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**ECOSYSTEMS IMPROVED FOR
SUSTAINABLE FISHERIES (ECOFISH)
PROJECT**

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BASELINE ASSESSMENT REPORT

ECOFISH Document No.: 05/2014

Version: Final

Implemented with:

Department of Agriculture-Bureau of Fisheries and Aquatic Resources
National Government Agencies
Local Government Units
Assisting Organizations

Supported by:

United States Agency for International Development
Contract No.: AID-492-C-12-00008

Managed by:

Tetra Tech ARD

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Abbreviations and Acronyms

BFAR	-	Bureau of Fisheries and Aquatic Resources
CFRM	-	Coastal and Fisheries Resources Management
CIG	-	Calamianes Island Group
CMMO	-	Coastal and Marine Management Office
COP	-	Chief of Party
COR	-	Contracting Officer's Representative
CPUE	-	Catch Per Unit Effort
CRM	-	Coastal Resources Management
CRMP	-	Coastal Resources Management Project
DA	-	Department of Agriculture
DENR	-	Department of Environment and Natural Resources
EAFM	-	Ecosystem Approach to Fisheries Management
ECOFISH	-	Ecosystems Improved for Sustainable Fisheries Project
FGD	-	Focus Group Discussion
FIES	-	Family Income and Expenditure Survey
FISH	-	Fisheries Improved for Sustainable Harvest Project
GIS	-	Geographic Information System
GPH	-	Government of the Philippines
KII	-	Key Informant Interview
LGU	-	Local Government Unit
LIT	-	Line-Intercept Transect Method
MEAT	-	MPA Management Effectiveness Assessment Tool
MERF	-	Marine Environment Resources Foundation
MKBA	-	Marine Key Biodiversity Area
MPA	-	Marine Protected Area
NGA	-	National Government Agency
NGO	-	Non-Governmental Organization
PMP	-	Performance Monitoring Plan
PO	-	People's Organization
PPP	-	Public-Private Partnership
UPMSI	-	University of the Philippines Marine Science Institute
UPVFI	-	University of the Philippines Visayas Foundation Inc.
USAID	-	United States Agency for International Development
VIP	-	Verde Island Passage

1. Introduction

The technical assistance and services contract was awarded to Tetra Tech for the implementation of USAID/Philippines' Ecosystems Improved for Sustainable Fisheries (ECOFISH) Project in June 29, 2012, under contract number AID-492-C-12-00008. The main objective of the ECOFISH Project is to improve the management of important coastal and marine resources and associated ecosystems that support local economies. The ECOFISH Project is intended to foster fishing sector reforms through the application of the Ecosystem Approach to Fisheries Management (EAFM) in larger marine conservation areas and involving clusters of Local Government Units (LGUs). It will promote the growth and restore the profitability of fisheries through conservation of ecosystem health and effective management.

The ECOFISH Project is in line with the current U.S. Country Assistance Strategy directed at reducing threats to biodiversity and improving natural resources and environment. The ECOFISH Project is expected to contribute to achieving "Development Objective 3: Environmental Resilience Improved," particularly "IR3.2 Natural Resources and Environmental Management Improved" of the results framework of USAID/Philippine Mission's Country Development Cooperation Strategy (2012-2016). The Project is also designed to contribute to priority goals and actions laid out in the Philippine Development Plan (2011-2016). This five-year project will provide technical assistance to the Government of the Philippines (GPH), through the Department of Agriculture – Bureau of Fisheries and Aquatic Resources (DA-BFAR) and implemented in partnership with selected LGUs.

The main objective of the ECOFISH Project is to improve the management of important coastal and marine resources and associated ecosystems that support local economies. It will conserve biological diversity, enhance ecosystem productivity and restore the profitability of fisheries in eight marine key biodiversity areas (MKBAs) using the ecosystem approach to fisheries management (EAFM) as a cornerstone of improved social, economic and environmental benefits. At the end of five years, the ECOFISH Project is expected to achieve the following key results:

- (A) An average of 10% increase in fisheries biomass across the eight MKBAs;
- (B) A 10% increase in the number of people gaining employment or better employment from sustainable fisheries management from a baseline established at the start of the Project;
- (C) Establishment of a national capacity development program to enhance the capacities of LGUs and relevant national agencies to apply ecosystem-based approaches to fisheries management;
- (D) Eight public-private partnerships supporting the objectives of the ECOFISH project created and operating;
- (E) One million hectares of municipal marine waters under improved management; and
- (F) A core of 30 LGUs across the eight MKBAs with improved capacity for implementing ecosystem approaches to fisheries management.

The ECOFISH Project is designed to make an impact on eight MKBAs in the country (Figure 1), namely: (1) the Calamianes Group of Islands MKBA, (2) Lingayen Gulf MKBA, (3) Ticao Pass – Lagonoy Gulf - San Bernardino Strait MKBA, (4) Danajon Reef MKBA, (5) South Negros MKBA, (6) Surigao del Sur and Surigao del Norte MKBA, (7) Sulu Archipelago MKBA, and (8)

Verde Island Passage MKBA. They represent all six marine bio-regions of the Philippines and were selected due to their extremely high need for marine biodiversity conservation.

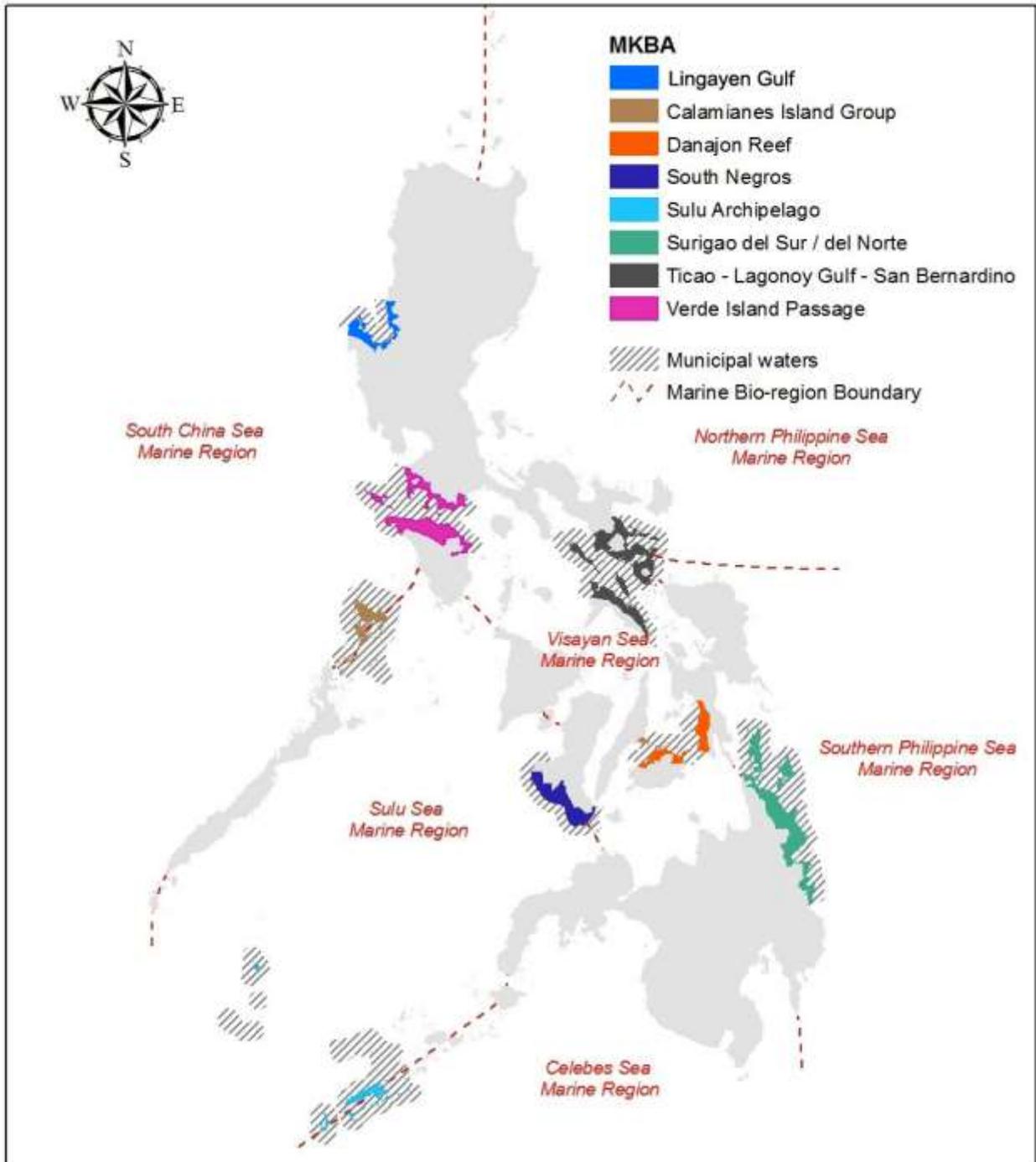


Figure 1. Map of the Eight Marine Key Biodiversity Areas (MKBA) of ECOFISH

This document summarizes the materials and methods used for and key results from assessments to establish baseline conditions for key performance indicators that describe the status of marine fish stocks, employment, capacity to manage fisheries and other relevant reference points at the start of the ECOFISH Project. The results will serve as reference points for the Project's performance through scheduled monitoring events. This document, however, does not include baseline and monitoring parameters that have inherent zero values at the start of the Project viz., those that will just be subject to a simple counting/accounting system. This Baseline Assessment Report is guided by the ECOFISH Baseline Assessment Plan (ECOFISH Document No. 07/2013).

Information derived from the baseline assessments will not only serve as reference points for project performance. They also serve as information inputs to roll out early fisheries management interventions, as well as other programmatic interventions such as the drafting of site management plans, vulnerability assessments, the national database on EAFM, the State of the Marine Resources Report, species and gear specific studies, MPA network analyses, cost-benefit analyses, and value chain analyses.

2. Materials and Methods

This baseline assessment report describes the materials, methods and corresponding results that will be used as baseline conditions for key performance indicators at the start of the ECOFISH Project, particularly parameters that will be used to measure and monitor the increase in fisheries biomass and the number of people gaining employment or better employment resulting from ECOFISH management interventions.

2.1. Fisheries and MPA Baseline Assessment

The fisheries and MPA baseline assessment utilized the most practical methods applicable for typical exploited multispecies fish stocks in the tropics (like the Philippines). The choice of methods and parameters measured was based on the following considerations:

- Use assessment and monitoring methods appropriate to project goals that are cost efficient.
- Apply the best available scientific methods, and in particular, those methods previously used and tested in USAID's 7-year FISH Project.
- Select and modify methods to build on already established Philippine data collection methods.
- Only fisheries dependent methods shall be used to measure increase in biomass across MKBAs for purposes of cost efficiency.
- Subsequent assessments to evaluate project result in 2015 and 2017 shall be carried out in the same months when baseline data collections were conducted and taking into consideration the phase of the moon.
- Other fisheries related parameters to be measured shall supplement or serve as basis for evaluating the primary project result (10% increase in fish biomass).
- To the extent possible (without unduly sacrificing the accuracy of results for project evaluation purposes), practical methods shall be selected or designed such that these can be carried out by the stakeholders beyond the life of the Project.

With the assistance of site coordinators, the Baseline Assessment Team assembled and reviewed all available secondary information about the fisheries in the MKBAs and, more specifically, in the focal areas. This initial step provided the team a general idea of the fisheries in the various focal areas, determine information deficiencies, and provide guidance on the appropriate and efficient field data collection protocol for fisheries and MPA baseline assessment in the focal areas.

2.1.1. Fisheries Baseline Assessment

Fisheries-dependent survey is the primary method used by ECOFISH to determine fisheries biomass in the focal areas of the eight MKBAs. This mainly involved catch and effort monitoring of all fishing activities during a specific period of time. In this case, a 3-month time series data was collected to determine catch per unit effort (CPUE) of municipal fishing gears operating in the focal areas. Landed catch of fishing gears were monitored for 3 straight months. The idea was to collect the same set of data during the baseline year in 2013 and during subsequent project monitoring events to be conducted during the same 3-month period in 2015 and 2017. Enumerators were hired to do daily catch and effort monitoring in selected landing sites. The same months of the year will be used in monitoring increase or decrease in CPUE in the future. The catch monitoring schedule followed a 3-day cluster scheme, designating the first 2 successive days for fieldwork and the third day as rest day. The scheme always starts on the first day of each month. This provides a higher likelihood of sampling both lean and peak days of fishing, covering holidays, weekends, and “must” fishing days, such as the eve of market days.

CPUE alone will only show the catch rate of a fisher operating a specific fishing gear. It does not, however, fully reveal the effect of changes in fishing pressure brought about by increase or decrease in the number of fishing gears or number of fishers. To determine this, additional sets of information were gathered. These include the total number of fishers operating in the focal areas, the total number and type of fishing gears being used, and the number of days of operation for the sampling duration. Non-fishing days for specific fishing gears influenced by the lunar phases, tidal fluctuations, magnitude of currents and weather conditions were noted and considered in the estimation of total landings. Together, these sets of information can provide estimates of the daily or monthly total landings by all gears operating in the focal areas.

An inventory of municipal fishing crafts (classified into motorized and non-motorized), fishing gears, and fishers in the focal areas was conducted. In addition, information about gear types, size, specifications, mode of operation, frequency of use, and seasonality of fishing operations were collected. These information, together with that on commercial fishing crafts (in case they are also operating in the area), will give baseline information on the level of fishing effort in the area.

For catch monitoring purposes, the team identified major and minor municipal landing sites in the focal area. Sampling sites for catch data collection were selected in a manner that both major and minor landing sites are proportionately represented. Future catch monitoring activities shall be conducted in the same sites and the same months of the year.

Enumerators were assigned in sampling sites and provided with gridded maps to trace the source of the catch. Information collected included the following: sampling site, date, and time; fishing ground

location (with reference to map grids); fishing boat size, propulsion, horsepower, number of fishers; fishing gear type, specifications (design, dimension, mesh or hook size, bait used and accessories); mode of operation, number of hauls, time of setting and hauling; total weight of catch; species composition by weight and number; and length frequency distribution of important species. Information like the number of operation, harvesting, or landing per day were likewise noted. For relatively large catches, samples were taken. Fish samples were bought so as not to bother the fishers and also enable the enumerators to process more catches. All catch data were made convertible to kilograms per day. Species landed were recorded using either the scientific names (as identified) or their local names. Identification of their scientific names was undertaken using the taxonomic guides provided in Rau and Rau (1980) and Masuda *et al.* (1984). The fishing area for each of the monitored landed catch were recorded with reference to a gridded map of the focal area. The location of the landing sites and the gridded map will be retained during the monitoring events in 2015 and 2017.

To get accurate results from the catch and effort monitoring activities, a field training was conducted before the actual monitoring. This covered the purpose of catch and effort monitoring, introduction to the basic principles of sampling, elaboration of the project sampling design, catch sampling strategies, and proper behavior during the catch sampling process. Actual catch monitoring practice runs were conducted for several days for enumerators to practice and develop their skills following the proper sampling procedure.

The overall effect of project interventions will be measured as percentage change in the weighted average of CPUEs of the fishing gears operating in each focal area. It will be weighted relative to the number of gears by gear type operating in the focal area. The overall average for the 8 MKBAs will be weighted relative to the area covered by the intervention, primarily represented by the selected focal area of each MKBA. As a support measurement to verify the catch rate trend, the percentage change in the weighted average of CPUEs of selected fishing gears (bottom set gill net or bottom set long line) common to all or majority of the focal areas will likewise be computed as another basis for estimating the specific project result of increase in fish biomass.

2.1.1.1. Key Informant Interviews and Focus Group Discussions

Since actual data collection is limited only to a 3-month duration, information on seasonal variations were captured through key informant interviews and focus group discussions. Qualified key informants at the barangay level are the presidents or chairs of people's organizations, the barangay captain (especially if he or she is also a fisher), the barangay council chair of the fisheries and environment committee, fish wardens, and elderly fishers with long fishing experience. Information gathered include the following: types of fishing gears used by the fishers in their area, specifications, mode of operation (including seasonality of use), estimated average catch per day (seasonal variation, if applicable), and ranking of major species caught (including seasonal variation, if applicable).

2.1.1.2. Other Fisheries-Related Measurements

Fisheries management interventions, if successful, will not only positively affect CPUE, total landings, or stock density but in the long term, can also result in improvement of catch and size

composition, particularly towards catching economically more valuable and larger fishes. These qualitative features will also be derived from data collected during the fishery-dependent surveys.

Species composition of catches by all fishing gears operating in the focal areas will serve as basis for comparison in future catch monitoring events. Putting them together, these sets of information will indicate the aggregate species mix during the baseline data collection for comparison with future catch monitoring events. Changes can be measured in terms of change in the abundance of commercially important species in the catch or in the average trophic level of the catch. As an added feature, the weight and number ratio can also be estimated and can provide an indicative value of the average size of each particular species of fish or invertebrate in the catch.

The mean sizes of various fishes caught by different fishing gears operating in the focal areas during the baseline year can serve as basis for comparison with future catch monitoring events. With individual lengths of fishes and invertebrates in the sorted catch measured, the length frequency distributions for species in the catch can be constructed and can serve as basis for future comparison. Through this, increase or decrease in average size through time can be statistically compared.

2.1.1.3. Activities and Schedule

Fisheries baseline data were collected in selected sampling sites within each focal area. Two core teams were formed, one for the MKBAs in the four old FISH Project sites and the other for the four new MKBAs. The first group was led by the prime contractor (Tetra Tech – ARD) while the other was led by MERF. A senior researcher supervised each core team supported by one junior researcher and 10 to 14 enumerators in each focal area. The two core teams collaborated to standardize the sampling method particularly learning from the lessons and knowledge gained during the catch monitoring by the FISH Project (FISH Project 2010).

Catch and effort monitoring in each focal area was conducted for a total period of 3 months. A coordinator was assigned to supervise the enumerators and perform weekly data encoding. Encoded data passed through a quality control process prior to input into the performance monitoring database. The schedule for conducting specific components of the fisheries baseline assessment in each focal area is given in Table 1.

Table 1. Generic Schedule of Activities During the Three-Month Fisheries Baseline Assessment in the Focal Areas of the Eight MKBAs Conducted in 2013

Fisheries Baseline Assessment Activities	2013														
	Month 1			Month 2			Month 3			Month 4			Month 5		
Make representation with LGUs and other partners	■	■	■												
Hire enumerators		■	■												
Train enumerators and field assistants			■	■											
Collect catch and effort data					■	■	■	■	■	■	■	■	■	■	■
Encode and analyze data									■	■	■	■	■	■	■
Prepare final report															■

2.1.2. Marine Protected Area Baseline Assessment

Strengthening and establishing MPAs in each focal area to enhance fisheries production and marine ecosystem integrity is a major management mechanism of the ECOFISH Project. These MPAs will form the building block of a network of MPAs to be established in each MKBA. An MPA network is a group of MPAs that interact ecologically such that sources of eggs, larvae, and propagules in one MPA may enhance recruitment in another. It can protect a species or group of related species if the component MPAs are sited in areas where such species are most vulnerable, such as, in aggregation sites, in critical habitats of particular life stages or along chosen points in migratory routes. As a key step towards MPA establishment, baseline assessment was conducted in existing MPAs or in potential new areas where MPAs will be established in each focal area.

