batalay, sinao-an saramulyete, senok</i> (young), <i>tiao, timbungan biya, tambo-tambo, tiao, senok</i> (young)	Ariidae Caesionidae Belonidae Mullidae Gobiidae, Eleotrididae
Grouper, seabass, perchlet	<i>lapulapu, kugtong</i> (large-sized), <i>suno, señorita, tingag, tirang, dolit, lilig, taleti-on, kobe, turnutulin, garopa</i>	Serranidae
Guitarfish, shovelnose ray	<i>bariwan, pating-sudsud</i>	Rhinobatidae
Hairtail, cutlass fish Halfbeak Hammerhead shark Hardtail Hawkfish Jack, cavalla, crevalle, trevally, dart	<i>balila, liwit, lahing, espada, langkoy bamban, buging, kasusuwit, sasa, sausid bingkungan, kodosan, kurosan atulay, adlo, kalapeon, pakan, oriles katambak-buak, ngisi-ngisi, ungo-ungo damis, tawa-ay, baho-olo, salay-salay, barilason, pampano, talakitok, lagidlid</i> (young), <i>pagapa, makaagum, trakito, bitilya, badlon, mamsa tabangka</i>	Trichiuridae Hemiramphidae Sphyrnidae Carangidae Cirrhitidae Carangidae
Jawfish Leatherjacket Lizardfish Manta ray, devil ray Milkfish Mojarras, silver biddy Monos, silver batfish Moonfish Moorish idol Moray eel Mudskipper	<i>salindato, yapis, lari kalaso, salantiki, talho, tiki-tiki, bubule sanga, mantihan, piantaihan, salanga banglis, banglus, bangus, awa, sabalo batuhan, batuhanan, batuhanon, malakapas muray-buray, duhay, kambing-kambing bilong-bilong, chabita, habas, sapatero, tabas alibangbang, sagurading, kalmin-kalmin hagmag, hangit, hawig, ogdok, pananglitan talimusak, tamasak, tambasakan</i>	Opistognathidae Carangidae Synodontidae Moblidae Chanidae Gerreidae Monodactylidae Menidae Zanclidae Muraenidae <i>Periophthalmus, Boleophthalmus</i>
Mullet Parrotfish Pomfret, butterfly	<i>balanak, banak, gagapan, gapang, pili, gisao aliyakyak, bon-ak, bungalog, loro, mulmul pampano, kambing-kambing, sandatan</i>	Mugilidae Scaridae Formionidae, Stromateidae/ Carangidae
Porcupine fish Pufferfish	<i>butete, duto, karatungan, tagutuman, utik boriring, butete, langigidon, tikong, tinga-tinga</i>	Diodontidae Tetraodontidae
Rabbitfish, spinefeet Remoras	<i>danggit, kitung, layap, samaral, tagbago parikitugit, parakitugit, parakit, banka, kini</i>	Siganidae Echeneididae
Rudderfish, drummer Runner Sardine, herring, sprat, gizzard shad Sawfish	<i>hak, lupak, ilak salmon, lapi, bansikol, solinaw tamban, tunsoy, toy, haol-haol, helos, kabasi mararapad, lupoy</i> (fry), <i>siliniasi</i> (fry) <i>taghan, tagan, gabsan, ihong gabsan</i>	Kyphosidae Carangidae Clupeidae Pristidae

