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BMB TECHNICAL BULLETIN
No. **2014 - 03**

SUBJECT : PRESCRIBED TOOLS FOR IMPACT MONITORING OF ECOTOURISM ACTIVITIES

I. Rationale

This Technical Bulletin prescribes the tools for monitoring the impact of ecotourism activities being implemented by the DENR pursuant to DENR Administrative Order 2013-19, *Guidelines on Ecotourism Planning and Management in Protected Areas* and the National Ecotourism Strategy. The recommended tools were developed by the DENR in collaboration with recognized experts and institutions and have been tried and tested in several DENR programs and projects.

The monitoring will focus on the effect of the ecotourism activities on the target beneficiaries and the ecotourism sites. It aims to achieve the following objectives:

1. To determine the impact of ecotourism on the quality of life of the host communities particularly in providing livelihood opportunities and increasing household income; and
2. To assess visitor impact on the biodiversity and ecology of ecotourism destinations.

II. General Considerations

1. Baseline information should be established based on existing or secondary data gathered from reports and official records; or primary data collected through surveys, Focus Group Discussion (FGD), Key Informant Interviews (KII) and other data gathering methods. The information provided in the Ecotourism Management Plan may be used as reference. The baseline information will be the basis for comparing subsequent monitoring results.
2. Visitor statistics should be gathered periodically as basis for analyzing the survey or assessment results.
3. Monitoring should be done at least twice a year, preferably right before and after the peak season of visitor arrival.
4. The monitoring shall be led by the Protected Area Superintendent with the assistance of technical staff from the PA Office, DENR Regional Offices, PENRO and CENRO especially those who have been trained on specific monitoring tools. Local communities, other government agencies, academe and research institutions may be tapped for technical assistance.
5. The concerned DENR Office shall allocate funds for the conduct of monitoring activities pursuant to this Technical Bulletin.

III. Monitoring Tools

A. Socio-economic Survey

The tool for the conduct of socio-economic survey is provided in ***Annex A***. This is intended to assess the effectiveness of the ecotourism program on the quality of life of the local communities.

Data gathering may be done through survey, focus group discussion (FGD) and key informant interview (KII). Data should be gender-disaggregated.

For surveys, informants should be the communities within and adjacent to the ecotourism area. For FGDs and KIIs, informants should include visitors, communities, protected area staff, and other people familiar and involved in ecotourism activities in the area. As much as possible, there should be a balance in the number of men and women respondents.

B. Resource Monitoring (for Visitor Impact)

The table below outlines the tools widely used for resource monitoring that are also prescribed to assess visitor impact in the ecotourism destinations. The tools will cover terrestrial, and the coastal and marine ecosystems. The detailed methodology for each are provided in ***Annex B***. However, for purposes of this Technical Bulletin, the study area should be selected within the ecotourism areas, where visitor activities are concentrated.

The data to be gathered from the study shall be compared against the number and activities of visitors in the subject ecotourism area for the period covered.

RESOURCE/S	**TOOL/S**
Terrestrial Resources	
• Flora and Fauna • Trail	Trail Resource Assessment and Monitoring (TRAM)
Inland waters (rivers & lakes)	Water quality test which may be requested from EMB or concerned academic institution
Coastal and Marine Resources	
Seagrass, corals, other flora and fauna	Transect Swim Method, Point Intercept Method
Mangrove	Mangrove Habitat Assessment
Swimming area	Water quality test which may be requested from EMB or concerned academic institution
For both terrestrial, and coastal and marine resources	
• Flora and Fauna • Trail • Ecotourism site	Photo Documentation Method

IV. Reporting

The PASU shall submit an annual monitoring report that will include the data analysis and recommended actions to the concerned Regional Director and the BMB Director.

For the information and guidance of all concerned.

