

I. Introduction

Coastal marine systems are among the most ecologically and socio-economically vital on the planet. Marine habitats from the intertidal zone out to the continental shelf break provide ecosystem goods (e.g. food and raw materials) and services (e.g. disturbance regulation and nutrient cycling). The Philippine Archipelago has an extensive coastline and several inland waters endowed with rich aquatic resources (Reyes and Martens, 1994) which can be divided into (1) the marine water resource (those that are found in the coastal zone), and (2) inland water resource (e.g. rivers and creeks, lakes, swamps, riparian zones, and aquaculture farms), wherein, people and living organisms depend upon it for life.

The coastal municipalities from Silago to Cabalian Bay, Southern Leyte has been identified by the Fisheries, Coastal Resources and Livelihood (FishCORAL) Project through BFAR as one of the places endowed with rich resources, however, they have been affected by the natural events like typhoons and earthquakes as well as anthropogenic activities. Coastal marine ecosystems are vulnerable to anthropogenic activities (like overfishing, pollution, infrastructures and other developments). Thus, the urgent need for proper management.

In any coastal resource management, it is necessary to collect valuable baseline habitat data that can be used in the quantitative/qualitative characterization of the aquatic resources of the area to determine the extent and changes of the aquatic resources. Data of previous studies like GIZ, Plan International, other NGOs and SLSU could be used for updating and comparing with the results of the proposed study on the status of the resources. Results of this study could serve as an evaluation on the interventions or programs conducted so that future plans and decision-making will be guided.

II. Project Overview

The Fisheries, Coastal Resources and Livelihood (FishCORAL) Project was approved at IFAD's Executive Board in September 2015. The total project financing is US\$ 43.74 million comprised of: an IFAD loan of EUR 27.31 million (approximately US\$ 29.42 million); an IFAD grant of US\$ 0.69 million; Government contributions of US\$ 6.12 million; and counterpart contributions by Local Government Units (LGUs) of US\$ 5.64 million and communities of US\$ 1.33 million. Implementation started on 2 January 2016, and the project completion date is 31 December 2020.

Objective

The sites of the project are coastal communities from Silago to Cabalian Bay, Southern Leyte of Region VIII (Figure 1). The goal is to reduce poverty in these areas by 5% from the mean poverty incidence of 42%. The goals of the project are: (a) to increase the annual income of participating fishing community households by 10% from baseline; and (b) to increase employment of women engaged in income generating activities by 40% from the baseline of 20%. The Project has three investment Components: (i) Coastal Resource Management; (ii) Livelihood Development; and (iii) Project Management and Coordination.

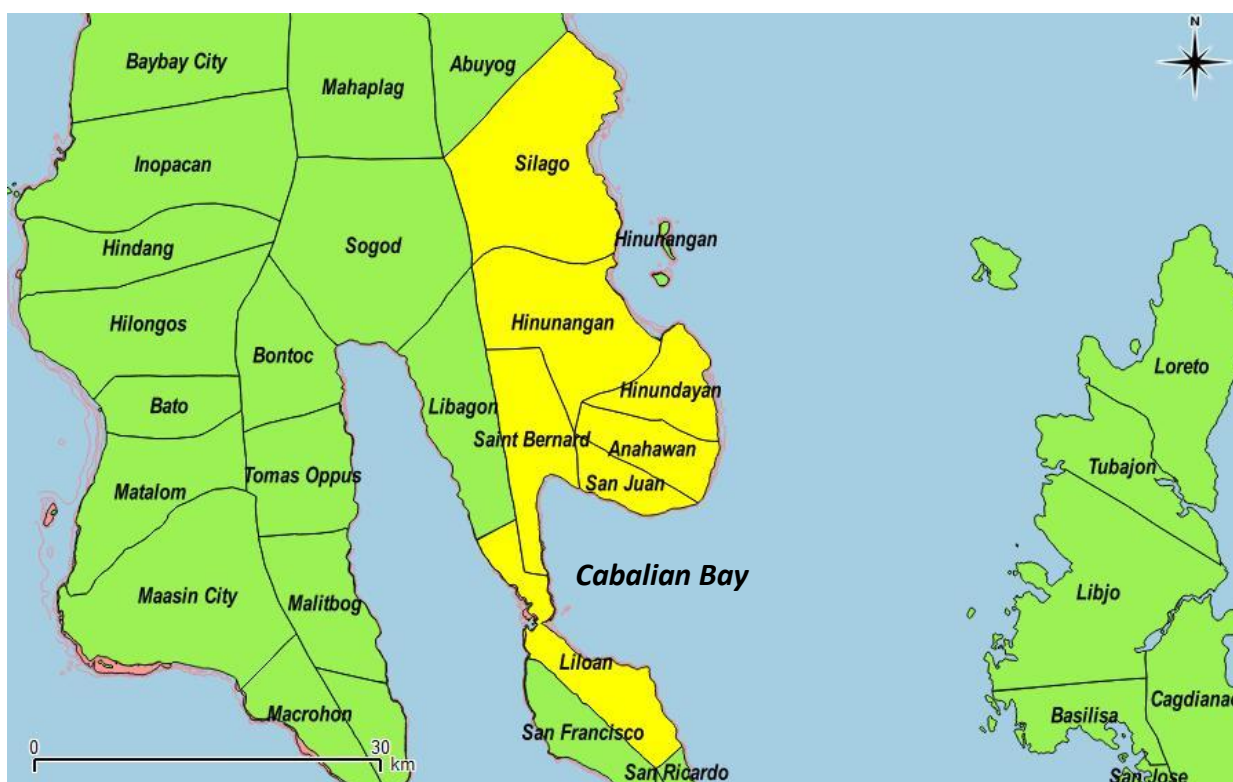


Figure 1. Map of Silago-Cabalian Bay (yellow areas). (QGIS Base Map)

Based on the goals and objectives of the Project, there is a need for information and data to be used in the monitoring and evaluation of the project periodically. At present, most of the available information and data are secondary and were gathered years ago, hence, the conduct of the Participatory Resource and Socio-economic Assessment (PRSA).

III. Objectives of PRSA

The Participatory Resource and Socio-economic Assessments (PRSA) of FishCORAL project from Silago to Cabalian Bay, Southern Leyte will have two main objectives:

1. To establish accurate **baseline information** on the extent and state of **coastal resources**; and
2. Provide data and information on the **socio-economic conditions and activities** of the coastal communities.

Results of this study will be fed into the project's monitoring and evaluation and management information system so that the impact of the FishCORAL Project can be assessed at the end of the project. The data and information collected will provide the project's planning and targeting of its work in support of coastal resource management plans, strengthening of organizations supporting coastal resource management (e.g. FARMCs, BMCs, FLETs, etc), habitat rehabilitation, and the establishment of livelihood projects for Peoples' Organizations in selected barangays.

IV. Scope of Work

The PRSA will cover the Silago-Cabalian Bays in Region 8. It will focus on the assessment of the coastal resources and socio-cultural-economic conditions and activities of the seven (7) coastal municipalities of Silago, Hinunangan, Hinundayan, Anahawan, San Juan, Saint Bernard and Liloan. Cabalian Bay is located at the south bordered by the municipalities of San Juan, Saint Bernard and Liloan. The project will cover a total of 76 coastal barangays from Silago to Cabalian Bay, as shown in Table 1. Eleven marine protected areas (MPAs), two mangrove areas, and thirteen barangays were identified as possible sites for detailed sampling. The 76 barangays will be surveyed using ARRAS (automated rapid reef assessment system).

Table 1. Coastal barangays from Silago to Liloan, Southern Leyte.

Silago (11)	Hinunangan (14)	Hinundayan (8)	Anahawan (9)	San Juan (14)	St. Bernard (8)	Liloan (12)
Balagawan✓	Ingan*	An-an	Mahalo	Bobon A*	Magbagacay✓	Molopolo✓
Hingatungan*	Calagitan*	Lungsod Daan	Lewing	Bobon B	Malibago	San Roque✓
Lagoma*	Pondol	Sabang*	Lo-ok	San Vicente	Himatagon	Anilao
Mercedes✓	Talisay	District 2	Tagup-on	Garrido	Panian	Candayuman✓
District 1	Bangcas A	District 1	Poblacion	Basak	San Isidro	Guintoylan
District 2	Bangcas B	Cat-iwing	San Vicente	Agay-ay	Himbangan✓	Estela
Puntana	Poblacion	Ambao*	Canlabian	Sua	Hindag-an✓	Pandan
Salvacion	Salog	Sagbok	Amagusan	Timba	Lipanto✓	Caligangan
Sap-ang	Panalaron		Cogon*	Santa Cruz		Catig✓
Sudmon*	San Pablo*			San Jose		Malangza
Tubaon✓	San Pedro*			Santo Nino		President
Lagoma✓	Tahusan			Osao+		Quezon
	Canipaan			Pong-oy+		Bahay
	Biasong✓			Miniyho		

Note: *with MPA; +with mangrove; ✓ possible assessment site.

Result of the ARRAS will be the basis for establishing the detailed bio-physical assessments. The sampling areas established will serve also as sampling sites in the monitoring activity by the BFAR Regional Staff after the PRSA. Sampling stations near communities and industries identified as disturbed areas will be given areas of priority management impact, e.g., near mouths of bays and river systems.