A key activity prior to selection of MPAs to be supported by the project, as well as establishment of new MPAs in the area to form a network of MPAs, was the inventory of existing MPAs in each MKBA. Existing MPAs, active or inactive, were evaluated using the MPA Management Effectiveness Assessment Tool (MEAT). MEAT as a tool have elements to gauge important threshold indicators and processes that help evaluate the management effectiveness of an MPA and, therefore guide the project in determining necessary inputs, interventions, or investments to promote effective MPA management. The selection of MPAs that will form part of the network as well as the immediate project intervention to strengthen management of existing MPAs were (and in the future expansions will be) based on this.

2.1.2.1. Selection of Existing or Potential MPAs

The baseline assessments of MPAs were conducted in existing or potential MPAs that are likely to be included in the MPA networks to be established by the Project. Some focal areas may contain MPAs that the project could build upon to develop into an MPA network. In other areas, no MPAs currently exist, thus requiring the identification of potential ones. Three MPAs within each focal area were selected for the surveys on the basis of information from discussions with local government officials, local fishers, and people’s organizations.

2.1.2.2. Reef Fish Biomass Inside and Adjacent to Selected MPAs

Reef fish biomass and density were measured in three MPAs within each focal area. Reef fish assemblages were surveyed using the standard visual census techniques in English *et al.* (1997). All fish (including juveniles) encountered within 5 meters of either side of the 50-m transect line were identified and counted, and their size (total lengths) were estimated to the nearest 1cm. A minimum of five transects were surveyed inside (if already established) and another five outside of each selected MPA (or other reef site). Length data were converted to biomass estimates by using length-weight relationships in the literature. Biomass of “major,” “target,” and “indicator” species were separately estimated. Biomass estimates are expressed in metric tons per km² and density expressed as number of individuals per km².

2.1.2.3. Reef Fish Species Richness Inside and Adjacent to Selected MPAs

As part of reef fish assessment described above, the number of species encountered in each transect were noted down, thus providing data on species richness. Species richness is expressed as number of species per km².

2.1.2.4. Benthic Condition Inside and Adjacent to Selected MPAs

The line-intercept transect (LIT) method (English *et al.* 1997) was used to obtain data on life form/genera that form the basis for assessing the percentage of living coral cover. In addition, the general characteristics of the reef site were also documented, such as depth, steepness of slope, general reef typology, and bottom rugosity. The baseline assessment of the benthic conditions were made simultaneously with reef fish assessment and along the same transect line.

2.1.2.5. Activities and Schedule

The baseline assessment team is generally composed of two members that conducted fish visual census and four members that surveyed the benthic life forms. The generic schedule for conducting MPA baseline assessment is given in Table 2.

Table 2. Schedule of Activities for the MPA Assessment in the Focal Areas of the Eight MKBAs Conducted in 2013

MPA Baseline Assessment Activities	2013							
	Month 1				Month 2			
Make representation with LGU and other partners								
Prepare logistics and supplies for reef assessment								
Establish sites and do reef assessment surveys								
Encode and analyze data								
Prepare final report								

2.2. Socio-Economic Baseline Assessment

The socio-economic assessment component intends to provide the baseline for measuring the progress of ECOFISH in reaching the Project's target of a "10% increase in the number of people gaining employment or better employment from sustainable fisheries management."

Measurement is based on a combination of parameters including household incomes, household expenditures, resource uses, and employment. Percentage changes will be used for the sample population directly relying on their coastal and marine resources for their primary livelihoods. Improvement may come from increased incomes, which in turn may come from increased savings, increased expenditures for improving standards of living, or decreased costs in fishing due to shorter distances of time spent fishing. It may also come in the form of better employment opportunities, away from traditional catch harvesting. Finally, it may come in the form of improved health status or social standing in the community due to improvements in the status of their coastal and marine resources.

The project team developed a socio-economic baseline survey to assess the effects of activities on all program outcomes. The survey included basic questions on social and economic indicators, which will be used to measure impacts against intended results. The baseline assessment is the first of three interconnected activities that will track and assess ECOFISH impacts. The surveys will be repeated in years 3 and 5, and responses of the same households will be measured and compared with the baseline survey results to measure the socio-economic impacts of the Project.

The socio-economic baseline was established primarily through a survey of individual households. The sample size was set at a minimum of 500 households per MKBA. Random sampling was employed in choosing the individual households. The choice of barangays (or villages) was made consistent with the choice of barangays covered by the biophysical surveys.

2.2.1. Socio-Economic Baseline Assessment Tool

The survey is divided into four major parts: (1) social and demographic profile of the fishing households, (2) general economic profile including household's sources of income and expenditures, (3) perceptions of the respondent with respect to conditions of, and threats to marine resources as well as perceptions on enforcement of fishing rules and regulations, and, (4) the profile of fishing households with respect to fishing practices, income and expenditures.

The demographic profile contains basic information on family size, age, ethnicity, religion, number of females in the household, civil status and educational attainment of the respondent. It further asks about house and lot ownership, housing materials, amenities, appliances, cooking fuel and drinking water sources, sanitation facilities, and waste management practices. Finally, seafood consumption and health conditions are included as health indicators of fisherfolk households.

The economic profile consists of top livelihood sources, household expenditures, and the various sources of income for the household. Household expenditure items are made consistent with national surveys on family income and expenditures.

Perceptions of respondents were gathered, focusing on primary opportunities and challenges in their respective barangays, their own qualitative assessment of conditions and threats to marine resources, their knowledge and views of MPAs in their areas, and their subjective rating of the various parts of the enforcement chain.

The last part consisted of questions dealing with most common gears used and top species caught, fishing profiles, average volumes harvested and sold, incomes and costs from harvesting activities, and measurements of economic rent. Respondents were asked to rate the demand for the top species they catch, as well as the primary markets and buyers they cater to.

2.2.2. Key Informant Interviews and Focus Group Discussions

To complement the household surveys particularly in determining which barangays would have the highest concentration of marginal fisherfolk for the conduct of the household surveys, KIIs and FGDs were conducted with selected local government officials in the focal areas of the project. Discussions focused on population demographics, the presence of or potential for the establishment of MPAs, common issues regarding capture fisheries, mariculture and aquaculture, other major livelihood activities of the community, issues related to governance and enforcement of fishing rules and regulations, potentials for ecotourism or other marine-related enterprises, current and potential revenue generating schemes for the implementation of CRM, and species of interest for value chain studies.

2.2.3. Activities and Schedule

A week of planning, FGDs, KIIs and training of enumerators were conducted for each MKBA, based on the general schedule given in Table 3.

Table 3. Generic Schedule for Socio-Economic Baseline Assessment in Eight MKBAs Conducted in 2013

Day	Activity
1	Travel to Site
2	Meeting with LGUs 1 & 2 (KIIs/FGDs)
3	Meeting with LGU 3 (KIIs/FGDs), Planning
4	Training of HH Enumerators, Planning
5	Training of HH Enumerators, Planning
6	Deployment of Enumerators, Conduct Surveys
35-50	Completion of Surveys

Site coordinators were asked to conduct the following preparatory activities in preparation for the FGDs and enumerators' training:

- Hiring of ten to twelve local enumerators to conduct the whole survey.
- Scheduling of LGU visits.

- Assistance in choosing the municipalities to be covered by the survey, and assistance in choosing barangays within focal municipalities to be covered. Ideal breakdown is six barangays per municipality, 30 households per barangay, for a total of 540 households in each MKBA. Adjustments were made accordingly if there were less than 6 barangays with fishers in the identified municipality.
- Procurement of barangay maps, list of residents per barangay covered by the survey, total number of fisherfolk per barangay, and total population per barangay.
- Logistical arrangements for the site visit: lodging, transportation arrangements, etc.

Trainings were conducted for 2 days in each MKBA. Day 1 consisted of providing an overview of the ECOFISH project and the SE baseline assessment activity, as well as an itemized discussion of the survey instrument. The second day was dedicated to conducting mock interviews, providing tips in conducting household surveys, choosing the households to be surveyed based on random sampling techniques, detailed scheduling in each barangay, and budget concerns. Surveys were typically completed in 30 to 45 days per MKBA.

2.3. Benchmarking the Capacity of Partners to Apply EAFM

To measure the cumulative effect of courses developed, trainings conducted, and on-site development and implementation of fisheries management interventions to increase capacity of partners to apply the ecosystems approach to fisheries management, ECOFISH has developed an EAFM Benchmarking System (Appendix 1) to standardize the assessment of the capacity of partner LGUs in implementing EAFM. Benchmarking was conducted at the start of the project (year 1) to determine the base level. The LGU conducted a self-assessment on seventeen benchmarks that correspond to essential elements of EAFM implementation. The benchmarking exercise was done during the ECOFISH orientation workshops in the MKBAs and validated by site coordinators during the early stages of project implementation. The exercise will be repeated during the monitoring events in year 3 and year 5. Recently, the team agreed to perform this on an annual basis since the other purpose of setting the benchmark and monitoring progress is to guide partners, particularly the fisheries managers, in effectively implementing EAFM programs primarily by being prompted by reference points for the various stages of their implementation.

Over the course of ECOFISH technical assistance, partner LGUs will undergo trainings and start implementation of fisheries management interventions. The trainings and implementation experience are expected to result in improvement in their overall capacity to implement EAFM. Another round of self-assessments using the benchmarks will be made during Year 3 and Year 5 of the Project to determine the cumulative effect of trainings conducted, and on-site development and implementation of fisheries management interventions.

There is “improved capacity for implementing EAFM” if the LGU records an improvement from Level 1 to Level 2 in at least seven (7) benchmarks, where ECOFISH provides direct interventions including benchmarks 2, 3, 4, 5, 7, 8 and 9. In addition, ECOFISH will monitor improvement in capacity for selected LGUs that receive site-specific assistance on specific species and gear management (benchmarks 12 and 13). Direct ECOFISH Project assistance will also be targeted for selected LGUs where there are opportunities for revenue generation and enterprise development. Improvement in capacity for these elements will also be measured. However, improvement in the

other benchmarks is dependent on factors beyond the control of the Project. For example, the establishment of ecosystem boundaries (Benchmark 1) depends on the successful resolution of municipal water boundary conflicts between contiguous LGUs. Establishment of a fisheries management office (6), constituency building (10) and multi-institutional collaboration (11) are also discretionary on the LGUs.

2.4. Other Baselines

The baseline conditions for the rest of the ECOFISH Project results and their subsequent monitoring will just require some form of counting/accounting system (given their inherent zero value at the start of project implementation). This includes measuring the area of municipal waters under improved management, the number of local government units capable of implementing EAFM, and the number of public-private partnerships created during the life of the Project (see the ECOFISH Baseline Assessment Plan, ECOFISH Document No. 07/2013).

3. Results and Discussion

The results presented in this document include parameters needed for estimating the key project results (namely, an average of 10% increase in fisheries biomass across the eight MKBAs and a 10% increase in the number of people gaining employment or better employment from sustainable fisheries management) from a baseline established at the start of the project, as well as the level of the capacity of partners to implement EAFM measured using the benchmarking system. Putting numerical values to EAFM benchmarks is important since they likewise will become the basis and threshold for other project results.

3.1. Fisheries and MPA Baseline Assessment

3.1.1. Fisheries Baseline Assessment

A total of 84 landing sites (Table 4) were selected for the catch monitoring in the focal areas across the eight MKBAs. As mentioned earlier the sampling sites for catch data collection were selected in such a manner that both major and minor landing sites are proportionately represented. Future catch monitoring activities to evaluate the project result shall be conducted in the same sites selected and the same months of the year.

Between 7 to 34 fishing gear types were encountered during catch and effort monitoring in the focal areas. Some gear types were encountered at least once while others at most 670 times during the 3-month monitoring. Commonly used fishing gears across the focal areas of the 8 MKBAs are the simple hook and line, bottom-set gillnet, bottom-set longline, drift gillnet and multiple handline. Tables 5 to 12 summarize the average catch rates (kg/day), standard deviations, and number of the gear types sampled. As a general observation, the mean catch rates of various fishing gears were relatively higher in Tawi-Tawi and Verde Island Passage MKBAs while relatively lower in Danajon Reef and Lingayen Gulf MKBAs. Ring net consistently have the highest catch rates (kg/day) in areas where they are still allowed to operate. Danajon Reef consistently has the lowest catch rates when gears common to all, such as simple hook and line and bottom set gill net, are compared. These average catch rates will become the base level in 2013

and the basis for comparing increase or decrease of catch rates of the same gear types during the monitoring events in 2015 and 2017.

The use of baseline data is not only to establish the base level for measuring the project performance but the information gathered can likewise be used for fisheries management interventions. The aggregate species composition can guide the project in determining species-specific interventions in each of the MKBAs. Table 13 summarizes the top ten species caught by fishing gears monitored in the focal area of each MKBA. The aggregate catch composition indicate potential species-specific interventions for reef anchovies in Calamianes Island Group MKBA, round scads and mackerels in Verde Island and Danajon Reef MKBAs, and small tunas in Lingayen Gulf, Tawi-Tawi and South Negros MKBAs. However, this is not clear in the species mix of the other MKBAs. Currently, ECOFISH is in the process of finalizing the species-specific interventions for each MKBA. Since the baseline monitoring covers only a 3-month period, species that may be abundant during other seasons of the year (but not captured by the data collection during the baseline assessment event) have to be considered.

Table 4. Fish Landing Sites Selected for the Fisheries-Dependent Data Collection in the Eight MKBAs During the Baseline Assessment in 2013

Municipality/Landing Site	Municipality/Landing Site	Municipality/Landing Site
Calamianes Island Group MKBA	Lingayen Gulf MKBA	Surigao del Norte and del Sur MKBA
Busunga	Agoo	Bacuag
Bogtong	Bani	Poblacion
Salvacion	Damortis	Claver
Coron	Alaminos	Panatao
Barangay 1-Bakawan	Bolo Islands, Telbang	Gigaquit
Barangay 1-Comesaria	San Fernando	Gigaquit Public Market
Barangay 2	Ilacanos Sur	Nagubat
Barangay 5-Bancuang	Poros	Punta Alambique
Bintuan	San Bernardino – Ticao Pass – Lagonoy Gulf MKBA	Placer
Bulalacao	Bulan	Banga
Diguiboy	Bulan	Surigao City
Maquinit	Matnog	Punta Bilar
Tagumpay	Tablac	Taganaan
Culion	Santa Magdalena	Cawilan
Balala	Barangay 1	Sampaguita
Bernabe	Barangay 3	Verde Island Passage MKBA
Chindonan	Poblacion 4	Calatagan
Culango	South Negros MKBA	Balibago
Jardin	Bayawan City	Balombato
Libis	Banga	Burot
Osmena	Buyco	Poblacion 2
Sitio Pescadores	Malabugas	Poblacion 4
Danajon Bank MKBA	Pagatban	Mabini
Buenavista	Suba Port	Pantalan Anilao
Asinan	Tinago	Tingloy
Clarín	Santa Catalina	Santo Tomas
Nahawan	Cawitan	Tingloy
Getafe	Fatima	Tawi-Tawi MKBA
Handumon	San Pedro	Bongao
Nasingin	Siaton	Chinese Pier
Pandanon	Agbagacay	Kasulutan
Inabanga	Albiga	Lamion
Cuaming	Malabuhan	Public Market
Hambongan	Maloh	Panlima Sugala
Lawis	Nagba	Batu-Batu
Sto Nino	Nasipit	Simunul
Tubigon		Bakong
Bagongbanwa		Mastul
Pandan		Pagasinan
Tinagan		Sukah Bulan
		Tubig Indangan
		Ubol

Table 5. Catch Per Unit Effort (kg/day) of Fishing Gears Monitored in Selected Landing Sites in the Calamianes Island Group MKBA During the Fisheries Baseline Assessment Conducted in 2013

	Gear Type	n	CPUE	Min	Max	Sd
1	Bag net	129	228.38	0.43	3995.00	457.58
2	Barrier gillnet	1	4.95	4.95	4.95	-
3	Bottom set gillnet	669	17.01	0.50	3000.00	125.25
4	Bottom set longline	402	9.41	0.32	71.00	6.35
5	Crab pot	1	5.00	5.00	5.00	-
6	Drag handline	26	33.11	3.25	95.00	27.68
7	Drift gillnet	110	13.70	0.53	83.00	13.48
8	Dynamite	1	60.00	60.00	60.00	-
9	Encircling gillnet	7	7.67	4.50	11.50	2.84
10	Fish corral	39	9.97	1.00	80.00	13.85
11	Fish trap	31	6.82	1.10	16.15	4.90
12	Gleaning	10	2.65	0.94	7.00	1.94
13	Hook and line with float	5	4.79	3.00	7.60	1.73
14	Multiple handline	306	5.17	0.25	630.00	36.13
15	Octopus jig	5	13.20	8.00	19.00	4.97
16	Scoopnet with light	1	3.30	3.30	3.30	-
17	Set gillnet with plunger	15	19.48	0.79	100.00	31.05
18	Simple hook and line	250	3.31	0.12	59.60	5.32
19	Spear	52	13.92	1.30	89.80	14.21
20	Spear with compressor	135	20.38	1.45	180.00	20.63
21	Squid jig	12	1.63	0.60	3.80	0.98
22	Trammel net	96	10.04	1.86	34.00	5.74
23	Troll line	268	18.40	1.25	78.80	15.22

Table 6. Catch Per Unit Effort (kg/day) of Fishing Gears Monitored in Selected Landing Sites in the Danajon Reef MKBA During the Fisheries Baseline Assessment Conducted in 2013