THERESA MUNDITA S. LIM
Director

ANNEX A. Socio-economic Survey Tool

(PAWB-DOT-NZAID National Ecotourism Program. 2009. *Final Report: Development of Database and Monitoring Framework for Ecotourism Projects*)

Name of Respondent : _____

Municipality : _____Barangay : _____

A. Demographic Information

1. Family Composition

Name (Surname, First Name, M.I.)	Position in the Family	Sex	Age	Civil Status	Educational Attainment	Occupation	Monthly Income
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

2. Mobility pattern
   [ ] Born-resident
   [ ] Migrant (Place of origin:_____)

3. How did you get to know the place?
   _____ Marriage _____ Friends/Relatives _____ Employment

4. Reason(s) for staying in the area
   _____ Marriage _____Land/Property _____ Friends & Relatives _____
   Work _____ Others Specify)_____

5. Length of stay in the area: _____

6. Ethnic group
   _____ Tagalog _____ Visaya Others specify)_____

7. Language/Dialect Spoken
   _____ Tagalog _____ Bisaya Others (Specify) _____

B. Economic Data

1. What is your main source of income?

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

2. What are your other sources of income? _____
_____

3. Property ownership

3.1. Land

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

3.2. Fishing gear

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

3.3. Animals owned

_____ carabao, how many _____
_____ cattle, how many _____
_____chickens, how many _____
_____ ducks, how many _____
_____ pigs, how many _____
_____ goats, how many _____

4. Housing amenities within the area

4.1. House

_____ owned _____ rented _____ shared
_____ caretaker Others (specify) _____

4.2. Housing materials

_____ nipa hut/cogon _____ wood/bamboo w/ GI roof
_____ concrete (cement) _____ combination (concrete/wood/GI roof)

4.3. Furniture/Appliances acquired

_____ transistor radio _____ sala set
_____ gas stove _____ cabinets/aparador
_____ flat iron _____ bed
_____ dining set _____ television
_____ VCD/DVD player _____ refrigerator
Others (specify) _____

4.4. Cooking fuel

_____ LPG _____ Firewood
_____ Kerosene _____ Charcoal
Others (specify) _____

4.5. Lighting facility

_____ electricity _____ kerosene lamp
_____ generator-operated _____ petromax/gas-operated
Others (specify) _____

5. Health and Sanitation

5.1. Toilet Facility

_____ Antipolo-type _____ water sealed
_____ flush-type _____ no toilet (specify where waste is disposed)

5.2. Potable water

_____ spring _____ deep well
_____ water pump _____ open tank (*sahod ulan*)
_____ Others (specify) _____

C. Data Analysis Guide

The results of the socio-econmic survey shall be analyzed based on the following indicators:

Indicators	**Description**
1. Extent of involvement of community	• Number of community members who are the entrepreneurs implementing the ecotourism project/enterprise; or as suppliers in the supply chain (e.g. boatmen, tricycle drivers, guides, porters, caterers, etc.) • Gender data should be segregated
2. Amount of income generated from the ecotourism project/enterprise	• Amount of income derived by the project/enterprise as a whole • Amount of individual earnings derived from the project/enterprise by the suppliers
3. Number of visitor arrivals	• Number of visitors • Segregate data into local and foreign, age, sex and dates of visits

ANNEX B. Tool for Monitoring Visitor Impact in Ecotourism Destinations

A. TERRESTRIAL RESOURCES

1. **TRAIL RESOURCE ASSESSMENT AND MONITORING** (PAWB-PCW-CIDA GREAT Women Project. 2013. *Gender-responsive Toolkit on Ecotourism Planning and Management*)

   a. What is TRAM?

   The trail resources assessment and monitoring (TRAM) system is a simplified process for conducting inventory of attractions, geophysical resources, and biodiversity. TRAM is done by protected area officers and local guides in various terrestrial ecotourism destinations in the Philippines. It is an easy-to-use method to evaluate the quality of a mountain trail used for ecotourism. Trails serve as "tramways" toward sustainable ecotourism in protected areas.

   b. Why conduct TRAM?

   TRAM aims to combine tried-and-tested techniques in natural resource and biodiversity assessment. Modern technology is used to provide participants with easy methods to evaluate the quality of a mountain trail for ecotourism. Specifically, TRAM participants must know how to measure geophysical parameters along mountain trails; how to conduct simplified biodiversity resource assessment; how to record observations using a TRAM Field Diary; and how to use modern digital technology and the data gathered. Data are then used to formulate visitor management policies, which include preventive and corrective measures to maintain an ecotourism destination's natural environment.

   c. Who conducts TRAM?