English name	Local name	Family name
Scad	<i>galunggong, borot, matangbaka, hagumaa, gutlob</i>	Carangidae
Scorpionfish, lionfish, turkeyfish, stonefish	<i>bantol, gatasan, lalong, lawag, lawong, lolong, ngisi-ngisi, noog-noog, tunok</i>	Scorpaenidae
Seabass, sandbass sea perch, barramundi	<i>bulgan, katuyot, matang pusa, apahap</i>	Centropomidae
Sea bream, porgy	<i>bisong tabo, gapas-gapas, mahuwana, kuwa</i>	Sparidae
Seahorse, pipefish	<i>kabayo-kabayo, hingiki sa buaya, hingiki, dagum-dagum, kulbog</i>	Syngnathidae
Sea-haarder, bonnetmouth	<i>inlis, lubintador, uan-uan</i>	Emmelichthyidae
Sergeant major	<i>kapal, puong dagat, preso-presos</i>	Pomacentridae
Sergeantfish, cobias	<i>dalag dagat, kume, pandawan, tase, gile</i>	
Shark	<i>bagis, iho, lahos, lahoy, pating, tanguiguihon</i>	Lamnidae
Shrimpfish, razorfish	<i>isdang laring-laring, sipul-sipul</i>	Centriscidae
Sicklefish	<i>bayang, kalmin-kalmin, kilyong, mayang, pasyon</i>	Drepanidae
Silverside	<i>langaray pako, guno</i>	Atherinidae
Slipmouth, ponyfish	<i>laway-laway, lumu-an (large-sized), palangan (large-sized), parutpot</i>	Leiognathidae
Snake eel	<i>igat, ogbok, ukdok</i>	Ophichthyidae
Snake mackerel	<i>aswang, langpoy</i>	Gempylidae
Snapper, sea perch	<i>aha-an, auman, lagan, mangagat, maya-maya</i>	Lutjanidae
Soapfish	<i>lumoan</i>	Grammistidae
Spadefish, scat	<i>kitang, kikiro, langkia, ngisi-ngisi</i>	Scatophagidae
Squirrelfish and soldierfish	<i>sigá, бага-бага, ganting, suga-suga</i>	Holocentridae
Stingray, skate, electric ray	<i>pagi, dahonan, pantikan, kiampao</i>	Dasyatidae, Rajidae, Torpedinidae
Surgeonfish, tang, unicornfish	<i>alibangbang, bagis, bakwak, bongkokan, indangan, kadlitan, kalmin-kalmin, labahita, mungit, pelason, saguranding, songhan, tudlo-an</i>	Acanthuridae
Sweeper	<i>tabas, sundang-sundang</i>	Pempheridae
Sweetlip and grunt	<i>bakoko, kanwo, olay-balay, pasinko, lipte, agoot, alatan</i>	Haemulidae
Tarpon	<i>awa-awa, buan-buan, bulan (small-sized)</i>	Megalopidae
Tenpounder	<i>alho, bidbid, bidbir</i>	Elopidae
Therapon, tigerfish	<i>bugaong, gonggong, langbu, bungao, dukuson</i>	Theraponidae
Threadfin	<i>kumehan, mamale, mamaleng bato, midbid</i>	Polynemidae
Threadfin bream, spinecheek	<i>bisugo, lambado, lagao, sagisi-on, bakay, silay</i>	Nemipteridae
Tilefish	<i>bisugong kabayo, tangaron, matang dagat</i>	Branchiostegidae
Triggerfish and filefish	<i>pakol, pugot, saguk-suk, sulaybagyo, ampapagot</i>	Balistidae, Monacanthidae
Tripletail	<i>kapkap bato, ligad</i>	Lobotidae
Tripodfish	<i>sungay-sungayan, sulay-bagyo, musi</i>	Triacanthidae
Trumpetfish, flutemouth	<i>droal, dahug-tubo, tubo tubo, sunugan, tihul-tihul</i>	Aulostomidae
Trunkfish, boxfish	<i>tabaong, tabayong, obuluk</i>	Ostracionidae
Tuna and mackerel	<i>tulingan, bariles, bankulis, alumaan, tangigue, hasa-hasa, burao, kabalyas, tambakol, pirit, karao</i>	Scombridae
Whale shark	<i>balilan, iho-tiki, tuki-tuki, tawiki</i>	Rhincodontidae
Whiting, sillago	<i>asohos, oso-os</i>	Sillaginidae
Wolf herring	<i>balila, balira, parang-parang</i>	Chirocentridae