	Gear Type	n	CPUE	Min	Max	Sd
1	Barrier gillnet	4	0.59	0.30	1.00	0.31
2	Barrier net	1	2.00	2.00	2.00	-
3	Bottom set gillnet	568	2.02	0.00	100.00	5.09
4	Bottom set longline	542	4.53	0.00	40.00	4.67
5	Crab gillnet	502	1.81	0.00	11.42	1.43
6	Crab pot	125	2.58	0.60	6.75	0.96
7	Danish seine	86	10.81	3.00	20.20	3.88
8	Diving	79	4.23	0.50	15.00	3.18
9	Drag handline	87	18.17	0.00	67.20	12.66
10	Drift gillnet	203	22.94	0.00	324.00	44.33
11	Drive-in gillnet	42	30.46	1.20	130.00	30.81
12	Dynamite	16	14.34	0.00	100.60	25.66
13	Eel pot	91	3.63	0.70	7.70	1.47
14	Fish corral	245	2.41	0.15	27.65	2.82
15	Fish trap	62	5.96	0.25	38.00	9.23
16	Hook and line with float	30	2.93	0.00	10.20	2.21
17	Multiple handline	265	2.61	0.00	9.25	1.85
18	Push/Scissor net	9	3.16	0.50	11.00	3.08
19	Ring net	82	546.41	0.00	2400.00	528.63
20	Seine net	48	6.52	0.50	10.00	1.85
21	Set gillnet with plunger	25	6.24	0.00	18.00	4.25
22	Simple hook and line	248	2.19	0.00	12.00	1.64
23	Spear	127	4.07	0.00	14.00	2.16
24	Spear with compressor	222	26.02	3.50	80.00	14.81
25	Squid gillnet	127	6.77	0.90	15.55	3.28
26	Squid jig	27	1.34	0.40	3.70	0.71
27	Trammel net	62	7.69	0.34	19.10	4.33
28	Troll line	32	3.04	0.00	31.00	5.54
29	Troll line for garfish	4	2.00	1.25	3.50	1.02

Table 7. Catch Per Unit Effort (kg/day) of Fishing Gears Monitored in Selected Landing Sites in the Lingayen Gulf MKBA During the Fisheries Baseline Assessment Conducted in 2013

	Gear Type	n	CPUE	Min	Max	Sd
1	Bottom set gillnet	385	4.20	0.20	150.00	9.82
2	Cast net	7	4.94	1.01	10.10	2.80
3	Fish trap	17	3.16	0.76	8.00	2.02
4	Harpoon fishing with lights	1	4.00	4.00	4.00	-
5	Multiple handline	97	17.61	0.39	90.40	16.04
6	Squid jig	6	1.86	0.65	4.00	1.15

Table 8. Catch Per Unit Effort (kg/day) of Fishing Gears Monitored in Selected Landing Sites in the San Bernardino Strait – Ticao Pass – Lagonoy Gulf MKBA During the Fisheries Baseline Assessment Conducted in 2013

	Gear Type	n	CPUE	Min	Max	Sd
1	Bottom set gillnet	155	13.01	1.00	200.00	25.16
2	Bottom set longline	1	10.00	10.00	10.00	-
3	Crab gillnet	37	5.29	1.21	11.00	2.37
4	Drift gillnet	208	39.57	0.50	465.00	66.16
5	Fish trap	59	5.46	0.00	100.00	13.08
6	Handspear	44	3.26	0.26	7.75	1.96
7	Multiple handline	127	4.75	0.30	23.30	3.71
8	Round haul seine	15	25.20	2.00	55.50	20.68
9	Scoopnet	8	14.22	1.25	50.00	16.18
10	Simple hook and line	565	9.71	0.56	43.10	6.96
11	Squid jig	70	1.24	0.10	11.00	1.74

Table 9. Catch Per Unit Effort (kg/day) of Fishing Gears Monitored in Selected Landing Sites in the South Negros MKBA During the Fisheries Baseline Assessment Conducted in 2013

	Gear Type	n	CPUE	Min	Max	Sd
1	Bottom set gillnet	27	6.00	0.20	30.00	6.26
2	Cast net	1	1.20	1.20	1.20	-
3	Crab pot	1	4.00	4.00	4.00	-
4	Drift gillnet	6	19.67	4.00	39.00	12.26
5	Harpoon fishing with lights	4	17.25	12.50	21.00	3.66
6	Ring net	2	1050.00	600.00	1500.00	636.40
7	Scoopnet with light	5	46.00	20.00	90.00	32.09
8	Simple hook and line	164	32.36	0.20	294.00	50.30

Table 10. Catch Per Unit Effort (kg/day) of Fishing Gears Monitored in Selected Landing Sites in the Surigao del Norte MKBA During the Fisheries Baseline Assessment Conducted in 2013

	Gear Type	n	CPUE	Min	Max	Sd
1	Bag net	21	35.44	0.00	80.00	22.73
2	Barrier gillnet	11	3.74	0.85	9.70	2.70
3	Beach seine	5	12.81	5.00	19.80	5.58
4	Bottom set gillnet	332	6.93	0.00	650.00	41.85
5	Bottom set longline	252	3.56	0.35	20.00	2.64
6	Bottom set handline	70	3.94	0.00	17.10	4.22
7	Crab gillnet	38	2.70	0.65	10.75	2.24
8	Crab liftnet	4	9.55	4.50	15.00	4.30
9	Crab pot	123	2.79	0.30	9.00	1.63
10	Drag handline	19	12.91	3.30	22.45	6.06
11	Drift gillnet	38	10.65	0.00	46.00	11.54
12	Drive-in gillnet	18	2.92	0.95	8.35	1.88
13	Encircling gillnet	2	15.50	5.00	26.00	14.85
14	Fish corral	9	1.22	0.00	4.00	1.35
15	Fish jig	1	8.00	8.00	8.00	-
16	Fish trap	15	4.11	0.30	11.60	3.44
17	Gleaning	1	4.15	4.15	4.15	-
18	Hook and line with float	7	7.66	4.20	20.30	5.72
19	Multiple handline	135	3.43	0.00	27.00	3.54
20	Seine net	1	1.50	1.50	1.50	-
21	Set gillnet with plunger	5	5.80	2.00	10.00	2.86
22	Shark gillnet	1	5.50	5.50	5.50	-
23	Simple hook and line	328	3.81	0.00	31.00	3.60
24	Spear	58	2.50	0.40	11.80	1.60
25	Spear with compressor	195	18.84	3.00	56.90	9.49
26	Squid gillnet	40	6.21	1.00	16.75	3.97
27	Squid jig	78	13.08	0.25	50.00	11.97
28	Squid trap	26	0.86	0.00	2.60	0.63
29	Trammel net	53	6.68	0.62	30.00	5.58
30	Troll line	63	11.20	2.75	37.20	8.29
31	Troll line for garfish	2	0.83	0.15	1.50	0.95

Table 11. Catch Per Unit Effort (kg/day) of Fishing Gears Monitored in Selected Landing Sites in the Tawi-Tawi MKBA During the Fisheries Baseline Assessment Conducted in 2013

	Gear Type	n	CPUE	Min	Max	Sd
1	Bag net	3	0.61	0.50	0.80	0.17
2	Barrier gillnet	25	6.57	1.80	16.00	3.81
3	Barrier net	17	6.38	2.35	10.50	2.35
4	Beach seine	71	13.08	0.50	280.00	35.85
5	Bottom set gillnet	297	16.64	1.50	90.00	9.71
6	Bottom set longline	270	14.56	0.45	133.20	16.32
7	Crab gillnet	249	6.26	0.70	39.55	5.04
8	Crab liftnet	60	8.11	0.55	17.00	4.24
9	Drift gillnet	13	9.80	1.40	40.00	11.61
10	Drive-in gillnet	28	25.14	1.00	90.00	22.84
11	Dynamite	300	32.21	0.50	1444.00	89.64
12	Encircling gillnet	21	55.05	3.00	160.00	44.17
13	Entrapping device	26	3.65	1.10	11.25	2.35
14	Fish corral	21	7.65	0.50	19.65	5.50
15	Fish trap	181	9.98	1.50	30.00	4.53
16	Gleaning	30	2.58	0.60	10.30	2.27
17	Hand spear	179	4.25	0.45	70.00	7.14
18	Hook and line with float	86	45.04	1.10	240.00	53.30
19	Lobster gillnet	195	17.07	1.50	180.00	18.79
20	Multiple handline	167	14.19	0.10	210.00	23.19
21	Octopus jig	127	4.86	0.00	17.00	2.72
22	Ring net	153	355.61	38.00	2660.00	423.63
23	Seine net	12	3.83	0.25	13.50	3.94
24	Set gillnet for rays	118	16.60	2.20	66.00	11.44
25	Set gillnet with plunger	8	3.51	0.40	8.00	3.07
26	Simple hook and line	580	4.05	0.00	120.00	6.09
27	Spear with compressor	17	11.79	1.20	58.50	15.08
28	Squid gillnet	15	12.17	6.10	27.00	5.62
29	Squid jig	9	4.78	0.90	10.00	4.06
30	Stationary liftnet	14	1.23	0.05	2.10	0.69
31	Surface set gillnet	102	22.59	2.95	103.30	14.23
32	Surface set longline	1	350.00	350.00	350.00	
33	Toxic substances	30	4.04	0.90	9.00	2.35
34	Troll line	460	13.57	0.00	266.00	18.12

Table 12. Catch Per Unit Effort (kg/day) of Fishing Gears Monitored in Landing Sites in the Verde Island Passage MKBA During the Fisheries Baseline Assessment Conducted in 2013

	Gear Type	n	CPUE	Min	Max	Sd
1	Bottom set gillnet	59	46.97	3.00	200.00	36.60
2	Drift gillnet	140	275.21	4.00	2800.00	335.61
3	Hand spear	33	34.91	1.33	75.50	20.79
4	Multiple handline	209	41.98	1.00	400.00	67.78
5	Simple hook and line	44	6.56	0.46	50.00	8.01
6	Spear with compressor	5	40.40	28.00	49.00	8.62
7	Squid jig	4	102.50	89.00	120.00	15.02

Table 13. Top 10 Species or Groups in the Aggregate Catch of Various Fishing Gears Operating in the Focal Areas of the Eight MKBAs Observed During the Fisheries Baseline Assessment in 2013

#	Species or Group	%	#	Species or Group	%
A. Calamianes Island Group MKBA			E. South Negros MKBA		
1	<i>Spratelloides gracilis</i> (dilis bahura)	12.08	1	tuna	66.90
2	Octopus	11.50	2	tulingan	3.68
3	<i>Atule mate</i>	10.47	3	liplipan	3.45
4	<i>Euthynnus affinis</i>	8.78	4	<i>Scromberomorus sp.</i>	3.03
5	Dilis bahura itim	6.47	5	pandawan	2.58
6	Kurisan	3.86	6	<i>Caranx sp.</i>	2.17
7	Susay	2.42	7	balo	1.57
8	<i>Rastrelliger brachysoma</i>	2.05	8	tamarong	1.44
9	<i>Amblygaster sirm</i>	1.80	9	shark	1.24
10	<i>Auxis thazard thazard</i>	1.52	10	tangigue	1.09
	Others	39.05		Others	12.87
B. Danajon Reef MKBA			F. Surigao del Norte MKBA		
1	<i>Rastrelliger faughni</i>	23.74	1	aliputang	5.73
2	<i>Auxis rochei</i>	18.99	2	nokus bulingit	3.85
3	<i>Decapterus muroadsi</i>	8.66	3	<i>Photololigo edulis</i>	3.84
4	<i>Sardinella lemuru</i>	5.48	4	<i>Thunnus obesus</i>	2.41
5	lambiyaw	5.15	5	<i>Caesio cuning</i>	2.39
6	<i>Thunnus obesus</i>	1.57	6	<i>Rastrelliger kanagurta</i>	2.30
7	<i>Sardinella fimbriata</i>	1.52	7	<i>Caesio teres</i>	2.09
8	<i>Euthynnus affinis</i>	1.50	8	<i>Pterocaesio marri</i>	2.05
9	<i>Portunus pelagicus</i>	1.48	9	bulis	1.87
10	<i>Portunus tuberculatus</i>	1.42	10	tulingan	1.86
	Others	30.49		Others	71.61
C. Lingayen Gulf MKBA			G. Tawi-Tawi MKBA		
1	<i>Makaira indica</i>	35.16	1	<i>Thunnus albacares</i>	15.18
2	<i>Scromberomorus guttatus</i>	16.99	2	<i>Dasyatis kuhlii</i>	8.08
3	<i>Alepes melanoptera</i>	10.47	3	<i>Portunus pelagicus</i>	4.11
4	<i>Decapterus sp.</i>	5.79	4	<i>Himantura uarnak</i>	3.88
5	<i>Katsuwonus pelamis</i>	4.87	5	<i>Katsuwonus pelamis</i>	3.64
6	<i>Portunus sp.</i>	4.77	6	<i>Octopus sp.</i>	3.03
7	<i>Coryphaena hippurus</i>	4.39	7	<i>Amblygaster sirm</i>	2.70
8	<i>Loligo sp.</i>	2.64	8	<i>Caranx ignobilis</i>	2.44
9	<i>Portunus pelagicus</i>	1.53	9	<i>Ranina</i>	2.12
10	<i>Scromberomorus guttatus</i>	1.47	10	<i>Rastrelliger kanagurta</i>	1.95
	Others	11.92		Others	52.86
D. San Bernardino - Ticao Pass - Lagonoy Gulf MKBA			H. Verde Island Passage MKBA		
1	pagi	10.60	1	matangbaka	44.26
2	alatan	7.46	2	galunggong	37.98
3	manusok	7.35	3	tulingan	6.55
4	danggit	5.60	4	batalay	2.02
5	mamsa	4.27	5	humalet	1.66
6	katambak	3.58	6	gulyasan	1.23
7	parangan	3.42	7	hasa-hasa	0.93
8	bag-angan	2.63	8	flying fish	0.78
9	turay	2.61	9	muslito	0.77
10	labungan	2.41	10	lagidlid	0.65
	Others	50.06		Others	3.17

3.1.2. MPA Baseline Assessment

Data and information gathered by the MPA baseline assessment teams included reef fish biomass, density, species richness, coral cover and other benthic forms. Details about the results were discussed in separate reports by the Monitoring teams from the University of the Philippines Visayas Foundation Inc. (UPVFI) and University of the Philippines Marine Science Institute (UPMSI). The results, aside from being primarily used as one of the basis for measuring the project results, were likewise used to communicate with stakeholders the effects of management, in general, and the positive impacts of protection, in particular. This portion of the report, however, will just focus on three important sets of information gathered to determine reef fish biomass, species richness and benthic condition (represented by the percentage in live coral cover).

Tables 14 to 21 summarizes the key parameters measured for each of the 8 MKBAs (such as mean reef fish biomass, their respective standard deviations and number of replicates, average total number of species per transect to indicate species richness, and one of the results of the line intersect transect survey indicating the percentage of live coral cover). Mean reef biomass ranged between 7 to 62 tons per square kilometer and was generally higher in the Verde Island Passage and Calamianes Island Group MKBAs and quite low in the Danajon Reef MKBA. Species richness, the proxy value for biodiversity, ranged between 42 to 212 species per transect. It is relatively high in the Verde Island Passage and San Bernardino – Ticao Pass – Lagonoy Gulf MKBAs. Live hard coral cover ranged between 20% to 63% with an extremely low value of 1% recorded in the Andulay Siit MPA in the South Negros MKBA. Live hard coral reefs were highest in the Calamianes Island Group MKBA and relatively low in the Lingayen Gulf, Tawi-Tawi, and Verde Island Passage MKBAs.

In subsequent monitoring events, changes in reef fish biomass together with changes in catch rates measured from fishery-dependent surveys will be the basis for estimating the increase in fisheries biomass across the eight MKBAs. Changes in species richness, hard coral reef cover, catch composition, and size composition will form the supporting scientific evidence.

Table 14. Average Biomass, Density, Species Richness, and Coral Cover of Selected MPAs in the Calamianes Island Group MKBA During the MPA Baseline Assessment Conducted in 2013

MPA		Biomass (tons/km ²)	Density (ind/km ²)	Species richness (# of species)	Live hard coral (% cover)	Live soft coral (% cover)	Other algae (% cover)
Siete Pecados	mean	41.19	2.75	60.80	44.68	0.62	20.61
	sd	18.14	1.11	7.52	19.09	1.22	15.91
	n	10	10	10	10	10	10
Bugor	mean	28.13	3.34	50.89	60.39	0.89	26.59
	sd	10.84	1.43	6.90	8.67	1.02	12.39
	n	9	9	9	9	9	9
Royukan-Sagrado	mean	21.30	3.81	54.63	62.97	1.32	8.12
	sd	12.06	1.80	8.37	19.30	1.41	4.74
	n	8	8	8	8	8	8

Table 15. Average Biomass, Density, Species Richness, and Coral Cover of Selected MPAs in the Danajon Reef MKBA During the MPA Baseline Assessment Conducted in 2013

MPA		Biomass (tons/km ²)	Density (ind/km ²)	Species richness (# of species)	Live hard coral (% cover)	Live soft coral (% cover)	Other algae (% cover)
Cuaming	mean	11.48	2.50	59.80	34.50	0.24	16.15
	sd	6.18	1.43	11.26	18.18	0.53	14.86
	n	10	10	10	10	10	10
Nasingin	mean	7.19	3.17	41.70	51.40	0.30	0.23
	sd	3.81	3.84	15.13	14.41	0.76	0.52
	n	10	10	10	10	10	10
Pangapasan	mean	14.76	1.11	55.20	19.75	0.01	1.99
	sd	8.99	0.49	10.27	9.05	0.03	3.17
	n	10	10	10	10	10	10

Table 16. Average Biomass, Density, Species Richness, and Coral Cover of Selected MPAs in the Lingayen Gulf MKBA During the MPA Baseline Assessment Conducted in 2013

MPA		Biomass (tons/km ²)	Density (ind/km ²)	Species richness (# of species)	Live hard coral (% cover)	Live soft coral (% cover)	Other algae (% cover)
Canaoay	mean	10.80	0.48	121	33.87	18.89	23.88
	sd	3.32	0.16	-	8.22	15.79	8.83
	n	9	9	9	9	9	9
Lingsat	mean	21.44	0.72	101	28.90	8.42	50.42
	sd	5.47	0.16	-	4.17	4.80	10.78
	n	4	4	4	4	4	4
Poro	mean	26.17	0.62	74	23.65	1.24	59.48
	sd	8.05	0.12	-	3.10	0.11	7.75
	n	2	2	2	2	2	2
Telbang	mean	13.47	0.39	96	25.96	1.02	17.20
	sd	5.63	0.14	-	9.29	0.99	7.03
	n	10	10	10	10	10	10

Table 17. Average Biomass, Density, Species Richness, and Coral Cover of Selected MPAs in the San Bernardino – Ticao Pass – Lagonoy Gulf MKBA During the MPA Baseline Assessment Conducted in 2013

MPA		Biomass (tons/km ²)	Density (ind/km ²)	Species richness (# of species)	Live hard coral (% cover)	Live soft coral (% cover)	Other algae (% cover)
Butag	mean	7.00	0.71	190	37.64	24.98	3.22
	sd	4.99	0.23	-	16.63	22.59	4.47
	n	10	10	10	10	10	10
Calintaan	mean	20.36	1.50	212	38.18	17.70	7.44
	sd	13.56	0.52	-	14.57	10.94	9.08
	n	8	8	8	8	8	8