   TRAM is conducted by local ecotourism guides, including women. Allowing local guides to participate in resource assessment and monitoring will help them formulate "a story to tell" in the form of a nature interpretation plan.

   d. Where and when is TRAM conducted?

   As its name implies, TRAM is conducted on all tourist-visited trails within an ecotourism site, from the jump-off point to the peak, and then down the mountain. Ideally, Teams traverse one trail to the peak and another trail to descend the other side. Both trails may be evaluated in just one trip. TRAM is conducted every six months, preferably right before and after the peak months of tourism to examine visitation impact.

   e. How does one prepare for TRAM?

   Equipment:
   - Pencils, pens, or markers
   - A small notebook
   - Topographic trail map

- Global positioning system (GPS) device
- Digital camera
- Digital video recorder
- Digital sound recorder
- Binoculars
- Head-mounted flashlights or headlamps
- Measuring tape
- Thermometer
- Plastic rope
- Hand-held net
- References for species identification

It is best to use an all-in-one device like a camera-GPS-phone with all the digital functions needed for TRAM.

f. How does one conduct TRAM?

1. Begin at the trailhead or starting point of the trail by photographing the welcome sign, visitor information or registration station, rules and regulations sign and other signage and facilities.
2. While walking along the trail, stop at areas where visitors are likely to stop like resting areas, picnic areas, view decks, campsites, unique rock formations or other remarkable features. Mark each location on a topographic trail map and/or GPS device as a MONITORING SITE.
3. In a small notebook, record the date, time, weather, air temperature (in degrees Celsius [°C]), altitude (in meters above sea level [masl]) and GPS coordinates of each monitoring site.
4. Take a photo of the trail.
5. Photograph any notable views, attractions, and natural features.
6. Photograph all signage and facilities like benches, tables, and railings.
7. Photograph any signs of negative visitor impact, such as graffiti, tree carving, and garbage.
8. Photograph any signs of damage from natural calamities like landslides and fallen trees.
9. Measure the width of the trail in meters (m) using a meter stick or measuring tape.
10. If present, measure the depth of leaf litter in centimeters (cm).
11. Determine the soil type (e.g., clay, loam, sand, clay-loam, sandy-loam, etc.).
12. If there are bodies of water, measure the stream width and water depth in meters (m).
13. Dip the thermometer bulb into the water for 30 seconds before reading the temperature (°C).
14. At each monitoring site, construct a 5×5-meter grid called the SAMPLING AREA. Use plastic twine or rope to delineate the subplots with the trail as the central point. Each subplot should be named using an alphanumeric system. Vertical columns should be named A to E from left to right while the uppermost to the lowermost rows should be named from 1 to 5.

15. Write down all plant, fungi, and animal species observed within each subplot of the sampling area.
16. Take photographs of all species, especially those classified as threatened, poisonous, edible, or have cultural, ornamental, medicinal, or economic value.
17. Measure the diameter-at-breast-height (dbh) of the largest tree present.
18. Since animals are mobile, one can also make indirect observations beyond the sampling area using tools such as binoculars and video recording devices.
19. Identify and photograph any indirect signs of animal presence, such as footprints, feces, scratch markings, eggs, nests, shells, and exoskeleton cast-offs.
20. Identify and record the sound of animal calls.
21. If present, disturb small sections of leaf litter for any animals that may be hiding underneath.
22. Upon encountering a body of water, observe and identify the surrounding vegetation.
23. Use a hand-held net to catch and identify any animals in the water like fishes, crustaceans, and mollusks. Write down and photograph any debris caught in the fishing net like algae, leaves, seeds, animal bones, and garbage.
24. Do night walks. Walk along riverbanks, streams, and wooded areas to search for animals using head-mounted flashlights or headlamps. Encountered species should be identified, recorded, and photographed. Record any calls heard and any indirect signs of animal presence found like scent markings, feces, and "eye shine" (i.e., reflection of light from the eyes of nocturnal animals).
25. Pay special attention to sites with ecotourism potential like areas with many fireflies.

g. How often should TRAM be conducted?

After the peak season of visitation, repeat TRAM.