The scope of the PRSA covers assessment of coastal resources and socio-economic conditions and activities of the coastal communities. The PRSAs will provide summary and analysis of the prevailing situation in the coastal communities with respect to: (a) status and utilization of fisheries and related coastal resources/habitats and existing management arrangements (both formal and informal/traditional) and related institutional structures; (b) threats, impacts, and stresses on the resources and livelihoods; and (c) preliminary implications of the prevailing situation in terms of key needs and opportunities for natural resource management and livelihood improvements.

V. Schedule of Implementation.

PRSA will cover six months from January to June subject to extension. Around four and a half months will include actual field work and one and a half months writing of report and completion of other contract outputs. Other activities are shown in the following table:

Table 2. Schedule of PRSA activities.

ACTIVITIES	IMPLEMENTATION DATE	OUTPUT
1. Finalizing inception reports of the proposed project & secure surety bond	1 week (2/11-15/19)	Final inception report & receipt of surety bond
2. Recruitment of research personnel	1 week (2/12-15/19)	Research personnel recruited
3. Orientation & training on methods	1 week (2/18-22/19)	Research protocols and mentored researchers
4. Procurement of equipment, materials and supplies	2 weeks (2/18-3/8/19)	Acquisition of equipment, materials and supplies
5. Courtesy calls and gathering of secondary data	1 week (3/1-8/19)	Establish linkages & acquisition of secondary data
6. ARRAS	1 month (3/1-29/19)	Resource maps
7. Interviews & FGDs	4 months (3/1-6/30/19)	Data/information collected
8. Samplings and data collection from field & laboratory	4 months (3/1-6/30/19)	Data
9. Data encoding and analysis	4 months (4/1-7/5/19)	Analysed data
10. Validation & feedback of results	2 weeks (7/1-12/19)	Presentations to LGUs
11. Preparation of terminal report	2 weeks (7/15-26/19)	Draft of terminal report
12. Submission of Terminal Report	3 days (7/29-31/18)	Terminal report

VI. Organization of VSU PRSA Project Team. The project will be composed of a project leader, 6 study leaders, 1 field research coordinator, 4 research assistants, 12 enumerators, 1 laborer and 1 data programmer. The study leaders will be assigned to the work based on his/her expertise on mangroves,

seagasses, seaweeds, corals, macro-invertebrates, fishes, socio-economy and policies. The research assistants will include Marine Biologists, Fishery Scientist and Economist.

The project will request BFAR Regional Staff, LGU staff and PO representatives to participate as partners in the conduct of the activities. This will help them equip with the necessary knowledge and skills to monitor the bays after the project ends. The community will also be involved in assisting the collection of data and other information especially in the conduct of the socio-economic surveys.

All data collected will be properly stored and can easily be retrieved to facilitate interpretation, integration and analysis of data generated. The report will be presented to stakeholders for validation. These, then, will be submitted to the PSCO as part of the final output of the PRSAs.

VII. Progress of Work Up To Date

Mobilization.

BFAR Region VIII initiated presenting the proposal of PRSA for coastal areas from Silago to Cabalian Bay to Visayas State University, City of Baybay, Leyte. A letter from BFAR VIII was sent to VSU President requesting VSU to provide the technical services of the project. A technical PRSA proposal was submitted and approved by BFAR VIII. Then, a MOA was drafted, reviewed and finally signed by the parties involved (Annex 5). Notice of Award (Annex 6) and Notice to Proceed (Annex 7) were issued by BFAR VIII. A Performance Bond (Annex 8) was secured from Stronghold Insurance Company, Inc., Ormoc City with SICI Bond Number G(13) 240555, dated 13 December 2018.

Review of Background Information

The coastal municipalities of Silago, Hinunangan, Hinundayan and Anahawan are known as Pacific Towns since they all face the vast Pacific Ocean on the east. Whereas, the municipalities of San Juan, Saint Bernard and Liloan are located around Cabalian Bay, although the bay has no legal basis for labeling Cabalian Bay.

In 2003, the LIP-ICOM (Leyte Island Program – Integrated Community-Based Coastal Zone Management, Silago Bay) conducted resource and ecological assessment/monitoring in the six municipalities of Southern Leyte: four municipalities of the Pacific area (Silago, Hinunangan, Hinundayan and



Figure 2. Location of the monitored and assessed sites in the Pacific and Cabalian Bay towns of Southern Leyte.

Anahawan) and two municipalities from Cabalian Bay (San Juan and St. Bernard), (LIP-ICOM 2003), (Figure 1). One sanctuary for each municipality was surveyed with the exception of Hinunangan whereby one sanctuary from the mainland (Calag-itan) and the island (San Pedro) were assessed/monitored. Methodologies used in mangroves, seagrass/seaweed beds, coral reefs and fish resources were conducted using the transect line-plots, transect quadrat, line-intercept transect and fish visual census methods, after that of English et al. 1994). Physico-chemical conditions (temperature, salinity, pH, visibility, depth & some tidal characteristics) were also determined. The following information were mainly taken from the LIP-ICOM Annual Report in 2003.

Physico-Chemical Factors

Results showed that the physicochemical parameters among assessed sites were generally within the range commonly found in coastal waters. Temperature ranged from 28 to 30°C within the four day assessment in 2003 but a slightly higher temperature of 32°C was recorded in September of the same year; salinity had very narrow range of fluctuation between 34-35 ppt. Visibility was lowest in the core zone of Ambao which was 9.5 meter and was highest Lipanto at 23m. The low visibility in the core zone of Ambao sanctuary

is not alarming since siltation was not observed. The sampling site in Silago was deeper (40 ft). The end of the transect in Lipanto was also in a deeper portion. It was observed that the current velocity in the area was correlated to changing moon phases.

Most municipalities maintained the number of established sanctuaries, established 3-5 years ago, although actual management varied. Precautionary measures to avoid conflicts were observed. It is also noted that the relatively long standing and vigilantly policed community based marine sanctuary of Cogon, Anahawan MPA management was maintained by the residents even without the municipal ordinance.

Mangroves

The mangroves in Barangay Veto of Hinundayan, Barangays Osao and Pong-oy of San Juan, Barangays Lagoma and Hingatungan of Silago, and Barangay Himbangan of St. Bernard were assessed. Seventeen species of mangrove species were observed in 4 mangrove areas surveyed. Most diverse with 11 species was seen in Hingatungan while all that was found in Lagoma were 3 species. In stand basal area (m^2/ha), *Avicennia officinales* in Baranagay Osao had 404.28 followed by 277.42 in Pong-oy. In all sites *Nypa fruticans* had the highest density, specifically, in Barangay Pong-oy. Based on frequency of occurrence, *Xylocarpus* and *Nypa fruticans* in Hinundayan and *A. marina* in Pong-oy had the highest relative frequency of 50%. All sites had certain degree of cutting with the highest of 33% in Pong-oy. Both areas in Silago had low percentage of cutting, probably because of the local ordinance that supports the national policy of non-cutting of mangroves. Barangays Biasong and Calag-itan in Hinunangan had very low mangrove cover, in fact, mangrove seedlings in Calag-itan were recently transplanted.

Mangroves in Hingatungan were composed of 7 species (*Sonneratia* sp. (pagatpat), *R. apiculata* (bakauan lalaki), *Aegiceras* sp. (saging-saging o tinduktindukan), *Xylocarpus* sp. (tabigi), *Lumnitzera* sp., *Nypa fruticans* (Nipa) and *Bruguiera gymnorhiza* (pototan). Basal area for *Sonneratia* was slightly higher compared to 2002 values ($71.941m^2/ha$ in 2002 to $72.21 m^2/ha$ in 2003). In Lagoma Marine Sanctuary, four mangrove species were found (*Rhizophora apiculata* (bakauan lalaki), *Bruguiera* sp. (pototan), *Nypa fruticans* (Nipa) and *Sonneratia* sp. (pagatpat)). The stand BA of *R. apiculata* increased from $93.59 m^2/ha$ in 2002 to $109.25 m^2/ha$ in the 2003. The importance value (IM) also increased from 148.69 in 2002 to 167.15 in 2003.

Barangay Veto, Hinundayan had only two mangrove species (which include *Xylocarpus* sp. (tabigi) and *Nypa fruticans* (Nipa). *Xylocarpus* had stand basal area of $212.62 m^2/ha$ while *Nypa* was densier occupying 77.18% compared to 22.83% that of *Xylocarpus*. In terms of frequency, the two

species had the same value. *Xylocarpus* had a total of 11,500 stems/ha. However 9.53% (1,000 stems) were cut. There were 65 saplings and 28 seedlings counted in a 100m² plot. In Barangay Osao, four species of mangroves (*Avicennia officinalis* (Api-api), *Bruguiera sp.*(pototan), *Rhizophora sp.* (bakhaw) and *A. marina* (bungalon/miyapi) were identified with *Avicennia officinalis* having the highest stand BA (404.28 m²/ha). Stands of *A.officinalis* were big reaching up to 212 cm GBH. In terms of density, *Bruguiera sp* was most dense. Its high density and also relatively big stands had influenced its high importance value. *A.marina* had the lowest stand BA and importance value.

