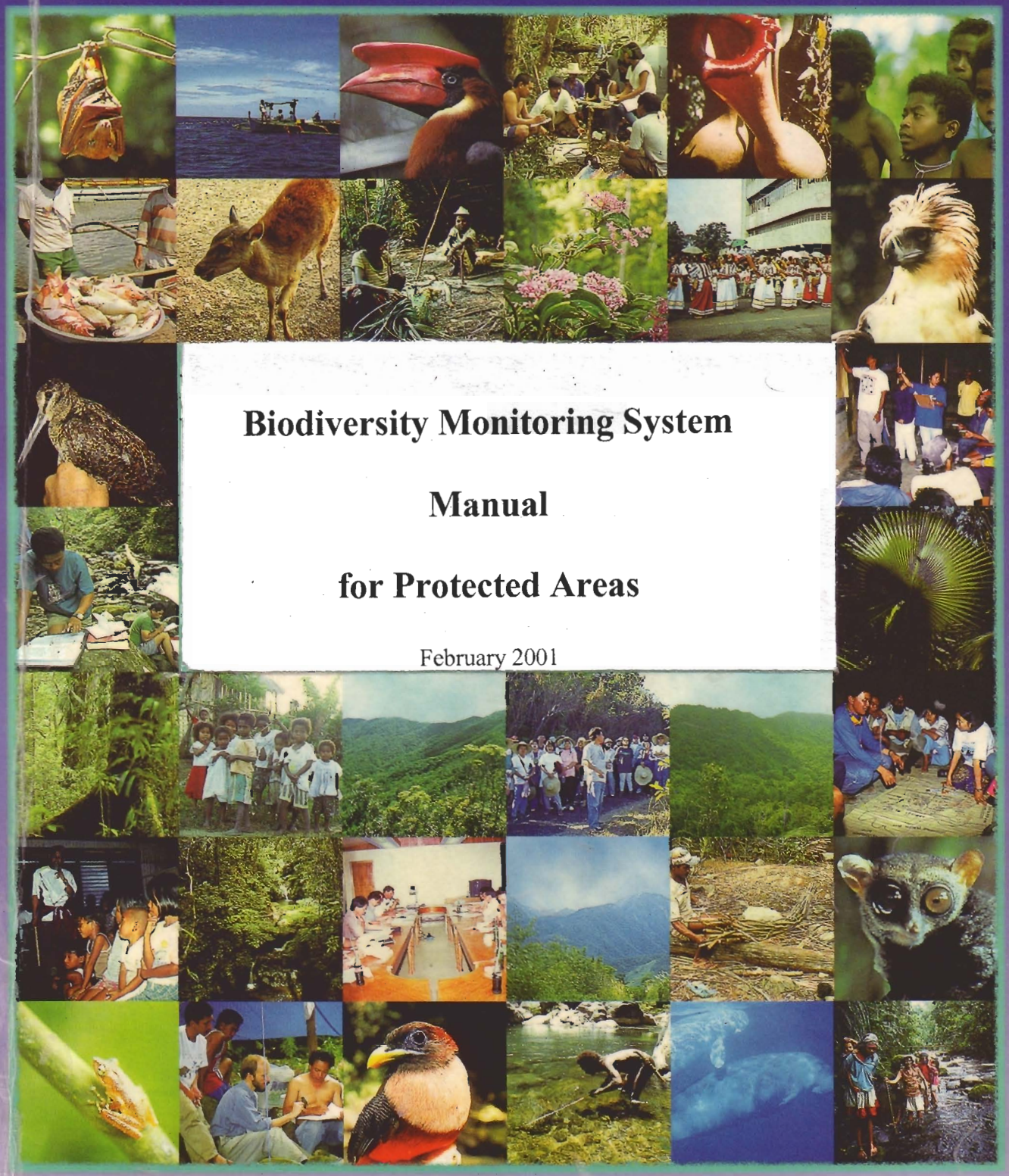


Biodiversity Monitoring System

Manual

for Protected Areas

February 2001

Nordic Agency for Development and Ecology

Department of Environment and Natural Resources

NGOs for Integrated Protected Areas, Inc.

Biodiversity Monitoring System

Manual

for Protected Areas

February 2001

DENR
NORDECO

Danida **World Bank** **DENR**

Technical Assistance
IMPROVING BIODIVERSITY CONSERVATION IN PROTECTED AREAS
THE PHILIPPINES

Biodiversity Monitoring System

Manual

for Protected Areas

February 2001

DENR-PAWB **NORDECO**

The World can tell us everything we wan t to know. The only problem for the World is that it doesn't have a voice. But the World's indicators are there. They are always talking to us ."

Said by an Inuit.

This document has been prepared by the Protected Areas and Wildlife Bureau of the Department of Environment and Natural Resources (PAWB-DENR) and the Technical Assistance for Improving Biodiversity Conservation in Protected Areas of the Philippines through NORDECO.

The technical assistance was funded by the Ministry of Foreign Affairs, the Government of Denmark.

The opinions and recommendations expressed in this document are those of the authors and do not necessarily reflect the views of DENR.

This publication should be cited as follows:
NORDECO & DENR 2001. Biodiversity Monitoring System Manual for Protected Areas. Second edition. DENR, Manila, and NORDECO, Copenhagen.

First edition 1998
Second edition 2001

ISBN 87-986168-8-9

REQUEST FOR COMMENTS:
The readers are kindly requested to send comments and suggestions for improvements of this Manual to PAWB-DENR with copy to NORDECO:

Protected Areas and Wildlife Bureau
Department of Environment and Natural Resources
Visayas Avenue, Diliman, Quezon City, Metro Manila, The Philippines

NORDECO (Nordic Agency for Development and Ecology)
23, Skindergade; DK-1159 Copenhagen K; Denmark
Tel: +45 33919030 Fax: +45 33919032 E-mail: nordeco@nordeco.dk

Acknowledgements

Discussion participants	J. Acay Jr., J. Accos, J. Albert, T. Aliaza, A.A. Alicante, A.P. Andres, N. Andres, V.V. Anonuevo, R.V. Antolin, L. C. Agaloos, E. Agbayani, J. Antonio, A.F. Asis, D. Azurin, M.A. Barcelona-Leones, T. Blastique, E.C. Bonilla, M. Botengan, B. Bulaclac, E.C. Bumatay, D.M. Cabriga, L. Calanog, M. Caleda, P. Calimag, E.B. Canet, M.L. Carmona, C.d. Castillo, R.A. Cornel, C.C. Custodio, J. David, J. Davies, V.U. Diaz, R. Dingal, D. Diwa, M. Ebuna, V. Estoconing, G. Estrada, C.F. Fetalvero Jr., R. Fragata, J.L. Garcia, K.M. Gatil, E.A. Gatumbato, E.J. Gaytano, L.S. Guarin, M. Hawkes, L. Heaney, M.B. Hernandez, N. Ingle, R. J. Kalaw, D.U. Kho, L. Ko, G.F. Lacastesantos, L. Laroya, N.M. Lita, E.J. Madamba, F.S. Magbanua, C. Makabenta, N. Mallari, M.G.C. Malolos, V.Q. Marcelo, M.M. Mendoza, A. Meniado, G. Morgan, P.d.v. Moss, N.M. Mounyawe, S. Nalupo, M.F. Nievales, M.E. Ocampo, G. Oleveira, R.B. Paalan, R.G. Padilla, I.C. Pangga, W.S. Pollisco, S. Pullarca, L.S. Punzalan, N.C. Reaño, J. Redor, N.A. Resurrecion, C. Rivero, G.B. Sabigan, L.M. Sadueste, J. Sapilan, S. Shen, A. Sitorio, R.Q. Sumiller, B. Tabaranza, R. Tabuno, C. Ulep, P.A. Velasco, R. Verian, E. Visquera
Field testing	R.A. Abad, E.G. Agbayani, N.B. Almonte, R. Altamirano, D. Balete, M. Botengan, H.S. Binahon, J. Castillo, E. Colobong, F. Danielsen, J.N. David, D. Decano, A. Diesmos, E. Domingo, A.B. Donato, R. Fernandez, R.T. Fragata, E.C. Gayona, A. Gonzales, M. Heegaard, A. Lilangan, V. Linis, H.B.D. Mausalalang, L.B. Minas, F.S. Mirasol, R. Mora, F.C. Paguirigan, R. Parejo, M.K. Poulsen, C. Rapio, J. Sarmiento, Z. Siggayo, D. Somera, M. Villena, J. Zabala
System development	R. Altamirano, P. Alviola, D. Balete, E. Batangan, F. Danielsen, A. Diesmos, M. Enghoff, R. Fernandez, G. Gee, A.E. Jensen, A. Manamtam, S.S. Nielsen, C.M. Nozawa, V. Palaganas, E. Paring, M.K. Poulsen, S. Pullarca, M. F. de los Reyes
Text by	F. Danielsen, D. Balete, M.K. Poulsen, M. Enghoff, V. Palaganas, C. Nozawa, A.E. Jensen
English language	E.D. Bolton
Local language	B. Abella, H.V. Balagan
Comments 2nd ed.	R. Altamirano, P. Alviola, C. Custodio, J. Fjeldså, E. Guiang, A. Khan, S.S. Nielsen, M. Mendoza, N. Moulinyawe, V. Palaganas, E. Pimentel, L.L. Sørensen, A. Tagtag
Editing and lay-out	G. Saunar-Abella, J. Lind, M. Heegaard
Illustrations	E. Naeg, O. Figuracion
Cover design	E. Naeg
Postproduction	G. Saunar-Abella, N. Sy-Changco
Project management	V. Palaganas, C.M. Nozawa, A.E. Jensen
Sources of inspiration	Kunkle, S., Johnson, W.S. & Flora, M. 1987. Monitoring stream water for land-use impacts: A training manual for natural resource management specialists. Water Resources Division, US National Park Service. 102 pp. McManus, J.W., Ablan, M.C.A., Vergara, S.G., Vallejo, B.M., Menez, L.A.B., Reyes, K.P.K., Gorospe, M.L.G. & Halmarick, L. 1997. ReefBase aquanaut survey manual. ICLARM Educ. Ser. 18. 61 pp. Bibby, C.J., Burgess, N.D. & Hill, D.A. 1992. Bird Census Techniques. Academic Press. 256 pp.

CONTENTS

Annexes

List of Boxes

List of Tables

List of Figures

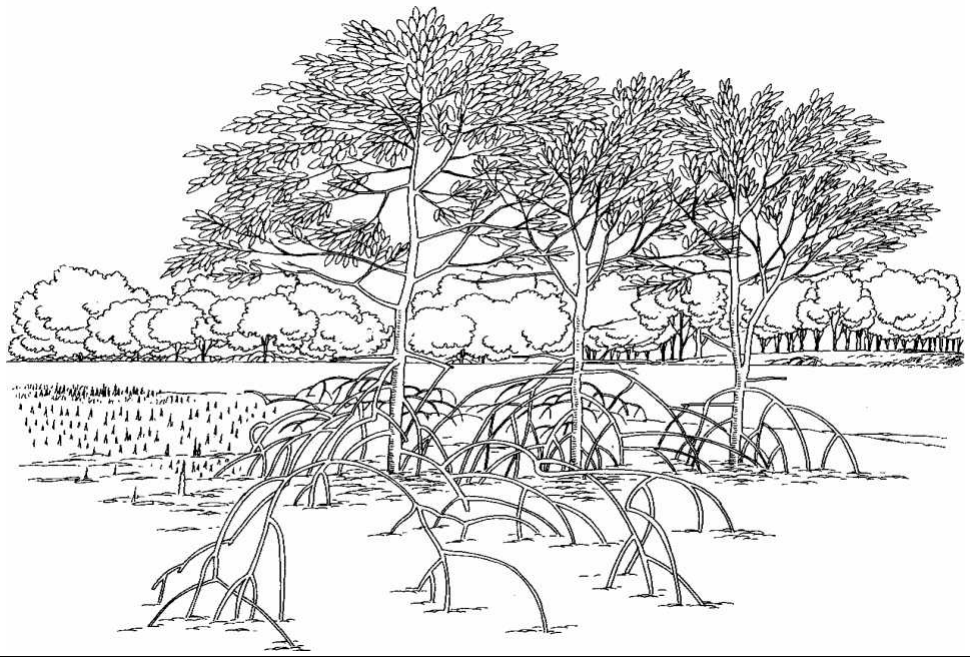
Preface

Welcome to the DENR Biodiversity Monitoring Manual! The Biodiversity Monitoring System methods have been designed to help you contribute to the improved conservation and sustainable use of forests and freshwater and marine wetlands. We have aimed to develop a set of useful and workable standard methods. We hope that this manual will not only help you survey and monitor protected areas using the methods described, but also encourage your interest in contributing to the conservation of biodiversity.

This manual offer information on biodiversity monitoring to enable you to carry out your work using the Biodiversity Monitoring System as prescribed in the DENR Administrative Order shown on the back cover.

The BMS: a minimum starting point. Biodiversity in a protected area encompasses thousands of life-forms, many of them not even named and described, yet the resources and people available to manage and monitor biodiversity are limited. The Biodiversity Monitoring System is a minimum starting point, which we hope will further evolve over time. The methods developed are a compromise between the financial resources available for monitoring purposes and the aim of ensuring that no major change in a protected area's biodiversity can go undetected. The methods are based on locally available people, equipment and funds.

Later when this monitoring system is in operation in more areas and additional resources are made available, it is advisable that the methods are backed up by satellite-based monitoring of land-use on a regular basis as well as in-depth monitoring of selected habitats and species. Since all data will be compiled on a geographical basis (with latitude and longitude wherever possible), the data can be entered into a computerised 'GIS'-database. In the future, when data can be stored and analysed on computers, perhaps Transect data could even be used by the Protected Areas and Wildlife Bureau to reveal national trends in the populations of species of priority to conservation.

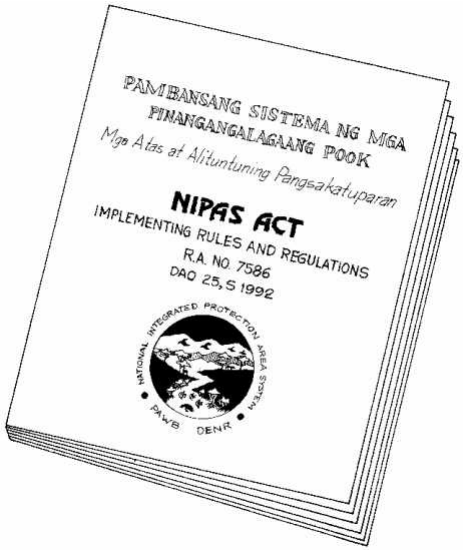


1. Introduction

Why monitor biodiversity? Protected areas have been established to conserve the Philippine *samut-saring buhay* or 'biodiversity'. Repeated data sampling or 'monitoring' can show if the biodiversity of an area is being maintained in accordance with the NIPAS Act and the management objectives of the area.

Questions monitoring can answer. Monitoring of biodiversity can answer questions such as:

- Are habitats and ecosystems being degraded?
- Are the populations of threatened species of plants and animals declining?
- What are the causes?
- Has management intervention had the intended impact on the ecosystem?
- Are there increased benefits to local communities from sustainable natural resource use?



In other words, monitoring can answer if the management interventions in the area are effective in addressing biodiversity conservation.

Existing monitoring activities. Many protected area communities, especially indigenous people, implement traditional systems for controlling access to resources (Box 1-1). Sometimes this is based on generations of experience with resource use. The BMS was designed to build upon and strengthen existing community-based monitoring.

Box 1-1. Example of indigenous monitoring activity.

Indigenous people who have lived in a particular area for generations often have intimate knowledge of the habitats and behaviour of wildlife species. Observing events in nature influences their survival strategies and resource use.

In several protected areas, community leaders and people regularly discuss the availability and quality of natural resources. One such example is the Talaandigs and Higaonon in Mt. Kitanglad Range Natural Park who perform rituals for hunting and forbid resource extraction in some places which are called *lalaw*. In this way they control and monitor access to certain areas and the use of resources. Merely by living in the area, using the resources and observing their environment, they monitor changes in the resources.

2. What is the Biodiversity Monitoring System?

Objectives. The Biodiversity Monitoring System aims to improve the information available for decision-makers in protected areas through the regular collecting of data on natural biological resources and their utilisation. The focus is on *identifying trends* in biodiversity and its use - *so as to guide action* in protected area management.

In addition, the BMS is intended to improve the participation of protected area communities in protected area management.

Who can undertake biodiversity monitoring? Anyone interested in gathering information on the environment and its use can monitor biodiversity. The BMS is particularly designed for use by PA staff, local communities, local environmental groups and deputized forest guards.

How will the monitoring information be used? The information you gather will be analysed by yourself or by the Coordinator of the BMS of the Protected Area Office. The results will be used by the Protected Area Management Board (PAMB) and the local government in order to take better decisions on the management of the land and the people in the protected area (Box 2-1). Some of the information will alert the PASu or the CENRO in charge about situations that should be examined further. The information will also be used by the protected area communities to improve local resource management together with the PA staff.

Box 2-1. What can the PAMB expect from the monitoring system?

The BMS can provide valuable data to the PAMB that will enable them to make informed and sound decisions as to how to better manage the protected area resources. Through the BMS, the PAMB can better determine the effectiveness of:

- livelihood programs on natural resource use
- resource use permits
- establishment of sanctuaries and seasonal closures
- municipal ordinances, and other management interventions on the part of the PAMB and the local government in addressing the threats to the PA.

In addition, the BMS encourages a dialogue between the PA staff and the PA communities regarding the status of PA resources and management. As a result of this, the communities are more likely to agree on, and participate in, regulation of resource use, reaction to encroachment by outsiders, and law enforcement.

3. Organizing biodiversity monitoring

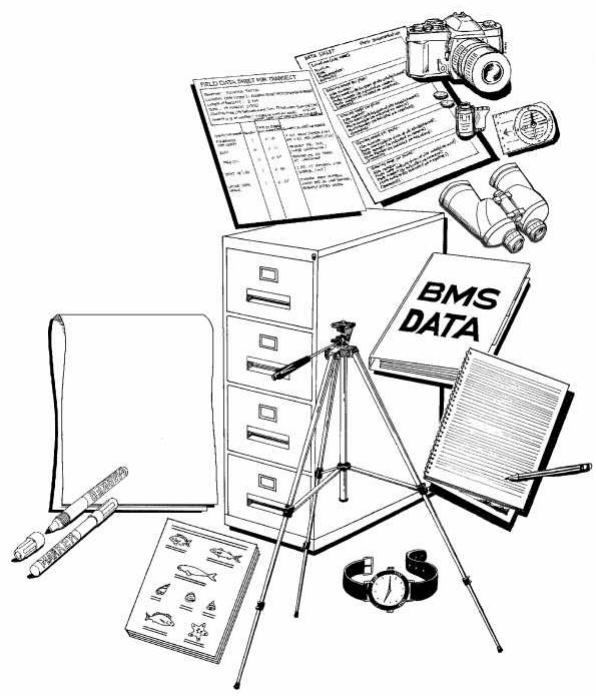
How should the field implementation be organized? At the protected area level, the Biodiversity Monitoring System is headed by the PA Superintendent (PASu) or CENRO in charge. Implementation is undertaken by regular DENR staff assigned by Special Order with monitoring and patrolling as part of their Key Result Area. These staff are normally selected among protected area, CENRO and PENRO staff. Among them, a BMS Coordinator is designated to coordinate and oversee the overall implementation of the monitoring system. The BMS Coordinator should be a permanent staff member. The team reports to the PASu, who in turn reports to the Protected Area Management Board, the PENRO and the Regional Executive Director of DENR.

It is the task of the BMS Coordinator to ensure that:

- BMS sites are monitored in accordance with the BMS Implementation Plan
- the methods are used in accordance with the Manual
- each transect route is surveyed by the same observer every quarter
- all data are submitted to the PA Office immediately upon return from field
- BMS equipment and data are properly stored
- Field Diary data and other BMS results are regularly discussed among PA staff to ensure high quality
- sufficient notes are made to document sightings of rare species
- BMS data are organized, analysed, interpreted and presented to PAMB with proposed management actions
- copies of the quarterly BMS standard report to PAMB are submitted to the Regional DENR
- photos are used for demonstration and education purposes whenever possible
- BMS achievements are properly documented.

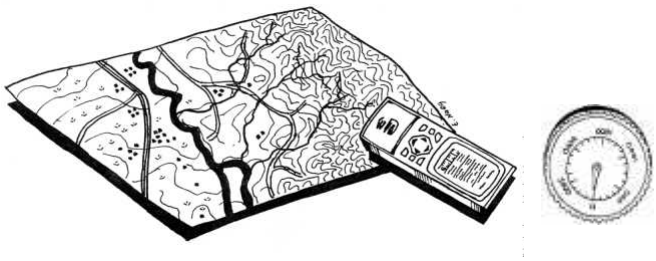
In most protected areas, PA staff are too few to implement the monitoring system in full. It is important to engage deputized forest rangers, indigenous people and volunteer community groups to assist the PA staff or conduct some of the monitoring methods on behalf of the PA management.

What equipment do you need? To monitor biodiversity using the Biodiversity Monitoring System, some basic equipment will be needed:



- notebook and pencils
- markers and large sheets of paper
- binoculars
- SLR camera with batteries and film
- a tripod
- a watch
- compass
- ring binders and filing cabinet for data storage
- Photo Documentation forms
- Transect data sheets
- identification guide

When setting up the Biodiversity Monitoring System, we also recommend that you have access to:



- topographic map of the area
- GPS (Global Positioning System receiver)
- altimeter

In addition, for the Transect Swim method in marine areas, you need:

- mask
- snorkel
- fins
- plastic writing slate (or plastic laminated Transect data sheet)
- cement for establishing permanent markers on the sea bed.

4. Budget requirements

Apart from the initial costs of purchasing equipment, the most expensive items when monitoring biodiversity are staff time and travel. Like patrolling, biodiversity monitoring is a basic and regular protected area function. It should be included in the DENR's proposed core budget every year (Box 4-1).

Box 4-1. The budget planning process of the government.

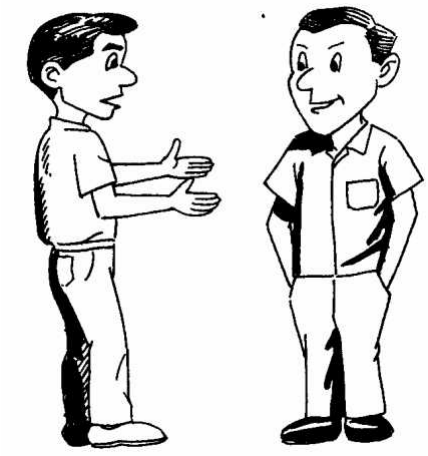
It is the responsibility of the PASu together with the Protected Areas and Wildlife Division (PAWD) Chief to ensure that the BMS budget in your PA is included in the annual funds set aside for the regional office.

This is the process:

1. Budget call (January-March)
2. DENR prepare and submit budget proposal (April-June)
3. Technical Budget Hearing
4. Revised budget to the President (July-September)
5. DENR budget approved
6. National Reprogramming Conference (October-December)

When the budget of the DENR is approved, a national reprogramming conference is held to identify the Banner Programs and/or Key Result Area (KRA). During this time all the PAWD Chiefs and the senior staff of the Protected Areas and Wildlife Bureau (PAWB) discuss and agree on the protected area and wildlife KRA of the regional offices.

For some protected areas, the financial requirements are indicated in their Protected Area Act and the PA budget is automatically included in the annual DENR budget appropriation. An indicative budget for biodiversity monitoring in an average PA is provided in Annex 3.