Table 18. Average Biomass, Density, Species Richness, and Coral Cover of Selected MPAs in the Southern Negros MKBA During the MPA Baseline Assessment Conducted in 2013

MPA		Biomass (tons/km ²)	Density (ind/km ²)	Species richness (# of species)	Live hard coral (% cover)	Live soft coral (% cover)	Other algae (% cover)
Tambobo (Bonbon)	mean	45.13	2.07	97.00	42.35	17.72	0.98
	sd	14.00	0.43	-	13.86	10.65	0.63
	n	4	4	4	4	4	4
Salag-Maloh	mean	32.13	1.27	90.50	44.70	10.40	3.22
	sd	10.76	0.63	-	8.00	9.63	0.93
	n	4	4	4	4	4	4
Andulay Siit	mean	29.84	0.83	97.00	0.82	0.04	31.33
	sd	17.49	0.18	-	0.57	0.12	17.82
	n	8	8	8	8	8	8

Table 19. Average Biomass, Density, Species Richness, and Coral Cover of Selected MPAs in the Surigao del Norte MKBA During the MPA Baseline Assessment Conducted in 2013

MPA		Biomass (tons/km ²)	Density (ind/km ²)	Species richness (# of species)	Live hard coral (% cover)	Live soft coral (% cover)	Other algae (% cover)
Nagubat	mean	34.93	5.62	53.60	48.75	1.95	3.74
	sd	25.86	3.57	7.43	14.40	3.71	3.72
	n	10	10	10	10	10	10
San Isidro	mean	11.47	1.58	44.30	28.35	8.06	12.29
	sd	6.42	0.91	15.32	19.82	11.50	15.44
	n	10	10	10	10	10	10
Tagana-an	mean	16.78	2.87	48.20	37.72	33.77	2.30
	sd	9.81	1.72	5.14	9.12	9.22	2.66
	n	10	10	10	10	10	10

Table 20. Average Biomass, Density, Species Richness, and Coral Cover of Selected MPAs in the Tawi-Tawi MKBA During the MPA Baseline Assessment Conducted in 2013

MPA		Biomass	Density	Species richness	Live hard coral	Live soft coral	Other algae
		(tons/km ²)	(ind/km ²)	(# of species)	(% cover)	(% cover)	(% cover)
Batubatu-Kulape	mean	14.27	1.65	69.00	20.6	4.0	2.0
	sd	8.53	0.74	14.02	11.7	7.3	3.0
	n	10	10	10	10	10	10
Tunggusong-Maruwa	mean	34.84	2.78	81.88	30.0	15.5	0.1
	sd	11.43	0.90	15.93	11.2	9.3	0.2
	n	8	8	8	8	8	8
Ungos-ungos	mean	21.16	2.83	85.80	26.7	9.4	1.2
	sd	6.47	1.59	10.70	13.8	16.0	3.0
	n	10	10	10	10	10	10

Table 21. Average Biomass, Density, Species Richness, and Coral Cover of Selected MPAs in the Verde Island Passage MKBA During the MPA Baseline Assessment Conducted in 2013

MPA		Biomass	Density	Species richness	Live hard coral	Live soft coral	Other algae
		(tons/km ²)	(ind/km ²)	(# of species)	(% cover)	(% cover)	(% cover)
Bagong Silang	mean	14.08	0.71	103.50	36.12	32.11	8.09
	sd	6.29	0.17	-	7.98	5.93	8.57
	n	10	10	10	10	10	10
San Teodoro-Twin Rocks	mean	60.10	1.54	133.50	22.48	12.63	1.31
	sd	33.89	0.38	-	9.21	17.03	2.21
	n	8	8	8	8	8	8
Sto Tomas-Pulang Buli	mean	62.17	2.13	135.00	27.28	12.43	1.06
	sd	39.03	1.19	-	8.05	8.36	2.37
	n	8	8	8	8	8	8

3.1.3. Monitoring and Estimation Procedure

The fisheries and MPA assessment will be repeated in Years 3 and 5 and the ECOFISH Project Result (an average of 10% increase in fisheries biomass across the eight MKBAs) will be estimated from the combined result of change in catch rates of selected fishing gears and change in reef fish biomass in selected MPAs. The catch rates will be based on the average catch per unit effort (CPUE) of selected fisheries in the focal areas. The average CPUE will become the proxy estimate of fish biomass. The computation will involve estimation of the percentage change in CPUE during the monitoring event (2015 or 2017), compared to baseline (2013), using fisheries dependent methods. The average CPUE will be estimated from the weighted average of catch per unit effort of various fishing gears used during the 3-month catch and effort monitoring using the number of samples as weighing factor. The second component (in evaluating increase in fish biomass) is assessing the change in reef fish biomass in marine protected areas, in this case, the average reef fish biomass inside and adjacent to MPAs in the focal areas. The computation will involve estimation of the percentage change in reef fish biomass during the monitoring event (2015 or 2017) compared to baseline (2013).

3.2. Socio-Economic Baseline Assessment

A total of 4,727 households were surveyed for the socio-economic baseline assessment (Table 22). A minimum of around 500 households per MKBA responded to the survey. Future socio-economic surveys in years 3 and 5 will be conducted with the same set of households to establish the trends in socio-economic parameters identified in the ECOFISH Baseline Assessment Plan.

Table 22. Number of Sample Households in Selected Municipalities in the Eight MKBAs for Socio-Economic Baseline Survey Conducted in 2013

MKBA	Municipality	Households surveyed
Calamianes Island Group	Busuanga	180
	Coron	182
	Culion	180
	Total	542
Surigao del Norte	Placer	200
	Bacuag	103
	Gigaquit	204
	Total	507
Southern Negros	Siaton	210
	Sta. Catalina	181
	Bayawan	153
	Total	544
Danajon Reef	Tubigon	157
	Getafe	214
	Buenavista	243
	Inabanga	186
	Total	800
Lingayen Gulf	Alaminos	180
	Rosario	90
	San Fernando	233
	Total	503
Verde Island Passage	Tingloy	187
	Mabini	196
	Calatagan	191
	Total	574
Tawi-Tawi (Sulu Sea)	Panglima Sugala	180
	Bongao	174
	Simunul	183
	Total	537
San Bernardino Strait	Bulan	172
	Sta. Magdalena	183
	Capul	190
	Matnog	175
	Total	720
Grand Total		4,727

Overall, the survey results confirm what national trends have shown in the past: fishers have large family sizes, and have very low educational attainment. They generally live in houses that are made of light materials, and although they own their houses, security of tenure is poor as many of them do not own titles to their houses and the lots where they stand. Sanitation and waste disposal

methods are still wanting, and water supply systems are still at Levels 1 or 2. Fuelwood is still the main source of cooking for a large majority, indicating a large dependence on natural resources for their livelihoods. Nevertheless, seafood is still consumed everyday, indicating they still have good sources of omega 3 and protein.

Families have very few sources of livelihoods, as very few respondents indicated income-generating activities other than fishing. In some cases, tourism and seaweed farming produced much higher incomes. However, opportunities were apparently not abounding.

Fishing incomes are exceedingly low, especially when compared to provincial and national average incomes in 2009. Commercial fishers are not doing as bad, but they represent a very small proportion of the survey. Economic rent estimates are negative for many fishers using non-motorized boats, and for motorized boats in Calamianes and Danajon. The economic interpretation of negative rents is that the fishery is being managed in an economically sub-optimal way. Moreover, inputs such as capital and labor are also being used in a sub-optimal activity, implying that there would be an improvement in economic welfare if these resources were employed elsewhere in the economy (Lasmarias *et al.* 2013).

The succeeding sections establish the baselines for each of the socio-economic components specified in the baseline assessment plan of the Project.

3.2.1. Resource Use for Livelihoods

3.2.1.1. Household Income Sources

The baseline survey purposely targeted fishing households. Hence, almost all respondents indicated they relied mainly on fishing as their main source of livelihood (Table 23). On the average, very few of them are also inland farmers (Table 24). Average monthly incomes from fishing are highest in Surigao, and lowest in San Bernardino (Table 23). Other seafood collection is prevalent in Bohol, Tawi-Tawi and Surigao.

CIG, San Bernardino and VIP households earn higher incomes from tourism relative to fishing. Middlemen in VIP and Calamianes earn significantly higher incomes on the average, as well as fish vendors and aquaculture operators in Surigao.

With respect to land-based livelihoods, farming incomes are highest in Surigao, followed by Lingayen (Table 24). The 4Ps recipients in Bohol receive the highest income relative to other 4Ps beneficiaries in other MKBAs. Livestock raising is most profitable in San Bernardino, while government workers are paid higher in Tawi-Tawi on the average. Around half of the respondents claim to be receiving lower incomes from fishing relative to two years ago (Table 25).

Table 23. Average Monthly Incomes of Marine-Based Livelihood Activities in the Eight MKBAs Estimated During the Baseline Survey Conducted in 2013

MKBA	Fin fishing	%	Sea cucumber collecting	%	Other seafood collection	%
San Bernardino Strait	3,521	96	1,820	2	2,156	4
Surigao	9,817	80	1,483	1	7,158	9
VIP	3,000	89	4,375	1	753	2
Lingayen Gulf	3,256	98	2,375	1	1,126	2
Calamianes Island Group	5,258	84	4,645	4	3,033	4
Danajon Bank	6,012	94	1,516	9	2,378	18
South Negros	5,258	99	4,825	1	225	1
Tawi-Tawi	6,647	99	1,801	9	1,596	18

MKBA	Tourism	Ornamental fish	Boat operation	Middle man	Aquaculture	Mangrove harvesting	Fish vendor	Seaweed
San Bernardino	6,500	3,600	1,265	4,758	-	-	2,033	1,208
Surigao	5,800	10,000	1,900	6,000	10,000	1,420	9,000	1,708
VIP	4,900	2,000	2,301	8,435	-	-	7,667	-
Lingayen Gulf	1,000	-	2,454	-	-	-	2,583	-
Calamianes	7,250	4,125	2,638	8,431	-	1,858	-	2,572
Danajon Bank	400	2,200	1,711	5,264	-	1,250	2,058	2,463
South Negros	300	-	2,000	1,821	-	-	2,150	-
Tawi-Tawi	-	2,400	6,542	825	-	-	2,696	3,451

Table 24. Average Monthly Incomes of Land-Based Livelihood Activities in the Eight MKBAs Estimated from Baseline Surveys Conducted in 2013

MKBA	Farming staple crops	%	Farming vegetables	%	Retail	%
San Bernardino Strait	1,883	23%	1,343	3%	2,754	3%
Surigao	13,484	19%	1,316	1%	3,394	5%
Verde Island Passage	2,142	6%	2,183	1%	1,976	4%
Lingayen Gulf	6,045	5%	2,000	1%	2,950	2%
Calamianes Island Group	2,764	10%	1,775	4%	5,421	6%
Danajon Bank	2,553	2%	1,780	0.3%	3,362	7%
South Negros	4,196	9%	3,213	1%	3,215	5%
Tawi-Tawi	4,380	23%	1,051	3%	2,913	4%

MKBA	Handi craft	Self-employed	Government	Remittance	4Ps	Private employ	Live stock	Laborers	House help	Driver
San Bernardino	925	2,435	4,098	1,762	-	2,192	11,000	2,922	2,400	2,443
Surigao	1,902	2,495	6,738	3,684	1,607	3,531	3,778	3,188	2,017	6,033
VIP	853	5,490	4,213	5,279	2,200	12,664	4,250	3,216	2,370	4,803
Lingayen Gulf	-	3,467	4,797	5,750	-	15,716	-	4,057	2,875	2,533
Calamianes	730	8,442	6,353	1,367	1,422	6,588	2,933	2,621	1,875	-
Danajon Reef	2,234	1,245	2,154	1,790	4,460	12,065	7,520	3,212	2,472	2,559
South Negros	-	2,164	5,277	2,374	1,870	3,449	2,158	1,705	1,633	1,510
Tawi-Tawi	1,444	3,105	8,040	3,250	-	2000	-	6,338	2,625	3,750

Table 25. Comparison of Marine-Based Livelihood Incomes Relative to Two Years Ago in the Eight MKBAs Estimated from Baseline Surveys Conducted in 2013

MKBA	Fin Fishing			Sea Cucumber Collecting			Other Seafood Collection					
	Mos.	Comparison			Mos.	Comparison			Mos.	Comparison		
		Less	More	No change		Less	More	No change		Less	More	No change
San Bernardino	8	44%	7%	48%	7	1%	0%	0%	6	1%	0%	2%
Surigao	11	47%	12%	14%	12	0.4%	0%	1%	11	4%	1%	4%
VIP	8	48%	6%	18%	-	-	-	-	-	1%	0.2%	0.3%
Lingayen Gulf	9	53%	5%	38%	-	-	-	-	6	2%	0.2%	0.2%
Calamianes	8	56%	2%	26%	8	4%	0%	1%	9	4%	0%	2%
Danajon Reef	11	61%	6%	24%	8	6%	1%	1%	9	12%	2%	4%
South Negros	12	51%	6%	42%	-	-	-	-	-	-	-	-
Tawi-Tawi	2	48%	7%	39%	2	7%	0.4%	1%	2	10%	0.2%	5%

3.2.1.2. Household Expenditures

Priority household expenses follow the general economic level of the area. As shown in Table 26, food items are still the bulk of expenses for all households followed by school expenditures, except in Danajon where debts constitute the second largest household expense. Third largest expense varies across MKBAs: clothing for San Bernardino and Calamianes, debts and interest payments for Surigao and VIP, transportation expenses for Tawi-Tawi and South Negros, and monthly paid services for Lingayen Gulf.

Table 26. Household Expenditures in the Eight MKBAs Estimated During the Baseline Surveys Conducted in 2013

MKBA	Largest expense item	% of total expenses	2 nd largest expense item	% of total expenses	3 rd largest expense item	% of total expenses
San Bernardino Strait	Food	63	School expenditures	13	Clothing	5
Surigao	Food	45	School expenditures	16	Debts, interest payments	9
Verde Island Passage	Food	41	School expenditures	18	House repairs, Debts	6
Lingayen Gulf	Food	58	School expenditures	14	Monthly paid services	6
Calamianes Island Group	Food	52	School expenditures	13	Clothing	8
Danajon Bank	Food	52	Debts, interest payments	12	School expenditures	10
South Negros	Food	38	School expenditures	20	Transportation expenses	9
Tawi Tawi	Food	52	School expenditures	11	Transportation expenses	8

3.2.1.3. Profile of the Fishing Households Surveyed

Majority of those surveyed are municipal fishers with boats, while only a few belonged to the commercial fishing sector (Table 27).

Table 27. Percentage of Municipal Versus Commercial Fishers in the Sampled Households During the Baseline Surveys Conducted in 2013

MKBA	Municipal		Commercial
	No Boat	With Boat	
San Bernardino Strait	4%	64%	0.3%
Surigao del Norte	-	63%	2%
Verde Island Passage	1%	78%	8%
Lingayen Gulf	-	92%	5%
Calamianes Island Group	-	91%	2%
Danajon Bank	3%	97%	1%
South Negros	-	86%	9%
Tawi-Tawi	-	93%	1%

Hook and line gears dominate the list of fishing gears used in the eight MKBAs, except in Lingayen and Surigao del Norte, where fish nets are most common (Table 28). Most common species caught are threadfin bream, squid, rabbitfish, grouper, snapper and scad across all MBKAs. Tuna was caught mostly in Southern Negros and in VIP (Table 29).

Fishing pattern varies widely across MKBAs, as outlined in Table 30. Average hours per trip range from a low of 5 in San Bernardino Strait or 6 in Danajon Bank to a high of 36 in Southern Negros. Travel time to fishing grounds also range from a low of 38 minutes in Danajon Bank to almost 4 hours in Lingayen Gulf. Most trips involve only 2 people, except in Lingayen Gulf where an average of 6 people form part of a typical fishing trip. As expected, trips per month are lowest in Southern Negros due to the lengthy fishing trips, and highest in Danajon Bank at 25 times per month. Most MKBA households fish at an average of 8 to 10 months per year, except in Danajon Bank where fishers work for an average of 11 months per year.

Table 28. Top Fishing Gears Used by Fishing Households Sampled During the Baseline Surveys Conducted in 2013

MKBA	Gears used	Percentage
San Bernardino Strait	Hook and line	28%
	Fish net	27%
	Spear gun	23%
	Kitang/palangre	8%
	Bobo	7%
	Jigger line	7%
Surigao del Norte	Fish net	26%
	Hook and line	21%
	Saranggat	6%
	Bontog	5%
	Kitang/palangre	5%
VIP	Hook and line	39%
	Fish net	37%
	Spear gun	6%
	Hook and line	6%
	Pakislap	3%
Lingayen Gulf	Fish net	36%
	Sigay	20%
	Hook and line	16%
	Spear gun	8%
	Fish corral	8%
CIG	Hook and line	49%
	Fish net	27%
	Bira-bira/boya-boya	13%
	Bondak	11%
	Ganti-ganti	3%
	Tora-tora	3%
Danajon Double Barrier Reef	Pasol	23%
	Fish net	22%
	Spear gun	9%
	Fish corral	7%
	Kitang/palangre	6%
South Negros	Hook and line	57%
	Fish net	32%
	Lasdak	10%
	Pahawin	7%
	Pampusit	5%
Tawi-Tawi	Hook and line	43%
	Fish net	33%
	Troll line	12%
	Fish trap	11%
	Octopus trap	11%

Table 29. Top Species Caught by Fishers of Fishing Households Sampled During the Baseline Surveys Conducted in 2013

MKBA	Name of fish caught	Percentage
San Bernardino Strait	Rabbitfish	38%
	Squid	19%
	Emperor	14%
	Snapper	13%
	Grouper	12%
Surigao del Norte	Threadfin Bream	16%
	Crab	13%
	Scad	13%
	Squid	13%
	Shrimp	12%
VIP	Frigate Tuna	39%
	Mackerel scad	37%
	Squid	26%
	Skipjack	17%
	Rabbitfish	16%
Lingayen	Rabbitfish	37%
	Short Mackerel	32%
	Ponyfish	29%
	Grouper	27%
	Threadfin Bream	22%
Calamianes	Grouper	78%
	Emperor	44%
	Trevally	43%
	Snapper	36%
	Threadfin Bream	33%
Danajon Bank	Rabbitfish	25%
	Threadfin Bream	22%
	Blue Crab	18%
	Goat fish	13%
	Short Mackerel	13%
South Negros	Scad	51%
	Frigate Tuna	28%
	Tuna	23%
	Bullet Tuna	22%
	Skipjack	19%
Tawi-Tawi	Snapper	42%
	Grouper	26%
	Trevally	25%
	Flying fish	25%
	Threadfin Bream	24%

Table 30. Fishing Pattern of Fishers from Fishing Households Sampled During the Baseline Surveys Conducted in 2013

MKBA	Average hours per trip	Average travel time to fishing ground (minutes)	Number of persons involved per trip	Average trips per month	Average number of months per year
San Bernardino Strait	5	41	2	17	8
Surigao del Norte	24	195	2	15	10
Verde Island Passage	19	86	3	17	9
Lingayen Gulf	8	231	6	22	10
Calamianes Island Group	22	69	2	14	9
Danajon Reef	6	38	2	25	11
South Negros	36	107	4	11	8
Tawi-Tawi	30	60	2	16	10

3.2.1.4. Fishing Revenues and Expenditures

Table 31 summarizes the information on revenues, including volumes harvested and sold. With respect to volume harvested of non-motorized boats, Danajon and Surigao fishers catch only 3 to 4 kilos on the average. Higher volumes are caught in the rest of the MKBAs, ranging from 6 to 9 kilos per trip. Highest average volumes are caught in Tawi-Tawi, registering at an average of 19 kilos per trip.