Three species of mangroves were found in Pong-oy, San Juan. These were *Avicennia marina*, *A. alba* and *Nypa fruticans*. *A. marina* had the highest stand BA (134 m²/ha) and also importance value. Stand BA of *A. marina* was influenced by its big stands reaching up to 2.9 m GBH. However, *Nypa* was the species found most dense in the area. Highest number of stems per hectare was counted for *A. marina* with 66.81% uncut stems. A total of 5,000 (=33.19%) cut stems were counted. In the coastal areas of Barangays Osao and Pung-oy, around 10,000 *Rhizophora sp* seedlings were transplanted. People in Barangay Pung-oy also planted *Ceriops* seedlings.

The assessed abandoned fishpond of approximately 60 hectares in Himbangan supported 5 true mangrove species (*Avicennia alba* (piyapi), *Aegicerias corniculatum* (saging-saging), *Avicennia officinalis* (Api-api), *Sonneratia sp.* (pagatpat), and *Avicennia marina* (bungalon/miyapi)). *A. marina* had the highest stand BA (121.35 m²/ha) and importance value. *A. officinalis* on the other hand had the lowest stand BA (1.06m²/ha) and importance value (16.57%).

Seaweeds and Seagrasses

Species composition and abundance of seaweeds and seagrasses at the marine sanctuaries of Silago Bay and Lipanto, St. Bernard, Southern Leyte were determined in 2003 and compared with the data during the assessment in 2002. Result showed an increase in number of species from 23 in 2002 to 35 in 2003. The increase was mainly due to the increase of the chlorophytes from 2 to 8 species. Among the five sanctuaries that were monitored, Ambao had the highest number with 24 (69%), followed by San Pedro Island with 12 (34%), Hingatungan with 7 (20%), Lipanto with 6 (17%) and Cogon with 0. Abundance of seaweeds and seagrasses based on mean cover for all sanctuaries improved from 5% (very poor condition) in 2002 to 57.8% (very good condition) in 2003. On the otherhand, frequency which indicate distribution, decreased from 12.5% in 2002 to 3% in 2003. Few seaweed-

seagrass associates were observed at the sanctuaries like shells, sea cucumber, *Synapta*, sea urchins, octopus, corals, juvenile siganids and *Plotosus lineatus*. The seagrass *Cymodocea* and phaeophyte *Sargassum* dominated the marine sanctuary of Hingatungan, based on frequency and cover. Cover of seagrass in the sandy intertidal area was good but very poor for seaweed (*Sargassum*) at the lower intertidal to shallow subtidal areas. The seaweed and seagrass beds must be protected and conserved since they serve as food and habitat for different fauna like fishes and mollusks. The economic importance in agriculture and phycocolloid industry of *Sargassum* that is abundant in this area, should be disseminated. Other economically important but unknown seaweeds like *Gracilaria* and *Gelidiella* should be disseminated for their proper management and utilization.

San Pedro has generally good cover of seaweed dominated by *Sargassum* species based on frequency and cover data. The rocky-sandy substrate and moderate water movement probably favor the good growth of these phaeophytes. No seagrass species was observed during the monitoring which could be attributed to the seasonality of the species or to human activities like fishing, boat anchorage and etc. Inter-annual assessments showed an increase in seaweed species composition, frequency and cover, while the seagrasses decreased in species composition, frequency and cover. Correspondingly, seaweed growth improved from poor to good condition, while seagrasses diminished from poor growth to absent.

Calag-itan had 2 species each of seaweeds and seagrasses in fair and good status respectively. *Sargassum* species dominated the rocky upper intertidal area, while the seagrass *Cymodocea* dominated the middle intertidal towards subtidal area having generally a sandy substrate. The fair to good growths of seaweeds and seagrasses indicates a potential area for mariculture of seaweeds to be feed to economically important fauna like sea cucumber, abalone, sea urchin, *Tridacna*, etc. The growth of *Eucheuma* in an established farm must be carefully monitored especially salinity since the river nearby may influence their growth. Other seaweed species like *Gracilaria* and especially *Caulerpa* could also be tested for farming. The patchy seagrass beds along the sandy intertidal tidal and shallow subtidal areas can be improved by seagrass transplantations. Seagrass beds serve as habitat and feeding ground for fishes like *Siganids* and invertebrates like sea urchins, sea cucumbers, etc.

Ambao reef supports fair seaweed and poor seagrass covers. Highest number of species was of the phaeophytes dominated by *Sargassum* in terms of cover. The reef's gradual slope, varied substrate from sandy-rocky-coraline, clear water, and moderate to strong water movements could favor

the occurrence and fair growth of these flora. Ambao could be a potential area for mariculture of seaweeds as well as invertebrates like *Tridacna* as indicated by their presence. Economically important seaweeds like *Eucheuma* or “guso”, *Gracillaria* or “gulaman dagat” and *Halymeniadurvillei* could be test planted. However, feasibility studies should be done to determine the economic viability of these species in the area.

The floral cover in Lipanto marine sanctuary was very poor and their distribution was limited at the upper intertidal area. Strong water current, sandy substrate and grazers could probably limit the growth. The presence of very few seaweeds and seagrass at Lipanto would indicate that the area is not feasible for culturing seaweeds and seagrasses inside the sanctuary itself. However, adjacent to the sanctuary was an area that harbored 4 and 14 taxa of seagrasses and seaweeds respectively. However, if the grazers can be minimized, test planting using technologies suitable for this area could be tried to determine the viability of seaweed.

Corals and Macro-Invertebrates

Evaluating the condition of the coral reef based on the cover of corals found that out of the seven assessed sanctuaries, only one was in excellent condition (76-100%), 2 each for poor (0-25%), fair (26-50%) and good (51-75%) category. Comparison of categories for monitored sites revealed that San Pedro remained in its poor category; Ambao improved from fair to good; Cogon was still in good condition, Bobon went from good to excellent attributed to high soft coral cover and Lipanto for 3 assessments fluctuated from fair to good then back to fair. It is not surprising that despite being protected, Hingatungan and San Pedro were in poor category. Both are the most exposed sites to the strong Pacific waves. In case of San Pedro, recovery from the suspected causes of El Nino, cyanide fishing and probably the least policed sanctuary (among monitored sites) is not expected to be that significant. However, it is noted that resources inside these protected areas showed no further decline contrary to reported cases in open areas.

Coral resources were found to be composed of 13 lifeforms of which soft corals had the highest cover. Non-scleractinian corals were composed of soft corals, *Heliopora*, *Cirripathes* and *Mellipora*. Scleractinian or hard corals in descending order were composed of branching *Acropora*, massive, branching, encrusting, submassive, tabulate *Acropora*, digitate, foliose and mushroom forms. The most diverse lifeforms was encountered in the oldest sanctuary in Lipanto while the least was in Hingatungan of poor category in general. All sites except for Lipanto, an offshore elevated reef, were fringing reefs. Associated reef organisms include those of mollusk of commercial value like *Tridacna*, *Cypraea*, *Lambis* and *Conus*. Aside from the common and

abundant *Diadema setosum*, that is harvested for its roe especially during lean months, holothurians of commercial value were also encountered. *Acanthaster planci*, known as crown of thorns (COT) were encountered in high number at the head of Cabalian Bay (St. Bernard) and in the mouth (Anahawan). In the northern part of Lipanto marine sanctuary St. Bernard, as many as six mature COT's could be found aggregating on a single coral colony. In the transect of Cogon, as much as 47 individuals were encountered in a 250m² area alone. These areas had abundant *Acropora* species, its favorite food. However, COT was not observed in San Juan which is contiguous with Cogon, Anahawan. The high number of COT is a potential threat to the coral resources at present. Some communities have begun removing these from the water.

The Hingatungan Marine Sanctuary was in poor category (16.63%). The low relief and patchy distribution of the reef coral reef was perhaps due to the frequent exposure of the area to strong water movements. Two forms of hard corals were just slightly higher in coverage than soft corals. *Cirripathes*, a black wire coral was seen at 40 ft. Sponge was found (23.13%) abundant and also *Halimeda* that was observed to contribute to sand formation. Other organisms include sea urchin, sea pens and crinoids. Despite the natural limitation to support massive reef formation due to natural topography, diversity of organisms was relatively good. This area might be inhabited by rare species of organisms not commonly encountered in typical reef flats. This is a feature of Silago area worthy of being dealt with perhaps starting with its sponge resources . It could be that the present cover is already showing the effect of the protection. Total cover of sand and rocks was approximately 50% of the area. Sand was not really that barren since this appeared to be coated with algae that can prevent sand erosion. The establishment of the area as a marine sanctuary should be upheld.

The poor category of San Pedro Marine Sanctuary showed the recovery time needed to bounce back from El Nino and probably cyanide fishing that devastated the area. Optimism that it might benefit from being a protected area is seen in the absence of recently dead corals. The slight increase of soft corals was also noted. These opportunistic species together with the fast growing seaweeds like *Sargassum* and *Turbinaria* are competing the hard corals. However, these dead corals covered with algae are grazed by parrot fishes observed to be abundant in the area. Despite the absence of demarcation buoys, the most convenient excuse for extractive activities inside the sanctuary, there were still target species encountered like giant clams, *Conus*, *Cypraea* and *Holothuria* which are of commercial importance.