- When monitoring is repeated after six months or so, the team must visit the same monitoring sites from the last assessment.
- Move, remove, or designate new monitoring sites as the topography of the area changes or if when new infrastructures and official trails are added.

h. Data Analysis Guide

1. Plot data from consecutive TRAM periods in tables and graphs.
    a. Are there any differences or similarities between different assessments?
    b. Discuss any notable trends or anomalies.
2. Are there any species that are new to the area?
    a. Are these considered invasive alien species?
    b. Discuss possible reasons why these new species were found.
3. Are there any species that that were previously recorded but were not found during succeeding assessments?
    a. Are they seasonal plants or migratory animals?
    b. Were they over-collected or over-hunted?
    c. Was a decline in abundance observed in previous assessments?
    d. Discuss possible reasons why this disappearance occurred.
4. Compare recent photos with old photos from previous assessments.

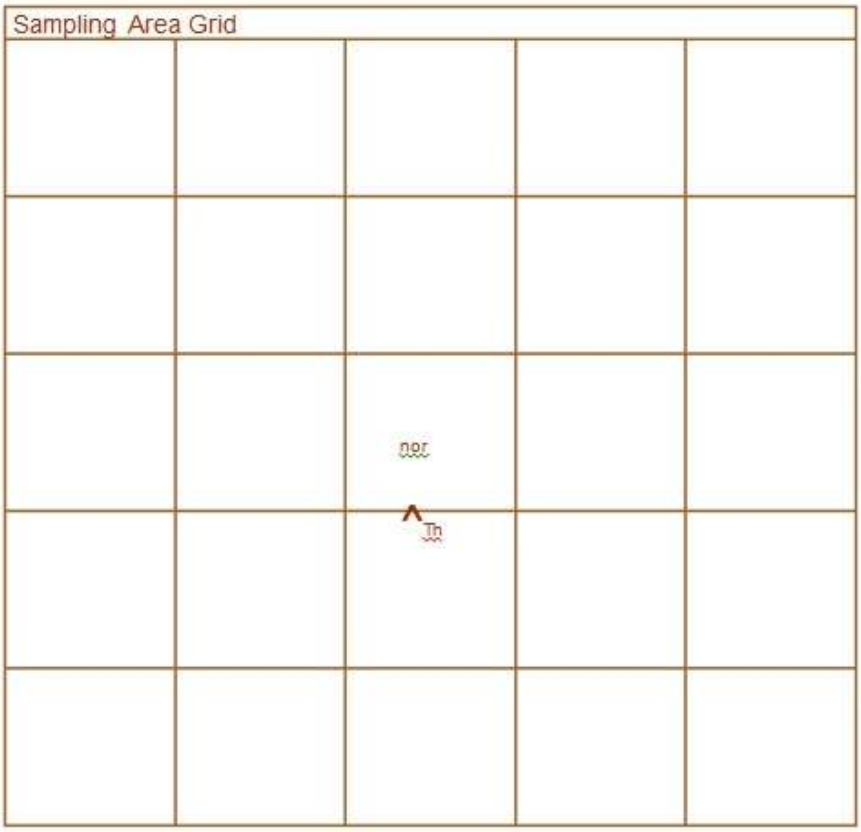
a. Did the trail sustain any noticeable damages?
b. Did negative visitor impact increase, decrease or remained the same?
c. Did previous regulations inhibit or promote negative visitor impact?
d. Discuss ways in which to mitigate or correct negative visitor impact.

Sample TRAM Field Diary

Monitoring Site No. _____

Date	
Time	
Name of evaluator(s)	
Name of protected area	
Name of trail	
Monitoring site location	
GPS Coordinates	

Physiochemical Assessment	
Altitude (masl)	
Weather	
Trail width (m)	
Depth of leaf litter (cm)	
Soil type	
Diameter-at-Breast-Height (dbh) of largest tree (m)	
Stream width (m) water	
Depth (m)	
Water velocity (m/s)	