English name	Local name	Family name
Wrasse	<i>bagondon, bugok, bungat, ipos-ipos, labayan, lakhoy, lamon-lamon, lupit, maming</i>	Labridae
Shells		
Abalone	<i>kapinan, lapas</i>	Haliotidae
Ark shell	<i>batotoy, suod-suod, tipay</i>	Arcidae
Auger shell	<i>sungkod-sungkod, honsoy-honsoy</i>	Terebridae
Bubble shell	<i>poki, buan-buan, litub, lumo, wasay-wasay</i>	Bullidae
Carditas	<i>tikud-tikud</i>	Carditidae
Cockle	<i>bisong-bisong, bug-atan, imbao, kasing-kasing, litub, pagapan</i>	Cardiidae
Comb oyster, oyster	<i>basa, sali-ot (small), sisi</i>	Ostreidae
Conch	<i>balo-balo, bao-bao (small), sa-ang, habasan</i>	Strombidae
Cone shell	<i>habasan, liswi</i>	Conidae
Coral snail	<i>tanghuwa</i>	Magilidae
Cowry	<i>katipan, lumban, poki, buwao</i>	Cypraeidae
Dolphin shell	<i>taktakon</i>	Angariidae
Egg shell	<i>poki</i>	Ovulidae
Fig shell, pear shell	<i>tanghuwa</i>	Ficidae
Frog shell	<i>guba-guba</i>	Bursidae
Giant clam	<i>basa (small), hagdanan, sali-ot (small), taklobo, tilang</i>	Tridacnidae
Harp shell	<i>sinaw</i>	Harpidae
Helmet shell	<i>budyong</i>	Cassidae
Horn shell	<i>pao-pao</i>	Potamididae
Jewel box	<i>tikud-tikud</i>	Chamidae
Melon shell, volute shell	<i>kibol</i>	Volutidae
Miter shell	<i>amo-amo, anikad, aninikad, guyod, paitan</i>	Mitridae
Moon shell	<i>buan-buan</i>	Naticidae
Mussel	<i>bahong, tahong, tahong-tahong</i>	Mytilidae
Olive shell	<i>dalinasan</i>	Olividae
Pearl oyster, wing oyster	<i>amahong, talaba, tipay</i>	Pterridae
Pen shell	<i>tarab</i>	Pinnidae
Periwinkle	<i>saka-saka, guba-guba, torong-torong</i>	Littorinidae
Rock shell	<i>guba-guba</i>	Thaididae
Scallop	<i>paypay, tipay</i>	Pectinidae
Slit shell, turret shell	<i>sungkod-sungkod</i>	Turridae
Spindle shell	<i>sungkod-sungkod</i>	Fasciariidae
Staircase, sundial	<i>lagang</i>	Architectonidae
Thorny oyster	<i>tikud-tikud</i>	Spondylidae
Top shell	<i>amongpong (small), samong, tandok</i>	Trochidae
Triton	<i>tambuli</i>	Cymatiidae
Tun shell	<i>tanghuwa</i>	Tonnidae
Turban shell	<i>lumban, pidjong-pidjong, piyong-piyong, nasa</i>	Turbinidae
Venus shell	<i>bugatan, halaan, imbao, punaw</i>	Veneridae
Whelk	<i>nasa</i>	Buccinidae
Other invertebrates		
Coconut crab	<i>alikway, tatus</i>	Coenobitoidea
Cuttlefish	<i>baghak, kobotan, kolambutan, tauban</i>	Sepiidae
Large shrimp and prawn	<i>hipong puti, lukon, pasayan, sugpo</i>	Penaeidae