In Calag-itan, Hinunangan, the coral reef in mounds was in good category (31.50%). Hard corals (31.17%) of seven forms dominated over soft

corals (0.33%). *Porites* was the dominant genus. *Diadema*, giant clams, *Holothuria* were seen inside the sanctuary. The sand was silt laden probably coming from the adjoining seagrass bed. Solid waste management especially in Saingan Point that is a potential picnic area should be practiced. Otherwise discarded plastics can be trapped by corals especially that the branching forms abound in the area. The conduct of regular "operation dap-ag maintains the area to be free from *Acanthaster* infestation observed in the northern sanctuaries.

The good category of the coral resources (50.75%) was attributed to the higher coverage of soft corals (29.90%) that occurred in large colonies. Hard corals were also diverse as seen in its seven lifeforms of which tabulate and branching *Acropora*, commonly seen in healthy reefs, had the highest cover. These too occurred in big colonies that explained its low frequency of occurrence (0.18/m) despite its large cover. These resources were found on top of mounds of massive old dead coral colonies. *Lambis*, *Linkia*, gastropoda and holothurians were some of the reef inhabitants. The support of the municipal LGU to the maintenance of Ambao had been sustained seen not only in the provision of supplies and materials but in manpower as well, in the properly maintained demarcation lines and even a construction of a guardhouse. The municipal LGU had also been consistent to assign a DA personnel to be involved during the assessment, who is also very much aware of the ongoing of the protected area. In fact, this personnel was able to share the Ambao experience to another sanctuary site (Cogon, Anahawan) regarding the legal back up and the intricacies in passing a municipal resolution supporting the establishment of a sanctuary. Those who availed of the introduced alternative livelihood should be assisted especially in the early phase. Although Hinundayan is one of those who were able to submit livelihood proposals, others may still be interested but needs assistance especially in proposal writing. The NGO, SPIADFI based in Hinundayan, is active in facilitating such assistance. This is a good example of an LGU extending its services in tandem with other agencies, including an NGO.

Despite being situated inside the marine sanctuaries, the coral resources are still experiencing disturbance. This includes being covered by debris resulting from poor solid waste management and poaching. Cyanide fishing, displacement of coral heads and indiscriminate anchoring were also reported. Efforts to protect and conserve the existing coastal resources in the province should be upheld. With the strong commitment of stakeholders to co-manage the marine resources, anthropogenic threats to the reef resources can be significantly reduced. In so doing, an increase of coral reef resources may be the trend in the near future.

The coral reef resources were in Cogon was in good category (69.33%) with the soft corals (46.50%) dominating over hard corals (22.83%). The three coral life forms and even sponge had high cover in most occurrence like that of branching *Acropora* that occupied 10m along the transect. Giant clam, holothuria, *Culcita*, *Cypraea*, and *Atrina* were also encountered. Coral destruction is done by corallivores crown-of-thorns with high population (21 individual/500m²) area. Cogon residents are highly vigilant as experienced by the assessment team when local key officials apprehended the team due to miscommunication of the schedule. Such vigilance is commendable considering that this community-based sanctuary had been established without a municipal ordinance resulting from the intricacies when such had to be approved up to the national level. However, as of this writing, this process is given due attention.

Of the seven marine sanctuaries, only Bobon had excellent category of (84%) coral reef resources composed of 65.58% was soft corals and 18.42% hard corals. Reef rehabilitation often targets hard corals since despite the usefulness of soft corals their terpinenes are toxic to other organisms. These are also opportunistic and more competitive to settling hard coral planulae. However, the hard coral cover itself is even higher than what is found San Pedro or Hingatungan Marine Sanctuaries. It is also diverse dominated by branching *Acropora*. No other benthic reef organisms were encountered but fishes were abundant. Dead coral cover was minimal. The crown-of-thorns in the neighboring sanctuary of Cogon was not observed in Bobon. In the maintenance of the sanctuary, it is better to keep the beach vegetated since these are anti-erosion agent. Conduct of monitoring of the crown of thorns and when necessary do 'operation dap-ag'. Interestingly, such is not yet done because according to the residents, no COT had been observed so far.

The old sanctuary of Lipanto is in fair category (32.17%) composed of hard (16.42%) and soft corals (15.75%). Eight hard coral lifeforms dominated by submassive form (4.67%), was the most diverse in Southern Leyte. Tabulate *Acropora* could reached a diameter of 2m. Other genera in the area were *Porites*, *Hydnophora*, and *Seriatopora*. *Linkia*, *Diadema* and zoanthids were common in the reef. Up to six COT (*Acanthaster*) was observed attacking one massive coral colony. Although this was not seen in the transect but the observation done by students that counted 12 crown-of-thorns/250 m², signaled population infestation. Recruitment was observed in the small branching *Acropora* colonies among the rubbles. The promotion of Lipanto Marine Sanctuary as an ecotourism destination by reef enthusiasts and those involved in establishment of a sanctuary may give financial gain but the status of the resources must not be jeopardized. To sustain the conservation and

rehabilitation measures, precautionary guidelines need to be established. Such measures include avoidance of indiscriminate holding to the *Rhizopsamnia* and the apricot-colored *Tubastrea* corals attached to the rocks; found most abundant near the opening of the underwater cave. The ladder and the bridge connecting the two rocks also served as resting as well as viewing platform. A pathway should be identified as passage way of motorboats to minimize disturbance emanating from propeller considering the shallowness of the area. The management should consider deploying a guide who knows the zones of the reef. For example designating areas at a depth where mere fin kicks cannot break corals. Specialist photographers are more likely to damage corals than amateur that's why in other places, those with underwater camera pay higher or they are not allowed at all.

Hingatungan sanctuary had six target families (Acanthuridae, Haemulidae, Lethrinidae, Nemipteridae, Scaridae, and Serranidae) that include large individuals within the transect while Plotosidae, Siganidae and small Serranids were seen off-transect. Two individuals of indicator species, *Chaetodon lunula*, were recorded. This sanctuary consistently had the lowest fish abundance and species richness compared to the other 6 sanctuaries in this study. Just 115 fish of 33 species across 15 families with just 11 species being of commercial importance were recorded. It seems that low fish counts are the result of poor physical features offering neither food nor adequate shelter for fishes. Heavy water motion may serve to send fishes to deeper water or into coral heads for refuge.

Fishes

The fish resources San Pedro marine sanctuary that ranked first in terms of diversity and abundance among the 7 sanctuaries manifested the potential of the reef. The high cover of seaweeds and dead corals supported the abundance of the commercially important parrot fishes and low number of indicator species respectively. Nevertheless, the disturbed reef but still intact supported teeming fish community. The fish community in the seaweed area was composed of juvenile schooling species that demonstrates the role of this ecosystem as spawning and breeding area.

The Calag-itan reef in fair status had impressive fish community. Relatively larger size of 19 species of commercially target groups (Acanthuridae, Haemulidae, Holocentridae, Lethrinidae, Lutjanidae, Nemipteridae, Scaridae, and Serranidae) high in numbers indicator species (both Chaetodontids and *Zanclus*) were seen. Another ten species of target species were in the seagrass bed. Schools of *Siganus canaliculatus* accounted 60.9%, whereas, the striped eel catfish *Plotosus*

lineatus accounted for 26.5% of total fish. Most of these were small juveniles thus a manifestation of the importance of the ecosystem as a nursery ground.

The 60 fish species in Ambao marine sanctuary had 16 target species and were of good size. However, 33.3% were pomacentrids. This was a slight increase compared to the 47 species observed last year. A total of 531 fishes were recorded along the 68m seagrass FVC transect. Forty-three species of which thirteen are of commercial importance, (Haemulid, Labrids Acanthuridae, Lethrinidae, Nemipteridae, and Siganidae) was the highest count of any seagrass transect. Two indicator species were observed, *Chaetodon trifascialis* and *C. vagabundus*.

Cogon Marine Sanctuary of Anahawan had the most diverse and abundant fish fauna (71 species). Pomacentrids and Labrids, had 22 and 19 species respectively. The 3072 resident reef fishes were dominated by Pomacentridae (82.5%). Abundant species were *Chromis viridis*, *Pomacentrus moluccensis* and *Amblyglyphidodon curacao*. It had 19 target species (Acanthuridae, Clupeidae, Holocentridae, Lutjanidae, Mullidae, Nemipteridae, Serranidae, and Siganidae, Holocentrids, Lutjanids, and Serranids). Six indicator species (five Chaetodontids and the Moorish idol *Zanclus cornutus*) were observed, totaling 22 individual fish. These high fish counts are consistently encountered in 2002 and 2003 surveys.

In the 15 m seagrass/seaweed transect, 23 fish species were identified, 11 of which were Pomacentrids (91.7%) High quality but none of large size of 5 target species and 2 indicator species were recorded. In 2002 with 100m transect, 20 species were recorded of which 89.7% were Pomacentrids. Pomacentridae and Labridae accounted for 85% of all species. Juveniles of four Labrids, were recorded. Two indicator species (*Chaetodon octofasciatus* and *C. trifascialis*) were seen. None of the fishes are classically associated with the seagrass/seaweed bed habitat, they are all more typically coral reefs species.