Photography Checklist		
[Check Mark]	**Item**	**Remark**
1. Signage		
	Welcome sign	
	Rules and regulations sign	
	“parking/no parking”	
	“beware of falling rocks”	
	“slippery when wet”	
	“do not remove vegetation”	
	“no smoking”	
	“campsite”	
	“viewdeck/picnic area”	
	Other signage:_____	
	Other signage:_____	
2. Signs of Negative Visitor Impact		
	Graffiti	
	Tree/rock carving	
	Burnt vegetation	
	Removal of moss patches	
	Removal of vegetation	
	Garbage	
	Widened trails newly	
	Cut trails	
	Other signs:_____	

3. Signs of Damage from Natural Calamities		
	Fallen trees	
	Flooded/ landslide areas	
	Widened waterways dried	
	Out waterways	
	Burnt vegetation	
	Cracks on the ground	
	Others:_____	
4. Trail Type		
	Cemented trail	
	Stone slab trail	
	Gravel trail	
	Soil trail	
	Trail of logs	
	Trail with tree roots	
	Trail with vertical climb	
	Trail with rappel	
	Trail with cliff-side traverse	
	Trail crossing a body of water	
	Others:_____	
5. Plants Present		
	Algae	
	Lichen	
	Bryophytes (mosses)	
	Epiphytes	
	Pteridophytes (ferns)	
	Herbs	
	Shrubs	
	Vines and lianas	
	Gymnosperm trees	
	Angiosperm trees	
	Others:_____	
6. Animals Present		
	Arachnids	
	Insects	
	Crustaceans	
	Mollusks	
	Annelids	
	Fishes	
	Amphibians	
	Turtle lizards	
	Snakes	
	Migratory birds	
	Eagles/hawks/falcons/owls	
	Doves/pigeons	
	Parrots/cockatoos	
	Hornbills	
	Other birds	
	Flying mammals	
	Non-flying mammals	

	Others:_____	
7. Indirect Signs of Animal Presence		
	Animal carcass/road kill	
	Footprints	
	Feces	
	Scratch markings	
	Webs	
	Cocoons	
	Eggs	
	Exoskeleton cast-offs	
	Bird nests	
	Frog foam nests	
	Mollusc shells	
	Others:_____	
8. Fungi Present		
	Molds	
	Mushrooms	
	Cup fungi	
	Jelly fungi	
	Bracket fungi	
	Others:_____	
9. Infrastructure		
	Registration station	
	Comfort rooms	
	Latrines	
	Huts or houses	
	Campsite/camping grounds	
	Picnic huts/tables	
	Benches	
	Trash bins	
	View deck	
	Others:_____	
10. Utilities		
	Deep wells	
	Water lines	
	Outdoor faucets	
	Electricity lines	
	Electric plugs	
	Electric lightning	
	Others:_____	

Drawings of Some Species Encountered

B. COASTAL AND MARINE RESOURCES

1. SEAGRASS BEDS AND CORAL REEFS

1.1. **TRANSECT SWIM METHOD** (DENR-PAWB. 2001. *Biodiversity Monitoring System Manual for Protected Areas*)

a. What is Transect Swim Method?

This 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 could use their wooden goggles and wooden fin.

b. How does one prepare for Transect Swim Method?

Equipment:

- Mask
- Snorkel and fins
- Plastic writing slate or plastic laminated Transect data sheets
- Pencil
- Identification guide
- Waterproof watch
- 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.

c. When and where is Transect Swim Method conducted?

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

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

d. Who conducts Transect Swim Method?

This method should be undertaken by regular 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.

e. How does one conduct Transect Swim Method?

Selection of transect swim routes

1. Obtain a map of the area.
2. Draw the routes on the map. Are any routes near coral reefs or seagrass beds which are particularly threatened or important for protected area communities, 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.
2. For each selected Transect Swim route, establish Permanent marker of cement 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. 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.

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, 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.
4. 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.

f. How often should Transect Swim Method be conducted?

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).

g. Data analysis guide

1. 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

2. 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?
3. 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.
4. Secondly, you must assess whether the changes could have been caused by a change in monitoring routines (ability of the observer to detect marine

organisms, etc.), or a change in staff (remember transect routes should preferably be surveyed by the same person every time).

5. 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.
6. 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.

1.2. POINT-INTERCEPT METHOD (DENR-DA-USAID Coastal Resource Management Project and Fisheries Improved For Sustainable Harvest Project. 2004. *Participatory Coastal Resource Assessment: Training Guide*)

a. What is Point-Intercept Method?

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

b. How does one prepare for Point-Intercept Method?

Equipment:

- Boat and fuel
- Scuba diving gear
- 50 m transect line (marked 25 cm)
- Waterproof slate with pencil and nylon string with fishing weight

c. How does one conduct Point-Intercept Method?

1. Study the map of the area to be surveyed. Identify sampling stations.
2. Using scuba, observers/researchers lay down the 50 m transect line parallel to the shoreline and should be kept at the same depth. When a large obstacle is encountered such as a rock or coral reef formation, the line must be passed around the obstacle, instead of over it, to maintain the same depth. Generally, when using scuba, a 6-7 m depth is standard.
3. Readings will be taken every 25 cm along the line, from one end to the other. A 50 m transect line provides a total of 200 sampling points. For each type of substrate or benthic life form observed at every 25 cm, the observer/recorder should mark it as one point in the substrate type on his slate. For instance, if live hard coral is observed under the first 25 cm mark, then 1 is given to live hard coral. By the end of the 50 m line, there should have been a total of 200 points awarded to the whole 50 m line.
4. To assist observers in doing the point intercept method, a line with an attached weight may be used and dropped alongside each 25 cm point. Such weight is most useful to more precisely determine the point intercept. In using the weight, utmost care must be taken to avoid coral damage caused by the weight.

5. The documentor/recorder marks the transect number and records the observation onto the waterproof slate. Additional slates may be needed if more transects are conducted.
6. The data generated from the point intercept survey are then copied onto the data forms for subsequent summarization as well as computation for percentage covers. Details of data organization and analysis for the point intercept method will be discussed more in the next chapter.

d. Data Analysis Guide

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

POINT INTERCEPT METHOD DATA FORM

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

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

Sample point intercept method data form.

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

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

2. MANGROVES

2.1. MANGROVE HABITAT ASSESSMENT (DENR-DA-USAID Coastal Resource Management Project and Fisheries Improved For Sustainable Harvest Project. 2004. *Participatory Coastal Resource Assessment: Training Guide*)

a. What is Mangrove Habitat Assessment?

In mangroves, the area of investigation is 10% of the total mangrove forest and as in coral and seagrass habitat assessments, transect lines and quadrats will be used. However, unlike coral or seagrass assessment which seeks to determine percentage cover, in mangrove assessment, observer calculate/ estimate the percent crown cover, number of regeneration per square meter, average height of trees and number of species observed.

b. How does one conduct Mangrove Habitat Assessment?

Equipment

- Transect lines (20-50 m),
- Nylon lines to establish 10 x 10 m quadrats,
- Data forms for mangrove habitat assessment,
- Pencils
- Appropriate attire (mud boots, shoes, etc.)
- Field guide to mangrove species

Activity

1. Determine beforehand the specific locations to be surveyed.
2. Assemble participants assigned to conduct the mangrove habitat assessment. Ensure that they are in appropriate attire, as mangrove areas are muddy, and more often than not, littered with various forms of wastes and garbage.
3. Familiarize participants with the various mangrove species locally found in the area. Since local names may vary from area to area, it is important to ensure that a standardized identification of the local name of each species be established. DENR's Field Guide to the Identification of Some Mangrove Plant Species in the Philippines is most useful.
4. The assessment starts with the participants choosing a starting point from which to lay down the strip transect. Typically, the transect starts from the portion of the shoreline where the mangrove habitat begins. Mangrove assessment generally requires a team of 4-5 members as the area to be surveyed requires longer transects and larger quadrats.
5. Extend the 50 m transect line seaward or perpendicular to the shoreline, at the right angle to the inland edge of mangrove area. Set up a strip transect by establishing a series of 10 x 10 m quadrats along the transect line, center, right or left position of the transect line; the position of the transect line; the position of the quadrats should be consistent throughout the survey. There will be no interval between the 10 x 10 m quadrats unlike coral or seagrass transects. Within the 10 x 10 m quadrats establish 3 smaller quadrats of 1 x 1 m equally distributed as regeneration plots.
6. With the strip transect and quadrats established, the participants count the number, estimate the height and the crown diameter of mature trees per species in the 10 x 10 m quadrat and record these onto the data sheet. Then count the seedlings and saplings per species in the 1 x 1 m regeneration plots that is within the 10 x 10 m quadrat.
7. Each kind of mangrove located within the quadrat will be counted according to the stage of its life cycle or age: seeding, sapling and mature tree, defined as follows:
    - seedling - up to 1 m height and a trunk size less than 4 cm in diameter
    - sapling - greater than 1 m height and a trunk size of 4 cm in diameter
    - mature tree - greater than 1 m height and a trunk size greater than 4 cm in diameter
8. Once the mangrove species and their corresponding growth stages found in the quadrats have been determined, participants record such data on a waterproof slate and later transcribed onto a data sheet for better organization. Additional observations about the substrate as well as condition of the environment of the assessed mangrove areas must likewise be attended to.

9. Following is the mangrove assessment data sheet.

DATA SHEET FOR MANGROVE ASSESSMENT

Transect no. _____ Location _____
Recorder: _____ Site _____ Barangay _____
Date _____ Municipality _____ Province _____

Quadrat no.	Tree no.	Substrate	Species	Total ht. (m)	Crown diameter (2 readings)	Observations (disturbance, threats, uses, cuttings, garbage, fauna)

DATA SHEET FOR MANGROVE REGENERATION

Transect no. _____ Location _____
Recorder: _____ Site _____ Barangay _____
Date _____ Municipality _____ Province _____

Quadrat no.	Plot no.	Species	Count	Remarks (average height, status, etc.)
1	1 2 3			
2	1 2 3			

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

c. Data Analysis Guide

The data obtained will now be used in the analysis of the condition of the mangrove area surveyed. In the analysis, it is important to know the value of the percent crown cover, regeneration per square meter and average height. Also, the environmental condition of the mangrove area which were gathered through observations form part of the analysis. The following formula will be used in deriving the information required for the analysis:

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

$$\textbf{Regeneration per } m_2 = \frac{\text{Total regeneration count}}{\text{Total no. of regeneration plots}}$$

$$\textbf{Average height} = \frac{\text{Total height of all trees recorded}}{\text{Total no. of trees recorded}}$$

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

Condition	Criteria
Excellent	76% and above in % crown cover 1 regeneration per m_2 Above 5 m in average tree height Undisturbed to negligible disturbance
Good	51-75% crown cover <1 - 0.76% regeneration per m_2 <5m - 3m average height of trees Slight disturbance and few cuttings
Fair	26-50% crown cover 0.50 - 0.75 regeneration per m_2 <3m - 2m average height of trees Moderate disturbance and noticeable cuttings
Poor	0-25% crown cover <0.50 regeneration per m_2 <2m average height of trees Heavy disturbance/cuttings/pollution, rampant conversion to other uses, nearly destroyed

3. FOR BOTH TERRESTRIAL, AND COASTAL AND MARINE RESOURCES

3.1. **PHOTO DOCUMENTATION METHOD** (DENR-PAWB.2001. *Biodiversity Monitoring System Manual for Protected Areas*)

a. What is Photo Documentation Method?
This method entails on-the-ground fixed point photographing of selected hillsides and ecotourism sites 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 especially 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.

b. How does one prepare for Photo Documentation?
Equipment

- DSLR camera with battery
- Compass
- Pencil
- Photo Documentation forms
- 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.

c. Where and when is Photo Documentation conducted?

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.

d. Who conducts Photo Documentation?

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

e. How often should Photo Documentation be conducted?

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 will be responsible for up to 5 photo documentation sites.

f. Where and when is Photo Documentation conducted?

Photo Documentation sites should be established at view-points along 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.
3. Draw those routes and trails on the map that pass through the seriously threatened areas.
4. Mark view-points 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 activities 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. 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.

g. How does one conduct 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.
4. Take two photos of the same view.
5. Enter all the relevant information in your data sheet for photo documentation.
6. Store and print the photos.
7. Make sure to note reference numbers that connect data sheet and prints.

h. Data Analysis Guide

1. If there are major differences between the photos you should carefully analyze 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.
2. 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.
3. If you consider that the differences are important, then try to identify the reason for the differences.
4. 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.
5. 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.