5. Ten steps in implementing biodiversity monitoring

The Biodiversity Monitoring System comprises ten steps to be followed in each PA:

Step 1 Compile basic information on the protected area

Before you can establish and use the Biodiversity Monitoring System, you should have at least a rough idea of what the major threats to the PA are and where they are most serious. In addition, you should know which parts of the area are particularly important to conservation and local use by PA communities. These can, for instance, be areas known to support species of conservation interest, or where local people fish, hunt and collect non-timber forest and wetland products, as well as areas under resource use permits.

Step 2 Identify priorities for biodiversity monitoring

Write down the names of those areas and those resource uses and species that should be monitored (Chapter 13). Discuss your list with the PASu or CENRO in charge, the PAMB and other knowledgeable people, including representatives of indigenous people and other local communities. Decide which areas, resource uses and species are the most important to monitor.

Step 3 Training

Request the Protected Area Wildlife Division of the Regional DENR or the PAWB for training in the Biodiversity Monitoring System. They may be able to provide a trainer, or they can get staff from other protected areas to assist you.

Step 4 Establish the Biodiversity Monitoring System

The Biodiversity Monitoring System entails four main methods:

- Focus Group Discussion
- Field Diary
- Photo Documentation
- Transect (Walk, Cruise and Swim)

Look at the list of the most important areas, resource uses and species you need to monitor. Read up about the methods in this manual and identify which areas and species can best be monitored by each method. Your choice will depend on the level of threat, your available time, number of PA staff and volunteers, funds and transport facilities. Establish monitoring sites in the field (Focus Group Discussion, Photo Documentation, Transect).

Be sure you know your priority resource uses and species. If necessary, prepare a simple guide for the field identification of your priority species, using available existing literature (ask PAWB for assistance).

Step 5 Compile data using the field methods

Use the field methods to compile data on resource use and biodiversity. Write a Field Diary whenever you and the other BMS staff and volunteers are on patrol or travelling in the PA. Use the other methods every quarter of the year.

Store the data sheets and photos carefully in ring binders and photo albums in a separate BMS filing cabinet at the Protected Area Office. Prepare copies of the Transect data sheets and submit them to the PENRO for safe storage.

Step 6 Analyse data and identify trends

Every quarter, look at your data and try to highlight any changes over time (Chapter 14). If there seem to be changes, you should assess whether the data is likely to reflect the true situation in the PA or if the data could be biased, for instance by a change in monitoring routines or the weather.

If there seems to be a real change, try to identify the reason for the change, the importance of the change, and then assess whether any management intervention is appropriate. The reason for a change is often related to the human use of the area. Chapter 15 describes the common impacts of human activities and typical causes of destructive activities in Philippine protected areas.

Step 7 Validate results with the protected area communities

Present the findings to local people in the barangays and request for their advice. Use pictures and figures but very few words, and try to be as site-specific as possible (Annex 1). Do the local people consider the findings relevant? Also, discuss possible actions to be taken by the people themselves, the Protected Area Management Board or the Local Government Units on the basis of the BMS findings. Maintaining a dialogue with the PA communities is a very important part of the monitoring process (Figure 5-1).

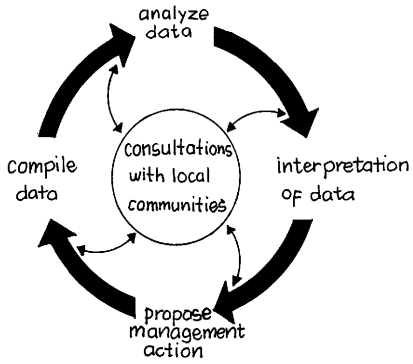


Figure 5-1. The flow of information in the Biodiversity Monitoring System.

Step 8 Present the findings and recommended actions to the PAMB

Present the most significant findings to the decision-makers in the Protected Area Management Board. Focus on trends. Present corresponding options for actions including draft resolutions. How you display your findings is very important (Chapter 16). Use maps, graphs, figures and few words (Annex 1).

Step 9 Make decisions to improve protected area management

Remember that the reason for spending time and money on monitoring biodiversity is to guide action in PA management in order to maintain the biodiversity. You should encourage the Protected Area Management Board to take decisions on the basis of the BMS findings. A list of possible management interventions is offered in Chapter 15.

Step 10 Revise and strengthen the monitoring system

One year after establishment of the system, assess whether the methods provided useful data or not, find out why, and then adjust the monitoring system. Perhaps a method generated too few data, or it did not cover the threatened areas it should have. Or perhaps some PA staff or volunteers were not fully committed to the work, and the task of monitoring biodiversity needs to be given to somebody else.

6. Choice of field methods

The Biodiversity Monitoring System methods have been selected because they are the easiest and most cost-effective to use. They encourage a constructive dialogue between local communities and protected area staff. They are appropriate to the people and resources locally available in most protected areas.

You should prioritize:

- The Focus Group Discussion method
- The conducting of a regular Field Diary
- The Photo Documentation method.

The Transect method should *only* be established in areas where you are sure that your priority species are present. If the protected area is short of staff, use less than one third of the time and resources available for monitoring on the Transect method.

Box 6-1 to 6-3 describe recommended methods in land, freshwater wetland, and marine areas.

Box 6-1. Recommended BMS methods in land areas.

In land areas, use of the following methods is recommended:

- Focus Group Discussion
- Field Diary
- Photo Documentation
- Transect Walk

Box 6-2. Recommended BMS methods in freshwater wetlands.

In freshwater wetlands, use of the following methods is recommended:

- Focus Group Discussion to monitor the fishery and status of freshwater habitats
- Field Diary
- Photo Documentation above water (in undulating terrain such as river valleys and along the shoreline of lakes and swamps)
- Transect,
  - in dry areas: by walking on foot (Transect Walk);
  - in wet areas: by using a boat along rivers and shorelines of lakes (Transect Cruise)

Box 6-3. Recommended BMS methods in marine wetlands.

In marine wetlands, use of the following methods is recommended:

- Focus Group Discussion to monitor the fishery and status of marine habitats
- Field Diary
- Photo Documentation above water along the coastline
- Transect,
  - in dry areas: by walking on foot (Transect Walk);
  - along mangrove channels and inter-tidal mudflats: by using a boat (Transect Cruise);
  - in coral reefs/seagrass beds: by swimming or using a glass bottom box (Transect Swim).

If the protected area has large financial resources and skilled surface and scuba-divers, they may embark upon more standardized methods for coral reef monitoring such as manta tow and line intercept transect carried out, for instance by volunteer dive clubs. For breeding seabird colonies on islets, it is recommended that you consult PAWB for census method.

In freshwater and marine areas where more than 500 waterbirds regularly occur, it is recommended that you also count waterbird numbers (see Appendix on Waterbird Counts).

Table 6-1. BMS methods for use in land, freshwater and marine habitats.

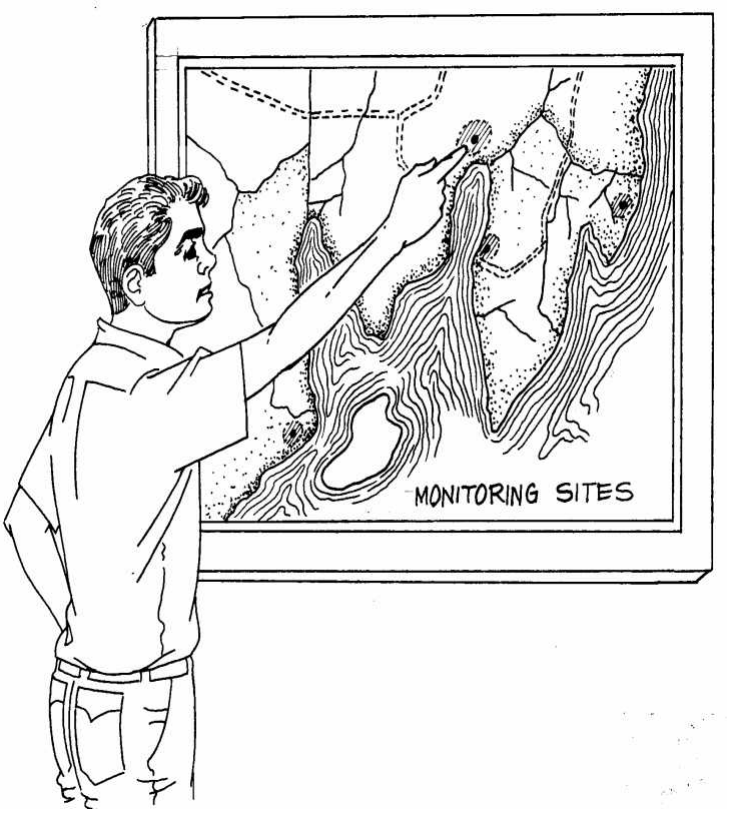
	Focus Group Discussion method	Field Diary method	Photo Documentation method	Transect method
Land area	+	+	+	+ Transect Walk
Fresh-water area	+	+	+ (above water)	+ Transect Walk/Cruise
Marine area	+	+	+ (above water)	+ Transect Swim

+: method applicable

7. Location of monitoring sites

Vast areas of the protected area without the presence of people may not need more than a few monitoring sites. You should establish monitoring sites:

- In seriously threatened areas. For instance, areas with intact natural habitats of priority to conservation (such as old growth forest, wetland and coral reef) in the multiple use and sustainable use zones of the protected area or in areas under user permit, including community resource extraction areas.



- In each municipality so that the local government can benefit from your results. Often PAMB resolutions resulting from your monitoring work will need to be translated into municipal and barangay level ordinances in order to be effective.

- Along regular patrol routes. To save costs, ensure that, whenever possible, biodiversity monitoring sites are located so that they can be visited as part of the regular patrol or community work.

Details on the recommended location of monitoring sites for each method are provided in Chapter 8-12.

8. Focus Group Discussion Method

This method comprises the establishment of a volunteer Community Monitoring Group of local people who are encouraged to collect information on a regular basis between quarterly Focus Group Discussions with PA staff.

Focus Group Discussions and barangay/sitio meetings can generate very important information regarding trends in use of resources, trends in status of selected resources, and trends in the number of households benefiting from the use of resources. The information is mainly based on local communities' own perception of trends. Data gathered continuously from a number of representative communities can provide a valid picture of general trends.

For instance, changes in harvest volume per effort can indicate trends in abundance of resources. It can provide an early warning of over-harvesting situations which would threaten local communities' opportunities for sustained resource-use.

This method particularly encourages a constructive dialogue between PA staff and local communities on the status and management of the protected area. The PA communities will be directly involved in biodiversity monitoring. Consequently the communities will become more aware of the need for biodiversity conservation. It is further anticipated that the communities involved agree on, and participate in, law enforcement and regulation of resource use. The monitoring system could also provide input to the community-based resource management plans and possible tenurial contracts between the communities and PAMB and DENR.

EQUIPMENT

The following tools are needed: identification guide, large sheets of paper, markers, snacks.

SUITABILITY

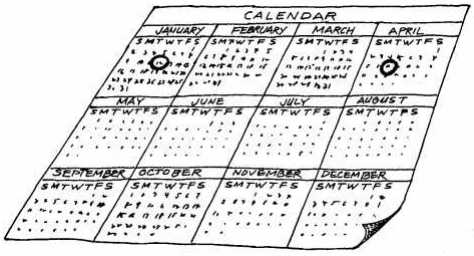
Useful on land and in freshwater and marine areas. In freshwater and marine areas, the method can be used to monitor the fishery (Annex 5) as well as the status of wetland habitats (e.g., through discussions of trends in use of explosives).

PERSONNEL

This method should be undertaken by those PA staff who are not involved in enforcement activities in the same area (so as to encourage open discussion with local people). Two persons are needed, one to facilitate discussions and one to record the minutes. One of them should be a permanent staff member. Skills in Participatory Rural Appraisal (PRA) method are an advantage. Two PA staff can be responsible for 4-6 Community Monitoring Groups, alongside other PA staff duties.

FREQUENCY

A discussion meeting of two hours should be undertaken every quarter with the Community Monitoring Group (Focus Group Discussion). Once a year a meeting should be held with the village (barangay/sitio meeting).



LOCATION OF COMMUNITY MONITORING GROUPS

Community-based biodiversity monitoring groups should ideally be set up in most settlements within the PA. However, it is suggested that in the initial stages of the Biodiversity Monitoring System you focus on:

- Communities living near areas of high conservation value,
- Communities with a relatively high dependence on forest or freshwater/marine products for their livelihood and subsistence. The more dependent they are, the more chance there is of people having valuable information on the resources,
- Communities thought to over-harvest areas of high conservation value, and
- Communities living in areas known to be the entry/exit points of resources.

STEPS IN ESTABLISHING FOCUS GROUP DISCUSSIONS

Focus Group Discussions are to be conducted in a pre-selected and permanent number of barangays or sitios. You should meet with barangay captains or other relevant community leaders to explain the objectives and activities of the monitoring system (Annex 2). You should stress the common interest of PA staff and local people in conservation and also mention the possible use of the monitoring data in a more sustained use of local natural resources.

1 Assisted by the barangay leader, you should identify 10-15 community members among households utilizing the PA biodiversity resources and persons involved in natural resource management (forest guards, community forestry committee members, etc.). Include the most experienced indigenous healer and all-round hunter/forest product gatherers and fisherpeople. Make sure that both men and women from different age groups are represented.

2 From among these, a volunteer Community Monitoring Group of 5-8 people should be established (based on a selection of the most willing and interested). This group should preferably remain the same over a long period of time.


Meeting with Community Monitoring Group

3 Together with the Group, you will agree on what should be monitored.

4 You, as PA staff, should be responsible for conducting regular discussion meetings with the Group in each of the selected barangays/sitios. See the text below on steps in conducting a Focus Group Discussion. You should conduct the discussions as an integral part of your regular work within the PA. You should encourage the Group to collect information and data (and write it down, draw or photograph it, or otherwise record it) on a regular basis between their quarterly discussions/meetings with PA staff.

5 You should give prior notice regarding the group discussions (at least one week) to allow all participants to attend. Make sure that the time set for the meeting is convenient for the participants. For instance, the meeting could be held in the evening when work or household activities are completed. You should also arrange the program and a venue for the meetings.

6 Soon after each meeting, write a report on the meeting. Collate and analyze the data (format for reporting in Annex 4). The report must be presented and discussed at the next quarterly discussions/ meetings between the Group and yourself.

7 You should analyze results from the Focus Group Discussions on a quarterly basis and summarize them for the Head of the Protected Area Office.

8 You should arrange a common meeting at community (barangay/ sitio) level on a regular basis with as much community participation as possible for each area covered by the Group. This will enable the entire community to have access to the results of the biodiversity monitoring trends in their area and enable the communities' inputs and responses to be obtained, leading to agreed mitigating actions.

STEPS IN CONDUCTING FOCUS GROUP DISCUSSION

1 Make sure that you know the objective of the meeting (e.g., to discuss those resource uses and species that have been selected for monitoring by the Group) and how you want to conduct it (who will participate, proposed agenda, etc.).

2 Start the meeting by agreeing on the duration. Then agree on the order in which issues should be addressed. Use possible waiting time before all participants arrive for informal discussions and for taking a look in the members' notebooks. Show a strong interest in the members' notebooks.

3 Show the report you made from the last meeting and discuss it.

4 Go through the resource uses (that you already have decided to monitor) one by one:

(a) let the members present their notes on the specific resource use,
(b) agree on the combined numbers/quantities they have noted,
(c) discuss the perceived trends in the resources,
(d) discuss the trends at the level of extraction,
(e) discuss significant changes,
(f) discuss reasons for changes,
(g) discuss problems and solutions.

During (a) and (b) use the Format 2 matrix for resource uses (Annex 4). During (c)-(g) use the Format 1 on main issues discussed (Annex 4). Repeat the steps for the other main resource uses.

5 Let the members present the list of priority species observed following the Format 3 matrix for species observed (Annex 4). Discuss changes in the observations, if any.

6 Discuss any other relevant matters with the Group that you or they think important.

7 Evaluate the session. See if anything needs to be improved.

8 Agree on the time and place of the next meeting. Draw the meeting to a close.

DATA STORAGE

The report from the meetings (Format 1, 2 and 3, Annex 4) should be stored in a ring-binder and filed in the BMS filing system in the Protected Area Office.

TIPS

1 Ensure that the discussion is a dialogue. You should encourage everyone to participate, including indigenous people. Make sure that direct resource users are given priority as members in the monitoring group. Try to establish and maintain an atmosphere of trust. Focus on fruitful co-operation with people (not laying down the law) and on listening to people (not teaching them).

2 Do not use leading questions ("Is the river water drinkable?") but use open-ended questions ("How is the river water?"). Let the group make their own conclusions of the discussions.

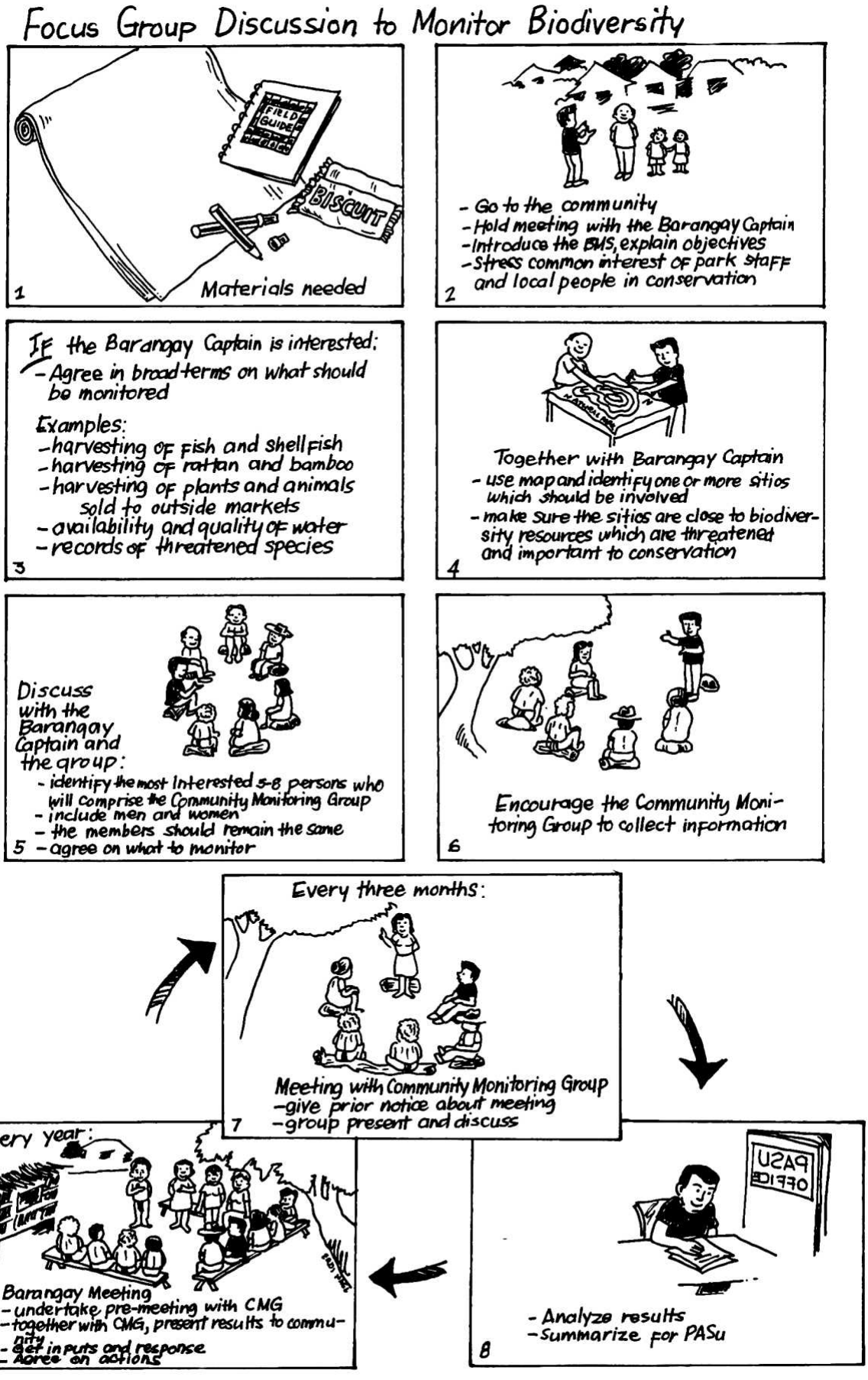
3 If a resource use plan or a development plan is available for the barangay you should know it and include in your discussion the relevant areas of overlap between the plan and the monitoring (such as regulations/actions on fishing/hunting/other land use). Regularly share the outcomes of the Focus Group Discussions with the barangay officials.

4 Do not shy away from reporting the obvious and continue to do this. At some point this may lead to important discoveries that can be used for management purposes. Remember that no changes are also important information.

EXAMPLES OF ISSUES TO BE DISCUSSED

Since last year/last quarter...

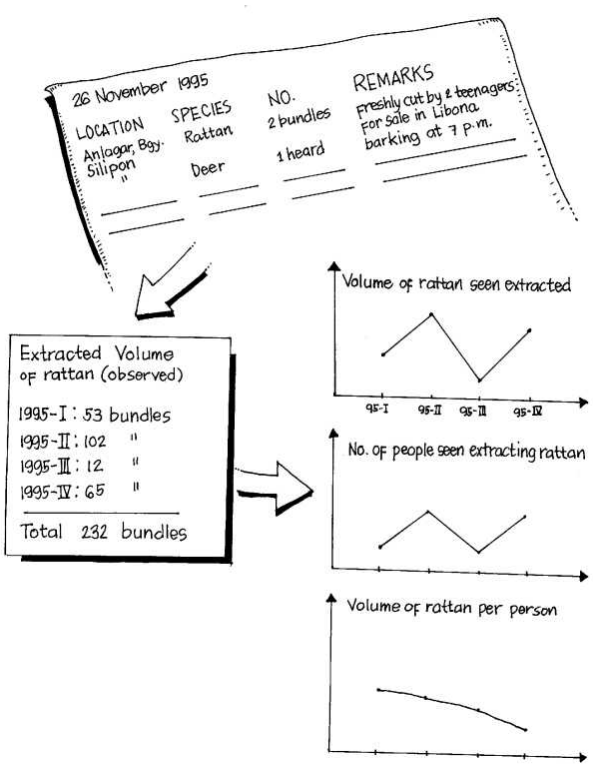
- Has there been any change in time and effort needed to collect a fixed amount of resources such as rattan, firewood, shellfish, freshwater fish, medicinal plants, fruits, wildlife species, etc.?
- If yes, how much more or less effort (time) had to be spent?
- What are the perceived trends in occurrence/abundance of key resources/species?
- What are the possible reasons for the changes?
- What are the problems/solutions to the changes if any?
- Has the quality or average size of the collected resources changed?
- Are resources being used now which have not been harvested previously?
- Have there been any changes in the methods being used for harvesting resources?
- Has the number of people engaged in activities like small-scale logging, kaingin, use of wetland resources, etc. changed during the last quarter (or the last year)?
- Has the number of dealers changed?


Focus Group Discussion to Monitor Biodiversity
FIELD GUIDE
BISCUIT
1
Materials needed
- Go to the community
- Hold meeting with the Barangay Captain
- Introduce the BMS, explain objectives
- Stress common interest of park staff and local people in conservation
2
IF the Barangay Captain is interested:
- Agree in broad terms on what should be monitored
Examples:
- harvesting of fish and shellfish
- harvesting of rattan and bamboo
- harvesting of plants and animals sold to outside markets
- availability and quality of water
- records of threatened species
3
Together with Barangay Captain
- use map and identify one or more sitios which should be involved
- make sure the sitios are close to biodiversity resources which are threatened and important to conservation
4
Discuss with the Barangay Captain and the group:
- identify the most interested 5-8 persons who will comprise the Community Monitoring Group
- include men and women
- the members should remain the same
- agree on what to monitor
5
Encourage the Community Monitoring Group to collect information
6
Every three months:
Meeting with Community Monitoring Group
-give prior notice about meeting
-group present and discuss
7
- Analyze results
-Summarize for PASu
8
Every year:
Barangay Meeting
- undertake pre-meeting with CMG
- together with CMG, present results to community
- get inputs and response
- Agree on actions
9

9. Field Diary Method

This method comprises standardized recording of routine observations on resource use, habitat and wildlife in a simple pocketbook or data sheet during regular patrols in the PA. It encourages a routine of making daily accounts of observations.

All you need is to record in writing your observations when you are in the field. This will encourage you to be observant of changes in the use of PA resources, in the location of threats, and in the abundance of priority species in the PA.



EQUIPMENT

Only a notebook, a pencil and binoculars are needed, but an identification guide is also useful.

SUITABILITY

Useful in land, freshwater and marine areas.

PERSONNEL

Protected area rangers, deputized forest guards and the assigned BMS staff should use a Field Diary when they are in the field. The BMS Coordinator is responsible for ensuring this.

FREQUENCY

It is recommended that all PA staff undertake Field Diary reporting whenever they are in the field. The BMS Coordinator is responsible for this.

LOCATION OF MONITORING SITES

A Field Diary is used on the regular patrol routes.

HOW AND WHAT TO WRITE IN A FIELD DIARY

1 Write your name, date and general locality (sitio/barangay) of the site you are visiting or patrolling (Box 9-1). Always start your diary on a clean page.

2 When recording people encountered and their activities (reason why they are in the area), you should note:

- the type of products gathered (orchids, rattan, fruits, leaves, shells, fish, etc.) and wildlife in their possession,
- their quantity,
- the use, and
- the market price where possible (if for selling).

If you see people engaged in major unsustainable activities (mining, large-scale logging, destructive fishing, constructing buildings and roads without permits, large-scale extraction of resources without permit etc.), note the number of people and what they are doing.

3 When recording signs of people's presence in the PA, note the type of disturbance, such as:

- cut/sawn logs,
- discarded remains of hunted wildlife such as bird feathers and bat skins (count heads if possible),
- sound of chainsaws (how many) or major cutting of trees,
- forest fires,
- smoke from kaingin,
- recent forest clearings (type of forest, size in hectares, and exact location), and
- large amounts of garbage.

If immediate management intervention is needed and you have a camera, take photos to document your observations.

4 When recording wildlife, note:

- the type of record (seen, heard, tracks found),
- the estimated numbers of individuals,
- the habitat, and
- the location.

For unfamiliar species, it is desirable that a sketch of the animal be made emphasizing distinguishing features such as color, shape of beak, relative size (length or height), etc.

5 When recording physical changes (natural or caused by humans) in the landscape, such as eroded banks, landslides, new logging roads, mining exploration, quarrying or excavations, note the exact location of the observed disturbance. If you have a camera, take photos of the most important observations.

6 Second-hand information (what you are told, but you have not seen yourself) should also be noted in the Field Diary. Note always who gave the information. See the list of priority resource uses and species for your PA.

7 At the end of the day or after completion of each routine patrol round, a separate page in the Field Diary is allotted for a tally of all observations, arranged according to appropriate categories. The Field Diary data should be submitted to the PA Office immediately upon return from the field.

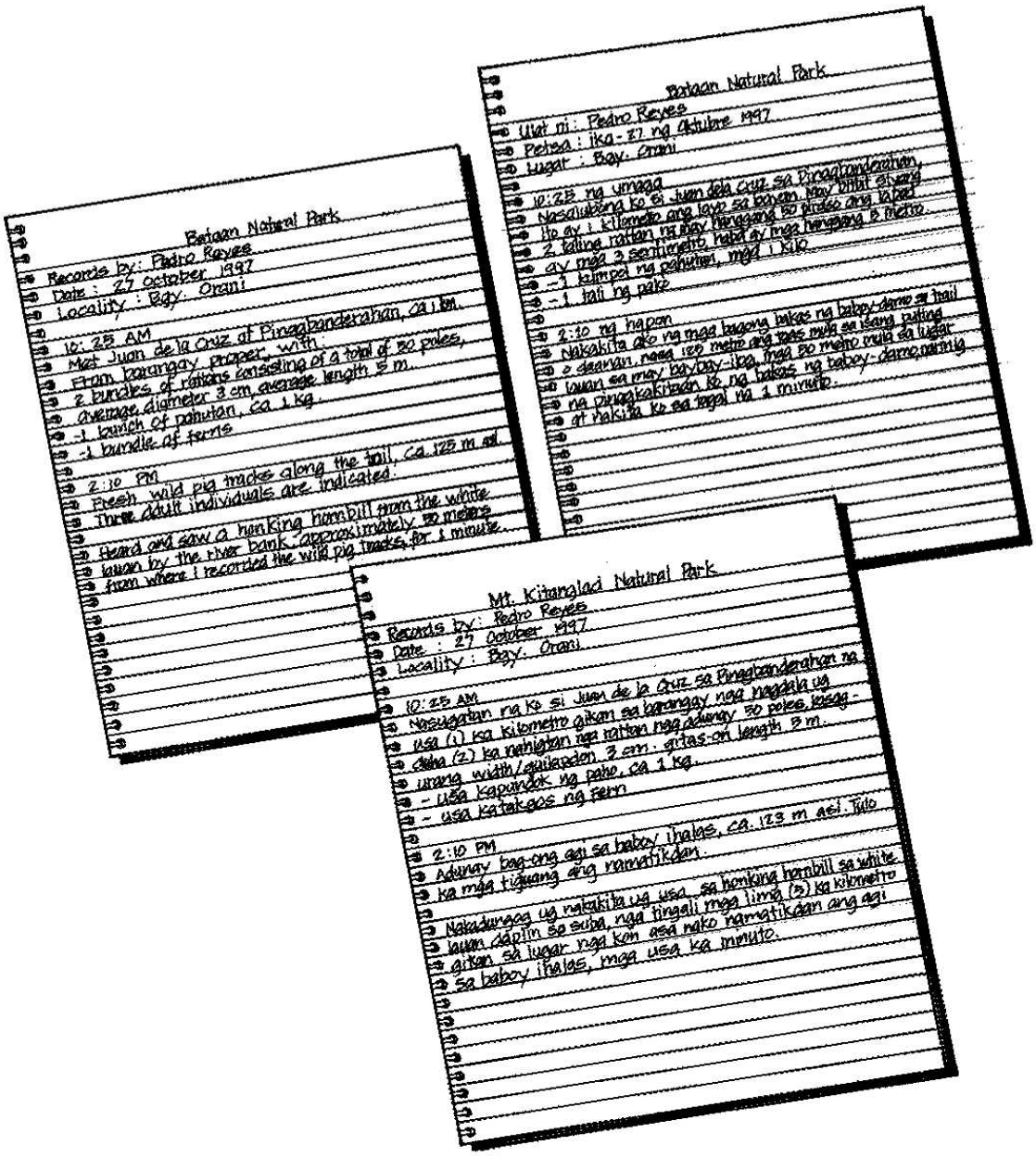
DATA STORAGE AND MANAGEMENT

Store your notebook carefully. If you are using separate sheets of paper (data sheets), file them in a ring-binder in the biodiversity monitoring filing system and never bring used data sheets to the field again.

TIPS

1 Always use good quality paper
2 Never use ball-point pen as its ink tend to fade or run when wet. A good quality pencil of medium point, no. 2 or 3, is useful.
3 Store your field notes in a water-proof container such as a plastic bag while travelling.
4 Always write in short, concise sentences.
5 It will often be useful to be able to locate the exact place where human activities (e.g. kaingin, recent forest clearings, etc.) or rare wildlife were recorded again. Note the exact location (name of river, distance from nearest community center or from prominent features in the landscape, elevation, co-ordinates).
6 The BMS Coordinator should regularly discuss the Field Diary information with the PA staff to ensure high quality.

Box 9-1. Example of a Field Diary
(English, Tagalog and Visayan)

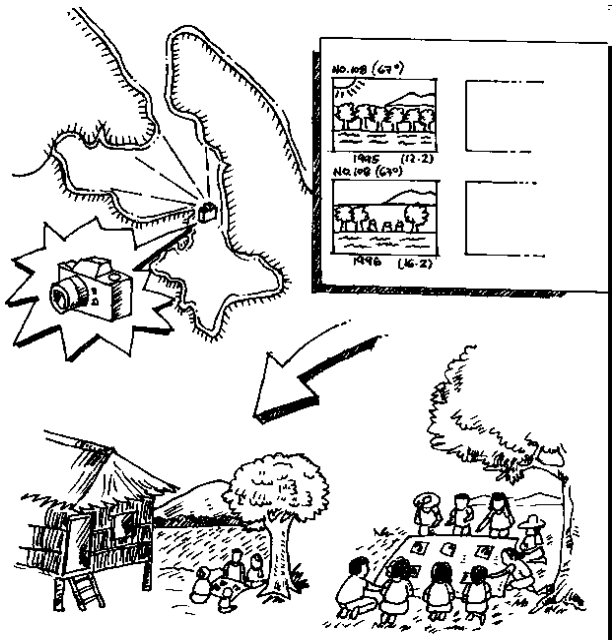


10. Photo Documentation

This method entails on-the-ground fixed point photographing of selected hillsides in priority forest blocks at regular intervals.

Monitoring of major changes in forest cover and wetlands is best undertaken by comparing remote-sensing images (photos) taken from air planes or satellites at regular time intervals. However, these methods require funds and specially skilled staff, which are not locally available in the protected areas.

Taking ground-based photos ('Photo Documentation'), on the other hand, is rather simple and inexpensive. It provides permanent documentation which does not depend on identification skills. This method is suited to monitor habitats and land-uses. It can tell if the size of important habitats is declining, and why. Photos can be taken of the exact areas where changes are likely to occur. Photos are very useful when presenting and discussing the results of biodiversity monitoring, as most people will be convinced by photographic documentation.



Photos can be used for discussion as well as demonstration and education purposes.

EQUIPMENT

The following equipment is needed: SLR camera with battery, film, compass, pencil, Photo Documentation forms and, if possible, a tripod. When installing the method you need a topographic map. A GPS, and paint or other materials for permanently marking a site, would also be very useful.

SUITABILITY

Useful in land, freshwater and marine areas, in undulating terrain such as hills, river valleys and along the shoreline of lakes, swamps and the coast.

PERSONNEL

This method should be undertaken by PA rangers, deputized forest guards and assigned BMS staff with knowledge of the basic operations of a camera.

FREQUENCY

We recommend that you take photos every quarter of a year. You may later reduce this to once every year at view-points where no changes in land-use and habitats have occurred. Typically one PA staff or volunteer assigned to patrolling will be responsible for up to 5 photo documentation sites.

LOCATION OF PHOTO DOCUMENTATION SITES

Photo Documentation sites should be established at view-points along patrol routes and trails in seriously threatened areas (view-points are places where you can see large parts of the surrounding landscape from - not just the nearest few trees). In addition, a few sites should be established in areas without human use.

STEPS IN SELECTING AND ESTABLISHING PHOTO DOCUMENTATION SITES

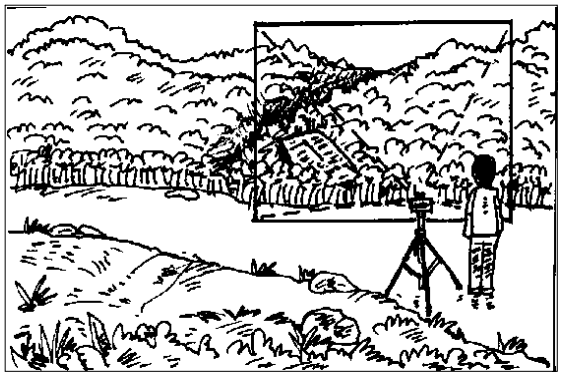
1 Get hold of a topographical map and, if possible, vegetation/forest cover and land-use maps for the protected area.

2 Identify the most seriously threatened areas on the map (e.g., where logging, swiddening or other disturbance may occur or recently occurred).

3 Draw those patrol routes and trails on the map that pass through the seriously threatened areas.

4 Mark view-points in seriously threatened areas along the patrol routes and trails as possible photo documentation sites.

5 Select up to five of those view-points. Choose those which are accessible and from where you can overlook areas of forest where logging or kaingin may occur within the next half year, or where disturbance recently occurred. Make sure you know the agreed land use for the area.



6 Go to the selected view-points and bring camera, compass, data sheet for establishment of photo documentation sites, topographic map, and if possible a GPS, paint or other tool for permanent marking of the site, and tripod.

7 Read the position and altitude using a GPS (and preferably an altimeter), and note the reading in the data sheet. If a GPS is not available, mark the approximate location of the site on your topographic map.

8 Use your compass to take a degree reading of the direction (camera angle) for each photo, and note the reading on the data sheet.

9 Take two identical photos for each camera angle.

10 Enter all the relevant information in your data sheet for the establishment of a photo documentation site (Box 10-1 and 10-2). Very careful notes must be taken during establishment of photo sites.

11 Mark the exact site of the camera location with a permanent marker so that you or your colleagues can easily find the place again (e.g. paint on big stone or rock, not on grass or loose soils).

12 Draw the location of all your photo documentation sites on a topographic map.

HOW TO TAKE A PHOTO FOR PHOTO DOCUMENTATION

1 Adjust the time (shutter speed) on the camera to 125 (1/125 of a second),

2 Look at what you want to photograph, not the sky above, through the camera. Use a tripod if available.

3 Adjust the aperture (lens opening) until the camera (light meter) indicates that the combination of shutter speed and aperture gives the correct amount of light to the film.

4 Take two photos of the same view.

5 Enter all the relevant information in your data sheet for photo documentation (Box 10-3).

6 Get the film developed and prints made. Prompt processing of used films avoids color changes associated with long storage.

7 Make sure to note reference numbers that connect data sheet, negative film and prints.

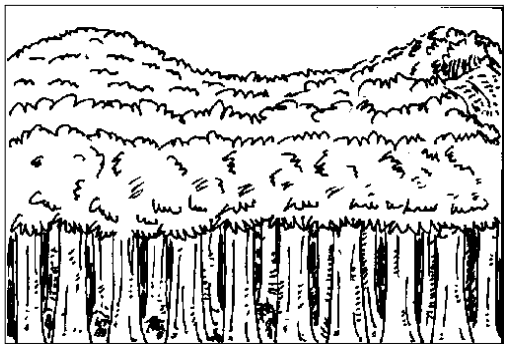
DATA STORAGE AND MANAGEMENT

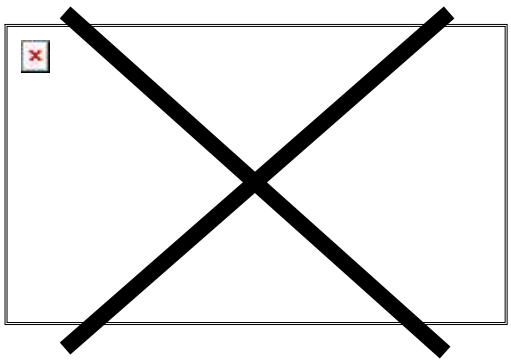
Avoid touching the negatives with your fingers. Each photo must be numbered/catalogued according to the sequence of frames on the negative film. Make sure never to store any negative or print without marking them with a name and date. It should be easy to relate each photograph to the data sheet that holds full information about it.

Always keep negatives and prints in a safe, dry place.

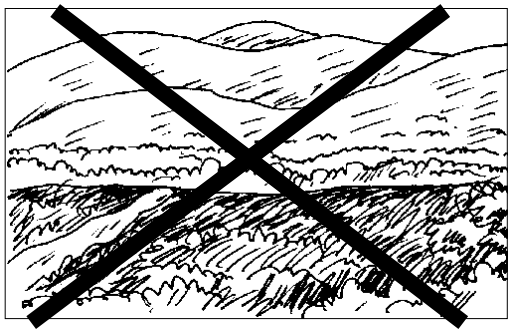
What is a good view for photo documentation?

You have to take photos where you can see the landscape but can still distinguish many single trees in your photos.





Do not take photos where you can see less than 100-500 trees. You are too close.



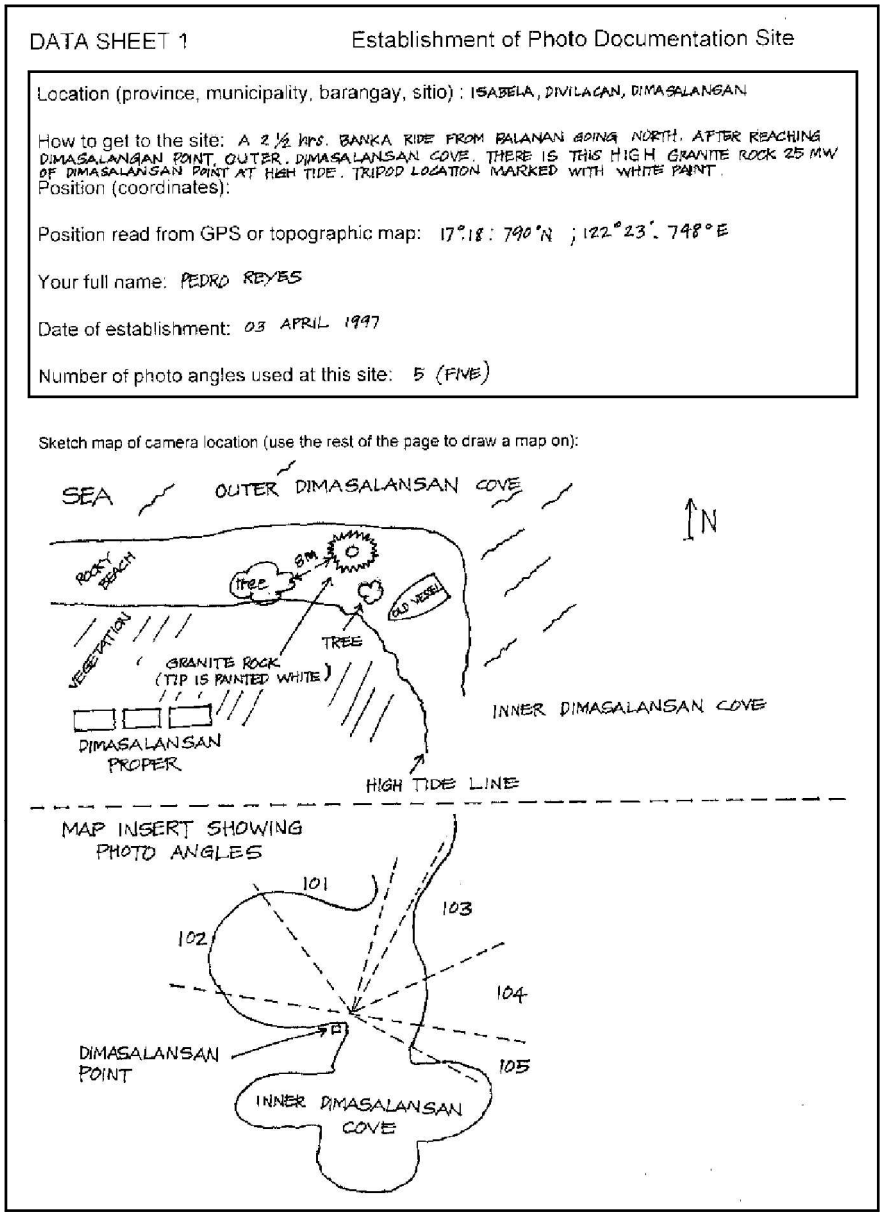
Do not take photos of landscapes where the forest is so far away that you cannot distinguish single trees.

Box 10-1. Filling in data sheet 1 when establishing a Photo Documentation site

In the data sheets for establishment of a Photo Documentation site you will have to write:

Data Sheet 1:

- Location and how to get to the site: Municipality, barangay, sitio and a full description identifying the site and how to get there (remember, you or somebody else, have to be able to return to exactly the same spot to take photographs).
- Position: Geographical co-ordinates. Indicate if GPS was used or if co-ordinates were estimated using topographic map.
- Your full name.
- Date of establishment.
- Number of photo angles used at the site.
- Sketch map of camera location and camera angles.



Box 10-2. Filling in data sheet 2 when establishing a Photo Documentation site

In the data sheets for establishment of a Photo Documentation site you will have to write:

DATA SHEET 2 Establishment of Photo Documentation Site

Location (site name): DIMASALANSAN POINT, OUTER DIMASALANSAN COVE DIVILACAN, ISABELA
Position (coordinates): 17°18 : 790"N; 122°23; 748"E
Date: 03 APRIL 1997
Your full name: PEDRO REYES
Remarks: SITE 100 NSMNP

Sketches of the photos:

1

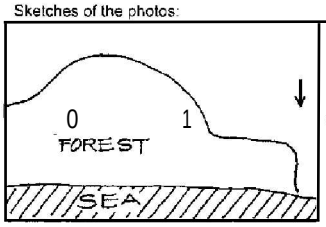


Photo name code (specific name given now to this photo): SM COVE 101

View angle: 326° VIEW TOWARDS NW PART OF DIMASALANSAN COVE
Description:
RIGHT SIDE SHOULD JUST INCLUDE W-SIDE OF MOUTH OF ENTRANCE TO DIMASALANSAN COVE

1

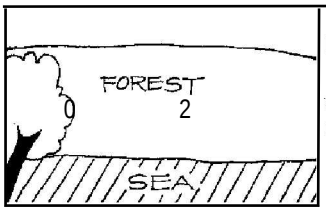


Photo name code (specific name given now to this photo): SM COVE 102

View angle: 300° VIEW TOWARDS W PART OF DIMASALANSAN COVE
Description:
LEFT SIDE SHOULD INCLUDE TRUNK OF 6 M. TALL-TREE, LOCATED 18m FROM THE CAMERA

1

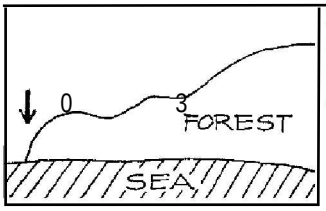


Photo name code (specific name given now to this photo): SM COVE 103

View angle: 34° VIEW TOWARDS NNE PART OF DIMASALANSAN COVE
Description:
LEFT SIDE SHOULD INCLUDE E-SIDE OF MOUTH OF ENTRANCE TO DIMASALANSAN COVE

1

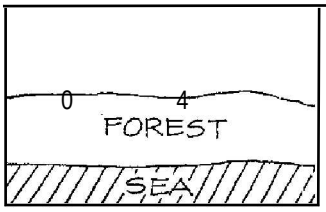


Photo name code (specific name given now to this photo): SM COVE 104

View angle: 63° VIEW TOWARDS ENE PARTS OF DIMASALANSAN COVE
Description:
SHOULD OVERLAP WITH 103 ON LEFT AND 105 ON RIGHT

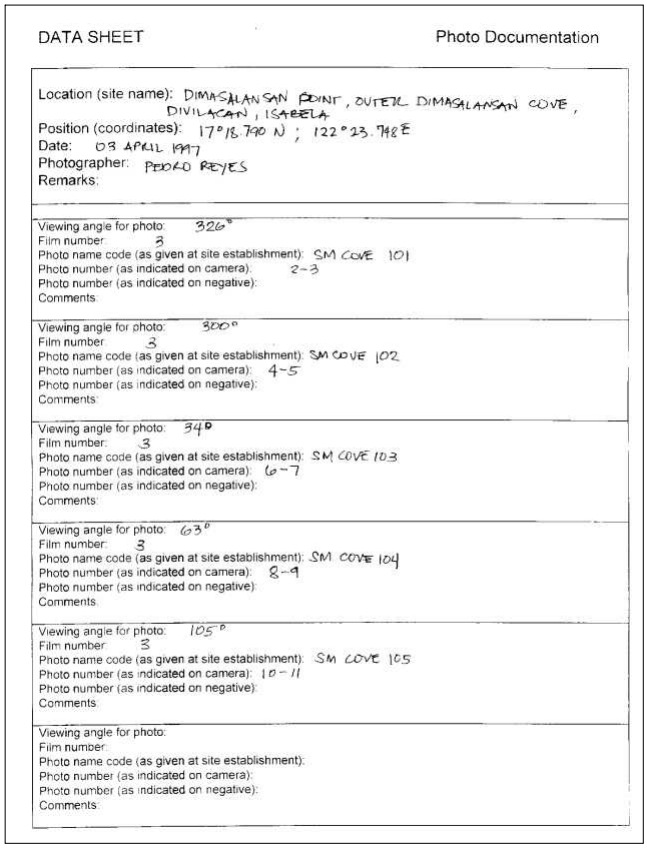
Data Sheet 2:

- Remarks: There might be signs of human activities in the area or other aspects you would like to remember.
- View angle (for each photo)
- Description of what is on the photo (for each photo)

Box 10-3. Filling in
data sheet 'Photo Documentation'

In the data sheet on Photo Documentation you must write:

- Location: the same name as used when the site was established.
- Position.
- Date and (optional) time and weather.
- Photographer: write your full name.
- Remarks: there might be signs of human activities in the area or other aspects you would like to remember.
- Viewing angle for photo.
- Film number: a specific film number which can include letters has to be written on each roll of film. This number must also be noted on the developed film.
- Photo name code (as given at site establishment).
- Photo number: this has first to be noted as indicated by the camera and later when the film is developed, the number which is actually written on the film strip along the photograph has to be noted.



DATA SHEET — Photo Documentation

Location (site name): DIMASALANSAN POINT, OUTER DIMASALANSAN COVE, DIVILACAN, ISABELA
Position (coordinates): 17°18.790 N ; 122°23.748 E
Date: 03 APRIL 1997
Photographer: PEDRO REYES
Remarks:

Viewing angle for photo: 326°
Film number: 3
Photo name code (as given at site establishment): SM COVE 101
Photo number (as indicated on camera): 2-3
Photo number (as indicated on negative):
Comments:

Viewing angle for photo: 300°
Film number: 3
Photo name code (as given at site establishment): SM COVE 102
Photo number (as indicated on camera): 4-5
Photo number (as indicated on negative):
Comments:

Viewing angle for photo: 34°
Film number: 3
Photo name code (as given at site establishment): SM COVE 103
Photo number (as indicated on camera): 6-7
Photo number (as indicated on negative):
Comments:

Viewing angle for photo: 63°
Film number: 3
Photo name code (as given at site establishment): SM COVE 104
Photo number (as indicated on camera): 8-9
Photo number (as indicated on negative):
Comments:

Viewing angle for photo: 105°
Film number: 3
Photo name code (as given at site establishment): SM COVE 105
Photo number (as indicated on camera): 10-11
Photo number (as indicated on negative):
Comments:

Viewing angle for photo:
Film number:
Photo name code (as given at site establishment):
Photo number (as indicated on camera):
Photo number (as indicated on negative):
Comments:

TIPS

1 Take photos when the light is good such as in the morning or in the early evening.

2 Do not take photos when the sun is behind what you want to photograph, otherwise you will get only a silhouette on the horizon.

3 Use a 100 or 200 ASA color print film and a readily available film brand, e.g., Kodak or Fuji. Stick to only one film brand and one photo processing shop to ensure consistent quality of your pictures.

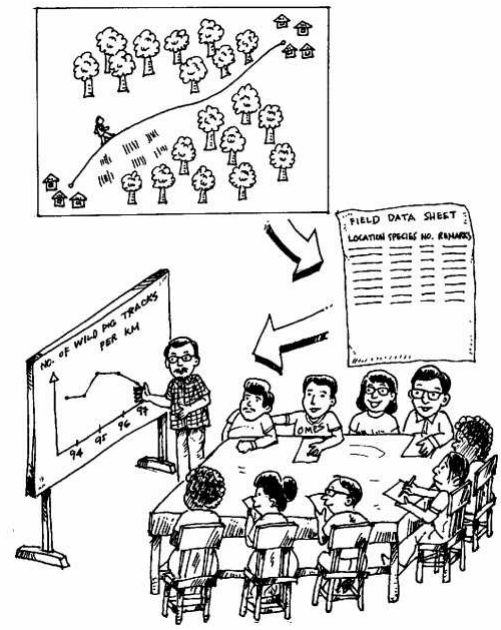
4 If your camera has a zoom lens, use the same enlargement every quarter.

7 Ground-based photos are also useful for ground-truthing of remote sensing images.

11. Transect Walk Method

This section describes the transect method for walking on foot. The method can also be used with a boat sailing along rivers and shorelines (Transect Cruise, Annex 6). Transect swimming over coral reefs and seagrass beds is described in section 12.

The Transect Walk is somewhat similar to routine patrolling using the Field Diary. However, transects are permanent, demarcated routes where there are precise recommendations as to where to walk, when to walk and what to note, etc. The recommendations aim to ensure that new and earlier data sets are comparable (Box 11-1).



EQUIPMENT

The following materials are needed: Binoculars, watch, identification guide, Transect data sheet, pencil, drinking water, and snacks. When establishing the Transect Walk route, you will also need: A topographic map, compass, a long string (50 or 100m), permanent marker (paint), a bolo, and if possible a GPS.

SUITABILITY

Useful in land areas and in drier sections of freshwater and marine areas (such as inter-tidal areas, open lake shores and wetland meadows). In areas where it is impossible to walk, you can use a boat (Annex 6). The method is not suitable in very small PAs (less than 10 ha).

PERSONNEL

This method can best be undertaken by assigned BMS protected area staff with skills in identifying species. It can also be undertaken by regular patrolling staff with the same skills. Each transect route should be surveyed by the same person every quarter. The person coordinating the conduct of Transect Walks in the protected area should also remain the same if at all possible

FREQUENCY

Each Transect Walk route should be walked once every quarter within a defined two-week period. Typically one PA staff will be responsible for 3-5 Transect Walk routes.

LOCATION OF TRANSECT ROUTES

Transect routes should be established in the most seriously threatened areas of the PA, and in the areas most important for conservation and resource use by local people. It is advisable only to establish Transect routes where the species you need to monitor are present. Transect routes are best located along patrol routes in old growth (or old secondary) forest. Some routes should pass through areas with human use, others through areas with no or minimal human use.

Box 11-1. Transect Walks: Do them the same way every time!

The Transect Walk survey has to be carried out in the same way every time:

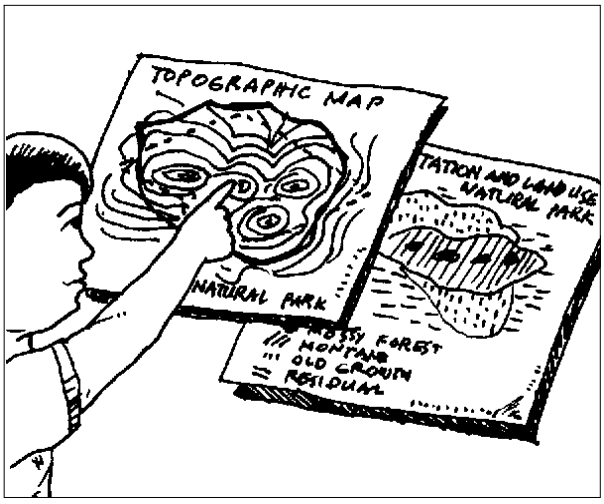
1. the same amount of time to walk (1 km per hour)
2. the same number of kilometres (2-3 kms) on
3. the same routes in
4. the same weather (if possible) at
5. the same time of the day (beginning between 6 and 7 a.m.) at
6. the same time of the year recording
7. the same species and uses in
8. the same way by
9. the same observer (or another with same identification skills, if at all possible) and using
10. the same way to estimate numbers.

Why are such rules needed?

1. Imagine what would happen if you tried to compare morning transects with midday transects: Most animals (and people) show little activity at midday. Midday data would show a false decline in biodiversity and human activity.
2. Imagine what would happen if you tried to compare data collected by an experienced and a less experienced observer: A less experienced observer would record less and the data might show a false decline in biodiversity and resource use.

STEPS

SELECTION OF TRANSECT WALK ROUTES



1 Get hold of a topographical map and, if possible, vegetation and land-use maps for the particular area.

2 Draw patrol routes and trails on the map.

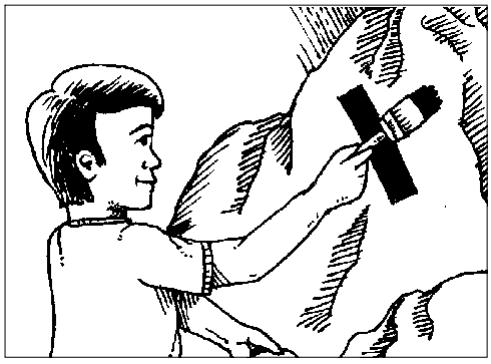
3 Are any patrolling routes passing through primary (old growth) forest? If so, they might be useful for transect surveys. Select several routes of 2-3 kilometres in different parts of the PA (preferably at different altitudes) and passing through primary (old growth) or good secondary forest. Use a small trail through closed forest (not a road with edge habitats). Avoid open areas with tall grass or bushes, and areas which are not safe to travel in when you are alone.

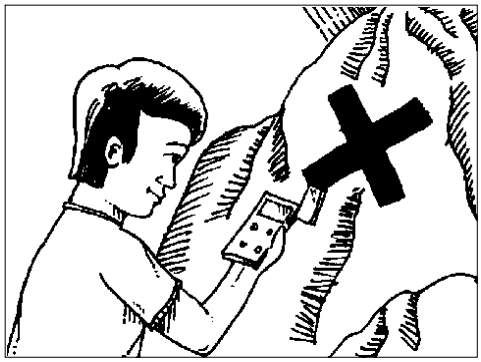
4 Do a reconnaissance of the proposed routes to check that they are possible to walk (e.g. not too steep) and that they are located inside the PA.

ESTABLISHMENT OF TRANSECT WALK ROUTES

1 Visit the proposed routes. Make sure that a 2-3 kilometres transect route can be established on each patrol route so that it passes through primary forest or old secondary forest within priority areas for conservation. If not, another site has to be selected.

2 For each selected transect route, mark the starting point of the transect with a permanent marker (e.g. paint on rock, big stone or tree, not on grass or loose soils).

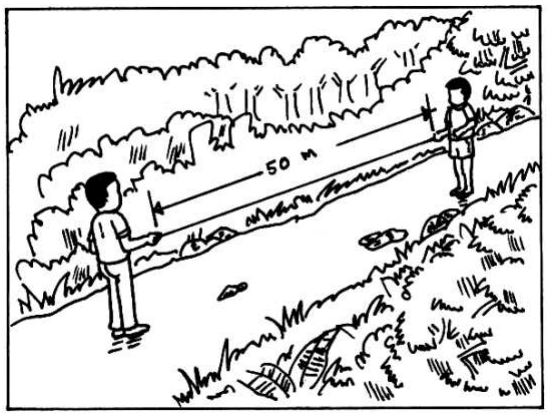




3 Use a GPS to obtain the geographical co-ordinates for the transect starting point.

4 Use a GPS (or an altimeter) to obtain the altitude for the transect starting point.

5 From the starting point, measure (using the string) and mark (using paint) every 250 m (5×50m) distance to the end of the route.



6 Note habitats (e.g. lowland forest) within each 250 m section and the condition of the forest (e.g. primary forest, logged forest, forest with kaingin, secondary growth forest, scrub, grassland, or cultivated area). Such broad categories must be noted even if a more precise description is also given.

7 Mark the end point of the transect with a permanent marker. The transect should be at least 2 kilometres and not more than 3 kilometres and it should end at a 250 meter mark.

8 Use a GPS, if available, to obtain the geographical co-ordinates for the transect end point.

9 Use a GPS (or an altimeter), if available, to obtain the altitude for the transect end point.

10 Sketch maps of routes must be prepared as well as precise descriptions of where the end points of transects are. The transect routes must also be plotted into topographic maps of 1:50,000 scale or more detailed.

11 Data to be noted when establishing a Transect Walk route is listed in Box 11-2.

Box 11-2. Data to be noted when establishing a Transect Walk route.

- Name given to the transect (e.g., name of nearest sitio, mountain or river system)
- Transect location (province, municipality, barangay, sitio)
- Geographical co-ordinates for starting point and end point and land marks along the route.
- Altitude for starting point and end point.

- Total length of transect (meters).
- Major habitat type and modification level for each 250 meters section.
- Date of establishment

- Full name
- Plot the location of the route on a topographic map.

WHEN WALKING THE TRANSECT

1 You must walk the Transect Walk route with a constant rather slow speed. The distance between two 250 meter markers has to be walked in precisely 15 minutes (that is one kilometre covered every hour). Only short stops are permitted when identifying and noting. Otherwise the survey should not be disrupted, not even if illegal activities are observed. If a Transect Walk is disrupted, it should be undertaken again a few days later.

2 You must always begin Transect Walks between 6 and 7 am and finish before 11 am.

3 You should walk the transect alone. Different observers have different identification skills and different estimates of numbers. A less experienced observer records less and data will show a false decline in biodiversity and resource use. Be as quiet as possible so as not to scare away wildlife.

4 Try to keep track of individuals or the flocks of wildlife species. If there are many individuals or flocks of a species there is a risk of double counting because of confusion from animals appearing in all directions. Species that move quietly between places where they sing or call might also cause confusion.

DATA STORAGE AND MANAGEMENT

After each Transect Walk, the observations written in the Transect Walk data sheet must be tallied by the BMS observer. The filled out form should be turned over to the BMS Coordinator and filed in a ring-binder and stored in the BMS filing system at the Protected Area Office. A copy should be submitted to the PENRO for safe storage.

TIPS

1 Use a good quality pencil of medium point, no. 2 or 3. Never use ball-point pen as this ink tend to fade or run when wet.

2 Always store field notes/data sheets in a waterproof container such as a plastic bag.

3 Make sure to bring water and snacks with you on the Transect Walk.

4 Don't walk transects in heavy rain or typhoons. However, be prepared for a few drops of rain. It is time to cancel the walk when there is so much rain that you cannot use your binoculars.

8 When you survey the transect route wear clothes with dark colors. Do not wear white or bright colored clothes since this would scare away wildlife.

9 It is difficult to estimate numbers in groups of Long-tailed Macaque (Unggoy). When you encounter this species, write your best estimate of the group size as well as the minimum and maximum number. Example: Unggoy 4 (min. 3, max. 5)

FIELD DATA SHEET FOR TRANSECT WALK

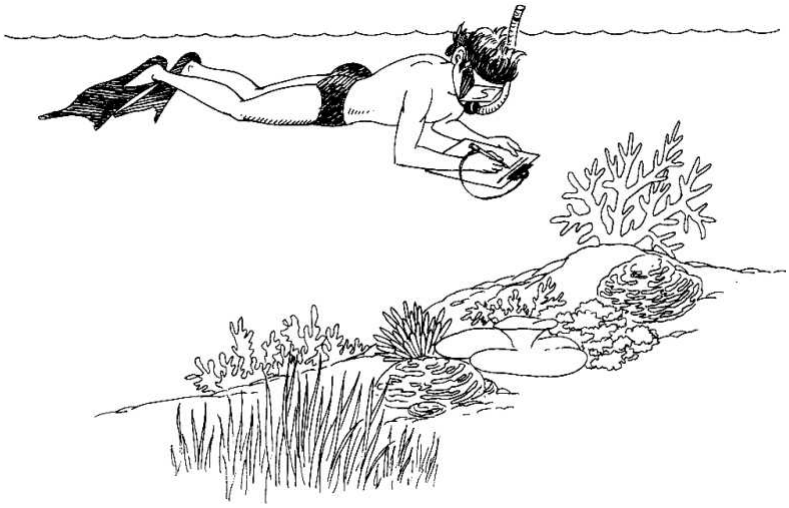
Observer: PEDRO REYES
Location: THE FOREST TRANSECT ON THE TRAIL FROM X TO Y
Length of transect: 3 Km.
Date: OCT. 13, 1997
Starting time (must be between 6.00 and 7.00) 6:01 am
Comments (e.g. on weather): NO WIND OR RAIN

Species/use recorded	Number	Time (or distance from transect start)	Remarks on what was recorded
PHIL. DEER	1	6:10	TRACKS (one or two individuals)
PIGEON	3	6:15	I COULD SEE THEM UP IN THE CANOPY PERHAPS THERE WERE MORE.
TARICTIC HORNBILL	1	6:25	HEARD
RED JUNGLEFOWL	1	6:30	HEARD, PERHAPS FROM THE VILLAGE
PERSON	2	6:40	TOURISTS WITH BINOCULARS, PERHAPS FROM AMERICA.
CHAIN SAW	1	6:55	HEARD FAR AWAY. PERHAPS FROM OUTSIDE THE P.A.
PHIL. PIG	5	7:20	MANY TRACKS. I ESTIMATE 5 INDIVID
PIGEON	1	7:30	HEARD
STUMPS	10	7:50	THE SAME NO. I COUNTED HERE LAST TIME (JULY)
TARICTIC HORNBILL	1	7:51	PERCHING. MALE.
REDJUNGLEFOWL	1	7:58	HEARD.

Figure 11-1. Example of a filled in Field Data Sheet for a Transect Walk

12. Transect Swim Method

This method is an adaptation of the Transect Walk method to marine areas. The method records changes in priority marine organisms, resource uses and threats. It entails swimming over the top of seagrass beds and coral reef in predetermined survey routes with the use of skin diving equipment (i.e. mask, snorkel and rubberized fins). Local communities and volunteers assigned to the BMS could use their wooden goggles and wooden fin.



EQUIPMENT

The following materials are needed: mask, snorkel and fins, plastic writing slate or plastic laminated Transect data sheets, pencil, identification guide, waterproof watch and compass. It is also recommended to have drinking water and snacks. When establishing the Transect Swim route, you will also need cement, a long string (25m), a map of the area, and, if possible, a GPS.

SUITABILITY

Useful in marine areas with shallow (less than 20 feet of water depth) coral reefs and seagrass beds in areas of good visibility.

PERSONNEL

This method should be undertaken by regular BMS staff able to swim and to identify marine habitats and organisms. It can also include volunteer coastal indigenous people and other community members with vested interest in maintaining marine resources. Each transect route must be surveyed by the same BMS observer every time.

FREQUENCY

Each survey path should be surveyed once every quarter within a defined two-week period. Two of the surveys should be during the inter-monsoon seasons (May and October).

LOCATION OF TRANSECT SWIM ROUTES

Transect Swim routes should be located along patrol routes near shallow coral reefs or seagrass beds that are particularly threatened or important for protected area communities and for conservation.

STEPS

SELECTION OF TRANSECT SWIM ROUTES

1 Obtain a map of the area.

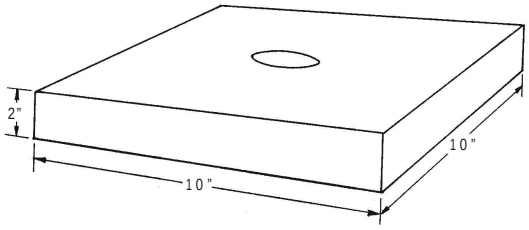
2 Draw the patrol routes on the map. Are any patrol routes near coral reefs or seagrass beds which are particularly threatened or important for protected area communities and for conservation? If so, a route from the seagrass bed to the shallow (i.e. 15-20 feet) portions of the coral reef might be useful for a Transect Swim. Select several transect routes of 100-500 meters.

3 Photocopy and/or enlarge the map of the transect routes to the desired useful scale. For example: 1:50,000 scale enlarged 5× gives 1:10,000.

4 Locate and mark the preferred transect routes on the map.

ESTABLISHMENT OF TRANSECT SWIM ROUTE

1 Visit the selected sites. Make sure that a route of at least 100 meter can be established. If not, another site has to be selected. If the area with seagrass bed and coral reef is large and the observer is a good swimmer, the route can be extended to 500 meter.



Permanent marker of cement

2 For each selected Transect Swim route, establish permanent markers of cement at the sea bed at the start and end points and for every 25 meter. In addition, if the route is parallel to the shore mark the tree (or cliff, or other land mark) found on the beach opposite the start and end points of the route.

3 Write down the major seabed habitat type for each 25 meters section. Major seabed habitat types are: seagrass bed, live coral, dead coral, mud/sand, rock. Rock is stones larger than finger-size.

4 If you have a boat and a GPS, obtain the geographical co-ordinates for the start and end points.

WHEN SWIMMING THE TRANSECT

1 You must always begin Transect Swims at the same time of the day, preferably at 9 am.

2 From the start point, swim along the survey route for 5 minutes. Maximum speed of swim should be only 25 meters every 5 minutes. This slow speed will enable you to see a lot.

3 Record the priority marine organisms you observe. For example, commercial fish larger than an outstretched hand, butterfly fish, sea cucumbers, urchins, crown-of-thorn starfish, giant clams.

4 Take note of any signs of resource uses and threats you observe. For example, presence of blasted or bleached corals, siltation, crown-of-thorn starfish infestation, visible man-made pollution, land plant debris, oily film on the water, broken corals etc.

5 Every 5 minutes, pause, and record all observations on the plastic laminated Transect data sheet (Figure 12-1). Relax for 1-2 minutes.

6 Repeat steps 2-5 until the entire route has been surveyed.

7 Add other notes (e.g., recent storms, nearby developments, signs of fishing, visibility in water reduced by sedimentation, etc.).

8 Transcribe the data onto a Transect data sheet which is not laminated.

DATA STORAGE AND MANAGEMENT

The filled out data sheet should be turned over to the BMS Coordinator and filed in a ring-binder in the BMS archive at the Protected Area Office. A copy should be submitted to the PENRO for safe storage.

TIPS

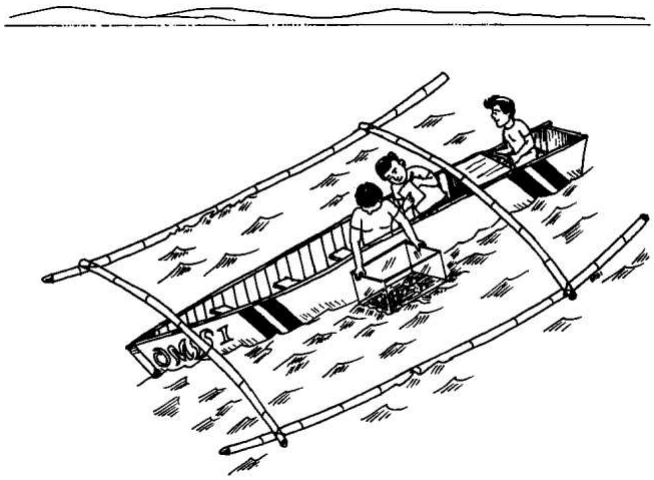
1 Be careful when you estimate size underwater. Everything appears larger and closer than it actually is.

2 If you do not have a plastic writing slate, take a blank Transect data sheet (Annex 7), photocopy it, place it back to back and laminate it in plastic. Roughen the plastic surfaces with fine sandpaper. Now it can be written upon underwater with a pencil.

3 If you are not familiar with using a mask, snorkel and fins, you can observe the sea bed from a boat with a glass bottom box (60 x 60 x 40 cm) instead.

The box should be tied to the side of the boat allowing its top to float on the water.

When surveying the transect, you should stop every 3 minutes and record your observations. The speed should be 50 meters every 3 minutes equivalent to a slow walk.



Use of a glass bottom box instead of mask and snorkel

FIELD DATA SHEET FOR TRANSECT

Observer: FILEMON T AMBASAKAN

Location (site name): NAGBALAYANG TO MAUGAN, BASCO BAY

Length of transect: 200M

Date: 8 MAY 2000

Starting time (TW between 6 and 7 am. TS between 9 am and 3 pm): 9:00

Comments (e.g. on weather): VISIBILITY IN WATER EXCELLENT

Species/use recorded	Number	Time (or distance from transect start)	Remarks on what was recorded
		9:00 - 9:05	
FISH TRAP	2		FOR REEF FISH
ANCHOR	1		
BUTTERFLY FISH	6		
SEA CUCUMBER	2		
		9:08 - 9:13	SOME SEDIMENT IN WATER
BLASTED CORAL	2		BLASTED LONG TIME AGO (PERHAPS LAST YEAR)
GLASS BOTTLE	1		
URCHIN	14		

Figure 12-1. Example of a filled in Field Data Sheet for a Transect Swim

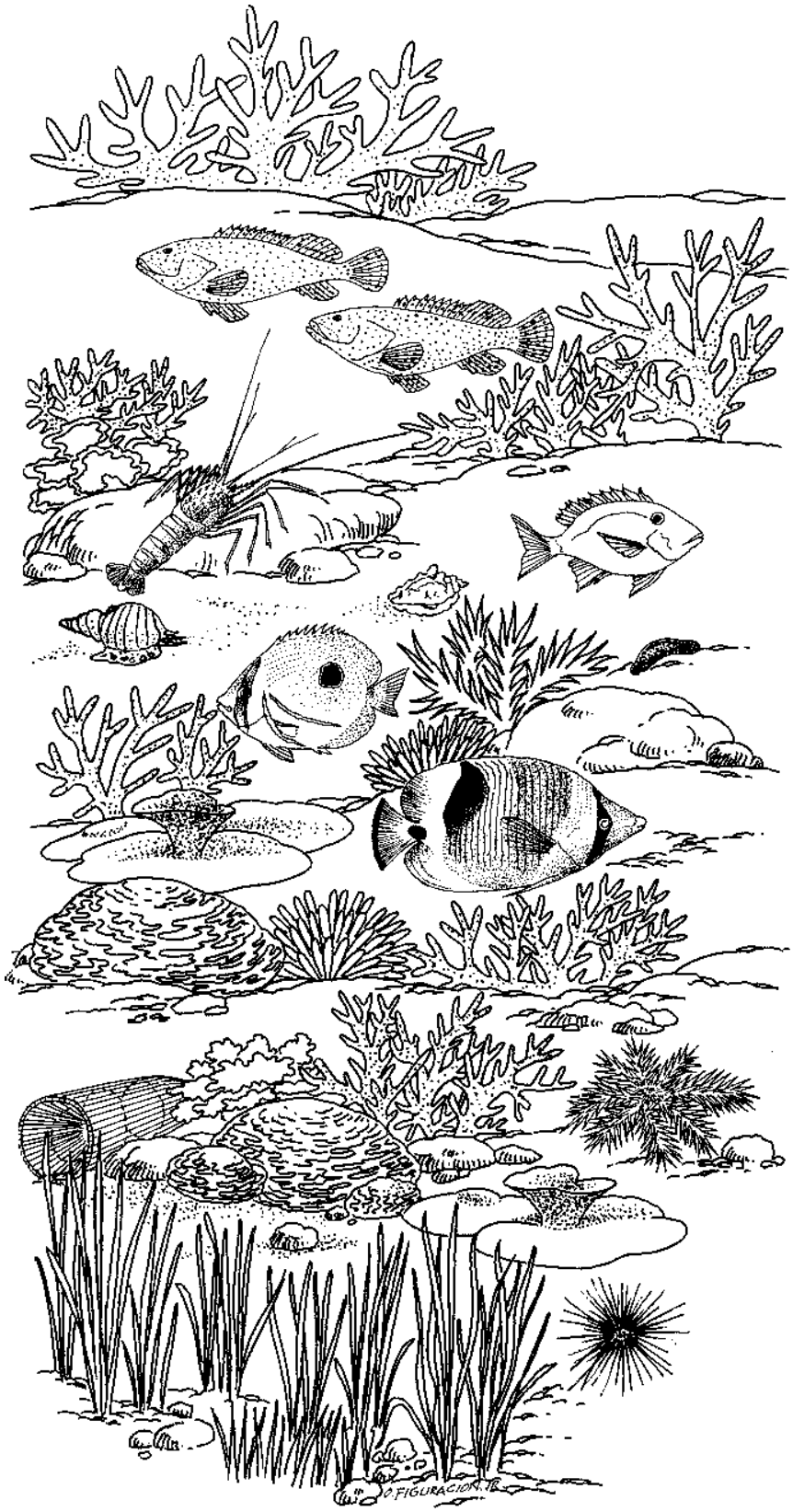


Figure 12-2. Sample picture of Transect Swim route

13. Which resource uses and which species should you monitor?

Biodiversity in Philippine protected areas encompasses thousands of life-forms, many of them not even named and described. It is impossible to monitor all of these.

The biodiversity of a protected area will remain almost the same as long as no large-scale habitat changes take place. If habitat changes do take place, these will probably be the result of human activity. It is therefore reasonable to focus biodiversity monitoring mainly on key habitats and uses in a protected area. It is very unlikely that wildlife species would become extirpated without major human activity followed by habitat changes.

STEPS

1 Look at the list of suggested signs of resource uses and species to monitor (Box 13-1 and 13-2).

These 'indicators' of resource use and biodiversity have been selected based largely on the following criteria for usefulness and practicality:

- those which reveal trends (changes) in resource use and biodiversity;
- those which are easy and cost-effective to collect data on, analyze and report on;
- those which are meaningful to local people;
- those which provide for continuous assessment over a wide range of disturbance levels.

There are species which are more sensitive or more threatened than those selected. None of these, however, is easily identified. Results based on trends of species which are difficult to identify are likely to reflect the identification skills of the observer rather than a change in biodiversity.

2 Identify which of the resources uses and species in Box 13-1 and 13-2 are likely to occur in your area. We recommend that you monitor those.

3 Are there other signs of resource uses or other species, which in your opinion are equally useful and practical to monitor? Then you may consider adding these to your list.

You can add as many signs of resource uses and species as you like, but we suggest for simplicity that you do not add more than a total of 5 extra resource uses and species to your list in the first years. Discuss your selection of indicator resource uses and species with the PASu or CENRO in charge, the PAMB and other knowledgeable persons, including representatives of indigenous people and other local communities.

Make sure the list includes representative resource uses and some of those species that are of high importance for use by the local communities.

4 Now agree with the PASu or CENRO in charge on the list of signs of resource uses and species to be monitored in your area.

Box 13-1. Forest areas: Suggested species and signs of resource uses to monitor (a list to select from)

English name	Scientific name	Tagalog name	Indicator for
BUTTERFLY			
Merry Widow	*Atrophaneura semperi*		f
Pretty Baby	*Pachliopta* spp.		f
Rhapsody	*Achill ides daedalus*		f
Kirirai	*Lamproptera meges/L. curius*		f
BIRDS			
Philippine Eagle	*Pithecophaga jefferyi*	Aguila, Manaol, Mamboogook	f, H
Rufous Hornbill	*Buceros hydrocorax*	Kalaw	f
Tarictic Hornbill	*Penelopides* spp.	Tariktik	f
Red Junglefowl	*Gallus gallus*	Labuyo, Manok ihalas	f, H
Pigeons and doves[1)]	Columbidae	Kalapati	f, H
Bleeding-heart Pigeon	*Gallicolumba* spp.	Lagbaan, Puñalada	f, H
Philippine Eagle-Owl	*Bubo philippensis*	Kuwago	f
MAMMALS			
Long-tailed Macaque	*Macaca fascicularis*	Unggoy	f, H
Philippine Warty Pig	*Sus philippensis*	Baboy-damo, Baboy-ihalas	f, H
Philippine Brown Deer	*Cervus mariannus*	Usa, Binaw	f, H
Large flying foxes	*Acerodon jubatus/ Pteropus vampyrus*	Bayakan, Kabog	f, cfo, H
SIGNS OF RESOURCE USES			
Stump		Stump	L
Piece of timber		Tablon	L
Sound of chainsaw		Tunog ng chainsaw	L
Charcoal stove in use		Lutuan sa uling na ginagamit	L
Forest products, e.g. on market		Produktong galing sa kagubatan, halimbawai sa palengke	U
Fishing gear and traps		Gamit at bitag sa pangingisda	F
River water availability/quality		Packakaroon ng tubig sa ilog/kalidad	L
Person (and activity)		Tao (lahathang ginagawa)	U

LEGEND FOR INDICATOR COLUMN:

HABITATS:

f	forest habitat
cfo	coastal forest habitat
m	marine habitat
w	fresh/brackish water habitat

HUMAN ACTIVITY:

B	by-catch
D	destructive fishing method
E	egg collecting
F	fishing and harvest of shellfish/sea cucumbers
H	hunting
L	logging
U	resource use
O	outsiders harvest resources

(1) Experienced observers may be able to distinguish between different pigeons and doves

Box 13-2 Freshwater and marine areas: Suggested species and signs of resource uses to monitor (a list to select from). Legend on page 37.

English name	Scientific name	Tagalog name	Indicator for
SPECIES BELOW WATER			
Sea cucumber	Holothuroidea	Balatan	m, F
Urchin	Echinoidea	Tuyum	m
Crown-of-thorn starfish	*Acanthaster planci*		m
Shark	Selachimorpha	Pating	m, F, D
Commercial fish (1)	Several families	Isdang pambenta	m, F
Butterfly fish	Chaetodontidae	Paro-parong dagat	m, F
Sea horse	*Hippocampus* spp.		m, F
Squid/octopus	Cephalopoda	Pusit/Pugita	m, F
Giant Clam	*Tridacna* sp.	Taklobo/Manglet/ Basa	m, F
Window Pane Shell	*Placuna placenta*	Kapis	m, F
Smooth Top Shell	*Trochus niloticus*	Samong	m, F
Turban Shell	*Turbo crassus*	Buteng	m, F
Giant Triton	*Charonia tritonis*	Tambuli	m, F
Lobster	Astacidea	Banagan	m, F
OTHER SPECIES			
Coconut Crab	*Birgus latro*		m, F
Marine turtle	Chelonidae	Pawikan	m, B, E, H
Crocodile	*Crocodylus* spp.	Buwaya	m, w, H
Seabird breeding colony		Pugaran ng mga ibong pandagat	m, E
Duck	Anatidae	Pato	w, H
Large heron-like bird	Ardeidae, large species	Malaking tagak	m, w, H
Small heron-like bird	Ardeidae, small species	Maliit na tagak	m, w, H
Wader	Charadriiformes		m, w, H
Other waterbird			m, w, H
Philippine Scrubfowl	*Megapodius cumingii*	Okong	cfo, E
Dugong	*Dugong dugon*	Dugong/Duyong	m, H
Small-Clawed Otter	*Amblonyx cinerea*	Dingguin	m, w, H
Dolphin/whale	Cetacea	Lumba-lumba/Balyena	m, B
SIGNS OF RESOURCE USES			
Fish and wetland products, e.g. on market		Isda at produktong mula sa basang-lupa, halimbawa sa palengke	F, U
Dunghill and new garden decoration of shells		Kabibing palamuti sa hardin	F
Large number of dead fish or other animals/plants		Malaking bilang ng patay na isda o ibang hayop	D (possible)
Fishing vessels of outsiders		Lantsa ng dayuhan	O
Fishing gear and traps		Gamit at bitag sa pangingisda	F
Charcoal stove in use		Lutuan sa uling na ginagamit	L
Person in inter-tidal area		Tao sa baybayin	F
Person (and activity)		Tao (lahathang ginagawa)	U
Sound of dynamite-fishing		Tunog/putok ng nag-didinamita	D

(1) Only individuals larger than an outstretched hand

14. From field data to results: Data organisation, analysis and interpretation

You should ensure that at the first meeting of the Executive Committee of the Protected Area Management Board every quarter the results of the previous quarter's biodiversity monitoring will be on the agenda.

In due time, prior to this meeting you should look over your data and try to highlight any changes over time in resource use or abundance of species. For the Photo Documentation and Transect methods, a period of 4-6 years will normally be the minimum duration of monitoring that could yield any meaningful trends. For the Focus Group Discussion and Field Diary methods, however, even the initial monitoring activities can provide useful results.

This chapter describes the data organisation, analysis and interpretation for each of the Biodiversity Monitoring System methods.

14.1 Focus Group Discussion method.

DATA ORGANISATION:

1 Draw up a report using the formats in Annex 4, after each Focus Group Discussion. The report should comprise:
- Main issues discussed, a narrative description of the discussion of perceived changes, problems and solutions related to key resource uses and issues (Format 1),
- A matrix for resource uses (Format 2), and
- A matrix for species observed (Format 3).

The narrative description of perceived changes and problems/solutions must be made after each meeting even if the group do not perceive any changes since last time.

2 Take all the reports from the last quarters. List all the monitoring themes. Divide them into those that indicate change (in wildlife, resource use or in effectiveness of the protected area to provide benefits to local communities), and those that do not.

ANALYSIS AND INTERPRETATION:

3 Do the findings correspond to your expectations? Compare the findings with the results of monitoring in previous quarters. Have several Community Monitoring Groups reported the same problems? Are there perceived trends that are common to several Groups? If so, are the changes caused by a change in monitoring routines (for instance, when members of the Group begin farming instead of fishing, or when the composition of the Group

changes). Or could they be caused by weather or other natural background conditions? Compare with the results of other methods.

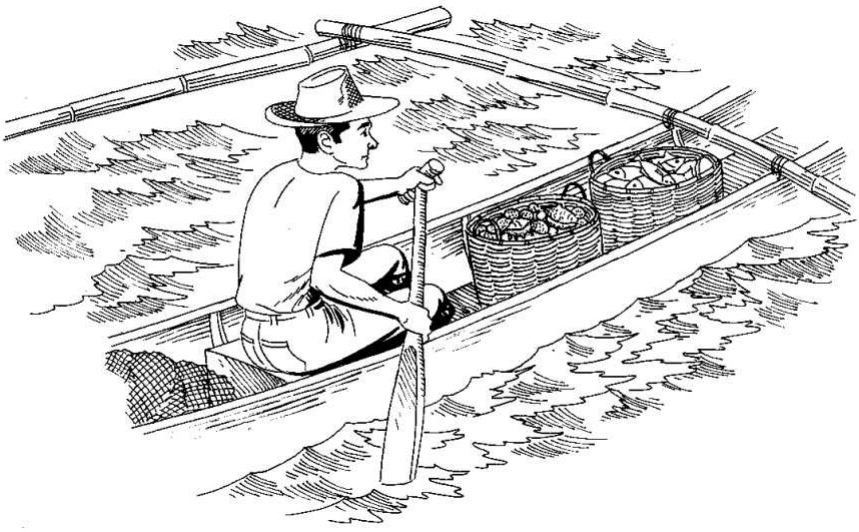
4 Are there indications of over-harvesting situations or consistent resource use problems that need to be discussed with the villagers at a community meeting?
Are there any changes that are so serious they need immediate attention from the PASu or CENRO in charge (such as big tree stumps indicating large-scale logging, or foreign fishing vessels using destructive fishing methods)?

5 If there are major changes not caused by a change in monitoring routines or natural background conditions then you should assess the reason for the change, the importance of the change and whether any management intervention is appropriate (Chapter 15). It might not be the amount of a resource harvested that has changed but perhaps the time it takes to harvest the resource, the number of people involved in harvesting a resource, or the number of dealers or middlemen.

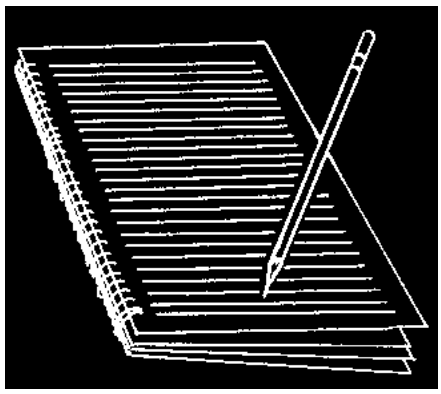
6 Present the findings to local people at community meetings and ask for their advice. Do they consider the findings relevant? Discuss possible actions to be taken by the people themselves, the Protected Area Management Board and the Local Government Units (Chapter 15).

TIPS ON MONITORING FISHERY:
When monitoring the fishery through the Focus Group Discussion method (Annex 5), take the filled-in Fishery Record Sheets and look at the catch per unit effort (CPUE) from the same seasons in the same barangays. See if any changes have occurred. Then continue with steps 3-6 above.

Fish and other freshwater and marine resources are heavily used. Sometimes the CPUE will be based on a large amount of data, making it likely that observed trends are real. The changes in CPUE are often of very significant and immediate importance to the communities. In your interpretation, look at both the reported CPUE as well as the perceived trends and problems as discussed with the Community Monitoring Groups.



14.2 Field Diary method.



DATA ORGANISATION:

1 Take your note-book (or ring-binder) with your Field Diary.

2 Arrange all resource uses and species within a certain area (ex. the protected area) and a certain time period (ex. 3 months) in alphabetical order. Example: Sitio Diclaclong; January-March 2000; Fern, Narra, Pahutan, Rattan, Wild Pig, Tambuli, etc.

ANALYSIS:

3 Calculate the number of records of each.
Example: Ferns 1+1+1=3 records, Narra flitches 1+1=2 records, Pahutan 1+1=2 records, etc.

4 Calculate the number of individuals or bundles or bunches (depends on unit used for measuring the quantity of the item).
Example: Ferns 2+3+2=7 bundles, Narra flitches 4+3=7 pieces, etc.

5 If you have a map plot those records you find particularly interesting (threats, resource uses of particular importance to local communities, threatened species, etc.).
Example: map of records of Narra flitches, Diclaclong, January-March 2000.

INTERPRETATION:

6 Are there indications of over-harvesting situations, or consistent resource use problems that need to be discussed with the villagers at a community meeting?
Are there any observations that are so serious that they need immediate attention from the PASu or CENRO in charge? Example: large number of Narra flitches, or large-scale killing of marine turtles.

7 Do the findings correspond to your expectations? Compare the results with results of monitoring in previous quarters. Are there major changes in numbers or distribution of records of resource uses and species?

8 If so, are you sure the changes are not caused by a change in patrol routines (change in sites visited, duration of time on each site, number of people talked to at each site, etc.)? Or perhaps by weather, seasons or other natural background conditions? Compare with the results of the other methods.

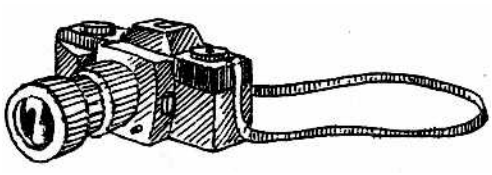
9 If there are major changes not caused by a change in patrol routines or natural background conditions, then you should assess the reason for the change, the importance of the change and whether any management intervention is appropriate (Chapter 15).

14.3 Photo Documentation method.

ORGANISATION OF THE PHOTOS:

1 Take the ringbinder or photo-album with the photos.

2 Look at all photos taken from the same view-point.



3 Begin with the oldest photo.

4 Have any changes occurred over the months?

5 Continue with photos from the other view-points.

ANALYSIS AND INTERPRETATION:

6 If there are major differences between the photos you should carefully analyse whether they are caused by a change in the natural background conditions. Perhaps the light, the cloud cover or the weather were different at the time when the photos were taken. Or maybe a difference is merely the result of the photos being taken in different seasons.

7 If there are major differences that are not caused by changes in the natural background conditions, then assess the importance of the differences. For instance, check whether the same differences occur in photos from other view-points.

8 If you consider that the differences are important, then try to identify the reason for the differences. Differences can, for example, be caused by land-slides, swiddening, logging, or forest conversion for farming or grassland, etc.

9 If differences are caused by a change in land-use or size of vegetation type blocks, you should compare this with the results of the other methods and assess whether any management intervention is appropriate (Chapter 15).

10 See whether selected photos can serve as a basis for discussing management initiatives and for demonstration purposes in meetings with the PAMB and local communities. You may also want to quantify the differences by calculating how many photos show significant differences in vegetation or land-use, or even by estimating for each photo the proportion of the photographed land that has been subject to change.

11 After having looked at the photos, return them to their ring-binder or photo-album so they will not be damaged by dust.

14.4 Transect methods.

This section describes the data organisation, analysis and interpretation of transect methods walked by foot on land (Transect Walk) and swum over coral reefs and seagrass beds (Transect Swim). If you are carrying out transects from a boat, the data organisation, analysis and interpretation follows the same procedure as described for the Transect Walk.

Transect Walk method.

DATA ORGANISATION:

1 Take your Transect Walk field data sheets.

2 For each Transect Walk, score the observations in your data sheet according to species and resource uses.

Example:

Species	Score	Sum
Deer	|	1
Pigeon	||||| ||	7
Persons	||	2
Rattan gatherers	||||	4

ANALYSIS:

3 For each species or resource use, divide the sum by the length of your transect in kilometres. This will give you the frequency of your observations per kilometre ('relative abundance'). After a few years a graph can be made showing relative abundance of a species or resource use per quarter or per year.

Example with a transect which is 2 km long:

Species	Sum	Individuals/km
Deer	1	0.5
Pigeon	7	3.5
Persons	2	1.0
Rattan gatherers	4	2.0

INTERPRETATION:

4 Compare the results with results from the same transect in previous quarters (do not compare between different species or resource uses, or between different transect routes). Do the findings correspond with your expectations? Are there major changes in the relative abundance of any species or resource use?

5 If so, you first need to assess whether the data is sufficiently extensive.

When there is little data, differences are often caused by chance alone. For example, if you flick a coin twice and see a head both times, you cannot be sure that there is a head on both sides of the coin. If you flick the same coin five times and still see a head every time, you are more sure that both sides have a head. However, it could still happen by chance.

It is the same with the monitoring data. The more data and the clearer change (or 'trend') they show, the more you can be sure that the trend is real.

Here are some examples for you to consider:

- absence of observations of a species or resource use does not necessarily mean absence of the species/resource use (if you do not record wild pigs in your transect, it does not mean that wild pigs are extirpated in your protected area);

- a decrease in the number of observations of a species does not necessarily mean that the species is actually declining;

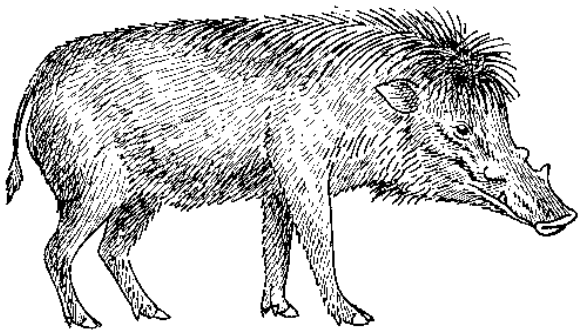
- absence of a uniform trend or pattern in your data does not imply errors in your monitoring (it could just be because you have too few records to show real trends).

6 Secondly, you must assess whether the changes could have been caused by a change in monitoring routines (timing of the Transect Walk, abilities of the observer to detect wildlife species by their sounds, etc.), or a change in staff (remember the Transect Walk should be surveyed by the same person every quarter).

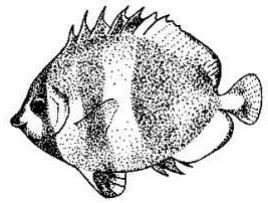
7 Thirdly, you should assess whether the changes could have been caused by seasonal or annual change in the ability to record wildlife or resource use, or by weather or other natural background conditions.

8 If there are major changes that are not caused by chance (insufficient data), or a change in monitoring routines or staff, or natural background conditions, then you should assess the reason for the change, the importance of the change and whether any management intervention is appropriate (Chapter 15).

TIPS ON WILD PIGS:
When analysing data on wild pigs based on foot prints, use “number of 250 meter transect sections with signs of pigs” instead of “number of individuals recorded” in Step 2. Step 3 will then give you “number of transect sections with signs of pigs per kilometre”. Then continue with steps 4-8 above. It is difficult to estimate number of wild pigs based on foot prints. This procedure will give a more reliable estimate of the relative abundance.



Transect Swim method.



DATA ORGANISATION:

1 Take the ring-binder with the Transect Swim data sheets.

ANALYSIS:

2 For each Transect Swim, score the observations of marine organisms, signs of resource uses and threats according to species and signs.

Example:

Species/ sign of threat	Score	Sum
Butterfly fish	𝍸	6
Urchin	|	1
Crown-of-thorn starfish	|	1
Blasted coral	|||	3

INTERPRETATION:

3 Compare the results with results of monitoring in previous quarters (do not compare between different species groups, or between different sites). Do the findings correspond with your expectations? Are there major changes in the occurrence of marine organisms, or the signs of resource uses and threats?

4 If so, you first need to assess whether the data is sufficiently extensive. When there is little data, differences are often caused by chance alone. The more data and the clearer change it shows, the more you can be sure that the change is real.

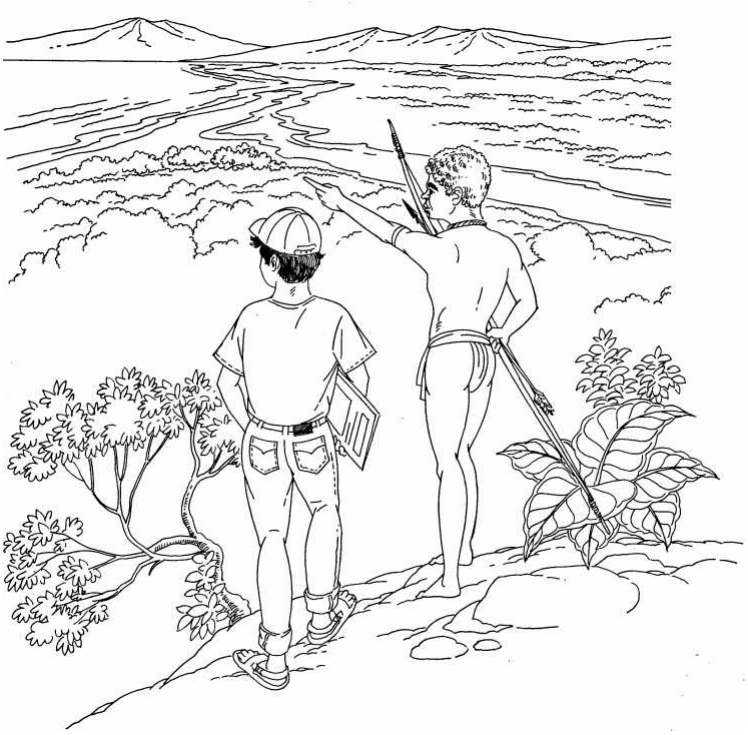
5 Secondly, you must assess whether the changes could have been caused by a change in monitoring routines (ability of the BMS observer to detect marine organisms, etc.), or a change in staff (remember transect routes should preferably be surveyed by the same person every time).

6 Thirdly, you should assess whether the changes could have been caused by change in the ability to see the marine organisms, or by weather or other natural background conditions.

7 If there are major changes that are not caused by chance (insufficient data), or a change in monitoring routines or staff, or natural background conditions, then you should assess the reason for the change, the importance of the change and whether any management intervention is appropriate (Chapter 15).

15. From results to management action

The most challenging aspect of the Biodiversity Monitoring System is that of being able to move from your results to a position of identifying appropriate management responses.



We trust that you have already ruled out the possibility that the observed change in resource use or in the abundance of a species is caused by change in monitoring efforts, weather, or seasons (or other biases).

If you consider that the change you have observed is important, it is now time to identify:

- the reason for the change, and
- whether any management intervention is appropriate.

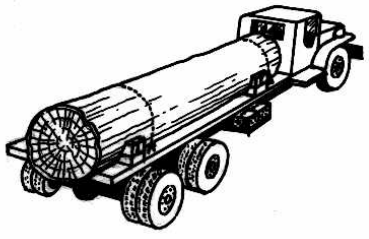
STEPS

1 Identifying the reason for the change. Since change in biodiversity in a protected area is often related to the human use of the area, you need to know what the likely impacts of different human activities are in order to identify the reason for the change. Examine the possible impacts of the human activities in your area and assess whether the change may have been caused by any of these. In addition, use information on possible reasons for change from the Focus Group Discussions and Field Diaries.

Human activities can be grouped into those that involve serious destruction of natural habitats (such as lowland forests, montane forests, marshes and coral reefs) and those that only affect single species.

Human activities that involve serious destruction of forest habitats include:

- logging using bulldozers and trucks,
- carabao logging,
- kaingin swiddening,
- agricultural development,
- industrial development,
- mining, and
- road construction.



A summary of the common impacts of these activities is provided in Box 15-1.

Box 15-1. A summary of the common impacts of logging, kaingin, agricultural development, industrial development, mining, and road construction in or adjacent to forest protected areas.

Increased access and in-migration. Increased access to the interior of the protected area due to new roads and trails, and increased in-migration and pressure on land for farming.

Fragmentation of habitat. Further degradation, fragmentation and destruction of the remaining small areas of natural habitat, which may eventually lead to the total disappearance of these habitats.

Extinction of plant and wildlife. Decline in the diversity and population of plants and animals of importance to conservation and local use. For instance, many globally threatened species are found in lowland forest, and some occur only in this habitat; those species would become extinct in the protected area if the remaining lowland forest disappeared.

Deterioration of watershed functions. Destruction of the vegetation cover, leads to further deterioration of watershed functions and increased occurrence of floods, landslides, soil erosion, sedimentation of rivers, poor quality of potable water, incidence of fires, and a dryer and hotter micro-climate.

Decline in fish stocks. Sedimentation of rivers and coastal waters leads to a decline in the stocks and diversity of riverine and marine fish, and degradation of coral reefs and sea grass beds, which are spawning and nursery areas for fish and crustaceans.

Marginalisation of local communities. Local communities, directly dependent on a diversity of forest and wetland resources, become increasingly marginalised and forced to engage in intensive extractive activities.

Damage of crops. Destruction of natural habitats may dislocate animals and drive them to infest or feed on crops.

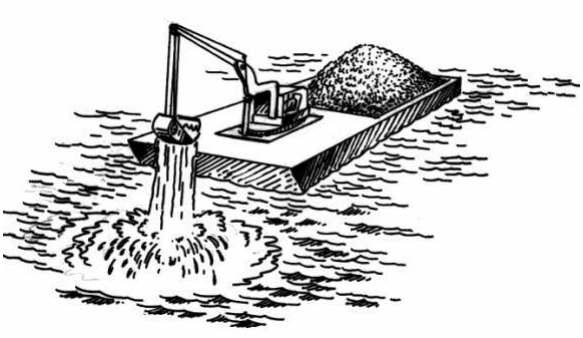
Water pollution. Mining and agricultural intensification, such as development of 'high value crop plantation' with high inputs of fertilizers and pesticides, may contaminate water sources.

Human activities that involve serious destruction of freshwater and marine habitats include:

- aquaculture development
- land reclamation for rice farming
- construction projects using rubble from corals
- charcoal and firewood production in mangroves
- fishing with dynamite, poison, compressor or electricity
- large-scale commercial fishing
- large-scale recreational tourism (with watersports, golf courses, etc.), and
- the introduction of exotic fish.

Freshwater and marine habitats may also be indirectly destroyed by human activities in neighboring or upstream areas causing pollution or sedimentation. These activities include:

- mining
- logging using bulldozers and trucks
- large-scale agricultural development (including piggeries)
- industrial development (including pulp and sugar mills)
- urban development
- road construction, and
- excavation of sea and riverbed materials.



In freshwater and marine areas, you should be on the lookout for situations of over-harvesting of fish and other species, as this will happen easily here where effective extraction methods can be used.

A summary of the impact of destructive human activities in or adjacent to freshwater and marine protected areas are provided in Box 15-2.

Box 15-2. A summary of the common impacts of destructive human activities in or adjacent to freshwater and marine protected areas.

Mining, logging using bulldozers and trucks, large-scale agricultural development, industrial and urban development, road construction, and excavation of river and seabed materials - in the area as well as in neighbouring or upstream areas: Siltation of wetlands. Organic and chemical pollution of wetlands.

Aquaculture development: Destruction of mangroves. Organic pollution.

Land reclamation for rice farming: Destruction of swamps and estuaries.

Construction projects using rubble from corals: Destruction of coral reefs.

Charcoal and firewood production in mangroves: Destruction of mangroves.

Fishing with dynamite, poison, compressor or electricity: Overharvesting of undersized fish. Destruction of spawning and nursery grounds.

Large-scale commercial fishing: Overfishing of commercial fish and other species. Destruction of sea bed habitats by heavy equipment.

Large-scale tourism: Collecting of corals. Destruction of coral reefs. Organic pollution.

Introduction of exotic fish: Extinction of fish species through predation and competition. Unpredictable changes in freshwater ecosystems.

Human activities that normally involve minimal destruction of natural habitats but which may affect single species in forest, freshwater and marine habitats are (Box 15-3):

- hunting,
- fishing and shell-fish gathering, and
- gathering of non-timber forest and wetland products.

Small-scale tourism, such as camping and hiking, is a special case that can sometimes cause severe disturbance (when it is targeted towards rare species or sensitive ecosystems such as coral reefs) but which usually has only a very limited impact (although it may occasionally lead to the desecration of the sacred places of indigenous communities).

Box 15-3. A summary of the common impacts of hunting, fisheries and gathering of non-timber forest and wetland products when undertaken beyond sustainable levels.

Decline in availability of resources. A decline in the availability of plant, animal and fish resources that are important for local food and income.

Decline in populations of threatened species. A decline in the local populations of species of plants and animals that are important to conservation.

Increased competition for resources. With the decline in resources, people need to travel further into the park to find resources and harvesting methods become increasingly destructive. Competition over the utilisation of resources intensifies. Most affected are the indigenous people and poorer households, who are further marginalised.

2 Identifying whether any management intervention is appropriate. We hope that you now know whether the change you have observed is likely to have been caused by human activity and, if so, which human activity is the cause.

In order to identify whether any management response is appropriate, examine the typical causes of destructive human activities (Box 15-4) and the possible management responses below.

Important management responses by the PASu or CENRO in charge could be to:

- **Disseminate information to authorities.** Disseminate information to relevant authorities on the conservation needs and problems faced by the protected area due to encroaching development projects, and to discuss and agree upon solutions. PAMB may find it necessary to make recommendations for the DENR Secretary to take action. Relevant authorities include the DENR Regional Executive Director's Office, Local Government Units, Department of Agriculture, Development Councils, Governor's Office, etc.

- **Strengthen co-ordination among government agencies.** Strengthen co-ordination among government agencies involved in resource use and conservation in and adjacent to the protected area. This can be done by (1) participating in meetings on land-use development, (2) ensuring that decisions at municipal and provincial level do not lead to destruction of the forest, freshwater and marine habitats in the protected area; and (3) continuously bringing up forest, freshwater and marine issues at meetings with the Sangguniang Bayan.

- **Delineate protected area zones and boundaries.** Delineate protected area management zones and boundaries by mapping, ground truthing and monumenting. Establish areas in the vicinity of communities, which will be for the sole use of people from these communities. These areas should accommodate their needs for fishing, hunting and forest product gathering and, within a smaller part of this area, farming and household supply of timber. Establish agreements on land use and quotas and state criteria for adherence to the agreed land and resource use in a contract.

- **Delineate fishing grounds**. Delineate fishing grounds with local communities and the local government in order to make it clear where the different barangays/sitios have their fishing rights and responsibilities for implementing fishing regulations.

- **Enforce fishing regulations**. Continue to persuade municipal and other government authorities to enforce fishing regulations. Use PA staff in collaboration with the local government and deputized PA rangers from the local communities to enforce fishing regulations.

- **Support processing of "tenured migrant instruments" and "ancestral domains".** Support a fast and efficient processing of "tenured migrant instruments" and "ancestral domains" in order to provide an incentive for the sustainable use of the land, to minimise land speculation, and to encourage PA communities to prevent people from expanding destructive activities in forest, freshwater and marine areas.

- **Raise awareness among local people**. Raise awareness among local communities of specific conservation needs, the role of local people in protected area management, and observed destructive practices in resource use.

- **Strengthen staff capacity.** Further train, support and deputize local forest guards. Strengthen the capacity of enforcement rangers in community approaches such as their style of communication and in establishing dialogue with community members. PAMB may find it necessary to recommend to DENR that they obtain more operational funds.

- **Support the implementation of livelihood projects**. Support the implementation of livelihood projects that seek to use the resources in a sustainable manner or that enhance an interest in resource conservation. Ensure that mechanisms to mitigate overuse of resources are in place.

- **Establish sanctuaries and closed seasons**. Discuss and agree with PA communities and local government on:

    - the establishment of fish/freshwater/marine sanctuaries and/or closed seasons for fishing,

    - the establishment of a system of closed season, quotas or zones for hunting and gathering of other selected species, and

    - the prohibition of capture, trade and possession of products from the most endangered species.

- **Issue municipal ordinances**. Encourage barangays and municipalities to issue ordinances supporting PA regulations and PAMB resolutions.

The Focus Group Discussions will probably have given you valuable information on possible solutions as perceived by the communities. Discuss your ideas with the Community Monitoring Groups, the PASu or CENRO in charge and other knowledgeable persons, and make sure you avoid any hasty conclusions.

Box 15-4 Typical causes of destructive human activities.

Destructive human activities in and adjacent to parks are often caused by:

1) **Inadequate co-ordination between government agencies**. The NIPAS Act is sometimes implemented in isolation from other development programs in and around the park, because of inadequate co-ordination between different government agencies and an unclear division of authority. Sometimes, the PASu or CENRO in charge and PAMB are not, in practice, in control of the provision of land use permits, rights or titles to land in the park; these may be controlled by Local Government Units and other government agencies that do not prioritise the NIPAS Act.

2) **Unclear demarcation of management zones**. Insufficient demarcation, on the ground, of Alienable and Disposable zones, park boundaries and zoning to guide people as to what activities to undertake where.

3) **Lack of security of tenure over land**. In forest areas, lack of security of tenure over land on the part of park communities encourages land speculation and creates opportunities for people to claim new land by swiddens. It is a disincentive to investing in sustainable land use (i.e. conservation measures, soil fertility improvement), and it leaves park communities powerless in trying to prevent people from expanding destructive human activities in the forest areas. Likewise, in freshwater and marine areas, lack of responsibilities and rights over specific fishing grounds on the part of local communities at barangay level encourages overfishing.

4) **Limited environmental information available**. Destructive practices may not be recognised if there is a lack of knowledge among park communities and park staff on local environmental issues, for instance, the status of threatened species, or the relationship between forest degradation and the productivity of coastal and other ecosystems. In addition, decision makers sometimes do not recognize freshwater and marine habitats as being of crucial local and ecological importance, and their destruction is thus not regarded as a serious problem.

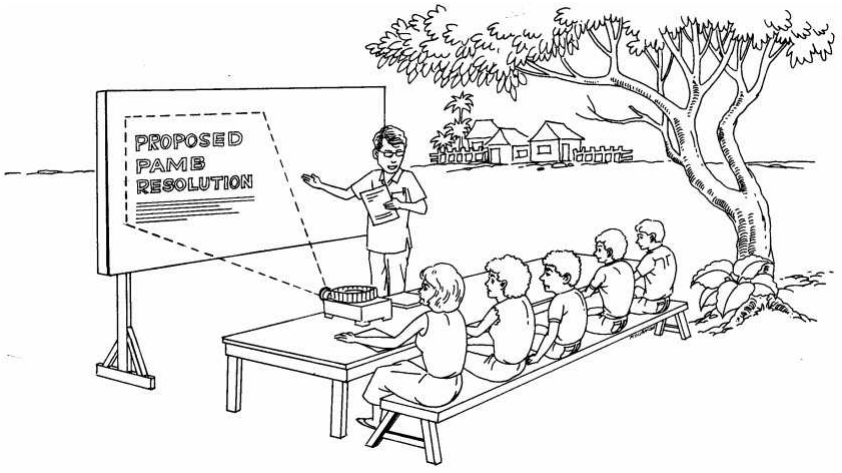
5) **Insufficient and inappropriate monitoring and enforcement**. Park rangers may lack appropriate training and operation funds to implement the laws. In addition, there may be a poor relationship between enforcement rangers and park communities and no participation on the part of local people in monitoring and enforcement. Rangers may be seen by locals as concentrating their enforcement efforts on local people's use of timber and non-timber forest products for household consumption rather than apprehending those involved in the commercial cutting of timber, dynamite/electro-fishing, and other more destructive human activities.

6) **Minimal follow-up to legal actions against major offenders**. In some areas, serious violations of the NIPAS Act by powerful groups may not be followed with legal actions. Sometimes, local government agencies may be involved in, or protecting, seriously destructive human activities in the park; this makes enforcement even more difficult.

7) **Other reasons**. In wetlands, another important reason is that methods for the sustainable use of the freshwater and marine resources are often not extended and supported. In forest areas, other important causes, particularly for kaingin cultivation, are poverty, a decline in the land area available for swiddening, and few cash-generating livelihood options for the park communities. Traditionally, kaingin cultivation was a fairly sustainable practice but today kaingin has become unsustainable in many areas due to a decline in the land area available for farm plot rotation and a decrease in the use of traditional soil conservation measures. Kaingin is rooted in poverty, a lack of land and alternative farming practices and limited income generating possibilities.

16. Presentation of biodiversity monitoring to the PAMB

It is important to inform the Protected Area Management Board (PAMB) about your biodiversity monitoring so that they can decide on appropriate mitigating measures in response to your findings.



Who should present the BMS results to PAMB? The presenter should be the PASu or CENRO in charge, alternatively the Assistant PASu. The BMS Coordinator should assist.

When do you schedule the presentation? When you prepare your annual Work and Finance Plan, you should include your presentation to the PAMB Executive Committee (Execom) quarterly on a continued basis. The first presentation should be scheduled for the first PAMB Execom meeting. If you have already been monitoring biodiversity for some time, you should include the BMS results and recommendations in your presentation.

Before you make the presentation. Ensure that you have enough time to prepare your choice of maps and audio-visuals for the presentation. Begin the preparations at least a week before the meeting. It is strongly recommended that you do a test run of the presentation to make any needed adjustments.

Read and study the Department Administrative Order (DAO) on the BMS and the DAOs on Users' Fees and Tenurial Instruments. Read the BMS Manual and the BMS Fact Sheet so you are prepared for questions.

When you make the presentation. Make the presentation in a way that ensures the active participation of the PAMB members. Get them to raise questions. Facilitate a discussion amongst them regarding what actions should be taken.

Use a mix of bullet form verbal presentation of facts and distributed fact sheets in local dialect. Support this with maps (scale 1:100,000 or 1: 50,000 or in overhead form) and plates of priority species and resource uses. You may also wish to use whiteboard or manila-paper. Make sure that everyone can see, read and hear what you are presenting.

If your presentation lasts more than 30 - 40 minutes, include an "ice-breaker" or a short break of five minutes. Otherwise the PAMB members will lose concentration and they will forget much of what you present.

Do the presentation slowly. Repeat the most important facts to ensure they understand the points you are making. End your presentation by summarizing the most important messages. Leave time for an open forum where questions can be raised and answers given by you or the PAMB Chairman.

The first PAMB presentation.

STEPS

1 Begin the presentation by summarizing the responsibility of the PAMB and the local government to oversee that the biodiversity of the protected area is maintained. The biodiversity includes species important for continued resource use by the indigenous people and the protected area tenured communities, as well as habitats/ecosystems, and wildlife populations and species that need protection.

2 Highlight the fact that the focus of the BMS is to identify trends in biodiversity and its use so as to guide the PAMB in their decisions. In addition, the BMS aims to improve the participation of indigenous people and other protected area communities in resource management and protection, in close collaboration with the protected area staff.

3 Introduce the BMS DAO, specifically, the role of the PASu and the PAMB (as expressed in its Section 4.3, paragraph 2):

- "The information provided by the PASu [regarding the results of the BMS] shall be used as a basis by the PAMB in coming up with management decisions for its concerned protected area".

4 Mention that the BMS can also provide information that might be useful for monitoring the access to and sustainable use of resources as prescribed in the DAOs:

- Guidelines and Principles in Determining Fees for Access to and Sustainable Use of Resources in Protected Areas (No. 2000-51)

- CBRM-programs under Establishment and Management of Community-based Projects and Tenurial Instruments within Protected Areas (No. 2000-44).

5 Make a short and precise bullet-form lecture on:

- What is the DENR Biodiversity Monitoring System or BMS? (Section 2)

- Why monitor biodiversity? (Section 1)

- For how long is biodiversity to be monitored? (BMS Fact Sheet)

- What can the PA management expect from the system? (Box 2-1)

- Why is the BMS particularly designed for the PA staff and the communities? (BMS Fact Sheet)

If necessary, explain to the PAMB that if the PAMB does not permanently monitor what is happening to the biodiversity and its use and to the areas critically important to conservation, it will be unable to fulfil is mandatory role and functions under the NIPAS Act.

6 Present your biodiversity baseline information per municipality. This means presenting a map showing:

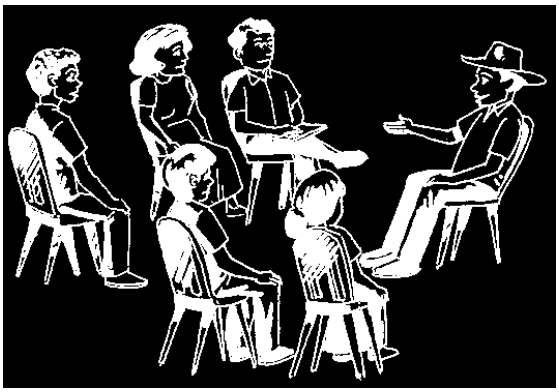
- The most important areas for conservation of species and ecosystems;
- The main community resource use areas (tenured migrants and indigenous people, and areas under DENR/PAMB resource use permits);
- Location of the most serious threats;
- Location of established or planned biodiversity monitoring sites divided into the different BMS methodologies (Community Monitoring Groups, patrol routes where Field Diary is regularly used, Photo Documentation sites and Transect routes).

7 Distribute as hand-outs:

- List of those resources that are being used by the communities or other stakeholders (e.g., under DENR/PAMB resource use permit) and monitored by the BMS. Indicate the use and conservation status of each resource.
- List of the habitats being monitored.
- Plates or photos of the main monitoring species, if possible.

8 Present the BMS organizational structure (Section 3). Describe the flow of data from collection and analysis to presentation to the PAMB and decision-making (Figure 5-1). Explain the link between PAMB and local government, Sangguniang Bayan, DENR Regional Office, PAWB, PASu, the BMS Coordinator and monitoring persons and groups involved (PASu/CENRO Rangers, Community Monitoring Groups, volunteer forest brigades and indigenous people, NGOs and CBRM-communities).

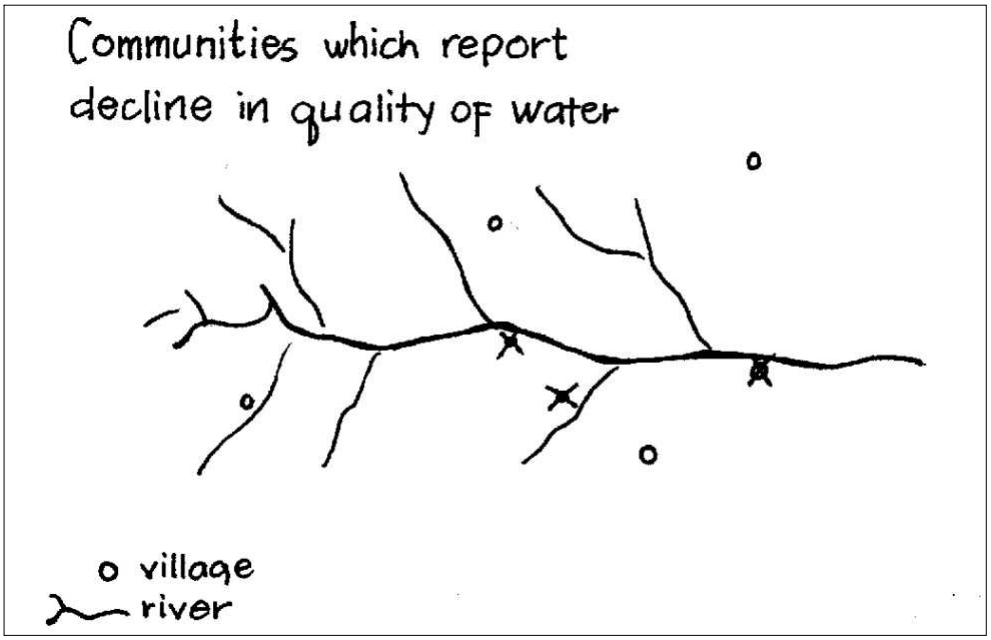
Forthcoming PAMB presentations. In subsequent presentations you will describe the status of work on the BMS in the PA and present the analyzed results and proposed actions. If there is a need to refresh the PAMB on the fundamentals of the BMS, you can begin with a brief summary of the first PAMB presentation.

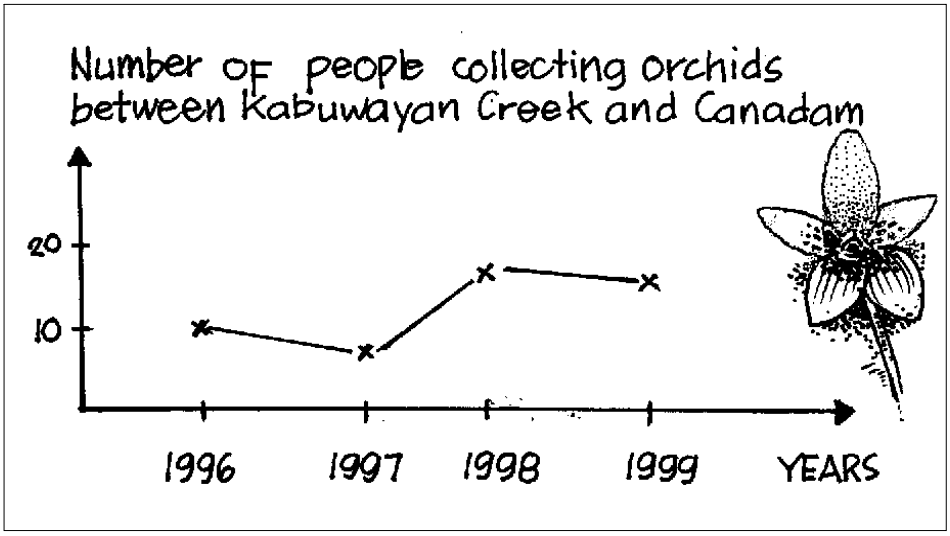


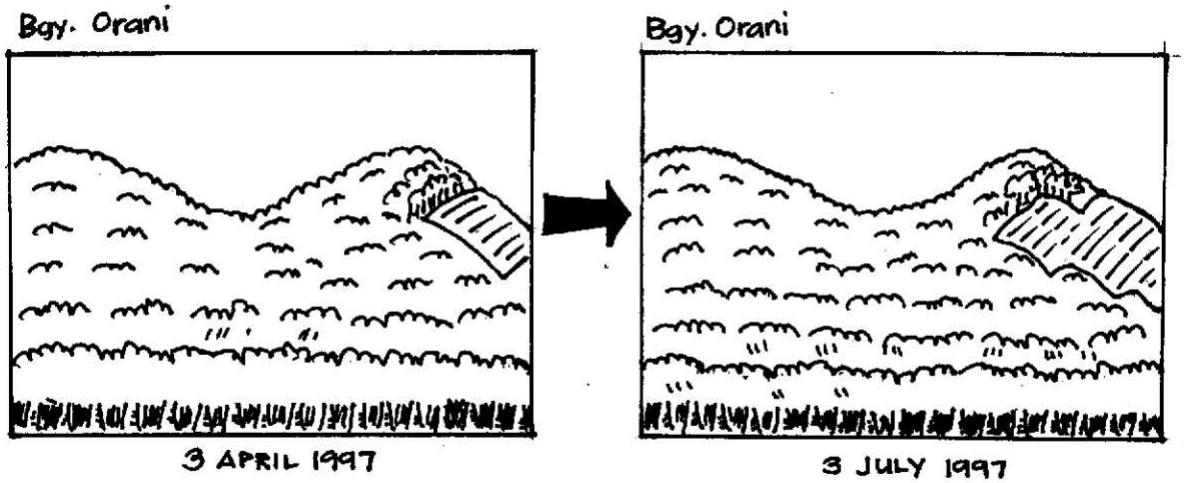
Annex 1. Display of data

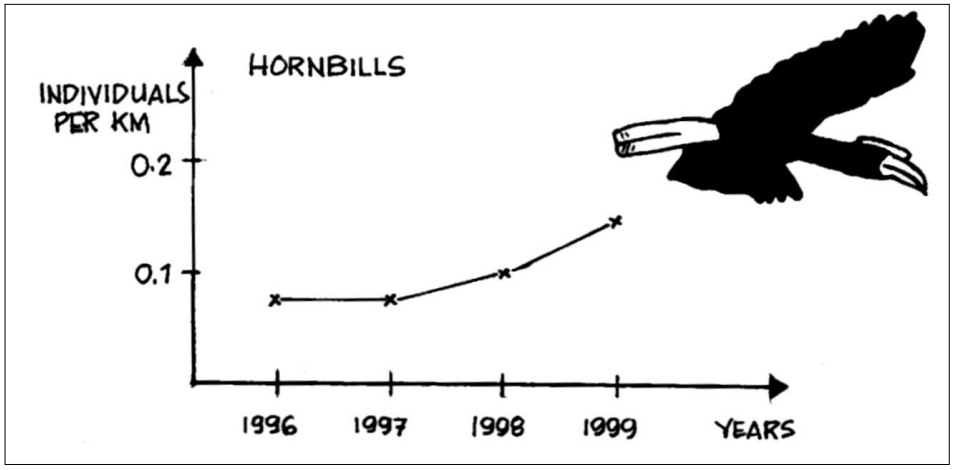
Graphs and charts serve as useful devices for summarising, simplifying and presenting data in a readily understood format. All graphics should be easy to understand without any explanatory text. Graphics should not present an overwhelming amount of information but should remain simple.

Below are a few examples of the many ways in which you can graph data from the Biodiversity Monitoring System.






Bgy. Orani
3 APRIL 1997
Bgy. Orani
3 JULY 1997


HORNBILLS
INDIVIDUALS PER KM
0.2
0.1
1996
1997
1998
1999
YEARS

Annex 2. How you can introduce the Biodiversity Monitoring System to the protected area communities

TAGALOG VERSION

Paraan ng pag-pakilala ng Biodiversity Monitoring system sa mga nakatira sa parke.

1. Pagpakilala ng sarili (Sabihin ang iyong pangalan, trabaho, pinanggalingang lugar)

2. Ipaliwanag kung paano nabuo ang parke at mga susunod na mangyayari. Ang ating pamahalaan ay nagpasiya noong ...[petsa] na ang mga likas yaman sa lugar na tinitirahan ninyo at ang mga karatig na pook ng ...[sabihin ang pangalan ng bundok o lugar] ay dapat gamitin sa likas-kayang paraan at pangalagaan. Ang pook na ito ay tinawag na ...[sabihin ang pangalan ng parke]. Ako at ang mga kasamahan ko rito sa parke ay inatasang makipagtulungan sa inyo sa pangangalaga ng pook na ito. Patakaran ng pamahalaan na ang pagtutulungan nating lahat ay ang pinakamabisang paraan upang tuluyang mapangalaan ang parkeng ito sampu ng mga gubat nito at mga hayop na nakatira rito.

3. Pagpapaliwanag ng mga layunin ng pagtatag ng parke. Sa dahilan na isa ito sa kakaunting lugar na natitira sa bansa na may magandang gubat/katihan na mahalaga sa pagbibigay ng malinis at matatag na daloy ng tubig, at tirahan ng hayop at halaman na naubos at hindi na maaring matagpuan sa ibang lugar sa bansa at sa buong mundo ... magbigay ng halimbawa ... maraming benepisyo/pakinabang ang binibigay ng parke katulad ng isda, hayop at mga produktong gubat sa mga tao sa parke. Nais siguraduhin ng ating pamahalaan na hindi mawala ang natatanging lugar nang sa gayon ay patuloy na makinabang kayo at lahat ng tao sa ating bansa.

4. Ipaliwanag kung paano makikipagtulungan ang tauhan ng parke sa mamamayan. Tutulungan kayo upang malaman ang pamamaraan ng:

- Tamang pamamaraan ng paggamit ng mga hayop at halaman kung saan mga ito ay hindi maaaring maubos o mawala,
- Pangangalaga ng kagubatan sa pagkasira nito,
- Mapabuti ang pangangalaga sa mga hayop at halaman na kakaunti na ang populasyon katulad ng (magbigay ng halimbawa),
- Mabuting paraan ng pagtatanim, paggamit sa gubat/katihan, pangangaso at pangingisda na hindi makakasira sa kagubatan at katihan,
- Mapangalagaan ang inyong karapatan sa paggamit ng lupa, tubig, produktong galing sa gubat at mga hayop sa inyong lugar na napapaloob sa tamang limitasyon at naaangkop sa inaprobahan ng PAMB at LGU.

Mangyayari lang ito sa pamamagitan ng patuloy na pagbisita sa inyong lugar upang makipagtalakayan, makapagbigay ng mungkahi, na sana matulungan kayo sa susunod na taon at mga panahon pang darating.

5. Nagpunta po kami dito sa inyong lugar upang malaman kung nais ninyong makipagtulungan sa amin na alamin ang ano mang mga pagbabago sa mga hayop at halamang ligaw o "wild plants and animals" na nakikita dito sa inyong lugar pati na rin ang paggamit sa inyong kagubatan/"wetland" upang mas mapangalagaang mabuti at mapakinabangan ito sa tama paraan.

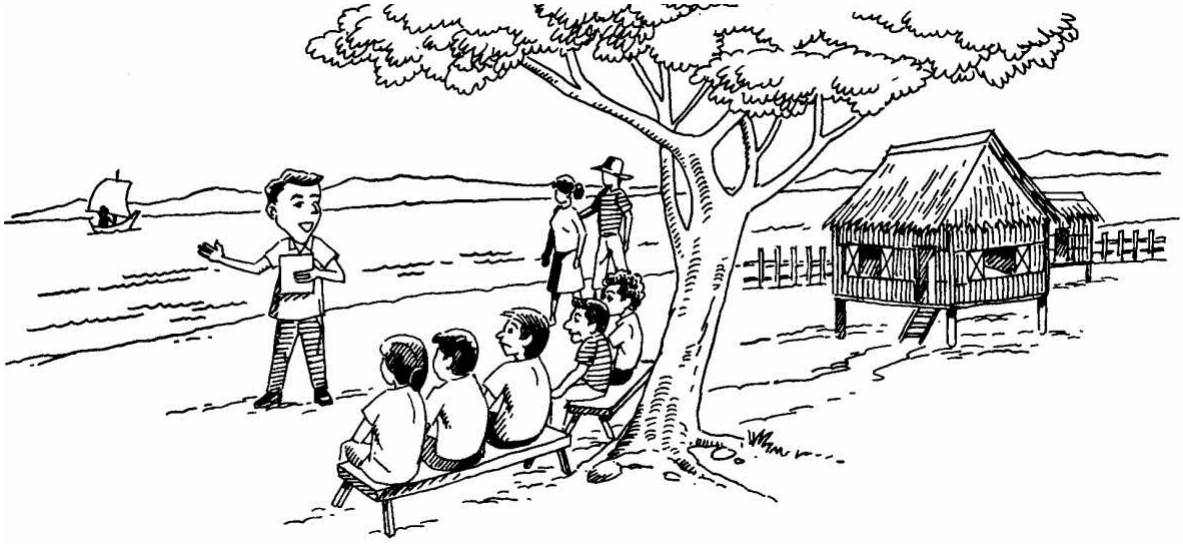
Kung kayo po ay interesado sa aming mungkahi, maari po bang maanyayahan ang sampo hanggang labing -limang (10 -15) katao na sumasangayong makipag tulungan sa amin na kumuha ng mga datus o mga impormasyon ukol sa mga hayop at halamang ligaw pati na rin ang mga gamit nito sa komunidad.

At kada tatlong buwan, babalik kami upang makipagpulong/ talakayan sa inyo ng isa hanggang dalawang oras tungkol sa inyong obserbasyon sa mga likas -yaman sa inyong lugar. Mabuting makasama sa gawaing ito ang mga taong meron ng karanasan sa pagtatrabaho sa komunidad tungo sa pangangalaga ng likas yaman (tulad ng "forest guards, community forestry committee members" , etc.) o kaya ay ang mga taong karaniwang gumagamit at nakikinabang sa ating kalikasan.

Nais din nating makasama ang mga dalubhasa sa panggagamot o albolaryo, mangangaso at mga nangunguha ng kapakipakinabang na producto sa kagubatan/wetland. Kada tao n ay nais naming magkakaroon tayo ng talakayan kasama ang buong sitio/barangay upang ipaalam sa kanila ang tungkol sa naging resulta ng ating pagsusuri/obserbasyon at makapagbigay din sila ng kanilang sariling obserbasyon at pananaw.

6. Ipaliwanag kung paano magtatrabaho ang mga empleyado ng parke sa iba pang pamamaraan.

Magtatrabaho kami rito at sa ibang lugar upang matalakay ang mga "issues" tulad ng : pagpigil sa "commercial hunting" at "gathering" na ginagawa ng mga dayuhan, ang pagiwas sa "development" na makakasira sa parke, ang pakikipagugnayan sa ibang agencia, ang pagpigil sa malawakang pagtotroso, at ang pagbibigay ng mga impormasyon sa komunidad na napapa- loob sa parke at iba pa.



ENGLISH VERSION

1. Introduce yourself (NAME, JOB, WHERE YOU COME FROM).

2. Explain how the protected area has been established and what will happen in the future
The Philippine government decided in ... that the area you are living in and the area within ...NAME OF GEOGRAPHICAL FEATURES... shall be an area in which the use of the natural resources shall not destroy the resources in the long term, and where conservation is very important. This area is called ...NAME... I together with other protected area staff in the area have been given the responsibility for working with you for the best conservation and use of the area. It is the policy of the government that collaboration between you and us, both expressed by protected area staff working directly with you and by the working of the Protected Area Management Board as representing your interests, is the best way to make sure that the protected area remains with good forest cover/water quality/wetland resources and with many different animals and plants when your children and their children grow up.

3. Describe the reason for establishment of the protected area
The protected area was established because it is one of the few remaining areas in the country with good forest/wetlands which are important for providing a clean and stable supply of water, and because it is home to animals and plants that have been wiped out in most other places in the country and in the world ..NAME A FEW.. The area is also providing many benefits such as fish, animals and forest products to many people in the area. The government wants to ensure that this unique area is not disappearing and is for the benefit of both you and people in the country as a whole.

4. Explain how the protected area staff will work with villagers
We will be able to work with you in order to assist you in seeking ways:

- of using the wild plants and animals in your area in such a manner that they are not disappearing,
- of better protecting the forest and wetlands from destruction,
- of improving protection of those wild animals and plants that are getting very rare such as NAME A FEW,
- of improving the methods for farming, use of forest/wetlands, hunting and fishing in such a way that they are not destroying the forest and wetlands,
- of securing your rights to use the land, water, forest products and wild animals in your area within certain limits and in a way that is approved by the Protected Area Management Board and Local Government Units.

We are able to do this by visiting your village frequently to discuss, maybe advise and hopefully assist you during the coming year and maybe longer.

5. Explain the objectives and activities of the Biodiversity Monitoring System
I have come to your village today because we would like to know if you will work with us to observe changes in the numbers of wild plants and animals and in the use of the forests and/or wetlands for the best conservation and use of the area. If you are interested, we would like to find 10 -15 local people who are willing to collect data on wild plants, animals and resource use, and who will spe nd two hours with me every quarter so that I can listen to, and we can discuss, their observations. It is best if those people are involved with community work within natural resource management (forest guards, community forestry committee members, etc.) or villagers otherwise interested in the use of forest/wetland resources. We would like the most experienced indigenous healer and all -round hunter/forest product gatherer and fisherpeople to be members of this group. EXPLAIN POSSIBLE ISSUES YOU WOULD LIKE THEM TO LOOK FOR BUT SAY THAT THEY MIGHT HAVE BETTER SUGGESTIONS. Every year or so we would also like to discuss the findings with the whole sitio/barangay so

that we can tell them about your findings and get input and responses from all members of the sitio/barangay.

6. Describe how the protected area staff will work in other ways
We will also work in other villages, and we will work, both here and other places, on issues such as: trying to stop commercial hunting and gathering by outsiders, trying to prevent developments that will destroy the protected area, co-ordinating with other agencies, preventing large-scale logging, providing information to protected area communities and others, etc.

Annex 3. Indicative budget for monitoring biodiversity

Below is a budget for establishing and running the Biodiversity Monitoring System (BMS) as part of the main operations in a protected area.

This example is based on a protected area with a size of 30,000 hectares (such as Mt. Kitanglad Range Natural Park). Assumptions are that a minimum of 6 protected area rangers participate (assisted by volunteers such as deputized forest brigade members, indigenous people, etc.), and that 10 Community Monitoring Groups, 5-10 Photo Documentation sites, and 3-5 Transect Walks/Cruises/Swims are established.

All prices in Philippine Pesos (1 USD = 45 PhP, August 2000).

EQUIPMENT COSTS

1) *Equipment Outlay above PhP 10,000* (DENR budget expense class 300-36)	
Binoculars 6 x 10,000/item	60,000
Camera 2 x 12,000/item	24,000
GPS 1 x 15,000/item	15,000
2) *Equipment Outlay below PhP 10,000* (DENR budget expense class 200-07):	
Compass 6 x 1,000/ item	6,000
Tripod 2 x 3,000/item	6,000
Ranger Field Gear 6 x 7,000/item	42,000
Additional equipment in marine protected areas:	
Marine Bottom Glass Box 2 x 3,000/item	6,000
Snorkeling Field Gear 4 x 5,000/item	20,000
Total	179,000

RECURRENT COSTS

1) *Travel* (DENR budget expense class 200-02):	
Travelling expenses and honoraria	
6 PA rangers/BMS assistants, 10 days per quarter x 4 qtr. x PhP 300	72,000
2) *Field Supplies and Materials* (DENR budget expense class 200-07)	
(incl. films/film processing, batteries, markers, paper sheets, xeroxing, snacks)	30,000
3) *Other Services* (DENR budget expense class 200-29)	
Focus Group Discussion - Community meetings,	
10 community meetings x 4 quarters x 1000/meeting	40,000
Total	142,000

The expenses can be classified as part of the protected area's core operational budget (the yearly Recurrent Costs or Maintenance and Other Operating Expenses).

Since the BMS methods should be undertaken by the PA or the deputized forest rangers during their regular patrolling (except the Focus Group Discussion with Community Monitoring Groups), the budget for travel and per diem should only reflect the additional costs of carrying out BMS work in areas away from the regular patrol routes.

Source: PAWB-DENR Work-shop on Monitoring Biodiversity, May 1998; DENR *in litt*. 2000.

Annex 4. Filled in data sheets from Focus Group Discussions

This annex comprises examples of filled in Focus Group Discussion (FGD) data sheets from a land (freshwater wetland or forest) and a marine area. It comprises three formats: Format 1, Format 2 and Format 3.

EXAMPLE FROM A LAND AREA

Bgy. Morong, Mt. Kanlaon Natural Park
April – June, 2000

FORMAT 1

MAIN ISSUES DISCUSSED

Resource uses chosen for monitoring:

- Hunting of wild pigs,
- hunting of wild deer,
- freshwater fish catch,
- use of household timber,
- lobster catch.

Hunting of wild pigs.
The Group stated that hunting of wild pigs has decreased since last quarter but this was attributed to seasonal changes and not to a decrease in the pig population. There was no change in the number of people involved in hunting wild pigs since last quarter, only normal seasonal changes. However, the number of wild pigs is still below what it was in previous years. The barangay has therefore recently decided to establish a closed season for hunting in December and January. Blasting of wild pigs is practised, particularly in the fields, in order to prevent pigs eating the rice. There was a short discussion of blasting around how to solve the fact that blasting is illegal according to the law but considered important for the protection of the rice harvest. No solution was found but the discussion will continue.

There are still very many traps. The Group discussed the need to limit the number of traps; no agreement was reached within the Group but all agreed that over-hunting was taking place. One of the Group members gave the example that it took 4 days to catch one pig with 3 traps in the vicinity of lower Blos River.

All pigs are reported to have been consumed within the Barangay, with some of the pigs being sold to other barangay members (should be continued with results on the other resource uses, hunting of wild deer, catch of freshwater fish, use of household timber, catch of lobster).

Format 2
MATRIX FOR RESOURCE USES

Resource use	Place extracted	Method of Extraction	Quantity extracted by CMG members	Quantity extracted by others in the Bgy.	Total number of days/hours spent in extraction by CMG members	Use and other remarks
Wild pig	Upper and lower Blos and Dicaduan	Blasting: 5 SiloL: 13 Bow: 1 Gun: 2	8 heads by 3 members	13 heads by 5 people	14 days spent by 3 members to catch 8 heads	Seasonal changes, see the discussion
Deer	Upper Blos	Silo: 5 Bow: 2	3 heads by 2 members	4 heads by 2 people	4 days spent by 2 members to catch 2	Domestic use
Fresh-water fish	Blos River, Diaduan River	Spear: 45 kg Gill net: 150 kg Electro: ? Unknown: 8 kg	48 kg by 5 members	155 kg by 13 people	Total of 35 hours spent by 5 members to catch 48 kg	Domestic use. See the dis-cussion
Household timber	Near Centro			1 log of Red Lawan		For irrigation system
Lobster	Bolos point	Light on reef (15 kg)	12 heads by 1 member (c. 15 kg)	No reports	5 nights of approx. 5 hours	Commer-cial use
Monkey	In the fields and in Blos	Silo: 4 Gun: 8	7 heads by 4 member	5 by 3 people	No records	Food, but also seen as a pest
Water Monitor Lizard	Lower Blos and Diduan	Silo: 17 Other: 4	8 by 5 members	13 by 7 people	5 members spent 10 hours to check traps	Domestic use
Junglefowl	Whole forest	Silo: 26	10 by 3 members	16 by 6 people	3 members spent 20 hours	Domestic use
Hornbill	Whole forest	Gun: 4	4 by 2 members	No reports	No data	Domestic use
Turtle/ Turtle eggs			None	None		
Rattan			None	None		
Timber poaching			None	None		
Kaingin			None	None		

Format 3
MATRIX FOR SPECIES OBSERVED

Species	**Place**	**Numbers**	**How observed**	**Date**	**Name of observer**	**Remarks**
Turtle	Bolos Point Diaduan Beach	1 1	Seen swimming in sea. Nest found	Mid April 10-4-00	Teddy Anuan Larry Subia	 Eggs were not collected
Crocodile	Croc. Sanctuary	1	Track	4-4-00	Gener Cabaldo	Very large maybe 6 m
Phil. Eagle		None				
Parrot	Upper Blos	10	Seen	April	3 different people	Seen in small groups
Tarictic Hornbill	Whole forest	20-25	Seen / heard	All of the quarter	Many people	Still very common
Rufous Hornbill	Upper Blos	10-14	Seen/ heard	All of the quarter	Many people	Still common
Wild duck	Lower Blos	40-50	Seen	All of the quarter but most in March	Many people	
Tabon bird		None				
Python	Lower Blos	1	Seen	March	Jerry Ramirez	Around 4 m

EXAMPLE FROM A MARINE AREA

Bgy. Didadungan, Northern Sierra Madre
January – March, 2001

FORMAT 1
MAIN ISSUES DISCUSSED

Resource uses chosen for monitoring:
- marine fishing,
- collection of shellfish,
- catch of lobster.

Marine fishing.
The Community Monitoring Group stated that marine fishing had declined during the last quarter. This was thought to be due to bad weather conditions, which made fishing difficult. Compared to the same time last year, the fishing is believed to be more or the less the same, with no perceived change in catch per unit effort for this season.

No change in number of barangay people involved in fishing. However there is a reported increase in outsiders fishing within the waters of the barangay. The outsiders use very small mesh-sized nets close to the coral reefs. The barangay chairman has reported to the municipality on the encroachment of outsiders, but nothing has happened. The Group agreed to follow up with the barangay council and with the PAMB through the PASu. If increase in fishing efforts by outsiders continue, the Group fear that their own catch would decrease due to over-fishing. The possibility of closing some of the coral reefs for fishing was discussed but not agreed upon. They will continue to try to prevent outsiders from fishing.

Use of dynamite fishing is minimal, with only one reported case during the quarter. The same amount of marine fish is still sold to commercial buyers, although there is increasing demand for fish on the part of the buyers (should be continued with results on the other resource uses, collection of shellfish and catch of lobster).

FORMAT 2
MATRIX FOR RESOURCE USES

Resource use	Place extracted	Method of Extraction	Quantity extracted by CMG members	Quantity extracted by others in the Bgy.	Total number of days/hours spent in extraction by CMG members	Use and other remarks
Marine fish						
Yellowfin		Hook on line	Total 340 kg by 4 members	> 1000 kg 12 boats	Total of 20 days by 4 members	50% sold
Lapulapu		Hook on line	Total 690 kg by 3 members	> 2000 kg 12 boats	Total 15 days by 3 members	100% sold
Coral fish		Gill nets /spear	Total 800-900 kg by 6 members	Unknown	Total of approx 25 days by 6 members	Domestic use
Lobster	Reef area outside sitio Lanang	Trap and light	12 pieces by one member	15-20 by 3 people	Total 8 nights by one member	100% sold to dealer from Didian
Other shellfish	Reef flats Bicobian	Collection by hand	Total 48 kg by 2 members	Unknown	Total of 50 days by 2 members	Domestic use
Catch of fish using illegal Methods	Reef outside sitio Dumag	Dynamite		7 kg		Only one instance of illegal fishing methods

FORMAT 3
MATRIX FOR SPECIES OBSERVED

Species	Place	Numbers	How observed	Date	Name of observer	Remarks
Turtle	All water Beach near sitio Dumag	8 1	Seen swimming Tracks on beach to nest	Start April and end March April 6	C. Lopez and W. Auan C. Lopez	Nest same place as last year. Eggs were already collected.
Dugong		None				
Sharks	All water	Plenty	Seen Swimming	All quarter		Still many, but maybe decreasing
Nesting seabirds	Spires Island	60-70 individuals	Seen on nest and flying	March/ April	D. Luang	Last year same time there were more than 100 nesting pairs
Whales	4-5 km off Spires Island	4 very large	Seen Swimming	Feb. 20	W. Auan	Probably Sperm whale according to description.
Dolphins	All water	Plenty seen. More than 20 times. Group size from 3 to at least 150 individuals	Seen swimming	Most in March		More seen this quarter than last quarter

Annex 5. How to monitor the fishery with Focus Group Discussions

The Focus Group Discussion method can be used to monitor the fishery in terms of over-fishing and overharvesting of shellfish. It can also be used to detect major changes in species composition of the fishery catch over time. This is important since fish and shellfish caught for consumption in many areas represent the resources of most value to the local communities. The Focus Group Discussion method was described in Chapter 8. Tips are given below on the use of this method for fishery monitoring.

Focus Group Discussion should be used to discuss:

- trends in effort to catch fish and other important resources,
- trends in abundance of fish and other resources,
- trends in number of fisherpeople/resource users,
- changes in fishing and extraction methods, and
- problems and solutions related to the fishery and other wetland resource use, such as illegal fishing by outsiders or electro/dynamite fishing.

STEPS IN MONITORING THE FISHERY

1 Establish Community Monitoring Groups in:
   - those protected area communities living near wetlands of high conservation value,
   - those protected area barangays and villages where there might be over-fishing,
   - those which are most dependent on fish/shellfish and other freshwater/marine resources from the protected area, and
   - those located next to proposed or established fish sanctuaries.

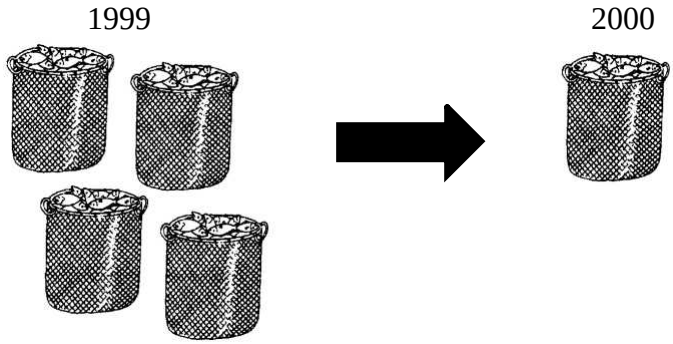
2 When you talk with barangay captains, you should explain that the aim of this monitoring is to assess the health of the fishery, that is, to ascertain whether there is any over-fishing that requires management action. Such management action could consist, for example, of reaching agreements limiting the minimum mesh size of gill nets. They could also consist of taking some pressure off the fish by encouraging fish culture in ponds on the periphery of the wetland, or introducing marine sanctuaries to improve fishing outside the sanctuaries. Some barangay captains might think that you are collecting data for taxation purposes. Emphasize that this is not the case but that you represent the PAMB.

3 Try to get the most experienced and committed fisherpeople in the protected area to participate in the volunteer Community Monitoring Groups.

4 Ask the members of the Community Monitoring Groups to keep track of their fish catches, threats to the area, use of other resources, and species observed. Follow the formats for main issues discussed, the matrices for resource uses and for species observed, given in Annex 4. For the fish catch/resource use it is important to know the weight of fish/resources caught together with the species and gear used as well as the time used to obtain that catch (Box 17-1).

Box 17-1. Why collect fishing effort data and catch data?

A trend in falling catches recorded by fisherpeople over a number of years in the absence of effort information could mean either of two things - that the fishing effort is being reduced; or that the fish are becoming scarcer; i.e. that overfishing is occurring. If the fisherpeople are recording decreased catches while the fishing effort remains constant or is even increasing, it means that there is a problem of overfishing.



Falling catches can mean reduced fishing effort or that fish are becoming scarcer.

5 Daily recording of data on the part of those who go fishing might be too large a job. If that is the case, ask them to record only during a two week period before every quarterly Focus Group Discussion you have with them. It is better to get uniformly collected data from the same individuals rather than randomly collected data from many different persons.

If any fisherpeople in the group are very keen and interested, you should encourage them to use a Fishery Record Sheet (Figure 17-1), which is an expanded version of the matrix for resource uses (Format 2, Annex 4). It is very important that not only the size of the catch but also the effort is noted (Box 17-1). The first 2-3 times they return from fishing you should go to the landing-site and help them fill in the sheet. Again, it is better to record data continuously for a fixed shorter period (two weeks or a month) than to record data on and off over the whole quarter.

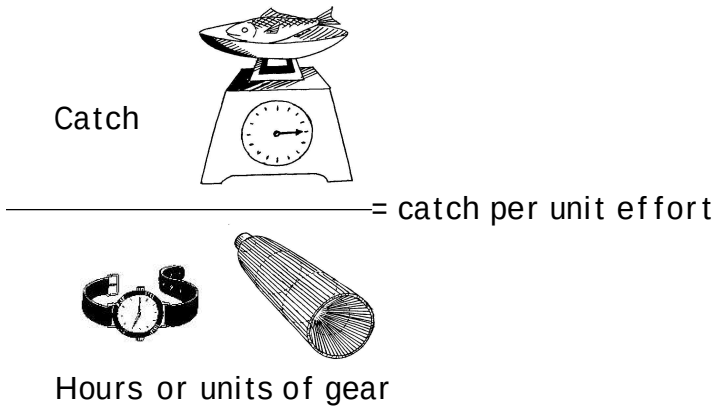
6 Please stress that the fisherpeople should also record zero values (if they go fishing but catch nothing) and any remarks they may have (e.g., on possible causes, including weather conditions and moon phase).

7 At the quarterly discussion meetings between the Community Monitoring Groups and yourself, you should look at and discuss the notes from the members and the filled-in Fishery Record Sheets. After or before the meeting, use the waiting time to calculate the catch per unit effort (CPUE, Box 17-2) based on the notes and the filled-in Fishery Record Sheets. Remember to bring an identification guide and a calculator.

8 Obtain a mean value for the catch per unit effort (CPUE) at different times of the year. In the first year, the variation in CPUE can be used to detect seasonal variations in catches. In the following years, the data can be used to detect any changes in the catch per unit effort, which can indicate the sustainability of the fishing.

9 On the same day that you are in the community, you should spend time at the fish landing site interviewing some of the fisherpeople present about the changes in the fishery. This will validate the information from the Focus Group Discussion.

Box 17-2. What is the catch per unit effort (CPUE)?



The catch data and fishing effort data are combined to give a term called the catch per unit effort (CPUE). This is the weight of fish caught divided by the effort (the time and meter of gill net) expended in obtaining it.

For example, a fisherman uses a gill net 30m long, which is left overnight for 12 hours and he catches 30 kg of fish. The CPUE for that particular night would be 30 kg of fish per 30m of gill net per 12 hours.

If another fisherman catches 100 kg of fish using a 50 m gill net and leaving it for 16 hours, then one can make these two CPUE data directly comparable by adjusting the units to weight of fish caught per meter of gill net per hour.

Result: For the first fisherman, his CPUE would be 0.83 kg of fish caught per meter of gill net per hour. For the second fisherman, his CPUE would be 0.125 kg of fish caught per meter of gill net per hour.

Tips on the analysis of fishery record data are provided in Chapter 8A.

Fishery Record Sheet

Locality: Brgy. Veruela, Agusan Marsh, Province of Agusan Del Sur

Date: 10 Dec. 2000 **Name of recorder:** Filemon Ambasakan

Fishing gear used (e.g., spear, push net, bottom gillnet, crab pot, scareline and net): Lines with hooks

Number of gear units (e.g., length of nets and longline, number of hook and number of traps): Two 50 meter lines with 50 hooks each

Length of time for gear use: four hours **number of fishing trips:** One

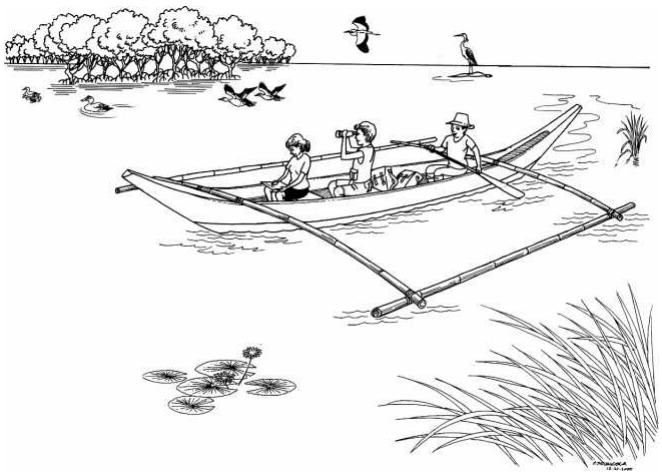
Other observations (e.g., sea state, weather and commercial fishing boats): Extensive flooding, new moon.

Kind of fish caught/shellfish gathered (local or common name)	Amount of catch (e.g., kg., volume, number)
Mudfish	2 kg
Tilapia	3 kg
Young crocodile	1 (size as a hand)
catfish (native)	1 kg
other small fish/carp	1.5 kg

Figure 17-1. Example of a filled in Fishery Record Sheet

Annex 6. Using a boat along shorelines: the Transect Cruise method

In wet areas where it is impossible to walk on foot, the Transect Walk method can be undertaken by boat. For example, along rivers, creeks, lakeshores, inter-tidal mudflats and mangrove channels. Except for the use of boat instead of walking, the field method and data analysis are the same as for the Transect Walk method.



PERSONNEL

Three people are needed: a boat driver, a BMS staff (observer) and an assistant (listing observations and handling equipment). It is advisable for those involved to be able to swim.

Box 17-3. Transect Cruises: Do them the same way every time!

Like the Transect Walk, the Transect Cruise has to be carried out the same way every time:

1. the same amount of time to survey
2. the same distance over
3. the same rivers and shorelines at
4. the same time of day (beginning between 6 and 7 am) at
5. the same time of the year recording
6. the same resource uses and species in the
7. same way by
8. the same observer (or another with the same identification skills) and using
9. the same way to estimate numbers and
10. the same type of boat and speed (paddling).

TIPS

When you select Transect Cruise routes, look for patrolling routes passing through:

- areas where major threats are found
- areas particularly used by the local communities (such as main rivers, lakes, mangrove forest, or coves important to fishing of lobsters)
- the major habitat types important for conservation (such as swamps, estuaries, large inter-tidal mudflats or small islands with undisturbed forest).

At least two Transect Cruise routes should be established in each freshwater protected area. A desirable cruise line could be a major river and smaller creeks leading to floodplains or oxbow lakes. Short trails can be walked at right angles to the waterway. The same trails must then form part of the route and be used each time.

When you establish Transect Cruise routes, sail the proposed routes and make sure that a 2 kilometre route can be established so that it passes through one or more major freshwater or marine habitat types. Start and end points should be clear land marks or marked with permanent markers. If boat views along the route are obstructed by high river banks or vegetation, you can establish short trails at right angles to the waterway (or construct simple bamboo platforms) and include them in the Transect Cruise route.

When you survey the Transect Cruise, before departure always:
- check the weather (no strong winds, no high waves, fair to overcast)
- check the water level (to judge optimal survey conditions).

You must survey the Transect Cruise route with low speed. The boat driver should paddle. On rivers you can drift with the current. Only short stops of 5-10 minutes are permitted when identifying and noting and when making observations from the short trails. A pillow is comfortable to sit on. A filled in data sheet for a Transect Cruise is shown in Figure 17-2.

FIELD DATA SHEET FOR TRANSECT

Observer: DODONG TAMSI

Location (site name): AGUSAN RIVER, FROM BINANGA TO DINAGAT

Length of transect: 2 KM

Date: 15 MARCH 2000

Starting time (TW between 6 and 7 am. TS between 9 am and 3 pm): 6:00 AM

Comments (e.g. on weather): SUNNY, NO WIND, NO WAVES, WATER LEVEL 1.2 M ABOVE THE 0 M SIGN ON THE LIGHT HOUSE

Species/use recorded	Number	Time (or distance from transect start)	Remarks on what was recorded
FISHERMAN WITH CATCH	1	6:10	9 PCS. DALAG (APPROX. 2 KG) AND 2 PCS. HITO (APPROX. 0.5 KG)
DUCKS	6	6:12	PROBABLY PHIL. DUCK (WHITE UNDERWING)
TARICTIC	2	6:25	FEEDING ON FIG TREES AT LAKESHORE
BOAT W/ LOG	1	6:40	2 PCS. OF BANGKAL LOGS (APPROX. 3 m^3)
LARGE DARK HERON	1	6:48	FLUSHED FROM FLOATING GRASS BED ON LAKE BINANGA, PROBABLY PURPLE HERON

Figure 17-2. Example of a filled in Field Data Sheet for a Transect Cruise

Annex 7.

Transect field data sheet and Photo Documentation forms

FIELD DATA SHEET FOR TRANSECT

Observer:

Location (site name):

Length of transect:

Date:

Starting time (TW between 6 and 7 am. TS between 9 am and 3 pm):

Comments (e.g. on weather):

Species/use recorded	Number	Time (or distance from transect start)	Remarks on what was recorded

DATA SHEET 1 Establishment of Photo Documentation Site

Location (site name, province, municipality, barangay, sitio):

How to get to the site:

Position (coordinates):

Position read from GPS or topographic map:

Your full name:

Date of establishment:

Number of photo angles used at this site:

Sketch map of camera location (use the rest of the page to draw a map on):

DATA SHEET 2 Establishment of Photo Documentation Site

Location (site name):

Position (coordinates):
Date:
Your full name:
Remarks:

Sketches of the photos:

	Photo name code (specific name given now to this photo): View angle: Description:
	Photo name code (specific name given now to this photo): View angle: Description:
	Photo name code (specific name given now to this photo): View angle: Description:
	Photo name code (specific name given now to this photo): View angle: Description:

DATA SHEET Photo Documentation

Location (site name):

Position (coordinates):
Date:
Photographer:
Remarks:

Viewing angle for photo:
Film number:
Photo name code (as given at site establishment):
Photo number (as indicated in the camera):
Photo number (as indicated in the negative):
Comments:

Viewing angle for photo:
Film number:
Photo name code (as given at site establishment):
Photo number (as indicated in the camera):
Photo number (as indicated in the negative):
Comments:

Viewing angle for photo:
Film number:
Photo name code (as given at site establishment):
Photo number (as indicated in the camera):
Photo number (as indicated in the negative):
Comments:

Viewing angle for photo:
Film number:
Photo name code (as given at site establishment):
Photo number (as indicated in the camera):
Photo number (as indicated in the negative):
Comments:

Viewing angle for photo:
Film number:
Photo name code (as given at site establishment):
Photo number (as indicated in the camera):
Photo number (as indicated in the negative):
Comments:

Viewing angle for photo:
Film number:
Photo name code (as given at site establishment):
Photo number (as indicated in the camera):
Photo number (as indicated in the negative):
Comments:

Glossary and abbreviations

Abbreviations

Bgy	Barangay
BMS	Biodiversity Monitoring System
CBRM	Community Based Resource Management
CENRO	Community Environment and Natural Resources Office
CPUE	Catch Per Unit Effort
DAO	Department Administrative Order
DENR	Department of Environment and Natural Resources
GIS	Geographical Information System
GPS	Geographical Positioning System receiver
HNGO	Host Non-Government Organisation
LGU	Local Government Unit
NIPA	NGOs for Integrated Protected Areas, Inc.
NIPAS	National Integrated Protected Areas System
PA	Protected Area
PAMB	Protected Area Management Board
PAWB	Protected Areas and Wildlife Bureau of DENR
PAWD	Protected Areas and Wildlife Division of the regional DENR
PENRO	Provincial Environment and Natural Resources Office
SLR	Single Lens Reflex

Definition of Technical Terms

Biodiversity	the variety and variability among living organisms and the ecological complexes in which they occur
Habitat	an environment of a particular kind (such as sea shore or old forest) that provides an animal or plant with adequate food, water, shelter, and living space
Indicator for biodiversity	a parameter which points to, provides information about, or describes the state of biodiversity of an area
Kaingin	slash and burn cultivation
Monitoring	data sampling which is repeated after certain intervals of time for management purposes
Species	related plants and animals that are capable of breeding freely to produce fertile offspring
Sustainable development	development which uses natural resources in a way to meet present needs without compromising the ability of future generations
Swiddening	slash and burn cultivation
Wetland	an area that is regularly wet or flooded, and where the water table stands at or above the land surface for at least part of the year

Republic of the Philippines
Department of Environment and Natural Resources
Visayas Avenue, Diliman, Quezon City, 1100
Tel. Nos. (632) 929-66-26 to 29 • (632) 929-62-62
929-66-20 • 929-66-33 to 35
929-70-41 to 43

DENR Administrative Order
No. 2000-13

SUBJECT: **Guidelines on the implementation of the Biodiversity Monitoring System (BMS) In Protected Areas.**

Pursuant to Republic Act No. 7586 (NIPAS Act) and the Implementing Rules And Regulations, in line with the Philippine commitment to the Conservation on Biological Diversity, and in order to provide up-to-date and comparable information on resources as basis for the management of protected areas, the following guidelines on their implementation of the Biodiversity Monitoring System (BMS) in protected areas is hereby promulgated.

Section 1. Objectives. The BMS aims to:

1.1 Provide simple, cost-effective, and standardized methods in monitoring the trends in population of indicator/priority species and land uses in protected areas;
1.2 Systematically generate up-to-date information necessary for effective and efficient management of protected areas;
1.3 Involvement of local communities and other stakeholders in the generation of information; and
1.4 Strengthen the capabilities of the protected area staff, other concerned DENR personnel, selected members of the Protected Areas management Board (PAMB) and local communities in the data collection, analysis and interpretation.

Section 2. Scope. The BMS shall be implemented in all protected areas and shall therefore be part of the regular activities in protected area management.

Section 3. Definition of Terms. As used in Order, the following shall be constructed as:

Biodiversity - the variety and variability among living organisms and ecological complexes in which they occur

Indicator/priority species for biodiversity
- a parameter which point to, provide information about, describes the status of the biodiversity of a protected area

Section 4. Procedure in the BMS implementation. The BMS shall have the following phases:

4.1. Training. The Protected Areas and Wildlife Bureau (PAWB) shall conduct the Trainers' Training Program. The Regional Offices shall conduct subsequent trainings. Training participants shall include but not be limited to the following:

4.1.1 Protected Area Superintendent (PASu) and PA Staff;
4.1.2 Concerned CENRO representatives;
4.1.3 Concerned PENRO representatives;
4.1.4 Regional Protected Area and Wildlife Staff;
4.1.5 PAMB representatives; and
4.1.6 Local community representatives

The DENR-Human Resource Management Services shall include the training of BMS in its accredited training programs.

4.2 On-site implementation. The BMS shall be implemented by the PASu staff using prescribed methods by DENR-PAWB.

4.3 Submission of BMS Reports. The PASu, thru the CENRO, if needed, and PENRO concerned, shall submit the BMS report to the Regional Executive Director, for endorsement to the PAWB Director. The PAWB Director shall submit an annual consolidation BMS report to the Secretary. The schedule of the submission of the BMS reports shall coincide with the submission of the regular quarterly CENRO and PENRO reports.

The PASu shall also regularly submit reports to the PAMB on the results of the BMS implementation. The information provided by the PASu shall be used as basis by the PAMB in coming up with management decisions for its concerned protected area.

4.4 Monitoring and Evaluation. The Regional Offices and PAWB shall undertake the annual monitoring and evaluation of the implementation of the BMS. The monitoring and evaluation of BMS results shall be done on a quarterly basis.

Section 5. Fund Allocation. The Regional Offices shall allocate the necessary funding for the implementation of the BMS activities.

Section 6. Effectivity. This Order takes effect immediately.

ANTONIO H. CERILLES
Secretary