The fish fauna of the marine sanctuary in Bobon, San Juan 60 species spanning 14 families was impressive.. *Spratelloides delicatulus* that likely numbered in the hundreds was among the 3848 fish counted. This is dominated by Labrids and Pomacentrids (23 and 18 species respectively) and account for 68.3%. Four species (*Chromis viridis*, *Pomacentrus moluccensis*, *Pomacentrus brachialis*, and *Amblyglyphidodon curacao*) account for the bulk of these damselfishes. There were 16 target species (Acanthuridae, Nemipteridae, Siganidae, Clupeids) mostly small wrasses (<20cm). The Bobon marine sanctuary had 6 indicator species with the highest number of individual (30). (5 species of Chaetodontids and, *Zanclus cornutus*). The fish visual census conducted at Bobon in October 2001 found considerably less

abundant and speciose fish fauna than was observed in 2003. In 2001, 19 species and six families were recorded but with more indicator fishes. In 2001, 42% was commercially important species. It is possible that reduced fishing pressure within the marine sanctuary is responsible for the increase in the population and diversity. However, it is not certain that the two surveys were conducted over the same section of reef so the differences in fish counts may reflect differences in habitat quality between study sites.

Lipanto sanctuary supported 66 fish species representing 18 families with total count 7633 fishes including several schools of the blue sprat *Spratelloides delicatulus*, totaling 5000 fish. Of the resident reef fishes, (73.5%) were Pomacentrids. Seventeen target species were identified but occurred not in great abundance and most were quite small. Eight indicator species (seven Chaetodontids and the Moorish idol *Zanclus cornutus*) were present, more than what were seen at any other site in this study. In most respects the fish fauna have continued to improve, with a dramatically increased overall species count and more diverse assemblage of indicator species. On the other hand, target fishes observed in 1999 included such highly valued species as members of families Haemulidae, Lutjanidae, and Caesionidae – fishes absent in 2003.

The open forum that followed after the presentation and validation of the resource assessment conducted in 2002 and 2003 included topics or concerns about the Leyte Island Project (LIP) in general. Attendees had different level of involvement and awareness about the project . In some place, the history and the rationale of the project had to be explained. All these queries were jointly addressed by the assessment team, municipal executives especially the mayor, personnel from line agencies, academe and NGO and representative from gtz-LIP.

It seems that most if not all of the marine sanctuary stakeholders were receptive and now felt the management intervention and wants to ensure its sustainability.

With the available multimedia paraphernalia, underwater resources of each sanctuary were feedback to the populace. So even non swimmers had a glimpse of the rich bounty of resources right in their coast. The forum was then a venue for environmental education campaign as well. Even the topics were customized to start with the ecological and economical function of its resource prior to the discussion of its status. Enthusiastic of the underwater beauty, possible ecotourism is likely but road infrastructure and other amenities are high cost and long term investment indispensable to concretize such feasibility.

The status of the resources in each sanctuary is a result of the synergistic effect of several factors. Among these is the topography wherein some are relatively sheltered like that in Lipanto while others are fronting the Pacific waves especially in Silago. Such awareness will also guide how much improvement and the rate of recovery is expected from a particular place aside from the correlation to the degree of protection afforded to the sanctuary.

History of the establishment of the 7 surveyed areas differed in many aspects. There were those initiated by line agencies like DA, BFAR, NGO like SPIADFI and Labrador, municipal LGU, barangay LGU and peoples organization. They also differ on the legal support prior to its establishment like the formulation of ordinance and management plan. However, all these sites, regardless of who the focal management body is patterned after the community based approach.

The longer the sanctuary had been established, the more issues had been encountered. To mention a few, San Pedro Island of Hinunangan and Lipanto in St. Bernard had been established earlier than others. Both had encountered difficulties crucial to the sustainability of the sanctuary. Both had to settle conflicts, but the approach must be tailored to each based on the circumstances. While others had the resolve to face the challenges for adaptive management, tendency to be lenient can also be resorted to the demise of the community.

Resource assessment and monitoring is done in support and to validate the claim that managing a marine sanctuary is a tool to rehabilitate the resources. Despite the high cost of doing so, the pilot municipalities with the technical assistance from gtz-LIP invested in this activity. Although as of this time, Leyte State University is taking this responsibility, the project is integrating in its management plan that succeeding assessment will be conducted by the stakeholders themselves. In fact, some fisherfolks had been trained for habitat assessment especially in those areas covered by SPIADFI. The provincial government had also supported some personnel to be trained for technical assessment aside from the academe that is geared to be the technical partner of the province.

'Guso' farming is selling like hot potatoes. While others like Calag-itan had already established a mariculture zone, others are willing to try but has to be cautious of the technology to be used to fit the biophysical characteristics of the coastal water. The assistance of LIP is not just mere funding but also marketing linkage and dissemination of different culture techniques. Livelihood follow up especially that of BUFOM were also made. Other alternative livelihood were also talked, but each must be carefully scrutinize before operation for successful results.

Different level of participation is not only seen in the local residents but also in the officials. While others are more visible in terms of material support and other logistical needs for the maintenance of the protected areas, others institutionalize the needed manpower while others are attached in personal level of commitment.

Hingatungan, being the farthest sanctuary surveyed, expressed its apprehension of the sustainability of the resource assessment. The exposure of the sanctuary to constant heavy surge result to higher turn over of demarcation paraphernalia. Although such can be availed from (BFAR Reg 8) or other line agencies, the manpower and other logistical support needed to deploy those necessitates the need to innovate that these can withstand increment weather conditions. Other areas of technical assistance that they can tap from the project were also discussed. Alternative livelihood was a focal point. It seems the delay to materialize the goat dispersal the residents wanted was not just administrative in nature but the difficulty of procuring goats.

The supposed to be biggest sanctuary among the sites is facing issues vital to its sustainability. Participatory approach should be emphasized. Perhaps the move of the fisherfolks to air the issues to the assessment team was based on the assumption that it has the technical skill to assess the situation, to verify the basis of the establishment. This is where technical assistance (like that of gtz-LIP) in conflict resolution comes in. However, internal resolution should be first exhausted. The fact that the ordinance was passed as legal support in the establishment of the marine sanctuary is a noble beginning. After some time of its existence, it is just proper to look into aspects evaluate its implementation. If violation is still high, consultations should be conducted for possible ways of massive compliance. Those mentioned (see San Pedro section), can be evaluated which can be adopted.

Calag-itan seaweed 'guso' farming topped the list of the topics. Conflict in coastal zoning due to the mariculture activity is emerging based on the adage of open water access to coastal resources. However, the active barangay captain was quick in elucidating the benefit of the guso farm and was willing to accommodate clarifications of the said concern. With the operational seaweed farming as alternative livelihood for the coastal residents, other livelihood needs for the upland stakeholders should also be addressed in particular reference to what has been initially discussed with BUFOM. Calag-itan community is an example of a project recipient of which the concept of participatory approach is in practice. The forum was also well attended despite the late arrival of the team from San Pedro. Representative from the municipal LGU (MAO himself and field personnel) and the academe (Southern Leyte Institute of Agricultural Technology) were there.

Ambao forum had good number of representative from the residents but also from municipal LGU led by the chief Local executive himself. Comment on the ecotourism potential of the area and seaweed farming were raised. Seaweed culture technique even for rough conditions need to be tested but the tourism venture is not encouraging unless the road access is improved. A short refresher of the rationale behind a sanctuary establishment had to be introduced when a question of possible lobster harvest can be done inside the sanctuary itself. In the breeding ground, the bigger the brood stock the higher is the fecundity. The residents were also interested to be informed of the advantage of having mangroves. Ambao folks led by Mayor Molina were then commended for the good status of their resources reflective of the vigilant policing of the sanctuary.

The team received valuable insight from a resident regarding schedule of assessment to avoid strong current. Indeed, moon phase can be referred to in addition to other factors during resource monitoring activities. The allocation of the LGU and even the personal funds (e.g. from Brgy captain) cannot suffice the budgetary requirements for some activities. Logistical support has to be sourced out to implement activities like COT collection, patrolling and livelihood projects. Such need was partly solved with the announcement from the MAO for an assistance of P32,000 for the construction of watch tower (instead of guardhouse) including other needs such as flashlights, signboards and demarcation materials. The Brgy. Captain said that catch had increased significantly compared to pre- sanctuary period. To alleviate the reduction of fishing ground as a complete NO TAKE ZONE, a buffer zone can be established where regulated traditional fishing activities can be done. At this junction, it was brought out that the sanctuary existed without an ordinance. To have the legal basis, the residents were strongly advised to formulate and pass the required ordinance. They can seek the assistance of Ambao fisherfolks. Technical know how on the feasibility of ecotourism was also sought with regards to number of people allowed at a time. The residents can decide on this matter but considerations on the size and the depth of the reef should be put to mind. In addition, precautionary measures should be observed since there strong whirlpools off reef . Proposal on alternative livelihood like giant clam farming, *Tridacna* 'takubo' culture, can be submitted to PCRMO. The absence of extensive seaweed/seagrass area might be indicative that 'guso' farming is not feasible in addition to threat by grazers. However, other culture method might solve the problem. Planting can be at the deeper part and the layering method can be tried. Planting of seagrasses together with the seaweeds can dilute the population of grazers like 'ngisi-ngisi'. Planting can be staggered. So they could plant everyday for 45 days

after which they could start harvesting daily. The municipal LGU is supportive to the proposed two more sanctuaries. It was cautious to conduct consultations with those who will be affected to avoid resource use conflict. In addition, the community based resource management concept of the sanctuaries should be adopted.