Motorized boats follow the same trend for most of the MKBAs. Danajon fishers catch only 4 kilos per trip, while San Bernardino, Surigao, Lingayen Gulf and Calamianes fishers catch 7 to 9 kilos. Verde Island Passage and Southern Negros fishers register much higher catches at 14-18 kilos per trip, while Tawi-Tawi fishers claim to harvest 44 kilos on the average.

Table 31. Average Annual Revenues per Fishing Household in the Eight MKBAs Estimated During the Baseline Surveys Conducted in 2013

MKBA	Ave price (PhP)	Average volume harvested (kg)			Average volume sold (kg)			Revenues per year (PhP)		
		NM	M	C	NM	M	C	NM	M	C
San Bernardino Strait	106	8	9		7	8		78,548	123,769	
Surigao del Norte	179	4	7	70	3	6	70	66,695	107,365	365,344
Verde Island Passage	92	9	14	27	8	13	29	75,790	142,958	428,885
Lingayen Gulf	114	3	7	19	3	6	18	76,868	145,145	664,597
Calamianes Island Group	190	6	9	27	5	8	25	57,676	122,590	93,601
Danajon Reef	99	3	4	49	3	3	20	53,716	98,180	525,109
South Negros	86	6	18	28	5	17	27	37,064	102,356	141,062
Tawi-Tawi	89	19	44	43	18	38	35	87,007	156,211	202,531

(NM – non-motorized boats, M - motorized boats, C – commercial vessels)

Table 32. Average Annual Cost per Fishing Household in the Eight MKBAs Estimated During the Baseline Surveys Conducted in 2013

MKBA	Fixed costs (PhP)			Variable costs (PhP)			Labor costs (PhP)		
	NM	M	C	NM	M	C	NM	M	C
San Bernardino Strait	7,540	8,378		7,528	14,699		14,652	14,127	
Surigao del Norte	2,592	13,016	161,346	13,808	27,672	123,187	36,042	74,730	72,120
Verde Island Passage	6,570	9,358	74,557	10,942	18,558	24,470	60,104	119,348	125,618
Lingayen Gulf	7,890	21,895	43,196	18,034	14,903	4,437	29,314	73,449	329,600
Calamianes Island	3,409	10,255	43,288	22,163	54,454	60,355	32,659	45,816	4,738
Danajon Reef	2,746	19,429	6,727	5,004	10,596	21,779	22,107	41,331	80,000
South Negros	3,881	16,032	8,287	20,947	28,022	30,056	23,691	191,977	134,663
Tawi-Tawi	3,341	6,867	1,990	22,834	43,554	56,107	44,709	78,548	

(NM – non-motorized boats, M - motorized boats, C – commercial vessels)

Revenues for motorized boats are almost double the average revenues for non-motorized boats, triple in fact in Southern Negros. Commercial fishers reported 3 to 4 times more income in Surigao, Verde Island Passage, Lingayen Gulf and Danajon relative to motorized municipal fishers, and five to ten times more than non-motorized fishers (Table 33). Calamianes commercial fishers had less income than municipal fishers, which might be dubious. Finally, there were marginal differences between motorized municipal fishers and commercial fishers in Southern Negros and Tawi-Tawi. The survey in San Bernardino Strait was not able to cover any commercial fisher among its respondents. For non-motorized boats, net incomes were exceedingly low in Southern Negros and Calamianes. Motorized boat operators in San Bernardino Strait and Tawi-Tawi had decent incomes.

Table 33. Average Annual Profit per Fishing Household in the Eight MKBAs Estimated During the Baseline Surveys Conducted in 2013

MKBA	Non-motorized boats	Motorized boats	Commercial vessels
San Bernardino Strait	61,102	93,743	
Surigao del Norte	47,394	63,651	233,542
Verde Island Passage	41,016	66,812	282,282
Lingayen Gulf	38,030	76,739	316,231
Calamianes Island Group	20,821	27,689	12,268
Danajon Reef	44,431	55,374	483,295
South Negros	11,838	48,382	94,830
Tawi-Tawi	45,684	84,116	144,434

Meanwhile, commercial fishing operators in Danajon, Lingayen Gulf, Verde Island Passage and Surigao del Norte were earning higher incomes compared with the provincial average incomes in 2009. But for majority of fishers, incomes were way below the provincial average incomes, as shown in Figure 2.

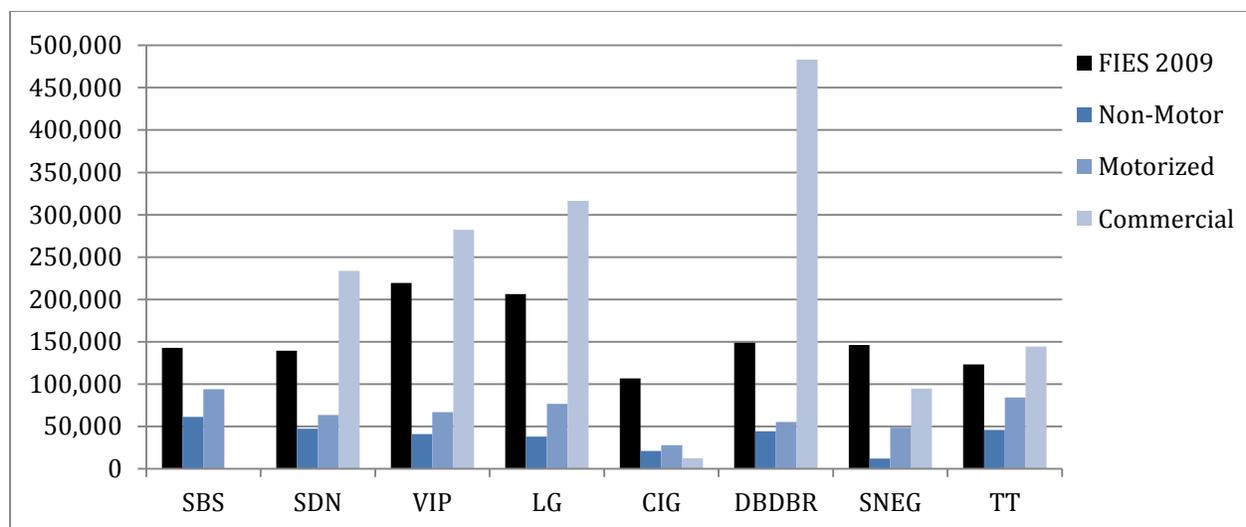


Figure 2. Average Net Income from Fishing Versus Average Family Income in the Eight MKBAs Estimated During the Baseline Survey Conducted in 2013 (Source of provincial incomes: FIES 2009)

Resource rent was negative for a substantial number of fishers with non-motorized boats, but still positive for those with motorized boats except in Calamianes and Danajon (Tables 34 and 35). Commercial fishers were still enjoying positive rents, except in Calamianes.

Table 34. Average Annual Economic Rent per Household and 15% Margin For Profit Risk (MPR) in the Eight MKBAs Estimated During the Baseline Surveys Conducted in 2013

MKBA	Own labor			15% MPR			Rent		
	NM	M	C	NM	M	C	NM	M	C
San Bernardino Strait	34,039	36,674		9,165	14,061		20,067	45,332	
Surigao del Norte	38,202	35,740	7,457	7,109	9,548	35,031	2,083	18,364	191,053
Verde Island Passage	44,709	47,874	28,345	6,152	10,022	42,342	7,897	24,818	222,724
Lingayen Gulf	53,771	60,841	53,383	5,705	11,511	47,435	-7,189	16,629	231,053
Calamianes Island	38,547	29,586	11,044	3,123	4,153	1,840	-20,849	-6,050	-616
Danajon Reef	74,682	74,882	35,283	6,665	8,306	72,494	-36,818	-27,814	375,518
South Negros	27,185	23,948	35,966	1,776	7,257	14,224	-17,123	17,177	44,640
Tawi-Tawi	40,672	36,611	34,800	6,853	12,617	21,665	2,394	38,483	87,969

(NM – non-motorized boats, M - motorized boats, C – commercial vessels)

Table 35. Average Annual Economic Rent per Household and 30% Margin for Profit Risk (MPR) in the Eight MKBAs Estimated During the Baseline Surveys Conducted in 2013

MKBA	Own labor			30% MPR			Rent		
	NM	M	C	NM	M	C	NM	M	C
San Bernardino Strait	34,039	36,674		18,331	28,123		10,901	31,271	
Surigao del Norte	38,202	35,740	7,457	14,218	19,095	70,062	-5,026	8,816	156,022
Verde Island Passage	44,709	47,874	28,345	12,305	20,044	84,685	1,745	14,796	180,382
Lingayen Gulf	53,771	60,841	53,383	11,409	23,022	94,869	-12,894	5,118	183,618
Calamianes Island	38,547	29,586	11,044	6,246	8,307	3,681	-23,973	-10,204	-2,456
Danajon Reef	74,682	74,882	35,283	13,329	16,612	144,988	-43,483	-36,120	303,024
South Negros	27,185	23,948	35,966	3,551	14,515	28,449	-18,898	9,920	30,415
Tawi-Tawi	40,672	36,611	34,800	13,705	25,235	43,330	-5,696	25,865	66,304

(NM – non-motorized boats, M - motorized boats, C – commercial vessels)

Majority of fish harvested is being bought by middlemen, and in Southern Negros in particular, fisherfolk indicated their primary buyers are households in urban areas outside of their municipality (Table 36). This MKBA appears to be a major source of fish of nearby major urban centers.

Table 36. Markets and Buyers of Fish Sold by Fishing Households in the Eight MKBAs Observed During the Baseline Surveys Conducted in 2013

MKBA	Location of Market			Buyers			
	Wet market	Middle-man	House to house	Households in the barangay	Households in the municipality	Exported to other urban areas	Exported outside the country
San Bernardino Strait	14%	28%	32%	44%	22%	5%	1%
Surigao del Norte	15%	24%	24%	34%	16%	12%	1%
Verde Island Passage	7%	60%	0%	39%	19%	42%	1%
Lingayen Gulf	15%	59%	23%	27%	34%	24%	
Calamianes Island	4%	56%	33%				
Danajon Reef	5%	75%	19%	26%	30%	39%	
South Negros	18%	53%	26%	36%	18%	74%	0.4%
Tawi-Tawi	47%	42%	7%	29%	28%	36%	0.2%

3.2.2. Socio-Demographic Profile

Fisherfolk families across all MKBAs have an average of 5 members, except in Tawi-Tawi (6 members). Those interviewed were in their mid-40s, married, Catholic except in Tawi-Tawi, and have lived in their current residence for more than 10 years. Table 37 contains the details of the basic demographic statistics of the sample households.

Around three-fourths have houses less than 50 sqm. Larger houses are found in Tawi-Tawi, and smaller houses are found in the San Bernardino Strait. Lot areas tend to be big in Calamianes, while farm lots are relatively large in Calamianes and Southern Negros (Table 38).

Table 37. Basic Demographic Profile of Fishing Households in the Eight MKBAs

MKBA	Household size	Average age of respondent	Average age of household members	% Female in household	Civil status of respondent	Ethnicity	Religion	Average years in Barangay
San Bernardino Strait	5	44	26	45%	Married	Bikol	Catholic	> 10
Surigao del Norte	5	47	28	48%	Married	Bisaya	Catholic	> 10
Verde Island Passage	5	46	27	49%	Married	Tagalog	Catholic	> 10
Lingayen Gulf	4	44	26	48%	Married	Ilocano	Catholic	> 10
Calamianes Island	5	43	25	48%	Married	Tagalog	Catholic	> 10
Danajon Reef	5	45	25	47%	Married	Bisaya	Catholic	> 10
Southern Negros	5	46	27	45%	Married	Bisaya	Catholic	> 10
Tawi-Tawi	6	41	22	50%	Married	Tausug	Islam	> 10

Table 38. Average Sizes of House, Lot and Farm of Fishing Households in the Eight MKBAs

MKBA	House floor area (sqm)						House area (sqm)	Lot area (sqm)	Farm size (sqm)
	< 10	10-29	30-49	50-79	80-119	> 120			
San Bernardino Strait	31%	30%	22%	8%	3%	3%	33	108	1,047
Surigao del Norte	13%	42%	13%	3%	3%	6%	135	440	2,608
Verde Island Passage	17%	59%	5%	0%	1%	2%	169	99	-
Lingayen Gulf	23%	48%	16%	2%	2%	6%	56	432	1,945
Calamianes Island	48%	54%	6%	1%	0%	0%	195	1,120	11,130
Danajon Reef	12%	50%	20%	5%	2%	3%	69	302	2,002
South Negros	35%	45%	8%	4%	2%	3%	149	315	8,456
Tawi-Tawi	25%	39%	24%	5%	1%	2%	212	273	2036

Tenure is not particularly secure, especially in terms of owning the lots where their houses are built on. Almost all respondents own their houses, but only half own their lots. Titles are uncommon. Furthermore, most respondents do not own farmlots (Table 39).

Table 39. House and Lot Ownership of Fishing Households in the Eight MKBAs

MKBA	Individual House	House Owned	Lot Owned	House & Lot Titled	Own Farm Lots
San Bernardino Strait	97%	91%	43%	30%	16%
Surigao del Norte	79%	77%	43%	15%	12%
Verde Island Passage	86%	76%	16%	22%	2%
Lingayen Gulf	92%	93%	51%	35%	2%
Calamianes Island Group	93%	83%	56%	23%	10%
Danajon Bank	98%	92%	49%	54%	1%
South Negros	93%	93%	58%	35%	8%
Tawi Tawi	98%	94%	41%	6%	17%

Houses are usually made of light materials, except in VIP and Lingayen Gulf (Table 40). Majority of houses have water-sealed toilets, except in Tawi-Tawi where open defecation is still the main practice. Fuelwood is still used by most fishing households.

Table 40. Housing Materials and Amenities of Fishing Households in the Eight MKBAs

MKBA	Roof	Walls	Floor	Toilet	Cooking Fuel	Lighting Source
San Bernardino Strait	Nipa/Sawali/Bamboo (84%)	Nipa/ Sawali/Bamboo (44%)	Concrete (57%)	Water sealed (45%)	Fuelwood (94%)	Electricity (72%)
Surigao	Nipa/Sawali/Bamboo (49%)	Wood (43%)	Wood (42%)	Water sealed (68%)	Fuelwood (83%)	Electricity (74%)
Verde Island Passage	Galvanized Iron (71%)	Concrete (56%)	Concrete (61%)	Water sealed (74%)	Fuelwood (77%)	Electricity (93%)
Lingayen Gulf	Galvanized Iron (91%)	Concrete (61%)	Concrete (75%)	Water sealed (78%)	Fuelwood (91%)	Electricity (95%)
Calamianes Island Group	Nipa/ Bamboo (59%)	Nipa/Bamboo (74%)	Nipa/Bamboo (58%)	Water sealed (59%)	Fuelwood (95%)	Kerosene (51%)
Danajon Bank	Galvanized Iron (69%)	Nipa/Bamboo (58%)	Nipa/Bamboo (51%)	Water sealed (38%)	Fuelwood (97%)	Electricity (64%)
Southern Negros	Nipa/ Bamboo (65%)	Nipa/Bamboo (58%)	Concrete (47%)	Water sealed (89%)	Fuelwood (97%)	Electricity (76%)
Tawi-Tawi	Nipa/ Bamboo (53%)	Wood (87%)	Wood (89%)	Open defecation (90%)	Fuelwood (95%)	Kerosene (70%)

Appliances owned are very basic, except in VIP and Lingayen Gulf where households tend to own more types of appliances (Table 41).

Table 41. Average Number of Appliances Owned Per Fishing Household in the Eight MKBAs

MKBA	San Bernardino Strait	Surigao del Norte	Verde Island Passage	Lingayen Gulf	Calamianes Island Group	Danajon Reef	South Negros	Tawi-Tawi
Chairs	2	3	2	3	1	2	3	2
CD/DVD player			1					
Dining room set	1	1		1				
Electric fan			1	1				
Electric iron			1					
First aid kit		1					1	
Mobile phone	1	1	2	1	1	1	1	1
Motorized Boat			1	1	1	1	1	1
Stove							1	
Television			1	1		1		

Segregation at source is practiced in most Lingayen Gulf and Tawi-Tawi households, and half of the other MKBAs (Table 42). Regular garbage collection is done only in 50% of Lingayen Gulf households, while burning is the main disposal method in most MKBAs. Tawi-Tawi households still dump in open waterways, while half of Danajon Bank households do composting.

Table 42. Waste Management by Fishing Households in the Eight MKBAs

MKBA	Segregation at Source	Main Disposal Method	Garbage Collection
San Bernardino Strait	38%	Burning (50%)	None (37%)
Surigao	47%	Burning (27%)	None (53%)
Verde Island Passage	43%	Burning (68%)	None (48%)
Lingayen Gulf	81%	Regular Collection (50%)	2-3x/ wk (41%)
Calamianes Island Group	42%	Burning (62%)	None (67%)
Danajon Bank	52%	Composting (47%)	None (58%)
Southern Negros	53%	Burning (63%)	None (69%)
Tawi-Tawi	92%	Dumping in waterways (80%)	None (65%)

Water supply systems are mostly Level 1 or 2, with only a few Calamianes, Verde Island Passage and San Bernardino Strait households having Level 3 systems (Table 43). VIP, Lingayen and South Negros rely on dug wells, while Calamianes and Surigao rely on spring water; Tawi-Tawi households rely on rainwater, while Danajon Bank households rely on delivered mineral water.