English name	Local name	Family name
Mantis shrimp	<i>kamuntaha</i>	Squillidae
Mud/mangrove crab	<i>alimango</i>	Portunidae
blue crab	<i>alimasag, kasag, lambay, masag</i>	
Nautilus	<i>lagang</i>	Nautilidae
Octopus	<i>kugita, pugita, tabugok</i>	Octopodidae
Sea cucumber	<i>balat, balatan, bat, trepang</i>	Holothuridae
Sea urchin	<i>tuyom</i>	Diadematidae
	<i>suwaki</i>	Toxopneustidae
Shovel-nosed/ slipper lobster	<i>banagan</i>	Theninae
Small shrimp	<i>alamang, balao, hipon</i>	Sergestidae
Spiny rock lobster	<i>banagan</i>	Palinuridae
Squid	<i>nokus, noos, pusit</i>	
giant red squid	<i>alopapa, dalopapa</i>	Loliginidae
Starfish	<i>koros-koros, padpad, dap-ag</i>	Oreasteridae
Plants		
Seagrass	<i>lusay</i>	Potamogetonaceae, Hydrocharitaceae
Green algae	<i>dayong-dayong, payong-payong</i> <i>bitukang-manok, lumot, lablab, habol-habol</i> <i>arurusep, aruting, lato</i> <i>pupuklo, pokpokio, sam-ang</i>	Polyphysaceae Ulvaceae Caulerpaceae Codiceae
Brown algae	<i>tabtaba, balbalolang, lukot-lukot, poko-poko</i> <i>aragan, layog-layog, samo</i>	Scytosiphonaceae Sargassaceae
Red algae	<i>bulaklak-bato</i> <i>kulot, dipdipig, tartaripig, lagot-laki</i> <i>gayong-gayong, gulaman-bato, kulkulbot</i> <i>kulot, sumon-sumon</i> <i>kawkawayan, gulaman, lagot</i> <i>guso, kanot-kanot, ruprupuuk</i>	Bonnemaisoniaceae Rhodomelaceae Gelidiaceae Hypneaceae Gracilariaceae Solieriaceae
Nypa	<i>nipa</i>	Palmae
Mangroves	<i>bungalow, api-api, piapi</i> <i>pedada, pagatpat</i> <i>bakawan-lalake, bakhawan-tigrihon,</i> <i>bakawan-babae, pototan-lalake, busain,</i> <i>langaral, malatangal, tangal, pototan</i> <i>taualis</i> <i>saging-saging, tinduk-tindukan</i> <i>sagasa, kulasi, mayoro, talisay</i> <i>nilad</i> <i>bantigi</i> <i>buta-buta, alipata</i> <i>baraibai</i> <i>malubago</i> <i>bitobitoo, botong</i> <i>dungon, dungon-late</i> <i>tabigi, piagau</i> <i>balok-balok, tui</i> <i>bani, tubli</i>	Avicenniaceae Sonneratiaceae Rhizophoraceae Myrtaceae Myrsinaceae Combretaceae Rubiaceae Lythraceae Euphorbiaceae Apocynaceae Maluaceae Lecythidaceae Sterculiaceae Meliaceae Bignoniaceae Fabaceae

III. Uses

Use letter codes, **A, B, C, ...** until all uses are reflected on the map.

Traditional and Subsistence Fishing Methods

Bag nets	Hoop nets
Barricades	Jiggers
Beach seines	Lever nets
Blanket nets	Lights
Bottom set gill nets	Multiple hook and line
Cast nets	Pole and lines
Cover nets	Pull nets
Cover pots	Purse seines
Crab lift nets	Push nets
Dip nets	Rakes and dredges
Dredge nets	Reef seines
Drift gill nets	Ring nets
Drift longlines	Round haul seines
Drive-in nets	Scoop seines
Encircling gill nets	Scoops
Filter nets	Set longlines
Fish corrals	Skimming nets
Fish pots and crab pots	Snares
Fish shelters	Spears
Hand instruments with curved blades, forks, hooks, etc.	Stop seines
Harpoons	Trammel nets
Hook and lines/handlines/droplines	Trap nets
	Troll lines

Illegal Fishing/Uses

Drive-in net with bamboo/tree trunk scare devices (<i>kayakas</i>)	Harvest of marine turtles and eggs
Drive-in net with weighted scarelines (<i>muro-ami</i>)	Harvest of milkfish (60 cm and over)
Electrofishing	Harvest of triton shells (<i>tambuli</i>)
Explosives	Harvest of whale sharks
Fine-meshed nets (less than 3 cm) for unexempted species	Not honoring closed seasons
Fishing in closed areas (e.g., fish sanctuaries, limitation on baby trawls, etc.)	Other gears (banned by local legislation, like baby trawls, modified Danish seines, beach seines, compressors, etc.)
Fishing without license	Tuck seine (<i>pantukos</i>) with torch and/or flammable substance
Harvest of dolphins	Superlights within municipal waters
Harvest of giant clams (<i>taklobo</i>)	Unauthorized commercial fishing within municipal waters
Harvest of helmet shells (<i>budyong</i>)	
Harvest of <i>kapis</i> (<i>Placuna placenta</i>) <80 mm using mechanical rakes, dredges and motorized boats	
Harvest of manta rays	

Legal but Controversial Fishing Methods (Perceived as Destructive/Depletive)

- Beach seines
- Compressors
- Drive-in nets with various scaring devices
- Modified Danish seines
- Other drag nets
- Trawls

Other Uses and Activities

Airports	Nipa harvesting
Anchorage	Nipa plantations
Banana plantations	Oil refinery/depots
Breakwaters	Orchards
Coconut farms	Port/pier/wharf/marina
Drainage canals	Power stations
Educational reservations	Protected areas (formal and informal)
Fish cages	Public laundry areas
Fish landings	Public parks/plazas
Fish pens	Research stations
Fish ponds/shrimp ponds	Resorts
Historical sites	Rice paddies
Human settlements/built-up areas	Roads, bridges
Industrial estates	Salt beds
Lighthouses/beacons	Sand and gravel extraction
Limestone quarries	Seawalls
Mangrove plantations	Seaweed culture
Mangrove timber cutting	Shellfish culture
Military stations/bases	Waste dumps/outfalls/effluent discharges
Mineral extraction	Watchtowers/observation platforms
Navigation channels	

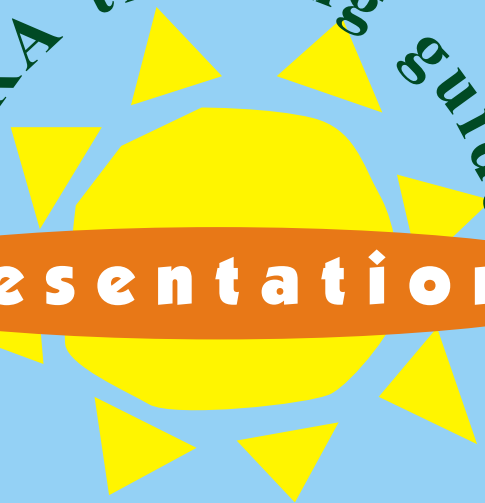
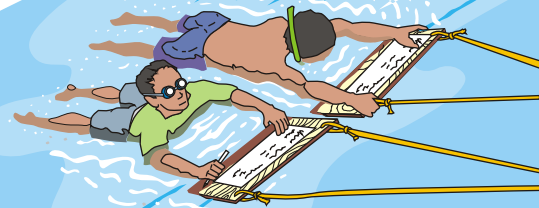
IV. Issues/Problems

Use Roman numeral numbers, I, II, III, ... until all problems/issues are recorded on the map.

Abandoned/unproductive fish ponds	Lack of legislation
Beach/shoreline erosion	Lack of organization
Breakage of corals	Lack of security of tenure of land and/or home lot
Closed access to sea	Lack of social services
Coliform pollution	Landslide
Coral bleaching	Loss of rare/endangered species
Coral extraction	Low awareness
Crown-of-thorns epidemic	Low prices of fishery products
Declining fish catch	Mangrove conversion
Decreased estuary circulation	Mangrove overharvesting
Defoliation/loss of vegetation	Nipa overharvesting
Destructive fishing	Oil spills
Deterioration of aesthetic quality	Overfishing
Diversion of freshwater	Pesticide pollution
Dredging	Piracy
Encroachment on the fishing ground by outsiders	Reclamation
Eutrophication	Red tide
Fish diseases	Saltwater intrusion
Fish kills	Shellfish contamination
Fishing gear conflicts	Siltation
Flooding	Smuggling
Heavy metal pollution	Theft of fishing gears and accessories
High cost of fishing inputs	Upland erosion
Hunting	Use conflicts
Illegal fishing	Use rights conflicts
Illegal fish ponds	Waste dumping
Increased estuary salinity	Water turbidity
Lack of alternative livelihood activities	Weak organization
Lack of law enforcement	Wildlife trade

PCRA training guide

presentations





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The FISHERIES IMPROVED FOR SUSTAINABLE HARVEST Project



CEBU: 5/F CIFIC Towers, J. Luna St. cor. J. L. Briones Avenue, North Reclamation Area, 6000 Cebu City, Philippines **Tel. Nos.:** (032) 232-1821 to 22, 412-0487 to 89 **Fax No.:** (032) 232-1825 **E-mail:** fishproject@oneocean.org **Website:** www.oneocean.org

MANILA: 18/F OMM CITRA Building, San Miguel Avenue, Ortigas Center, Pasig City **Telephone Nos.:** (02) 636-0052 to 53 **Fax No.:** (02) 634-0327 **E-mail:** FISH@temi.com.ph

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