San Juan municipality is supporting Bobon marine sanctuary. There is just a need to facilitate that the available facilities like the patrol boat and supplies will be managed. On the other hand, Bobon residents led by the Brgy. Captain are willing to provide counterpart in the form of labor. The residents were focused on the operational “bahalina” production (facilitated by SPIADFI) because of the experienced increase in demand.

Lipanto had already higher ecological awareness of their resources partly because of the duration of the established sanctuary. Environmental consciousness is noticeable, with the Mayor Lim announcing the relocation of Himbangan dumpsite that is overlooking the Himbangan sanctuary. This could be attributed to the work of an NGO, SPIADFI, that had sustained its community operation in the area. The reported seasonality of *Sargassum* in the area was confirmed by residents. To promote higher survival of transplanted *Rhizophora*, the attached barnacles need to be removed.

Possible measures to ensure sustainability of the promoted ecotourism in Lipanto were also raised. Proper guidelines should be formulated. The President of the fishermen’s organization said that the sanctuary is being patrolled. The navigation issue was also discussed. In as much as other would exclude boats to traverse the sanctuary, this has to be compromised since schoolkids in small boat use the route. Going offshore will endanger these young travelers. Possibility of submitting a proposal on ‘takubo’ culture as alternative livelihood was discussed. However, the LIP field coordinator forewarned that giant clam culture is a time consuming venture. For those who will opt for ‘guso’ farming, problem on grazers could be countered by planting at deeper part and doing relay method.

Capability Building for Coastal Resource Management (CRM)

CRM capability-building activities in six municipalities of Southern Leyte were conducted since January 2002 (LSU 2003). The objectives were to provide technical assistance in capacity-building and in the formulation of policies in the implementation of CRM, to provide available experts in research, monitoring and evaluation of the project, to conduct environmental education through environmental monitoring outcome feedback mechanisms, and to develop SLSCST’s capability to become a scientific and technical partner. Strategies employed include sharing of knowledge and expertise during TWG (Technical Working Group) meetings and informal discussions

with German consultants, LGUs and other stakeholders; conduct of resource and ecological assessment and monitoring in 6 municipalities; informal discussion with local folks who take part in the ecological monitoring activities as local guides; formal presentations and discussions on the outcome of the ecological monitoring, the status of their coastal resources, participatory project monitoring and evaluation and recommended courses of action; and consultation meeting, TNA (Training Needs Assessment) and lectures as initial steps in developing SLSCST's capability to become a scientific and technical partner to the province.

Lessons learned include the need to make frequent follow-ups to minimize delays in capability-building activities; the need to wait for completion of formal agreements prior to undertaking risky activities; the need to prioritize CRMG (Coastal Resource Management Group) creation and training in each municipality as well as livelihood screening and monitoring; the need to process, utilize and disseminate accumulated fish catch and effort monitoring data to sustain the momentum gained; and the need to develop a detailed proposal/workplan for project monitoring and evaluation to assist/guide the PLGU in this task. Aside from the improved state of coastal resources, important headways made by the LIP-Southern Leyte Project include greater awareness and involvement among local communities, LGUs and youth; sustained financial support to the project and mainstreaming coastal/natural resource management in local governance. With the coming elections, project implementors could also make use of the opportunity to fast track certain project activities, requirements and/or legal documents.

In 2005, Germano and Cesar (2007) conducted trainings on enhancing management effectiveness of MPAs in Southern Leyte. CB-MPAs (community-based marine protected areas) in Southern Leyte Province were assisted using the WCPA-Marine/WWF MPA management effectiveness methodology. The specific objectives are to train provincial and municipal/city extension specialists and community volunteers in Hinundayan and Maasin CB-MPAs on MPA management effectiveness methodology; conduct two CB-MPA assessments with the newly trained provincial/city/municipal specialists and community volunteers; assist the two CB-MPAs to adapt their management programs based on the evaluation results; and facilitate regional capacity building and networking between Indonesia and the Philippines through a regional workshop. A 14-people composite team which called themselves the SouLMaET (Southern Leyte Monitoring and Evaluation Team) was trained on the MPA M & E process advocated by the IUCN Guidebook. Training given to the SouLMaET consisted of lectures, workshops, role playing and validation on the MPA M & E process during the Training of Trainers.

A lesson learned from the project was transparency among partners in the way the project was implemented especially with respect to remuneration for participation in project activities also appeared to be an important factor in successful implementation of project activities. Transparency is also important in many aspects of MPA project implementation especially in the mechanisms of implementation and enforcement of MPA laws, budgets and in the sharing/disposition of cash and material fines.

Field Visit

Courtesy calls to the LGUs will be conducted once all the personnel of PRSA team will be completed. LGUs will be informed of the visit through mails and emails.

Conduct of Inception Workshop

Once the MOA was signed, members of VSU PRSA Team were identified to comprise the study leaders. A meeting of the team with BFAR VIII representative was conducted to review and make necessary revisions on the proposal. Study sites of PRSA and protocols on bio-physical assessments and socio-economic surveys were discussed and finalized. An inception report on Participatory Resource And Socio-Economic Assessment (PRSA) of Coastal Areas from Silago To Cabalian Bay, Southern Leyte was developed and submitted to BFAR VIII.

Finalization of Schedule

Schedule of activities is shown in Table 2. The schedule, however, is subject to extension owing to the extensive work to be done and the large area to be covered.

Issues and Concerns

Considering the extensive work and large area covered by the project, there is apprehension that six months duration of implementation may not be sufficient to finish the project. Also, the unpredictable weather conditions in Southern Leyte may hamper the conduct of the project. The VSU equipment to be rented may not be available during the samplings due to conflict of use with other research projects. An extension of the project would entail additional budget, especially on personnel.

Next Step

Once the inception report will be submitted and accepted, recruitment of personnel for the project will commence. The selected research assistants

and enumerators will undergo trainings on the protocols of sampling and surveys. Equipment and materials for sampling will be procured.

VIII. Technical Approach and Methodology

Entry Protocol

The project rationale and project staff will be presented to various stakeholders and local government officials. Consultation will also be conducted to identify sampling sites and local research partners. Secondary data will be gathered from the local partners.

After the project presentation, Enumerators and Research Assistants (RAs) will be trained to introduce standard protocols for assessment, monitoring, and evaluation of coastal resources.

Reconnaissance Survey

Reconnaissance survey of resources along the coastal areas of Silago to Cabalian Bay, Southern Leyte will be done using ARRAS (automated rapid reef assessment system) to determine the sites suitable for detailed sampling. Sites for detailed sampling will be decided among researchers in consultation with the LGUs involved. Coordinates of selected study sites will be marked with GPS and downloaded in a GIS map.

Participatory Resource and Socio-economic Assessment (PRSA) Tasks:

Task 1. Aquatic Ecology and Coastal Habitat Assessment

Expected Outputs:

1. An updated assessment of the resources of coastal habitats, specifically coral reefs, associated reef fish, seagrass and seaweeds, and mangrove forest.
2. A database on the status of coastal resources/habitat.
3. A base map indicating location and extent of coastal habitat (e.g. coral reefs, sanctuaries, mangrove forest, and seagrass/seaweeds).

1.1 Coral Reefs and Sanctuaries

Continous Phototransect Method: Five-belt transects (four 50m and one 75m) will be deployed along the 75m x 25m survey area. Fifty (50) transect photographs will be taken on the shallower side within the 1m x 1m quadrat laid every meter in each transect lines which will be placed parallel to the shoreline. Base transect (75m belt transect) will be laid around 5-meter tide corrected depth following the contour of the environmental gradient.

Remaining transects (50 will be deployed on the shallower side parallel to the base transect using the randomized number intervals. The photos taken will be sorted, scored and analyzed using Coral Point Count with Excel (CPCe) extension to identify and determine the abundance (cover) of coral and associated benthos. Percentage cover of benthic categories in CPCe is the relative frequency from the ten randomly located scoring points per photograph that will be averaged across each transect.

Corals will be identified based on growth forms. Some corals will be identified using the book of Veron (1986). Living coral cover will be arbitrarily categorized as excellent (>44%), good (33-44%), fair (22-33%) and poor (0-22%) (Licuanan, *personal comm.*)

1.2 Fish Visual Census: Fish population will be assessed using fish visual census (FVC) of the fishes along the corals and the seagrass transects. FVC will be done using SCUBA with the observer swimming slowly along the transect, recording the fishes encountered within 2.5 meters on both side, and 5 meters above the transect (English et al. 1994). FVC allows detection of differences in assemblages of reef fishes at different sites and determination of the population structure of specific species.