Table 43. Drinking Water Source of Fishing Households in the Eight MKBAs

MKBA	Main Source	Second Source	Primary Location	Secondary Location
San Bernardino Strait	Faucet (36%)	Spring (29%)	Outside yard (69%)	Within Yard (14%)
Surigao	Spring (33%)	Dug Well w/ Pump (19%)	Outside yard (37%)	Within Yard (22%)
Verde Island Passage	Dug well w/ Pump (46%)	Mineral Water (22%)	Outside yard (39%)	Inside House (26%)
Lingayen Gulf	Dug well w/ Pump (47%)	Mineral water (36%)	Outside Yard (43%)	Delivered (33%)
Calamianes	Spring (37%)	Dug well (33%)	Outside yard (46%)	Inside house (22%)
Danajon Bank	Mineral Water (40%)	Rainwater (24%)	Delivered (53%)	Outside house (30%)
Southern Negros	Dug well w/ Pump (49%)	Spring (19%)	Outside yard (58%)	W/in Yard (24%)
Tawi-Tawi	Rainwater (75%)	Dug well (50%)	Outside house (47%)	Delivered (20%)

Majority of households have access to temporary shelters except in Calamianes (Table 44). Health facilities are available especially in Danajon Bank and Southern Negros, and access is least in Tawi-Tawi (Table 45).

Table 44. Access to Temporary Shelters and Modes of Transportation of Fishing Households in the Eight MKBAs

MKBA	Have access	Time travel	Modes of transportation	
San Bernardino Strait	57%	17	Walking: 56%	Tricycle: 1%
Surigao	69%	14	Walking: 55%	Tricycle: 17%
VIP	-	-	-	-
Lingayen Gulf	73%	9	Walking: 59%	Tricycle: 5%
Calamianes Island Group	22%	26	Walking: 17%	Tricycle: 4%
Danajon Bank	77%	8	Walking: 72%	Tricycle/Motorbike: 2% each
Southern Negros	69%	18	Walking: 50%	Tricycle: 8%
Tawi-Tawi	64%	15	Walking/Tricycle: 16% each	Motorbike: 9%

Table 45. Access to Health Facilities of Fishing Households in the Eight MKBAs

MKBA	Have access	Time travel	Mode of transportation	
San Bernardino Strait	69%	14	Walking: 44%	Tricycle: 16%
Surigao	61%	16	Walking: 40%	Motorbike: 23%
VIP	-	-	-	-
Lingayen Gulf	77%	12	Walking: 65%	Tricycle: 9%
Calamianes Island Group	51%	16	Walking: 37%	Boat: 9%
Danajon Bank	99%	9	Walking: 88%	Tricycle: 7%
Southern Negros	97%	14	Walking: 71%	Tricycle: 16%
Tawi-Tawi	27%	21	Walking: 36%	Tricycle: 14%

Most have back-up sources of electricity and water; water back-up sources are lowest in San Bernardino and Calamianes (Table 46).

Table 46. Back Up Sources of Electricity and Water of Fishing Households in the Eight MKBAs

MKBA	Back up sources	
	Electricity	Water
San Bernardino Strait	63%	19%
Surigao	78%	72%
VIP	97%	82%
Lingayen Gulf	90%	43%
Calamianes Island Group	89%	32%
Danajon Bank	86%	61%
Southern Negros	89%	63%
Tawi-Tawi	63%	66%

Most fisherfolk were only able to finish elementary schooling (Table 47). Lingayen Gulf and Surigao fishers had some years in high school on the average. Most fisherfolk do not have any vocational training, except for a fourth in VIP, a sixth in Tawi-Tawi and a tenth in Lingayen Gulf.

Table 47. Educational profile of fishing households in the eight MKBAs.

MKBA	Average educational attainment of respondents	Vocational skill of respondents	Vocational skill of household	Vocation formally acquired	Vocation practiced
San Bernardino Strait	Elementary graduate	4%	8%	37%	63%
Surigao	Some years in high school	4%	15%	68%	46%
Verde Island Passage	Elementary graduate	24%	15%	53%	51%
Lingayen Gulf	Some years in high school	12%	11%	60%	19%
Calamianes Group of Islands	Elementary graduate	6%	6%	3%	2%
Danajon Bank	Elementary graduate	4%	13%	58%	50%
Southern Negros	Elementary graduate	9%	8%	49%	66%
Tawi Tawi	Elementary graduate	15%	33%	30%	68%

Seafood is still consumed everyday by most fishers especially in Tawi-Tawi; lowest consumption is in Surigao where only a little over half of the respondents do so (Table 48).

Table 48. Seafood Consumption of Fishing Households in the Eight MKBAs

MKBA	Everyday consumption of seafood	Frequency compared to 2 years ago
San Bernardino Strait	62%	No Change (55%)
Surigao	53%	No Change (60%)
Verde Island Passage	74%	No Change (86%)
Lingayen Gulf	65%	No Change (60%)
Calamianes Island Group	77%	No Change (70%)
Danajon Bank	71%	No Change (50%)
South Negros	71%	No Change (72%)
Tawi-Tawi	86%	No Change (52%)

Health conditions relative to 2 years ago either remain unchanged or are perceived to be better, mainly due to improved availability of health care services and improved water supply (Table 49).

Table 49. Perceived Health Condition of Fishing Households in the Eight MKBAs

MKBA	Health condition compared to 2 years ago	Reason for change in health condition
San Bernardino Strait	Better (51%)	Availability of Health Care Services
Surigao	No Change (51%)	-
Verde Island Passage	Better (70%)	Improved water supply
Lingayen Gulf	Better (39%)	Availability of Services, Water Supply
Calamianes Island Group	Better (72%)	Availability of health care services
Danajon Bank	No Change (43%)	-
South Negros	No Change (50%)	-
Tawi-Tawi	No Change (50%)	-

3.2.3. CRM-Related Perceptions of Fishing Households

The lack of capital, followed by the lack of education or training, are ranked as the highest challenges in village development (Table 50). Climate change ranks high in Calamianes and South Negros as a major challenge.

Table 50. Perceived Primary Challenges in the Barangay of Fishing Households in the Eight MKBAs

MKBA	Lack of education or training	Markets	Government support	Capital	Climate change	Community support and cooperation
San Bernardino Strait	78%	29%	46%	75%	60%	33%
Surigao del Norte	24%	18%	35%	56%	34%	20%
Verde Island Passage	44%	17%	18%	46%	30%	12%
Lingayen Gulf	75%	20%	33%	49%	56%	28%
Calamianes Island Group	95%	89%	73%	87%	87%	69%
Danajon Bank	53%	10%	14%	70%	28%	10%
South Negros	32%	13%	18%	41%	63%	6%
Tawi-Tawi	41%	13%	33%	61%	11%	7%

In terms of exposure to climate change impacts, tropical storms were ranked highest by almost all of the respondents in all MKBAs, and half of Tawi-Tawi households (Table 51). Storm surges

were marked by almost half of households in Calamianes and Tawi-Tawi. Floods were a threat to 40% of households in Surigao.

Table 51. Perceptions on Exposure to Natural Disasters by Fishing Households in the Eight MKBAs

MKBA	Tropical storm	Storm surge	Coastal erosion	Saltwater inundation	Floods	Land/Mud slide	Brush fire	Earth quake	Strong winds
San Bernardino Strait	95%	28%	13%	18%	26%	1%	0.3%		
Surigao del Norte	72%	27%	8%	16%	40%	10%			
Verde Island Passage	89%	32%	9%	11%	17%	5%	1%		
Lingayen Gulf	96%	32%	6%	11%	18%	1%	0.4%		
Calamianes Island Group	72%	54%	20%	31%	9%	8%	5%		
Danajon Bank	92%	16%	8%	36%	14%	0.1%	0.3%	1%	
Southern Negros	89%	29%	4%	14%	22%	2%		3%	5%
Tawi-Tawi	50%	47%	10%	15%	0.2%	0.2%			5%

Table 52 shows the perception of sample households on the relative condition of their marine resources. Coral cover is perceived to be worse off relative to two years ago, except in VIP and Tawi-Tawi. Fish abundance and fish size are worse in all MKBAs except in Tawi-Tawi, where abundance and size are perceived to be better. Fish diversity is likewise worse off in six MKBAs, except in Tawi-Tawi and VIP where households think there is no change. Finally, water quality is said to have been unchanged compared to two years ago except in Surigao, where it is perceived to be worse.

Population growth is seen to negatively impact on marine resources in half of the MKBAs (Table 53). VIP households claim there is no impact, while Calamianes households are evenly split among those claiming positive and negative impacts. Southern Negros and Tawi-Tawi households claim population growth has a positive impact.

Table 52. Perceptions on Relative Condition of Marine Resources (Compared to 2 Years Ago) by Fishing Households in the Eight MKBAs

MKBA	Live coral cover				Fish abundance			
	Better	Worse	No change	Don't know	Better	Worse	No change	Don't know
San Bernardino Strait	13%	52%	29%	3%	16%	61%	19%	1%
Surigao	10%	44%	9%	18%	8%	62%	7%	5%
Verde Island Passage	21%	19%	34%	19%	19%	44%	30%	1%
Lingayen Gulf	26%	30%	28%	12%	21%	55%	21%	1%
Calamianes Island Group	13%	65%	20%	-	12%	82%	6%	-
Danajon Bank	14%	54%	20%	11%	4%	71%	22%	2%
Southern Negros	2%	28%	19%	17%	5%	47%	35%	6%
Tawi-Tawi	36%	35%	19%	6%	41%	36%	18%	2%

MKBA	Fish size				Fish diversity			
	Better	Worse	No change	Don't know	Better	Worse	No change	Don't know
San Bernardino Strait	13%	50%	31%	2%	12%	43%	36%	5%
Surigao	8%	57%	10%	4%	8%	54%	11%	5%
Verde Island Passage	16%	34%	42%	1%	19%	28%	45%	1%
Lingayen Gulf	19%	45%	34%	1%	20%	41%	35%	1%
Calamianes Island Group	14%	64%	20%	-	16%	56%	26%	-
Danajon Bank	2%	64%	31%	2%	3%	60%	36%	2%
Southern Negros	3%	45%	44%	7%	3%	45%	39%	12%
Tawi-Tawi	36%	24%	33%	3%	32%	23%	36%	4%

MKBA	Water quality			
	Better	Worse	No change	Don't know
San Bernardino Strait	11%	19%	53%	8%
Surigao	16%	34%	23%	5%
Verde Island Passage	18%	16%	55%	2%
Lingayen Gulf	22%	27%	47%	0.4%
Calamianes Island Group	3%	26%	58%	
Danajon Bank	20%	18%	58%	2%
Southern Negros	9%	19%	54%	17%
Tawi-Tawi	6%	12%	51%	25%

Table 53. Perceived Impact of Population Growth by Fishing Households in the Eight MKBAs

MKBA	Very negative	Negative	No impact	Positive	Very positive	Don't know
San Bernardino Strait	14%	48%	19%	11%	2%	2%
Surigao del Norte	2%	34%	13%	21%	6%	3%
Verde Island Passage	4%	23%	34%	30%	1%	4%
Lingayen Gulf	13%	35%	10%	36%	2%	2%
Calamianes Island Group	11%	26%	8%	37%	0.2%	0.2%
Danajon Bank	3%	38%	33%	12%	3%	11%
South Negros	5%	19%	25%	24%	7%	19%
Tawi-Tawi	0.4%	5%	10%	46%	25%	8%

Coastal development is perceived to have a negative impact in San Bernardino, Surigao, VIP, Lingayen Gulf, Calamianes and Danajon (Table 54). Southern Negros households claim there is

no impact, and Tawi-Tawi households claim it has a positive impact. There is likewise a significant number of households in Negros and Tawi-Tawi who claim they don't know.

Table 54. Perceived Impact of Coastal Development by Fishing Households in the Eight MKBAs

MKBA	Very negative	Negative	No impact	Positive	Very positive	Don't know
San Bernardino Strait	6%	33%	23%	27%	3%	3%
Surigao del Norte	4%	21%	23%	19%	2%	8%
Verde Island Passage	4%	28%	32%	28%	1%	3%
Lingayen Gulf	15%	26%	26%	24%	3%	5%
Calamianes Island Group	7%	52%	14%	21%	4%	
Danajon Bank	4%	30%	31%	19%	2%	15%
South Negros	3%	17%	33%	17%	1%	26%
Tawi-Tawi	1%	21%	27%	18%	10%	22%

Pollution is perceived to impact negatively on marine resources for all except in Tawi-Tawi (Table 55).

Table 55. Perceived Impact of Pollution by Fishing Households in the Eight MKBAs

MKBA	Very negative	Negative	No impact	Positive	Very positive	Don't know
San Bernardino Strait	29%	46%	11%	3%	1%	1%
Surigao del Norte	10%	45%	7%	11%	6%	2%
Verde Island Passage	14%	25%	10%	35%	6%	-
Lingayen Gulf	29%	25%	9%	25%	8%	1%
Calamianes Island Group	24%	51%	3%	15%	-	-
Danajon Bank	21%	42%	22%	11%	3%	1%
Southern Negros	17%	20%	8%	18%	11%	25%
Tawi-Tawi	8%	18%	17%	12%	16%	21%

Destructive fishing is perceived as negative in all, except in Tawi-Tawi, and a third of households in Calamianes (Table 56).

Table 56. Perceived Impact of Destructive Fishing by Fishing Households in the Eight MKBAs

MKBA	Very negative	Negative	No impact	Positive	Very positive	Don't know
San Bernardino Strait	53%	29%	2%	4%	2%	1%
Surigao del Norte	18%	33%	3%	14%	7%	4%
Verde Island Passage	19%	36%	10%	16%	1%	2%
Lingayen Gulf	31%	19%	7%	23%	12%	4%
Calamianes Island Group	27%	20%	0%	33%	8%	1%
Danajon Bank	56%	23%	6%	9%	4%	1%
Southern Negros	20%	25%	7%	13%	5%	30%
Tawi-Tawi	18%	30%	2%	30%	2%	9%

Commercial fishing encroachment and lack of monitoring in municipal waters are negatively perceived, except in Tawi-Tawi (Tables 57 and 58).

Table 57. Perceived Impact of Commercial Fishing Encroachment in Municipal Waters by Fishing Households in the Eight MKBAs

MKBA	Very negative	Negative	No impact	Positive	Very positive	Don't know
San Bernardino Strait	22%	50%	10%	5%	1%	14%
Surigao del Norte	16%	32%	9%	16%	3%	3%
Verde Island Passage	17%	33%	6%	24%	3%	1%
Lingayen Gulf	28%	25%	9%	23%	7%	5%
Calamianes Island Group		42%	7%	30%	6%	1%
Danajon Bank	11%	46%	22%	10%	3%	7%
Southern Negros	17%	24%	14%	17%	4%	23%
Tawi-Tawi	6%	10%	22%	29%	9%	15%

Table 58. Perceived Impact of Lack of Monitoring by Fishing Households in the Eight MKBAs

MKBA	Very negative	Negative	No impact	Positive	Very positive	Don't know
San Bernardino Strait	32%	46%	5%	5%	1%	1%
Surigao del Norte	14%	31%	6%	22%	3%	2%
Verde Island Passage	13%	36%	9%	21%	1%	2%
Lingayen Gulf	27%	31%	6%	24%	6%	2%
Calamianes Island Group	14%	42%	4%	30%	7%	1%
Danajon Bank	12%	51%	15%	12%	3%	5%
Southern Negros	12%	22%	17%	8%	11%	27%
Tawi-Tawi	14%	18%	12%	21%	7%	20%

Danajon households have the highest awareness of and support for MPAs, along with the majority of households in Tawi-Tawi and Calamianes (Table 59). San Bernardino and Southern Negros households are hardly aware and supportive of MPAs. VIP households were likewise not as supportive. Lingayen and Surigao had less than half of households aware and supportive. Attributions of benefits (and less illegal fishing) due to MPAs are still wanting, except in Danajon and Tawi-Tawi. Sustainability of MPAs seems to be apparent only in Danajon.

Table 59. Perception on Marine Protected Areas by Fishing Households in the Eight MKBAs

MKBA	Very negative	Negative	No impact	Positive	Very positive	Don't know
San Bernardino Strait	11%	6%	3%	2%	5%	26%
Surigao del Norte	42%	25%	19%	22%	30%	42%
Verde Island Passage	28%	25%	24%	24%	24%	34%
Lingayen Gulf	41%	35%	35%	32%	32%	36%
Calamianes Island Group	51%	62%	49%	44%	62%	67%
Danajon Bank	92%	69%	51%	72%	79%	88%
Southern Negros	9%	5%	5%	6%	6%	8%
Tawi-Tawi	65%	69%	69%	48%	53%	67%

In terms of problems in fishing, financing is ranked as the biggest challenge, followed by illegal fishing (Table 60).

Table 60. Perceived Problems in Fishing by Fishing Households in the Eight MKBAs

MKBA	Financing	Marketing	Illegal fishing	Institutional	Accidents	Lost/damaged gears	Competition	No catch	Weather	Health
San Bernardino Strait	38%	4%	22%	0%	1%	2%	-	1%	11%	1%
Surigao del Norte	35%	4%	35%	0%	1%	-	-	2%	-	14%
Verde Island Passage	10%	3%	6%	2%	3%	10%	2%	4%	15%	-
Lingayen Gulf	43%	20%	56%	3%	-	-	-	-	-	-
Calamianes Island Group	53%	0.1%	44%	4%	3%	-	1%	1%	-	6%
Danajon Bank	39%	4%	31%	1%	-	9%	-	10%	19%	-
Southern Negros	39%	14%	23%	13%	-	1%	-	1%	2%	-
Tawi-Tawi	38%	4%	22%	0%	1%	2%	-	1%	11%	1%

Illegal fishing is still perceived as prevalent in Calamianes and Danajon, and by almost half of respondents in San Bernardino and Surigao (Table 61). Lack of livelihood alternatives and lower fish catch are the main reasons cited for continued prevalence of illegal fishing.

Table 61. Perception on Prevalence of Illegal Fishing by Fishing Households in the Eight MKBAs

MKBA	Prevalent illegal fishing	Reasons for prevalence of illegal fishing					
		Minimal patrolling	Minimal fines	Bribery	Authorities involved	Commercial	No. of municipal
San Bernardino Strait	43%	18%	11%	8%	12%	3%	12%
Surigao del Norte	44%	25%	17%	6%	7%	5%	12%
Verde Island Passage	12%	20%	14%	11%	10%	8%	5%
Lingayen Gulf	28%	21%	12%	8%	8%	10%	10%
Calamianes Island Group	60%	65%	44%	50%	40%	34%	30%
Danajon Bank	64%	33%	13%	10%	10%	5%	24%
Southern Negros	20%	21%	13%	10%	10%	21%	21%
Tawi-Tawi	33%	30%	17%	13%	12%	13%	31%

MKBA	Reasons for prevalence of illegal fishing					
	Less catch	No livelihood	Not destructive anyway	Too strict laws	Easy income	Others
San Bernardino Strait	15%	11%	0.3%	1%	2%	1%
Surigao del Norte	32%	34%	4%	2%	3%	
Verde Island Passage	28%	26%	1%	7%	1%	2%
Lingayen Gulf	20%	23%	1%	12%		1%
Calamianes Island Group	56%	56%	5%	26%		11%
Danajon Bank	41%	59%	3%	2%	10%	2%
Southern Negros	25%	26%	2%	7%		2%
Tawi-Tawi	1%	73%	1%	4%	1%	1%

Respondents are still cynical with enforcement initiatives, stating that there is no patrolling and detection occurring in their area, except in Danajon and a third of respondents in San Bernardino Strait (Table 62).

Table 62. Perceived Frequency of Patrolling and Detection by Fishing Households in the Eight MKBAs

MKBA	Everyday	3-4 times per week	1-2 times per week	1 per month	Every 2 months.	1 per year	Never	Seldom	Sometimes	Don't know
San Bernardino Strait	4%	3%	2%	4%	2%	16%	30%	2%	2%	3%
Surigao del Norte	8%	2%	0.4%	4%	8%	22%	24%	-	0.2%	1%
Verde Island Passage	1%	0%	1%	2%	0%	4%	25%	-	1%	7%
Lingayen Gulf	4%	2%	1%	2%	1%	11%	12%	-	-	8%
Calamianes Island Group	1%	1%	1%	5%	5%	19%	41%	-	-	8%
Danajon Bank	1%	1%	1%	12%	4%	35%	14%	-	0.4%	-
Southern Negros	4%	5%	10%	4%	7%	12%	53%	1%	-	5%
Tawi-Tawi	3%	2%	1%	1%	1%	18%	43%	0.4%	-	4%

Perceived probabilities of getting caught and arrested are a little higher than 50% in VIP, Southern Negros, Tawi-Tawi and Danajon (Table 63). However, perceived recidivism is also higher in these MKBAs. Prosecution is still seen as the weakest link in the enforcement chain. Bantay Dagat (BD) teams were given low marks in San Bernardino Strait, Calamianes and Southern Negros. Danajon BD teams were given relatively high marks.

Table 63. Perception by Fishing Households in the Eight MKBAs on the Probability of Detection, Arrest, Prosecution and Conviction of Illegal Fishers

MKBA	Detection	Arrest	Prosecution	Conviction	Recidivism	Bantay dagat score
San Bernardino Strait	5	5	4	5	6	4
Surigao del Norte	5	5	5	6	8	5
Verde Island Passage	6	6	6	6	7	6
Lingayen Gulf	5	5	5	5	6	6
Calamianes Island Group	4	4	3	4	6	4
Danajon Bank	6	5	5	6	7	7
Southern Negros	6	6	6	7	7	4
Tawi-Tawi	6	6	5	5	7	6

Very few respondents admitted to violating rules (Table 64). Among those who did, those in Lingayen Gulf, Calamianes and Southern Negros admitted being caught, along with half of those in Surigao and Tawi-Tawi. Furthermore, most of those violators in Surigao admitted being repeat offenders, along with a quarter of violators in VIP and Lingayen Gulf, and a fifth of violators in Danajon and Tawi-Tawi.

Table 64. Admission of Violation of Rules

MKBA	Violated?	Caught?	Jailed?	Fined?	Gear confiscated?
San Bernardino Strait	3%	8%	-	50%	-
Surigao del Norte	2%	33%	-	33%	-
Verde Island Passage	2%	36%	-	-	-
Lingayen Gulf	1%	75%	-	50%	-
Calamianes Island Group	4%	47%	33%	11%	22%
Danajon Bank	8%	33%	2%	22%	3%
Southern Negros	1%	50%	0%	25%	0%
Tawi-Tawi	3%	47%	0%	35%	0%

MKBA	Not caught	Reasons				
		No one saw us	Not harmful	Not Strict	Minimal patrol	Authorities involved
San Bernardino Strait	60%			20%	47%	7%
Surigao del Norte	33%	8%	50%			
Verde Island Passage						
Lingayen Gulf						
Calamianes Island Group						
Danajon Bank						
South Negros	36%					
Tawi-Tawi	59%	100%				

MKBA	Reasonable fines		Repeat offender	Reason (No alternative livelihood)
	Yes	No		
San Bernardino Strait	8%	20%	4%	100%
Surigao del Norte	50%		75%	
Verde Island Passage			27%	
Lingayen Gulf			25%	
Calamianes Island Group				
Danajon Bank			20%	15%
South Negros			0.4%	
Tawi-Tawi			18%	

3.2.4. Monitoring Project Targets Using Socio-Economic Assessment Tool

The surveys will be repeated in years 3 and 5 of the project. The measurements discussed below will show whether the project will successfully achieve its target of increasing the number of people gaining employment or better employment due to project interventions by at least 10%.

The increase in the number of people gaining employment or better employment will be composed of the following:

- a. A percentage increase in the number of people gaining better employment will be measured through the household survey of approximately 5,000 fishing households across all 8 MKBAs. The improvement of harvesting incomes will be the primary definition of better employment in fisheries. This will further be supported by the following indicators:
 - i. improved seafood consumption, as a proxy of protein intake;

- ii. improved awareness/ perceptions on conditions of and threats to marine resources, MPAs, and enforcement activities;
 - iii. improved household savings or better expenditure patterns;
 - iv. more fisherfolk using friendlier gears; and
 - v. more fishers with decreased economic costs in fishing, including time travel, distance from shore to fishing grounds.
- b. The percentage increase in the number of people gaining employment will primarily come from the number of households earning additional incomes from project interventions, as a proportion of the total number of households directly invited to participate in project interventions. This is based on the official definition of the indicator under Workforce Development of the USG's List of Standard Indicators:

Indicator Title: Number of people gaining employment or better employment as a result of participation in USG-funded workforce development programs (Element: EG 6.3 - Workforce Development)

DEFINITION:

Number of people gaining employment or better employment within six months of participation in USG funded workforce development programs.

Better employment is based on the participant's perception of whether the employment is better. (It could be better because it is closer to home, has better pay, a better schedule, etc.)

3.3. Benchmarking the Capacity of Partners to Apply EAFM

The following are the baseline scores of 59 partner LGUs based on their self-assessment on 17 benchmarks. The list of LGUs and their baseline self-assessment scores are given in Appendix 2. Benchmark level 0 and 1 together were scored 602 times, benchmark level 2 a total of 252 times, and benchmark level 3 only 149 times. This indicates that the LGU partners are generally at the initial stages of building the foundations for EAFM. There are 31 LGUs that scored themselves at Level 1 in at least 10 of the 17 benchmarks (Table 65).

Table 65. Local Government Units that Scored Themselves at Level 1 in at least 10 of the 17 EAFM Benchmarks

Calamianes Island Group	Danajon Reef	Lingayen Gulf	San Bernardino – Ticao Pass – Lagonoy Gulf	Southern Negros	Surigao del Norte	Tawi-Tawi	Verde Island Passage
Busuanga	Bato	Aringay	Sta Magdalena	Cauayan	Claver	Bongao	Calaca
Culion	Matalom	Sto Tomas	Bulan		Placer	P. Sugala	Lemery
Linapacan		Rosario	San Vicente		Surigao City	Tandubas	Taal
			Capul			Simunul	San Luis
						South Ubian	Bauan
						Sapa-Sapa	Mabini
							Tingloy
							Lobo
							Lian

San Fernando City, Bayawan City and Sipalay City are notable for having scored themselves at Level 3 in at least 10 of the 17 benchmarks. These three cities are considered “big brothers” to their neighboring LGUs and sources of best practice experiences. They are followed by Balayan (9 benchmarks at Level 3) and Calatagan (8 benchmarks at Level 3). The top six benchmarks where most LGUs are at level one are given in Table 66.

Table 66. Top Six Benchmarks Where Most LGUs are at Level 1

Benchmark number	Benchmark description	Number of LGUs at Level 1
17	Coastal environment-friendly enterprises established	48
3	Fisheries monitoring and early fisheries management planning established	47
9	Fisheries use zoning plan established	41
5	Comprehensive fisheries management plan conducted and updated	39
2	Coastal marine habitat monitoring and management planning established	39
1	Ecosystem boundaries established	37

These six benchmarks may be considered as the priority areas for capacity-building assistance from ECOFISH. The priority list is common to all MKBAs. Law enforcement is notably absent in the priority list. This appears to be inconsistent with the frequent request of LGUs for ECOFISH to conduct trainings on fisheries law enforcement. Of the 59 LGUs, 27 indicated they are at Level 1, 19 LGUs at Level 2 and 13 LGUs at Level 3. This could mean that enforcement teams are already established in most LGUs, but these are not fully functional – either because of logistical constraints and/or lack of technical capacity for effective law enforcement.

4. References

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Appendix 1. EAFM Benchmarking for LGUs in the ECOFISH MKBAs

EAFM as a process has already been practiced in the region. In the East Asia region as a whole, management of fisheries has been attempted at various ecological scales such as large marine ecosystems (LMEs), bays, gulfs, and other spatially defined seas. In many instances, specific fish or invertebrate species in these ecological scales have been the focus of management but due to the multi-species and multi-gear nature of fisheries the management approach has always been on multi-species scale. What have been lacking are the understanding of the interaction among the various components of the ecosystem that could have been a crucial input to management interventions and the establishment of a governance system or at least effective institutional mechanisms that implement management interventions.

As an ecosystem approach, EAFM tends to be complex. To make it workable, it is best for it to be disaggregated into its practical elements with corresponding expected results. At the national level, EAFM activities may only be limited to policy formulation, enactment of laws, or agreements on number and areas of geographies subject to fisheries management. At the site level, however, EAFM activities and expected results can be more specific. Below is a set of recommended generic results at the LGU and cluster of LGUs level used during the FISH Project that can also be applied by ECOFISH.

Generic results can include:

1. Delineated ecosystem boundaries that reflect institutional and political elements to manage the ecosystem as one management unit.
2. Determined the habitat need of important harvestable organisms that constitute the “significant food web”.
3. Incremental understanding of the components of the ecosystem and the dynamics of the entire ecosystem.
4. Developed and set in place a functioning network of MPAs.
5. Developed indices of ecosystems’ health as targets for management.
6. Assessed how removals affect the stock size, harvest, and trophic structure and gradually achieve an appropriate overall fishing effort limit or configuration.
7. Assessed institutional elements of the ecosystem which most significantly affect fisheries and developed appropriate institutional mechanisms to effectively implement management interventions.
8. Developed and implemented strategies such as management planning, zoning schemes, gear/species-specific management, registration and licensing, law enforcement, and temporal and permanent no take zones.
9. Established governance system that is responsive to ecosystems approach (it should cover the boundary, scale and scope of the fishery system).
10. Developed and instituted monitoring schemes used for fisheries management.

These generic results were used as guide in developing specific benchmarks that cover as many EAFM elements as possible. This benchmarking follows the system developed by CRMP’s monitoring and evaluation guidelines for municipal/city CRM (DENR-CMMO 2003) and the proposed template for the development of a municipal fisheries management benchmarking system

in the Philippines (FISH Project 2010). The levels of the benchmarking system follow the orders of governance outcomes described in Olsen (2003) wherein each level corresponds to the order of governance. Only in this case, levels 3 and 4 were lumped together. Each level is likewise considered a building block to subsequent levels.

The purpose of setting the benchmarks is to provide a framework to guide implementors, particularly the fisheries managers, in effectively implementing EAFM programs primarily by providing guideposts for the various stages of progress in their implementation. The benchmarks are subdivided into two major groups: (A) Basic Requirements, and (B) Site Specific Requirements. The former (A) covers the basic requisites and can be implemented across all priority geographies or sites, while the latter (B) are site-specific and may only be carried out in specific priority geographies. The EAFM Benchmarks are given in the table below, followed by the table detailing benchmark description at various levels of implementation.

EAFM Benchmarks

	Benchmark	Level 1 Programs Established	Level 2 Programs Functional	Level 3 Programs Sustained and Results Realized
A. Basic Requirements				
1	Ecosystem boundaries established	Ecosystem boundaries drawn and established	Formal agreement on ecosystem boundaries	Ecosystem boundaries legally recognized by the national government
2	Coastal/marine habitat monitoring and management planning established	Coastal/marine habitat baseline assessment conducted and habitat profile developed	Coastal/marine habitat monitoring conducted regularly and feedback to stakeholders and resource users	Results of coastal/marine habitat monitoring used in formulation of coastal/marine habitat management actions
3	Fisheries monitoring and early fisheries management planning established	Fisheries baseline assessment conducted and fisheries profile developed	Fisheries monitoring conducted regularly and reported back to stakeholders and resource users	Results of monitoring used in formulation of fisheries management plans and actions
4	Fisheries Law enforcement team and program established	Fisheries law enforcement team and law enforcement program established	Fisheries enforcement operations regularly conducted and enforcement database established	Fisheries enforcement operations sustained and enforcement effectiveness evaluated. Collaborative enforcement with other participating local governments conducted (e.g. joint enforcement)
5	Comprehensive fisheries management plan conducted and regularly updated	Comprehensive fisheries management plan developed and adopted	Comprehensive fisheries management plan implemented (with corresponding legal and policy instrument) and	Fisheries management plan revised or updated based on the monitoring results

			programs in the plan continuously funded	
6	Fisheries management office established and operational	Fisheries management office in each participating local government established with corresponding mandate and staff	Coordination among offices within the local government, institutional partners, and other participating local governments established	Leveraging support of programs with institutional partners and collaborative endeavors with participating local governments within the ecosystem boundary established
7	Fisheries registration and licensing system established	Fishers, boats and fishing gears registration and licensing system established	Fishers, boats, and fishing gears registration and licensing system implemented and enforced	Fishers, boats, and fishing gears registration and licensing system implementation sustained and information from the database used for fishing effort control and regulations
8	Network of Marine Protected Areas (MPA) established	Individual MPA or MPAs established, baseline data collected, MPA management plan implemented, and monitoring system established	Individual MPA or MPAs sustained and MPA network arrangements established	MPA network arrangements implemented, enforced and sustained
9	Fisheries use zoning plan established	Fisheries and other uses identified and zoning plan developed	Fisheries use zoning plan implemented (with corresponding legal or policy instrument) and monitored	Fisheries use zoning plan improved, sustained and objectives attained (e.g. conflict reduced)
10	Local constituencies for fisheries management organized and actively involved	Local constituencies for fisheries management organized	Local constituencies for fisheries management actively participating in program development and implementation	Local constituencies for fisheries management sustained and expanded
11	Multi-institutional collaboration on coastal and fisheries resources management (CFRM)	Multi-institutional collaboration on CFRM established	Multi-institutional collaboration on CFRM programs and services effectively implemented	Multi-institutional collaboration on CFRM sustained and showing positive impacts
B. Site Specific Requirements				
12	Species-specific management measures established	Species that constitute the “significant food web” identified and baseline assessment conducted	Species-specific management measures developed, enforced and monitored	Species-specific management measure sustained and monitoring results show impacts

13	Gear-specific management measures established	Gear-specific management measure identified and baseline assessment conducted	Gear-specific management measures developed, enforced and monitored	Gear-specific management measure sustained and monitoring results show impacts
14	Mangrove management area established	Mangrove management area established and baseline data collected	Mangrove management plan developed, implemented and monitoring system established	Mangrove management sustained and monitoring results show impacts
15	Seagrass management area established	Seagrass management area established and baseline data collected	Seagrass management plan developed, implemented and monitoring system established	Seagrass management sustained and monitoring results show impacts
16	Revenue generation established	Revenue generation system on CRM/fisheries management initiated	Revenue-generating measures effectively implemented and enforced	Revenue-generating measures sustained showing positive impacts
17	Coastal environment-friendly enterprises established	Coastal environment-friendly enterprises initiated	Successful coastal environment-friendly enterprises expanded	Coastal environment-friendly enterprises sustained showing positive impacts

Description of the EAFM Benchmarks at Various Levels of Implementation

	Benchmark	Benchmark Description
1	Ecosystem boundaries established	<p>Level 1: Ecosystem boundaries drawn and established</p> <ul style="list-style-type: none"> Ecosystem boundaries drawn incorporating institutional and political considerations <p>Level 2: Formal agreement on ecosystem boundaries</p> <ul style="list-style-type: none"> Ecosystem boundaries agreed upon by the participating local governments through a memorandum of agreement or other form of policy instrument <p>Level 3: Ecosystem boundaries legally recognized by the national government</p> <ul style="list-style-type: none"> Ecosystem boundaries recognized by the national government as part of its Coral Triangle Initiative
2	Coastal marine habitat monitoring and management planning established	<p>Level 1: Coastal marine habitat baseline assessment conducted and habitat profile developed</p> <ul style="list-style-type: none"> Marine habitat profile developed through compilation of secondary data and baseline assessment of the status of coral, seagrass, and mangrove habitats Issues and opportunities pertaining to coastal habitats, socio-economic, governance and other related issues identified Key indicators for habitat, socio-economic and governance aspects developed as part of the future monitoring and evaluation <p>Level 2: Coastal/marine habitat monitoring conducted regularly and fed back to stakeholders and resource users</p> <ul style="list-style-type: none"> Key habitat data collected analyzed and compared to baseline Analyzed monitoring results presented to stakeholders and resource users

		<p>Level 3: Results of coastal/marine habitat monitoring used in formulation of marine habitat management plans and actions</p> <ul style="list-style-type: none"> • Baseline and monitoring results analyzed and results used to formulate habitat management options • Habitat management options presented to stakeholders for formulation of habitat management plan or improvement of existing habitat management plan • Habitat management plans enacted
3	Fisheries monitoring and early fisheries management planning established	<p>Level 1: Fisheries baseline assessment conducted and habitat profile developed</p> <ul style="list-style-type: none"> • Fisheries profile developed through compilation of secondary data and baseline assessment of the status of fishery resources, fishers, and fishing effort (boats and gears) • Issues and opportunities pertaining to fisheries, socio-economic, governance and other related issues identified • Key indicators for fisheries, socio-economic and governance aspects developed as part of the future monitoring and evaluation <p>Level 2: Fisheries (catch and effort) monitoring conducted regularly and reported back to stakeholders and resource users</p> <ul style="list-style-type: none"> • Key fisheries data collected analyzed and compared to baseline • Analyzed monitoring results presented to stakeholders and resource users <p>Level 3: Results of fisheries monitoring used in formulation of fisheries early action plans</p> <ul style="list-style-type: none"> • Baseline and monitoring results analyzed and results used to formulate initial fisheries management options • Fisheries management options presented to stakeholders for formulation of specific fisheries management intervention or improvement of existing fisheries management interventions
4	Fisheries law enforcement team and program established	<p>Level 1: Fisheries law enforcement team and law enforcement program established</p> <ul style="list-style-type: none"> • Members of fisheries law enforcement team identified, trained and deputized • Law enforcement program developed and funded • Law enforcement assets (boats, radios, GPS, etc. procured) <p>Level 2: Fisheries enforcement operations regularly conducted and enforcement database established</p> <ul style="list-style-type: none"> • Fisheries law enforcement operation planning (Oplan) regularly conducted • Results of enforcement operations documented in a form of data base • Coordination mechanism with agencies (police, navy, coast guard) having coastal and fisheries law enforcement mandates established <p>Level 3: Fisheries law enforcement operations sustained and enforcement effectiveness evaluated. Collaborative enforcement with other participating local governments conducted</p> <ul style="list-style-type: none"> • Fisheries law enforcement operations continuously funded • Training of fishery law enforcement team regularly updated • Effects of fisheries law enforcement evaluated and operations improved • Joint enforcement with other participating local governments conducted
5	Comprehensive fisheries management plan	<p>Level 1: Comprehensive fisheries management plan developed and adopted</p> <ul style="list-style-type: none"> • Comprehensive fisheries management plan laid out, programs and activities in response to issues identified in the baseline assessment and profile

	conducted and regularly updated	<ul style="list-style-type: none"> Comprehensive fisheries management plan incorporates habitat management plans and early fisheries management plans Draft comprehensive fisheries management plan presented to stakeholders <p>Level 2: Comprehensive fisheries management plan implemented and programs in the plan continuously funded</p> <ul style="list-style-type: none"> Comprehensive fisheries management plan adopted through enactment of enabling policy instrument or legislation (ordinance) Programs and activities in the comprehensive fisheries management plan funded by the local governments <p>Level 3: Fisheries management plan revised or updated based on the monitoring results</p> <ul style="list-style-type: none"> Comprehensive fisheries management plan reviewed, updated and revised following the results of the regular coastal/marine habitat and fisheries (catch and effort) monitoring schemes Programs and activities in the comprehensive fisheries management plan regularly funded
6	Fisheries management office established and operational	<p>Level 1: Fisheries management office in each local participating government established with corresponding mandate and staff</p> <ul style="list-style-type: none"> Fisheries management office with mandate to implement and coordinate fisheries management activities established Fisheries management office allocated with human and financial resources to perform mandated activities <p>Level 2: Coordination among offices within the local government, institutional partners, and other participating local governments established</p> <ul style="list-style-type: none"> Staff of fisheries management office trained to effectively perform mandated activities Linkages between fisheries management office, offices within the local government and institutional partners developed Linkage between the fisheries management office and other participating local governments within the defined ecosystem established <p>Level 3: Leveraging support of programs with institutional partners and collaborative endeavors with participating local governments within the ecosystem boundary established</p> <ul style="list-style-type: none"> Fisheries management office able to leverage financial and services support of programs with institutional partners and other government agencies Collaborative activities between the fisheries management office and other participating local governments in developing common fisheries management policies, common ordinance and joint management planning established
7	Fisheries registration and licensing system established	<p>Level 1: Fishers, boats and fishing gears registration and licensing system established</p> <ul style="list-style-type: none"> Fishers, fishing boats, and fishing gear registration procedure established Registration and licensing initiated Fisheries registration and licensing data base developed <p>Level 2: Fishers, boats, and fishing gears registration and licensing system implemented and enforced</p> <ul style="list-style-type: none"> Registration and licensing database functional and registration and licensing data stored and analyzed

		<ul style="list-style-type: none"> • Registration and licensing system fully functional <p>Level 3: Fishers, boats, and fishing gears registration and licensing system implementation sustained and information from the database used for fishing effort control and regulations</p> <ul style="list-style-type: none"> • Database fully functional and information used to determine and monitor fishing effort • Fisheries registration and licensing information used to revise and improve plans and policies on fisheries management.
8	Network of Marine Protected Areas (MPA) established	<p>Level 1: Individual MPA or MPAs established, baseline data collected, MPA management plan implemented, and monitoring system established</p> <ul style="list-style-type: none"> • MPA site identified, boundaries delineated, zones (no-take and buffer zones) established • MPA baseline information (live hard coral cover, reef fish biomass, diversity, etc.) collected • MPA management plan formulated and adopted (preferably supported by legal instrument), management body and enforcement team trained and organized • Enforcement protocol operational, enforcement infrastructure established and enforcement assets procured and utilized • Management body and enforcement team conduct regular implementation and enforcement activities with funding support from local government • MPA monitoring regularly conducted and compliance monitored <p>Level 2: Individual MPA or MPAs sustained and MPA network arrangements established</p> <ul style="list-style-type: none"> • Activities of the MPA Management body and enforcement team sustained • Implementation and enforcement activities funded by local governments • MPA monitoring sustained and impacts regularly presented to stakeholders • Components of the MPA network identified and MPA managers organized • Implementation and coordination arrangements established • Enforcement and monitoring protocols harmonized and agreed <p>Level 3: MPA network arrangements implemented, enforced and sustained</p> <ul style="list-style-type: none"> • MPA network management plan developed • Coordination meeting among MPA network management bodies regularly conducted • Programs in MPA network management plan implemented and funded • MPA bodies of members of the MPA network conduct collaborative MPA monitoring activities
9	Fisheries use zoning plan established	<p>Level 1: Fisheries and other uses identified and zoning plan developed</p> <ul style="list-style-type: none"> • Existing and potential municipal water uses identified and mapped • Interaction among the various activities evaluated and conflicting uses identified and resolved • Proposed zonation map developed and regulatory mechanisms formulated <p>Level 2: Fisheries use zoning plan implemented (with corresponding legal or policy instrument) and monitored</p> <ul style="list-style-type: none"> • Fisheries use zoning plan presented to stakeholders and resource users for approval

		<ul style="list-style-type: none"> Enabling policy or zoning ordinance enacted and management and enforcement arrangement established <p>Level 3: Fisheries use zoning plan improved, sustained and objectives attained (e.g. resource use conflict reduced)</p> <ul style="list-style-type: none"> Fisheries use zoning plan updated and revised Implementation and enforcement of zoning regulations sustained Resource use conflict reduced
10	Local constituencies for fisheries management organized and actively involved	<p>Level 1: Local constituencies for fisheries management organized</p> <ul style="list-style-type: none"> Organization concerned with fisheries management formed <p>Level 2: Local constituencies for fisheries management actively participated in program development and implementation</p> <ul style="list-style-type: none"> Organization concerned with fisheries management involved in policy formulation and review of management plan Organization concerned with fisheries management participating in program implementation and monitoring of results <p>Level 3: Local constituencies for fisheries management sustained and expanded</p> <ul style="list-style-type: none"> Organization concerned with fisheries management actively lobby for the development of management measures and implementation of the programs in the fisheries management plan
11	Multi-institutional collaboration on coastal and fisheries resources management (CFRM)	<p>Level 1: Multi-institutional collaboration on CFRM established</p> <ul style="list-style-type: none"> Potential partners from LGUs, NGAs, NGOs, academe, private sector and funding institutions identified Potential arrangements among neighboring LGUs that form the ecosystem identified MOAs and other instruments adopted through municipal legislative action or signed by collaborating partners and planning, implementation, coordination and monitoring arrangements established <p>Level 2: Multi-institutional collaboration on CFRM effectively implementing programs and services</p> <ul style="list-style-type: none"> Multi-institutional CFRM program identified and plans for their implementation drafted Multi-institutional CFRM activities coordinated, implemented, enforced and monitored <p>Level 3: Multi-institutional collaboration on CFRM sustained and showing positive impacts</p> <ul style="list-style-type: none"> Multi-institutional CFRM program implementation sustained with measurable positive impacts to collaborating LGUs and coastal communities Multi-institutional collaborative mechanisms reviewed and improved, and contributing to effective management of coastal and fishery resources
12	Species-specific management measures established	<p>Level 1: Species that constitute the “significant food web” identified and baseline assessment conducted</p> <ul style="list-style-type: none"> Economically important species that constitute a significant portion of the food web based on the fisheries profiling process identified Focus group discussion to identify early and immediate management action for identified economically important species conducted Baseline assessment of identified species conducted

		<p>Level 2: Species-specific management measures developed, enforced and monitored</p> <ul style="list-style-type: none"> • Species-specific management options for identified species drafted • Consultations on species-specific management options conducted • Selected species-specific management measure implemented (supported by legal instrument) • Fisheries monitoring protocol for identified species developed <p>Level 3: Species-specific management measure sustained and monitoring results show impacts</p> <ul style="list-style-type: none"> • Enforcement of species-specific management measure established and sustained • Fisheries monitoring of species-specific management intervention sustained and results regularly presented to stakeholders and resource users
13	Gear-specific management measures established	<p>Level 1: Gear-specific management measure identified and baseline assessment conducted</p> <ul style="list-style-type: none"> • Gear-specific issues based on the fisheries profiling process identified • Focus group discussion to identify early and immediate management action for identified fishing gears conducted • Baseline assessment of identified fishing gears conducted <p>Level 2: Gear-specific management measures developed, enforced and monitored</p> <ul style="list-style-type: none"> • Gear-specific management options for identified fishing gears drafted • Consultations on fishing gear-specific management options conducted • Selected gear-specific management measure implemented (supported by legal instrument) • Fisheries monitoring protocol for identified fishing gears developed <p>Level 3: Gear-specific management measure sustained and monitoring results show impacts</p> <ul style="list-style-type: none"> • Enforcement of species-specific management measure established and sustained • Fisheries monitoring of gear-specific management intervention sustained and results regularly presented to stakeholders and resource users
14	Mangrove management area established	<p>Level 1: Mangrove management area established and baseline data collected</p> <ul style="list-style-type: none"> • Mangrove management site identified, boundaries delineated, zones (rehabilitation zones, aquasilviculture zones, etc.) established • Mangrove baseline information (mangrove species, mangrove cover, fish and invertebrate species, human activities) collected • Mangrove management plan formulated and adopted (preferably supported by legal instrument), management body and enforcement team trained and organized <p>Level 2: Mangrove management plan developed, implemented and monitoring system established</p> <ul style="list-style-type: none"> • Enforcement protocol operational, enforcement infrastructure established and enforcement assets procured and utilized • Management body and enforcement team conduct regular implementation and enforcement activities with funding support from local government • Mangrove monitoring regularly conducted and compliance monitored <p>Level 3: Mangrove management sustained and monitoring results show impacts</p> <ul style="list-style-type: none"> • Activities of the mangrove management body and enforcement team sustained

		<ul style="list-style-type: none"> • Implementation and enforcement activities funded by local governments • Mangrove monitoring sustained and impacts regularly presented to stakeholders
15	Seagrass management area established	<p>Level 1: Seagrass management area established and baseline data collected</p> <ul style="list-style-type: none"> • Seagrass management sites identified, boundaries delineated, zones (rehabilitation zones, rabbitfish protection zones, etc.) established • Seagrass baseline information (seagrass species, seagrass cover, fish and invertebrate species, human activities) collected • Seagrass management plan formulated and adopted (preferably supported by legal instrument), management body and enforcement team trained and organized <p>Level 2: Seagrass management plan developed, implemented and monitoring system established</p> <ul style="list-style-type: none"> • Enforcement protocol operational, enforcement infrastructure established and enforcement assets procured and utilized • Management body and enforcement team conducting regular implementation and enforcement activities with funding support from local government • Seagrass monitoring regularly conducted and compliance monitored <p>Level 3: Seagrass management sustained and monitoring results show impacts</p> <ul style="list-style-type: none"> • Activities of the seagrass management body and enforcement team sustained • Implementation and enforcement activities funded by local governments • Seagrass monitoring sustained and impacts regularly presented to stakeholders
16	Revenue generation established	<p>Level 1: Revenue generation system on CRM/fisheries management established</p> <ul style="list-style-type: none"> • Potential revenue-generating coastal and fishery management programs assessed and identified • Revenue collection program established with clear purpose and implementation arrangements of how the funds will be used in coastal and fisheries management activities • Specific revenue ordinance enacted, or revenue clause (indicating use of funds) should be part of enacted fishery ordinance <p>Level 2: Revenue-generating measures effectively implemented and enforced</p> <ul style="list-style-type: none"> • Revenue collection program implemented and compliance monitoring activities conducted • Revenues collected monitored, and program implementation evaluated and modified/adjusted if necessary <p>Level 3: Revenue-generating measures sustained showing positive impacts</p> <ul style="list-style-type: none"> • Sustained implementation of revenue-generating measures • Revenue collection program and schemes for their use in the fisheries management program are already established components of the local government's Annual Investment Plan • Revenues from fisheries related interventions are plowed back to fisheries management activities
17	Coastal environment-friendly enterprises established	<p>Level 1: Coastal environment-friendly enterprises initiated</p> <ul style="list-style-type: none"> • Non-fishing livelihoods, low-impact mariculture, ecotourism established for fisherfolk/coastal communities to augment incomes • Involvement and management arrangement defined • Socio-economic baseline and monitoring indicators established

		<ul style="list-style-type: none"> • Environmental carrying capacity assessment initiated <p>Level 2: Successful coastal environment-friendly enterprises expanded</p> <ul style="list-style-type: none"> • Environmental carrying capacity established and monitoring and control mechanisms set in place • Livelihood and enterprise development programs expanded employing fisherfolk/coastal communities in nonfishing livelihoods <p>Level 3: Coastal environment-friendly enterprises sustained showing positive impacts</p> <ul style="list-style-type: none"> • Livelihood and enterprise development programs sustained • Monitoring shows measurable socioeconomic benefits to fisherfolk/coastal communities
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Appendix 2. Local Government Units and their Self-Assessment Scores Resulting from the Benchmarking Exercises Conducted in 2013

MKBA/ Municipality	Benchmark																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Calamianes Island Group																	
Busuanga	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1
Coron	1	1	2	1	1	2	1	2	1	1	2	2	2	2	1	2	1
Culion	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
Linapacan	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Danajon Reef (Bohol)																	
Tubigon	3	2	1	3	2	3	3	1	2	3	2	2	3	1	1	3	1
Clarín	3	1	1	2	2	1	2	1	2	2	1	1	2	1	1	2	1
Inabanga	3	2	1	2	2	2	2	3	2	2	1	2	2	3	2	2	1
Buenavista	2	2	1	2	2	2	2	2	2	2	1	0	1	1	0	2	1
Getafe	2	2	1	1	2	2	3	2	2	2	1	1	1	3	1	3	1
Danajon Reef (Leyte)																	
Baybay	3	2	1	2	2	2.5	2	2	1	2	2	1	1	3	1	2	1
Inopacan	3	3	1	2	2	2	2.5	2	1	2	2	1	1	3	2	2	1
Hindang	1.5	1	1	2	2	2	2	2	1	2	2	1	1	1	2	2	1
Hilongos	1	1	1	2	2	3	2	X	1	1	2	1	1	1	X	X	1
Bato	1	1	1	1	1	2	2	1	1	2	2	1	1	X	2	2	1
Matalom	1.5	1	1	1	1	1	2	1.5	1	1	2	1	1	3	1	2	1
Maasin	3	1	1	3	3	3	2	1	1	2	1	1	1	3	1	2	1
Lingayen Gulf																	
San Fernando	2	2	3	3	3	1	3	2	2	3	3	3	3	2	2	3	3
Aringay	1	1	1	1	1	1	1	X	1	1	X	X	X	2	X	1	1
Sto. Tomas	2	1	2	1	1	1	1	X	1	2	2	2	1	1	X	1	1
Agoo	1	1	2	3	2	1	2	1	2	2	2	X	2	2	X	2	1
Caba	3	3	1	3	1	2	1		1	2	1	X	3	X	1	X	3
Bauang	1	1	1	2	1	2	2	2	2	2	1	1	2	3	1	3	2
Rosario	1	1	1	1	1	1	1	1	2	2	1	2	1	1	1	2	1
Alaminos	1	1	1	1	3	3	2	1	2	2	2	2	2	3	1	3	2
San Bernardino – Ticao Pass – Lagonoy Gulf																	
Sta. Magdalena	1	0	0	1	0	2	0	0	0	1	0	0	0	0	0	0	0
Bulan	1	1	2	2	0	3	1	0	0	1	0	1	1	0	0	1	1
Matnog	1	2	2	1	1	3	2	1	1	2	0	0	1	3	1	3	3
San Vicente	0	1	1	2	0	1	2	0	0	2	0	0	2	0	0	2	1
Capul	1	1	1	2	0	0	1	0	0	1	0	0	1	0	0	1	1

Southern Negros																	
Siaton	1	1	1	3	3	3	2	3	1	3	2	1	1	1	1	2	1
Sta. Catalina	2	2	2	3	1	2	3	2	1	3	2	1	2	3	1	2	1
Bayawan	3	3	3	3	2	3	3	X	3	3	3	1	3	3	X	3	2
Basay	3	2	1	1	1	2	2	2	1	1	1	1	1	3	1	3	2
Hinobaan	3	3	2	2	2	3	2	2	1	2	2	1	1	1	1	1	1
Sipalay	3	3	3	3	3	3	3	3	3	2	3	1	2	1	1	3	1
Cauayan	2	1	1	1	1	1	1	1	1	1	1	X	1	3	X	1	1
Surigao del Norte																	
Bacauag	2	3	1	2	1	1	1	2	2	2	2	1	1	2	1	1	2
Claver	1	1	1	2	1	1	1	2	2	3	2	1	1	1	1	1	1
Gigaquit	1	3	1	2	1	2	2	1	2	2	2	X	1	2	1	1	1
Placer	1	1	1	1	1	2	1	1	1	2	2	1	1	1	1	1	1
Surigao City	2	1	1	1	1	2	2	1	1	1	1	1	1	2	1	1	1
Tagana-an	1	2	1	2	2	2	1	2	1	2.5	3	2	1	2	1	2	1
Tawi-Tawi																	
Bongao	1	1	1	2	1	2	2	2	1	1	1	0	2	1	0	2	0
P. Sugala	1	1	1	1	1	2	2	3	1	2	2	1	1	1	0	1	1
Simunul	1	1	1	1	1	0	1	1	1	1	1	0	0	1	1	1	0
Tandubas	1	1	0	1	0	0	1	1	0	0	0	1	0	1	0	0	0
South Ubian	1	1	1	1	0	1	1	1	1	2	1	1	1	1	0	0	0
Sapa-Sapa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Verde Island Passage																	
Calatagan	1	2	1	3	3	2	2	3	0	2	2	3	1	3	3	3	3
Balayan	1	1	1	3	1	3	3	3	3	3	1	2	2	4	0	3	3
Calaca	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1
Lemery	1	1	1	1	1	0	1	2	1	1	2	0	0	1	X	0	0
Taal	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
San Luis	0	1	0	1	0	1	0	0	0	1	0	0	0	2	0	0	1
Bauan	1	1	0	2	0	0	2	2	1	1		0	0	0	0	2	0
Mabini	1	2	2	3	1	1	1	3	3	2	1	0	0	0	0	3	0
Tingloy	1	0	1	2	1	0	2	1	0	2	1	0	2	0	0	3	1
Lobo	2	3	1	1	0	0	2	1	1	1	2	0	0	1	0	0	0
Lian	1	1	0	3	2	0	0	1	2	2	2	0	1	1	1	1	3