1.3 Mangroves

Transect Line – Plots Method: Mangrove sites will be assessed to determine the extent of the mangrove forest. Specific location will be taken by GPS reading and plotted on available map of the area. The transect line-plots method after English et al. (1994) will be used to assess the community structure and the species composition within the selected mangrove area. For each site, transect lines will be established from the seaward margin at right angles to the edge of the mangrove area. These transects will be divided, whenever applicable, into zones corresponding to the change in vegetation. In each zone, 10 x 10m plots will be established. The species and DBH (diameter at breast height) of each tree (larger than 4 cm in girth) will be measured. Saplings (girth less than 4 cm and height greater than 1m) and seedlings (height less than 1 m) will also be identified and counted. The girth will be measured at breast height, approximately 1.3 m above the ground. For trees and shrubs forking below breast height, each branch will be measured separately. The community structure will then be analyzed using the formula:

Basal area (BA) for the stand per hectare (ha)

$$\text{Stand BA (m}^2\text{ha}^{-1}\text{)} = \frac{\text{BA}}{\text{Area of the plot}}$$

$$BA(\text{cm}^2) = \frac{\pi DBH^2}{4}$$

DBH = Diameter at breast height

$$\text{Stems per ha} = \frac{\text{No. of stems in plot} \times 10,000}{\text{Area of the plot}}$$

The importance value of the contribution of each component species to the stand in terms of density, contribution to basal area (dominance) and probability of occurrence throughout the plot (frequency) are described by the following parameters:

$$\text{Relative density (RDe)} = \frac{\text{No. of individuals of a species}}{\text{Total no. of individuals}} \times 100$$

$$\text{Relative frequency (RFe)} = \frac{\text{Frequency of a species}}{\sum \text{Frequency of all species}} \times 100$$

$$\text{Relative dominance (RDo)} = \frac{\text{Total basal area of species}}{\text{Basal area of all species}} \times 100$$

$$\text{Importance value (Ni)} = \text{RDe} + \text{RFe} + \text{RDo}$$

Furthermore, notes on any impact in the area such as storm damage and human pressure will also be recorded.

Benthic fauna associated with the mangroves will also be assessed. Three (3) 1 x 1 m quadrats will be laid in each established plot. The fauna found will be identified to the lowest possible taxa and will be counted to determine the abundance and diversity.

1.1 Seagrass and Associated Flora and Fauna

Transect- Quadrat Method: Areas seen to have seagrass and seaweeds cover will be subjected to detailed sampling using SCUBA. At each site, a transect will be laid perpendicular to the shore. The starting point of the transect will be the inner margin of the seagrass-seaweed bed and the length of the transect depends on the extension of the meadow. However, the maximum length of the transect will be 100 m. Quadrats of 1 m², subdivided into 10 x 10 cm grids with the total of 100 sectors per quadrat, will be laid at regular 10 m intervals along the transect line. Each grid corresponds to 1% cover of the quadrat. Along each transect, quadrats will be laid at the left and

right sides at every 10 m interval. Depending on the length of the transect/seagrass bed, a maximum of 22 quadrats will be assessed per transect.

The percent cover of each species of flora found in each quadrat will be estimated. Mean percent cover will be computed from the cover of each species in all quadrats of the transect line. The percent frequency of occurrence of each species will be determined from the number of occurrence in each quadrat along the transect line calculated as follows:

$$\%F = \frac{\sum f_i}{\sum Q} \times 100$$

where: f_i = number quadrats that species occurred

Q = total number of quadrats

Associated invertebrates will also be identified and counted to determine their density and diversity.

Task 2. Physico-Chemical Factors

Expected output:

1. To measure the salinity, pH level, temperature, current, and transparency of the water.

Methods

The following physico-chemical factors will be measured during the assessment: salinity using handheld refractometer, pH using pH meter, temperature using thermometer, current using current meter and transparency using Secchi disk. The data collected from these parameters will be correlated to the biological data (mangroves, seagrasses, seaweeds, macroinvertebrates, corals, and fishes). This will provide understanding on the variations of the abundance and distribution of species within ecosystems.

Task 3. Coastal Fisheries Assessment

Expected output

To provide scientific information on the current status and utilization of fisheries in the area, specifically on:

- a. inventory of fishing boats and gears;
- b. characterization of fishing activities;
- c. number of fishermen – full time and part time;
- d. mapping of fishing areas and landing sites;
- e. preliminary estimates of catch and effort; and

- f. problems and issues of the fisheries sector.

Methods

3.1 Fishery Dependent Surveys

Gathering of data such as the type and number of fishing gears used in each municipality and on 'fishers' perception on fishery trends, issues and problems will be done through Focus Group Discussion (FGD). Information on the major fish species harvested, fishing grounds, number of fishers in the area, trip frequencies, estimates of fishing effort, seasonality of fish species by gear type, changes in catch rates, and conservation awareness among local fishers will be gathered.

Task 4. Socio-Cultural, Economic and Institutional/Policy Characterization

Expected outputs:

This task will include the following outputs:

- a. stakeholder analysis;
- b. institutional relationships;
- c. seasonal calendars (fish catch, cropping patterns, occupational shifts, resources uses, and fishing areas);
- d. historical lines;
- e. coastal transects; and
- f. resource map.

To establish the baseline socio-economic conditions, the following data and information will be gathered:

1. Basic Socio-economic information- demographic characteristics including population size, density and distribution, growth rate and migration trends, topographical location, employment, sources of household income, average household expenditures, primary and secondary occupations, household members' age and educational attainments, household decision making and decision roles, gender roles in fishing and ownership of assets.
2. Economic Activities – labor force participation, income sources, monthly family income and expenditures
3. Fishing activities – income from fishing, investment expenses incurred, costs of fishing operation and input, utilization of harvests, sharing system
4. Marketing Schemes
5. Community involvement
6. Environmental awareness

Methods

Data collection will be done by enumerators from Ocean-action Resource Center (ORC), a local nonprofit organization in Silago, Southern Leyte. Three methods of data gathering will be used: household interviews (HHI), focus group discussion (FGD) and Key Informant Interviews (KII).

4.1 Household Interviews (HHI)

- Total household population of 76 barangays : 16,980
- Sample size: 10% of total household population—1,808 respondents
- 12 enumerators with two (2) team leaders and one field coordinator will conduct the HHI. The field coordinator will also supervise the FGD and the KKI.
- Enumerators will use an electronic questionnaire through ODK app using smart phones, encoding data as they interview. Enumerator will therefore act as encoders and interviewer.
- Considering the length of questionnaire, each enumerator is expected to finish at least four respondents per day.
- Every week, each enumerator will upload (via Internet) survey results to the main database.

Data management, Processing and Analysis

Considering that HHI will be using electronic questionnaire, there will be no need for encoders. Enumerators will themselves upload the data every week to the main database where they will be processed and analyzed by the data manager.

4.2 Focus Group Discussion (FGD)

- Approximately four FGD sessions will be conducted per municipality.
- Nearby barangays will be lumped together into clusters. Each cluster will have one FGD session.
- Each FGD will have a maximum of 35 participants. During the FGD, the participants will be grouped into two. Each group will have one facilitator and one encoder.
- FGD participants will be chosen based on the referrals of barangay council, agricultural technicians (AT) and BFAR community facilitators of FishCoral. FGD participants should represent various sectors of the barangay.

Data management, Processing and Analysis

Data will be recorded using recording equipment (Smartphone), encoded and sent to the data analyst for analysis. Data will be verified and validated by the principal investigator. Data will be tabulated and analyzed using the Statistical Packages for Social Sciences (SPSS) and STATA. Descriptive statistics such as totals, means and percentages will be used to describe the data.

4.3 Key Informant Interviews (KII)


Key informants will be chosen from the heads or representatives of LGU offices like Municipal Administrator, Planning Officer, MAO, MNRO, DSWD, and other agencies like DENR, BFAR. LGU officials may be invited as key informants.

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Center for Integration and Development Studies, Coastal Resource Management Project, and Fisheries Resource Management Project, Cebu City, Philippines

Prepared by:


Humberto R. Montes, Jr.

Annex 1. Budgetary Requirement

Particulars	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	TOTAL FUNDING
I. Personnel Service							
Honorarium:							
Project Leader @ P8,800/mo	8,800.00	8,800.00	8,800.00	8,800.00	8,800.00	8,801.00	52,801.00
Study Leaders @ P7,500/mo x 6 pax	45,000.00	45,000.00	45,000.00	45,000.00	45,000.00	45,000.00	270,000.00
Contract of Services:							-
Study Leader (NGO) @ P7,500/mo	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	45,000.00
Field Research Coordinator @15,000/mo x 6 mos	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	90,000.00
Research Assistants @ P15,000/mo x 4 pax	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00	360,000.00
Enumerators @ 300/day x 22 days x 12 pax	79,200.00	79,200.00	79,200.00	79,200.00			316,800.00
Laborer @ 5,500/mo	5,500.00	5,500.00	5,500.00	5,500.00	5,500.00	5,500.00	33,000.00
Database Programmer @ 350/day x 22 days/mo x 5 mos		7,700.00	7,700.00	7,700.00	7,700.00	7,700.00	38,500.00
Report Packaging @ P10,000						10,000.00	10,000.00
Sub-Total							1,216,101.00
II. Maintenance and Other Operating Expenses (MOOE)							
A. Travel/Transportation Expenses:							
Car rental @ P5,000/travel x 8 travels/mo	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00		200,000.00
Boat rental @ P5,000/travel x 12 travels/mo	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00		300,000.00
Local fare (multicab/motorcycle) @ P200/person/day x 18 persons x 22 days		79,200.00	79,200.00	79,200.00	79,200.00		316,800.00
Travel allowance @ P600/day x 17 persons (Field Coordinator, RAs, enumerators) x 22 days/mo		224,400.00	224,400.00	224,400.00	224,400.00		897,600.00
Travel allowance @ P800/day x 7 persons (Study Leaders) x 12 days/mo	57,600.00	57,600.00	57,600.00	57,600.00	57,600.00		288,000.00
Participation in seminars & trainings (in-house for food & materials)	20,800.00						20,800.00
B. Supplies and Materials:							
Office supplies (Bond papers, ink, usb, external drive, etc)	44,200.00						44,200.00
Reproduction & binding of reports						50,000.00	50,000.00
Field supplies & materials (fuel for vehicle, boat & compressor; collectings bottles, ziplock, mounting boards, batteries, slate boards, ropes, sunblock)		20,000.00	20,000.00	20,000.00	20,000.00		80,000.00
C. Communication Expenses (mobile cards, etc.)							-
Mobile cards @ P300/person/mo x 25 persons	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	45,000.00
E. Miscellaneous Expenses							
Sub-Total	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00	120,000.00
							2,362,400.00

III. Equipment Rental							
SCUBA gear @ P100/day x 5 units x 10 days/mo		5,000.00	5,000.00	5,000.00	5,000.00		20,000.00
Mask, snorkel, fins, booties @ P50/day x 5 sets x 12 days/mo		3,000.00	3,000.00	3,000.00	3,000.00		12,000.00
GPS @ P50/day x 10 days	500.00	500.00	500.00	500.00	500.00		2,500.00
Go Pro camera with accessories with SD cards & accessories @ P100/day x 10 days	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00		5,000.00
Underwater camera (1 unit) with SD cards & accessories @ P400/day x 10 days		4,000.00	4,000.00	4,000.00	4,000.00		16,000.00
Sub-Total							55,500.00
TOTAL COST	472,600.00	750,900.00	750,900.00	750,900.00	750,900.00	671,700.00	3,634,001.00
Administrative Cost (10% of total cost)	47,260.00	75,090.00	75,090.00	75,090.00	75,090.00	67,170.00	363,400.10
GRAND TOTAL							3,997,401.10

Annex 2. Budget Summary and Schedule

Particulars	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	TOTAL FUNDING
I. Personnel Service	215,500.00	223,200.00	223,200.00	223,200.00	144,000.00	154,001.00	1,183,101.00
II. Maintenance and Other Operating Expenses (MOOE)	255,900.00	510,125.00	510,125.00	510,125.00	510,125.00	77,500.00	2,373,900.00
III. Equipment Rental	3,000.00	18,500.00	18,500.00	18,500.00	18,500.00	-	77,000.00
Administrative Cost (10% of total cost)	47,440.00	75,182.50	75,182.50	75,182.50	67,262.50	23,150.10	363,400.10
GRAND TOTAL	521,840.00	827,007.50	827,007.50	827,007.50	739,887.50	254,651.10	3,997,401.10

Annex 3. **VSU Counterpart:**

Particulars	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	TOTAL
Vehicle (canter)	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	60,000.00
Internet	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	9,000.00
Computers (desktops & laptops)	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	30,000.00
Printers	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	12,000.00
Mobile phones	91,000.00						91,000.00
References	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	9,000.00
Office space, tables, chairs	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	30,000.00
Scuba air compressor	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	30,000.00
Microscopes	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00	18,000.00
Transect tapes	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	12,000.00
Slateboards	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	12,000.00
Quadrats	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	12,000.00
Total	130,000.00	39,000.00	39,000.00	39,000.00	39,000.00	39,000.00	325,000.00


 Prepared by: Humberto R. Montes, Jr.
 Project Leader

Annex 4. **Work Plan**

ACTIVITIES	February 2019				March 2019				April 2019				May 2019				June 2019				July 2019			
	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
1. Finalizing inception reports of the proposed project & secure surety bond		■																						
2. Recruitment of research personnel			■																					
3. Orientation & training on methods				■																				
4. Procurement of equipment, materials and supplies				■	■																			
5. Courtesy calls and gathering of secondary data					■	■																		
6. ARRAS					■	■																		
7. Interviews & FGDs					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
8. Samplings and data collection from field & laboratory					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
9. Data encoding and analysis													■	■	■	■	■	■	■	■	■			
10. Validation & feedback of results																					■	■		
11. Preparation of terminal report																						■	■	
12. Submission of Terminal Report																								■

H.R. Montes Jr.

Prepared by: Humberto R. Montes, Jr.

Annex 5. Notice of Award.

Department of Agriculture-BFAR8- FishCORAL Project
Procurement of Consulting Services: Professional and Technical Services for the Participatory Resource
and Socio-Economic Assessment of Silago-Cabalian Bay

Republic of the Philippines
Department of Agriculture
Bureau of Fisheries and Aquatic Resources
Regional Office 8
Tacloban City
bfar_region8@yahoo.com

Notice of Award

January 23, 2017

EDGARDO E. TULIN, Ph.D.
President
Visayas State University
Baybay, Leyte

Dear **Sir**:


We are happy to notify you that **PROCUREMENT FOR CONSULTANCY SERVICES FOR PROFESSIONAL AND TECHNICAL SERVICES FOR THE PARTICIPATORY RESOURCE AND SOCIO-ECONOMIC ASSESSMENT OF SILAGO-CABALIAN BAY** for the Contract Price equivalent to **THREE MILLION NINE HUNDRED NINETY SEVEN THOUSAND FOUR HUNDRED ONE PESOS AND TEN CENTAVOS ONLY (3,997,401.10)** is hereby awarded to your Agency.

You are hereby required to provide within ten (10) days the performance security in the form of surety bond equivalent to 10% of the contract price. Failure to provide the performance security shall constitute sufficient ground for cancellation of the award and forfeiture of the bid security.

Very truly yours,


DR. JUAN D. ALBALADEJO
Regional Director

Conforme:

(Name of Representative of Bidder) 

(Name of Bidder)

Date: January 25, 2017

Annex 6. Notice to Proceed.

Department of Agriculture-BFAR8

**Bureau of Fisheries and Aquatic Resources
Regional Office 8
2nd Floor, SDC Bldg. 1, Marasbaras, Tacloban City
Telefax No. 053-832-4655
bfar8bac@gmail.com**

NOTICE TO PROCEED

May 18, 2018

EDGARDO E. TULIN, Ph.D.
President
Visayas State University
Baybay, Leyte

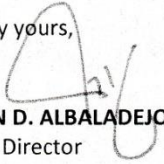
Dear *Sir*:

The attached Contract Agreement having been approved, notice is hereby given to VISAYAS STATE UNIVERSITY, for the **PROCUREMENT FOR CONSULTANCY SERVICES FOR PROFESSIONAL AND TECHNICAL SERVICES FOR THE PARTICIPATORY RESOURCE AND SOCIO-ECONOMIC ASSESSMENT OF SILAGO-CABALIAN BAY**. The contract period is _____ calendar days after the effectivity of this notice.

Upon receipt of this notice, you are responsible for performing the services under the terms and conditions of the Agreement and in accordance with the Implementation Schedule.

Please acknowledge receipt and acceptance of this notice by signing both copies in the space provided below. Keep one copy and return the other to the **BFAR 8**.

Very truly yours,


DR. JUAN D. ALBALADEJO
Regional Director

I acknowledge receipt of this Notice on (date of receipt) Oct. 26, 2018
Name of the Representative of the Bidder: _____
Authorized Signature: _____

Annex 7. Performance Bond.

STRONGHOLD
INSURANCE COMPANY, INCORPORATED
17th Floor, Security Bank Centre 6776 Ayala Avenue, Makati City

PERFORMANCE BOND

SICI BOND NO. _____
G(13) 240555

KNOW ALL MEN BY THESE PRESENTS:

That we, VIKAS STATE UNIVERSITY
contractor, of Southern Leyte as Principal
and the **STRONGHOLD INSURANCE COMPANY, INC.**, a corporation duly organized and
existing under and by virtue of the laws of the Philippines, with head office at Makati City,
as Surety, are held and firmly bound unto the
in the sum of Three hundred ninety nine thousand seven hundred Pesos of
(Ps. 399,700), Philippine Currency, for the payment of which well and truly be made, we
bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally,
firmly by these presents;

The CONDITIONS OF THIS OBLIGATIONS are as follows:

**VALID FOR GOVERNMENT INFRASTRUCTURE
PROJECTS SUPPLY & SERVICES CONTRACTS**

To Comply with The Full Terms and Conditions of The Recurrence For
Consultancy Services For Professional And Technical Services For The
Participatory Resource and Socio-Economic Assessment Of Silago-Cabalian
Bay Southern Leyte.
This bond is callable on Demand.

WHEREAS, the liability of the Surety Company under this bond shall in no case exceed
the sum of Three hundred ninety nine thousand seven hundred Pesos **PESOS:**
(Ps. 399,700), Philippine Currency, inclusive of interest, attorney's fee and other
damages, and shall not be liable for any advances of the Oblige to the Principal;

WHEREAS, said contract requires the said Principal to give a good and sufficient bond
in the above-stated sum to secure the full and faithful performance on its part of said contract;

NOW THEREFORE, if the Principal shall perform well and truly and fulfill all the
undertakings, covenants, terms, conditions and agreements of said contract, then, this obligation
shall be null and void; otherwise it shall remain in full force and effect.

The liability of the surety company under this bond shall expire on _____
and the bond is deemed absolutely cancelled **Ten (10)** days thereafter.

IN WITNESS WHEREOF, we have set our hands and signed our names at Makati City
this _____ day of _____, 20____.

STRONGHOLD INSURANCE COMPANY, INC.
TIN 000-602-270
By: RODEMER S. PATECIERA
MANAGER
(Principal)

SIGNED IN THE PRESENCE OF: