Doctoral Dissertation

Empirical Study on the Functionality and Sustainability of Coastal Resource Management: An Application of Environmental Economics to Marine Protected Areas in Cagayan, Philippines

沿岸資源管理の取り組みの機能と持続可能性に関する実証研究：
フィリピン･カガヤン州の海洋保護区への環境経済学の適用

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ABSTRACT

The establishment of Marine Protected Areas (MPAs) is considered as an important tool for fisheries management, biodiversity conservation, habitat restoration and ecotourism development in the world. The setting up of MPAs generate benefits such as increase in fish production, biodiversity conservation, spill-over effect to other fishers and recreational resources among others. These benefits are classified as common-pool resources (direct use values) and public goods (non-use values) which can be enjoyed by the community that manages the MPA, tourists, other coastal communities as well as the general population. Common-pool resources are goods and services that are non-excludable but rival in consumption while public goods are services that non-excludable and non-rival in consumption. With this nature of goods and services, challenges in MPA establishment and management such as over-exploitation and free-riding effect arise.

Effective management and economic valuation are some of the strategies that can be done to institute property rights and ensure budgetary considerations for coastal resource management as ways to address the challenges. This research therefore examined the institutional mechanisms in the establishment of MPAs, identified the social complexities that influence the involvement of the local residents in the conservation initiatives and evaluated the externalities using practical methods for its internalization. The study aimed to provide information on ensuring the functionality and sustainability

of MPAs along the Kuroshio Region and less developed countries using MPAs in Cagayan, Philippines as case studies.

The context of resource governance in the province was studied by investigating the prevailing MPA management systems by means of document analysis and key informant interviews. Subsequently, household surveys with randomly selected respondents were conducted to assess the socio-economic profile and livelihood structures of the study areas. The participation of the respondents in the MPA management were analysed using econometrics to identify the factors that induce the voluntary participation among local residents. Further, the conservation value of MPAs to the villagers was estimated using stated preference techniques such as Contingent Valuation Method (CVM) and Contingent Behavior (CB) through individual interview surveys using a structured questionnaire. The recreational value of MPAs was further assessed using revealed preference such as Travel Cost Method (TCM) and supplemented with CB through on-site tourist's interviews.

The analysis of the MPA governance in the province revealed differences in the institutional arrangements, developmental processes in MPA establishment and management structures, nevertheless, all MPAs were following a community-based co-management regime. The empirical study showed that MPAs were basically managed by the local communities through voluntary manner, however a strong and systematized support from the government (e.g. provision of alternative livelihood, sustainable ecotourism), is indispensable to encourage insistent participation in MPA management. Moreover, this research revealed that the livelihood structure in the study villages is characterized by high marine and coastal resource reliance, low household income and apparent insufficient livelihood opportunities. Despite the economic situation, villagers

either direct or indirect users (fishers and non-fishers; island and mainland residents), support the establishment and the presence of MPA in the community. Therefore, a holistic approach to rural development is necessary to gain wider support for coastal resource management. Analysis of the data by probit model showed that stable household income, presence of alternative livelihood project, access to extension services for information, perceptions on MPAs and membership in organizations (e.g. fisher's association) were among the factors that influence the involvement of the local residents in the conservation initiatives through MPAs.

The result of the valuation studies indicated that local residents have the willingness to work (WTW) and pay (WTP) to maintain the existence of MPAs in the villages. However, the equivalent value of WTW based on average daily income is 3.9 to 5.4 times higher than WTP estimates of ₱187.50/month (US$3.95*). The preference of respondents on the voluntary labor rather than monetary payment can be attributed to the short supply of the labor market in the area. The aggregated monthly WTW suggests that it is possible to assign local residents from the MPA villages for the daily monitoring and patrolling of the respective MPAs. Furthermore, the aggregated value of WTP is estimated at ₱1.6 million (US$ 33,870) per year. If this amount is used solely for patrolling and considering the present minimum daily agricultural wage, this value is enough to pay 20 persons per month. The quantitative values obtained can be incorporated in the decision making of the policy makers on how to sustainably manage the MPAs (e.g. assigning local residents for patrolling, collection of fees, appropriate budget).

Furthermore, the local tourists demonstrated a high value for the opportunity to visit the MPAs with an average individual consumer surplus of ₱1,401.15 (US$30.12**) at the present status and ₱2,420.72 (US$52.04) for the hypothetically improved

conditions. The result revealed the high monetary values attached to the recreational services in the area and provide justification for its conservation and development of sustainable recreational activities for the economic benefit of the local residents. With an estimated 7,000 annual visit of local tourists in 2015, this translates to an aggregated consumer surplus of ₱9,808,050 (US$ 210,835.13) at its present condition. The strong willingness of tourists to spend money for the recreational services suggests that ecotourism can be an effective sustainable financing mechanism for MPA management. Government intervention focusing on the infant industry argument could create a necessary incentives to promote sustainable MPA management by internalizing the externalities.

Based from the major results, the following policy implications were drawn from the empirical studies in MPAs in Cagayan: (1) an enabling management regime such as community- based co-management approach can be considered in managing a common pool resource such as marine resources or MPAs.; (2) an institutionalized incentive system (e.g. livelihood projects, ecotourism activities) is necessary for sustainable MPA as it has the tendency to encourage participation of local residents to resource conservation; (3) development of sustainable ecotourism activities in the protected areas is seen to sustain MPA management and (4) management of MPAs can be strengthened and enriched through appropriate internalization of externalities (institution of fees, taxes, etc.). The Kuroshio Region and less developed countries with similar structures may obtain insights from these results in designing a functional and sustainable community-based MPAs.

*1US$ = ₱47.43, average exchange rate in September 2016; **1US$ = ₱46.52 average exchange rate in April-June 2016 (BSP Reference Exchange Rate Bulletin)

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TABLE OF CONTENTS

Chapter	Title	Page
	Title Page	i
	Abstract	ii
	Acknowledgement	vi
	Table of Contents	viii
	List of Tables	xi
	List of Figures	xiii
	List of Appendices	xv
	List of Acronyms and Abbreviations	xvi
	List of Main Papers	xvii
	List of Conference Presentations	xviii
Chapter 1	**General Introduction**	1
	1.1 Development and Challenges of MPAs in the World	1
	1.2 Benefits from and Total Economic Value of Coastal and Marine Resources	6
	1.3 Nature of Goods and Services and its Challenges in the Establishment and Maintenance of MPAs	10
	1.3.1 Common Pool Resources (CPRs)	10
	1.3.2 Public Goods	14
	1.4 Strategies to Address the Challenges in MPAs	15
	1.4.1 Strategies for CPRs	15
	1.4.2 Strategies for Public Goods	18
	1.4.2.1 Economic Valuation of Non-Market Benefits of MPAs: Revealed and Stated Preference Techniques	19
	1.5 Theme of this Dissertation	22
	1.6 Selection of Study Site	22
	1.6.1 MPAs in the SE Asia	23
	1.6.2 MPAs in the Philippines: History and Structure	24
	1.6.3 Study Site: MPAs in Cagayan, Philippines	27
	1.7 Dissertation Outline	30
Chapter 2	**Governance and Institutional Mechanisms of Marine Protected Area Establishment and Management in Cagayan Province, Philippines**	31
	2.1 Introduction	31
	2.2 Methodology	32
	2.3 Results and Discussion	34
	2.3.1 Marine Protected Areas in Cagayan Province	34
	2.3.2 Governance Level and Developmental Processes of MPA Establishment	36
	2.3.3 Management Structures and Governance Systems	43
	2.3.4 Institutional Support in the Maintenance of MPA	48

2.3.5 MPA Management Issues and Problems 51
2.4 Conclusions and Policy Implications 53

Chapter 3 Livelihood Structure and Participation of Villagers on the Management of Marine Protected Areas in Cagayan Province, Philippines 57
3.1 Introduction 57
3.2 Study Areas 59
3.3 Methodology 60
3.4 Results and Discussion 62
3.4.1 Socio-demographic Characteristics of Respondents 62
3.4.2 Livelihood Structure and Income Composition 64
3.4.3 Poverty Incidence and Income Inequality 65
3.4.4 Fishing Profiles and Practices 67
3.4.5 Knowledge on the Purpose and Awareness on the Presence of MPA 70
3.4.6 Participation of Villagers and Extension Support Policy on MPA Management 71
3.4.7 Factors Affecting Participation of Villagers on MPA Management 74
3.5 Conclusions and Policy Implications 79
3.5.1 Enhancing the Livelihood Opportunities and Poverty Alleviation in the Coastal Villages 79
3.5.2 Strengthening the Participation of Local Community in MPA Management 80

Chapter 4 Evaluation of the Villagers' Willingness to Work or Pay for the Promotion of Community-based Marine Protected Areas in Cagayan Province, Philippines 83
4.1 Introduction 83
4.2 Study Areas and Methodology 85
4.2.1 Study Areas 85
4.2.2 Methodology 86
4.2.2.1 Survey Questionnaire 86
4.2.2.2 Sampling Approach 89
4.2.2.3 Statistical Analysis on WTP and WTW Estimation 90
4.3 Results and Discussions 93
4.3.1 Non-parametric Estimation of Acceptance Probability Curve 93
4.3.2 Comparing the Monetary Value of WTW and WTP estimates 95
4.3.3 Aggregation 96
4.3.4 Estimation of Volunteer Labor Equation (WTW) and Payment Behavior Equation (WTP) 96

4.4 Conclusions and Policy Implications 99

Chapter 5 Estimating the Recreational Value of Marine Protected Area in Northern Philippines in Support to Coastal Management and Rural Transformation 101
5.1 Introduction 101
5.2 Study Area and Methodology 103
5.2.1 Study Area 103
5.2.2 Methodology 105
5.2.2.1 Survey Questionnaire and Data Collection 105
5.2.2.2 Data Analysis: TCM and CB demand and Consumer Surplus Estimation 107
5.3 Results and Discussions 111
5.3.1 Socio-economic Profile of Respondents 111
5.3.2 Respondents' Perception on the Marine Resources 111
5.3.3 Model Estimation: TCM and CB Demand and Consumer Surplus 113
5.4 Conclusions and Policy Implications 118
5.4.1 Implications on MPA Management and Policy 118
5.4.2 Implications on the use of TCM and Contingent Behavior Model 119

Chapter 6 Conclusions and Policy Implications 120
6.1 General Discussions 120
6.2 Policy Implications 127

Literature Cited 130

Appendices 141

LIST OF TABLES

Table No.	Title	Page
1.1	Classification of benefits generated from MPAs by beneficiary and economic values	9
2.1	Profile of marine protected areas along the coast of mainland Cagayan Province	35
2.2	Comparison between marine protected areas proclaimed by the national and local governments in Cagayan Province	38
2.3	Timeline showing the milestones in San Jose and Casitan MPA developmental processes	41
2.4	Institutional support in the maintenance of MPAs in Cagayan Province	50
3.1	Socio-demographic characteristics of respondents	63
3.2	Profile and characteristics of fisher-respondents	68
3.3	Knowledge, awareness and support of respondents towards the MPAs in their respective villages	70
3.4	Percentage of respondents who participates in MPA management	72
3.5	Perception of respondents towards the implemented livelihood projects and ecotourism activities in the villages	74
3.6	Determinants of participation on the management of locally-established MPAs	76
3.7	Determinants of participation on the management of nationally established MPAs	78
4.1	Status quo condition and hypothetical changes in the contingent scenario	88
4.2	Household population and number of respondents	90
4.3	Result of nonparametric estimation of survival curve	95
4.4	LogRank test on the difference of WTW acceptance probability curve	95

4.5	Result of probit estimation on WTW and WTP	98
5.1	Annual tourists' arrival in PIPLS	104
5.2	Expenses of a typical visit to PIPLS	105
5.3	Present condition and hypothetical changes in the contingent scenario	107
5.4	Description of individual travel cost model variables	110
5.5	Socio-demographic characteristics of respondents	111
5.6	Tourists' ranking on the islands marine resources attractions	112
5.7	Tourists' perception on the attributes of the island's marine resources	112
5.8	Tourists' discernment on the state of conservation of PIPLS	113
5.9	Estimation result of TCM and CB	114
5.10	Welfare calculations	116
5.11	Estimating individual demand for trips to PIPLS using a Demand function	116

LIST OF FIGURES

Figure No.	Title	Page
1.1	Global map of MPAs	3
1.2.	Trend in the global establishment of MPAs, 1990 – April 2016	5
1.3	Total economic valuation framework	8
1.4	Schaefer's Model on the (a) growth function of fish and (b) concept of maximum sustainable yield	13
1.5	Relationship of fishing effort, total costs and fish population	13
1.6	Non-market environmental valuation techniques	21
1.7	(a) Countries in the Southeast area and imposing the coral triangle area (b) Comparative number of established MPAs (1990 and 2014) in the different regions of the world	24
1.8	Cumulative number of MPAs in the Philippines	26
1.9	Distribution of MPAs in the Philippines showing the marine bioregions and corridors highlighting the location of Cagayan Province and its MPAs	29
2.1	Location of Cagayan Province in the Philippines showing the distribution of the six MPAs	33
2.2.	Management structure of Palaui Island Protected Landscape and Seascape, a nationally-established MPA in Cagayan, Philippines	46
2.3.	Management structure of locally-established MPAs in Cagayan, Philippines	47
3.1.	Conceptual relationships by category among factors that influence participation of villagers towards MPA management	59
3.2	Household income composition in the MPA villages	65
3.3	Distribution of annual household income in villages with locally established MPAs	66
3.4	Distribution of annual household income in San Vicente village	66
4.1	Survivor function of willingness to work among local residents	

	in MPA villages in Cagayan Province	94
4.2	Survivor function of willingness to pay among local residents in San Vicente village in Cagayan Province	94
5.1.	Effect of hypothetical scenario (better conditions) on the demand for recreation at the PIPLS	117

LIST OF APPENDICES

Appendix No	Title	Page
1	Survey Questionnaire for the Socioeconomic Assessment of Locally-established Marine Protected Areas (MPA) in Cagayan Province, Philippines	141
2	Survey Questionnaire Used the for Socioeconomic Assessment of Residents in and around the Palaui Island Protected Landscape and Seascape (PIPLS) San Vicente, Sta. Ana Cagayan Province, Philippines	152
3	Results of LR-Chow Test of Data Structures for Chapter 4	163
4	Survey Questionnaire to Local Community Residents for Estimating the Value of Marine Resources in San Jose Marine Protected Area, Gonzaga, Cagayan	166
5	Survey Questionnaire to Local Community Residents for Estimating the Value of Marine Resources in Palaui Island Protected Landscape and Seascape (PIPLS), Sta. Ana, Cagayan	171
6	Results of test whether data structure is same or not among datasets by Chow-type Likelihood Ratio (LR) Test: WTW data sets	176
7	Survey Questionnaire to Tourist for Further Encouragement of Ecosystem Services in Palaui Island Protected Landscape and Seascape (PIPLS), Sta. Ana, Cagayan	177

LIST OF ACRONYMS AND ABBREVIATIONS

BFAR	Bureau of Fisheries and Aquatic Resources
CAMPADA	Casitan MPA Development Association
CB	Contingent Behavior
CBD	Convention on Biological Diversity
CEZA	Cagayan Economic Zone Authority
COP	Conference of Parties
CPR	Common Pool Resources
CS	Consumer Surplus
CVM	Contingent Valuation Method
DENR	Department of Environment and Natural Resources
ICRMP	Integrated Coastal Resources Management Project
IUCN	International Union for Conservation of Nature
IP	Indigenous People
IPAF	Integrated Protected Area Fund
LGC	Local Government Code
LGUs	Local Government Units
LR-Chow Test	Loglikelihood-ratio Chow Test
MENRO	Municipal Environment and Natural Resources Office
MAO	Municipal Agriculture Office
MPAs	Marine Protected Areas
MTO	Municipal Tourism Office
MSY	Maximum Sustainable Yield
NGAs	National Government Agencies
NGOs	Non-Government Organizations
NIPAS Act	National Integrated Protected Area Systems Act
PAMB	Protected Area Management Board
PAO	Provincial Agriculture Office
PASAMOBA	Palaui-San Vicente Motorboat Association
PASu	Protected Area Superintendent
PEPA	Palaui Environmental Protector's Association
PIPLS	Palaui Island Protected Landscape and Seascape
SAMOBA	Sta. Ana Motorized Boat Association
SE Asia	Southeast Asia
SJFA	San Jose Fisherfolk Association
TNFA	Taggat Norte Fisherfolk Association
TCM	Travel Cost Method
UNCLOS	United Nations Conference on the Laws of the Sea
WTP	Willingness to pay
WTW	Willingness to work

LIST OF MAIN PAPERS

Main papers used in creating the dissertation

Peer-reviewed papers

1. **Ballad, E.L.** and T. Shinbo (2016), Are Several Village-based Marine Protected Areas (MPAs) Necessary for Conserving Coastal Resources in a Municipality? A Case of Municipality of Gonzaga, Cagayan, Philippines, Kuroshio Science, 9(2): 138-149.

2. **Ballad, E.L**., Y. Morooka and T. Shinbo (2016), Factors Inducing Community Participation in Coastal Resource Management: Case Study of MPAs in Gonzaga, Cagayan, Philippines, Journal of Rural Problems, 52(4): 241-246.

3. **Ballad, E.L**., T. Shinbo, Y. Morooka and M. Morales (2017), Estimating the Recreational Value of Marine Protected Area in Northern Philippines in Support to Coastal Management and Rural Transformation, Proceedings of The 9th ASAE International Conference 2017:Transformation in Agricultural and Food Economy in Asia, 83-92.

4. **Ballad, E.L**., Y. Morooka and T. Shinbo (2017) Role of Extension Services with Special Reference to Livelihood Projects for Supporting a Community-based Marine Protected Area in Northern Luzon, Philippines, Asian Fisheries Science, 30: 1-16

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Ballad, E.L., Y. Morooka and T. Shinbo (2017, under-review) Evaluation of the Villagers' Willingness to Work or Pay for the Promotion of Community-based Marine Protected Areas in Cagayan Province, Philippines

LIST OF CONFERENCE PRESENTATIONS

1. Emma Legaspi Ballad Teruyuki Shinbo and Yoshinori Morooka, Factors Inducing Community Participation in Coastal Resource Conservation Initiatives: Case Study of MPAs in Gonzaga, Cagayan, Philippines, 65th Regional Agriculture and Forestry and Economics Association Convention, Tottori University, Tottori City, Japan, October 30, 2015.

2. Emma Legaspi Ballad and Teruyuki Shinbo, Socio-economic Conditions and Social Structures of Local Community in Marine Protected Areas: Case Analysis of Gonzaga, Cagayan, Philippines, 9th International Kuroshio Symposium, National Sun Yat-sen University, Kaohsiung City, Taiwan, ROC, November 18, 2015.

3. Emma Legaspi Ballad, Teruyuki Shinbo and Yoshinori Morooka, Opportunities and Challenges of Community-based Marine Protected Area (CB-MPA) Programs in Cagayan Province, Philippines, 10th International Kuroshio Symposium, Bicol University, Tabaco City, Bicol, Philippines, November 24, 2016.

4. Emma Legaspi Ballad, Teruyuki Shinbo and Yoshinori Morooka, Local Residents' Valuation on Marine Protected Areas (MPAs) in Northern Luzon, Philippines: Application of Willingness to Pay (WTP) and Willingness to Work (WTW) Approach, 10th International Kuroshio Symposium, Bicol University, Tabaco City, Bicol, Philippines, November 25, 2016

5. Emma Legaspi Ballad, Teruyuki Shinbo, Yoshinori Morooka and Milagros Morales, Estimating the Recreational Value of Marine Protected Area in Northern Philippines in Support to Coastal Management and Rural Transformation, 9th Asian Society of Agricultural Economist International Conference, Bangkok, Thailand, January 11, 2017.

6. Emma Legaspi Ballad, Teruyuki Shinbo and Yoshinori Morooka, Evaluation of the Villagers' Willingness to Work or Pay for the Promotion of Community-based Marine Protected Areas in Cagayan Province, Philippines, 2017 Annual Meeting of Agricultural Economics Society of Japan, Chiba University Matsudo Campus, Chiba, Japan, March 29, 2017.

Chapter 1: General Introduction

1.1 Development of MPA in the World

The coastal and marine ecosystems encompass about 70% of the earth and assume a critical role in human development through its social, economic and ecological benefits (Kaiser and Roumasset, 2002; OECD, 2016). However, the coastal communities worldwide are being imperilled due to alterations in the marine resources caused by key pressures such as overfishing and exploitation of fisheries resources, increasing population, habitat destruction, occurrence of invasive species and global climate change (OECD, 2016). These changes put the communities at greater risks from coastal hazards (e.g. storms, shoreline erosion, etc.) and economic frailties particularly for those who highly depend on these resources for living (Van Lavieren et al., 2011). Considering the ecological importance and economic benefits provided by the coastal and marine resources, it is of vital importance to manage it on a sustainable manner. With this, establishment of marine protected areas (MPAs) emerged as one of the most significant approach in the management of the marine resources (Christie and White, 2007).

Whereas there is no distinct unanimously agreed definition, the International Union for Conservation of Nature (IUCN) defines MPA as any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment (Kelleher, 1999). At present, wide variability in the typology of MPAs (e.g. marine park, marine reserve, closed area, marine sanctuary, marine and coastal protected areas, marine management area, biosphere reserve, no-take area, coastal park, national marine park, marine conservation area, etc.) both between countries and within a particular country is observed (Day et al., 2012). Nevertheless,

these were all known as MPAs which has the prime objective of keeping the marine resources in their natural state. MPAs put emphasis on protecting an area of the marine environment by limiting or eliminating human activity (Pomeroy et al., 2007) therefore, it has been established as a vital tool for fisheries management, habitat restoration, biodiversity conservation, and tourism development (Christie and White, 2007). Policy makers and resource managers are keen into addressing the pressures on marine ecosystem due to its ecological and economic benefit. The cumulative economic impact of poor ocean management practices is estimated at US$ 200 billion per year (UNDP, 2012).

At the worldwide scenario, methodologies for the conservation of marine habitats have progressed from the solely centralized regulation of fishing such as specifying total allowable catches to the use of a comprehensive range of management tools (Techera and Troniak, 2009). With the emergence of the concept of sustainable development, the paradigm shifted towards mechanisms to which ecological, developmental and social goals can be achieved. And as unjustifiable human activities increased globally, which impend the preservation of ecosystem services, MPAs have been gradually seen as one of the most essential tools for managing and conserving marine ecosystems (Gaines et al., 2010) which perpetuates all over the world (Figure 1.1). The Protected Planet Report as of December 2016 revealed that there are now just under 15,000 MPAs spread across 18.5M km^2 of the marine waters of the world which translates to over 12.7% of the total territorial waters (UNEP-WCMC and IUCN, 2016).

The development of the concept of MPAs in the international arena started as early as 1950s to 1960s when marine scientists and environmentalist felt the severity of the human exploitation towards marine and coastal ecosystems. From therein, legal

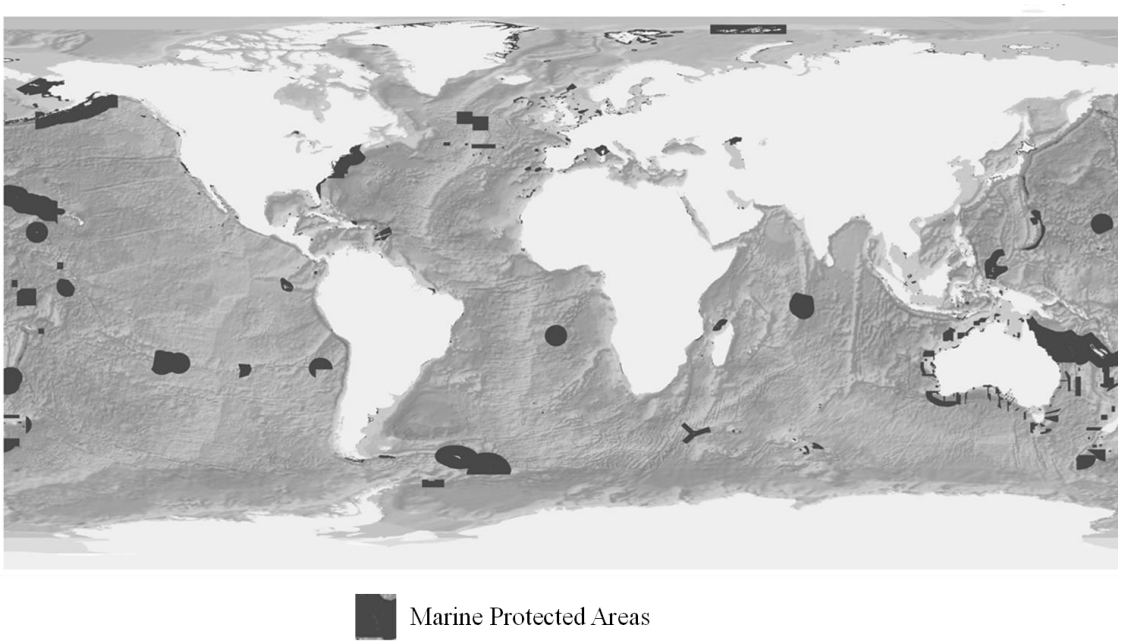


Figure 1.1. Global map of MPAs (Source: IUNC and UNEP-WCMC, 2016)

frameworks for the protection and governance of the resources were developed beginning with the Law of the Sea in 1958. This was preceded by several conventions and conferences (e.g. First World Conference on National Parks in 1962; Ramsar Convention in 1971; World Heritage Convention in 1972; Third UN Conference on the Laws of the Sea (UNCLOS) in 1973 – 1977; Conference on MPAs in 1975) which all called for the development of schemes and regimes for the establishment, management and monitoring of MPAs (NRC, 2001). In the 1980s to 1990s, the IUCN, comprising of 218 member states and government agencies and is considered as the world's largest and most diverse environmental network, assumed the prime role in the development and standardization of the MPAs. Through a series of consultations, treaties and agreements, IUCN was able to publish important documents (e.g. Marine and Coastal Protected Areas: A Guide to Planners and Managers in 1984; A Global representative System of Marine Protected Areas in 1995; Guideline for Marine Protected Areas in 1995) which outlined and

described the systems for MPA establishment (NRC, 2001). With all of these interventions, the establishment of MPAs started to increase from 1990s up to the present (Figure 1.2). Significant events that led to the substantial growth of MPAs globally were primarily the commitment (i.e. pledges and agreements) of the respective countries and regions to meet the goal of biological diversity conservation.

The continuing decline in marine catch and habitat degradation have prompted the call to conduct the 2002 World Summit on Sustainable Development to establish a global system of MPAs and the Convention on Biological Diversity (CBD) adopted the programme of works for protected areas to build up a global network of wide-ranging and efficiently managed systems of marine protected areas in 2004 (NRC, 2001). In 2006, at CBD's 8th Conference of Parties (COP), the global community set a target of protecting 10% of the coastal and marine waters by 2012, however, despite all the efforts, the increasing trend of MPA coverage clearly showed that the world is falling far short of the goal, so at the 10th COP to the CBD, delegates from different countries reached consensus on extending the 2012 deadline to 2020 (De Santo, 2013). Nevertheless, Figure 1.2 shows that the MPAs covered 10.1% the global marine and coastal waters in 2016, which means meeting the world's target. Henceforth, at the 2016 IUCN's World Conservation Congress, a motion was passed by the majority to protect at least 30% of each marine habitat in a network of MPAs with the ultimate aim of creating a fully sustainable ocean (MCI, 2016).

The establishment of MPAs gain wide acceptance as it is expected to provide several environmental goods and services that could address the pressing issues in the degradation of marine and coastal resources.

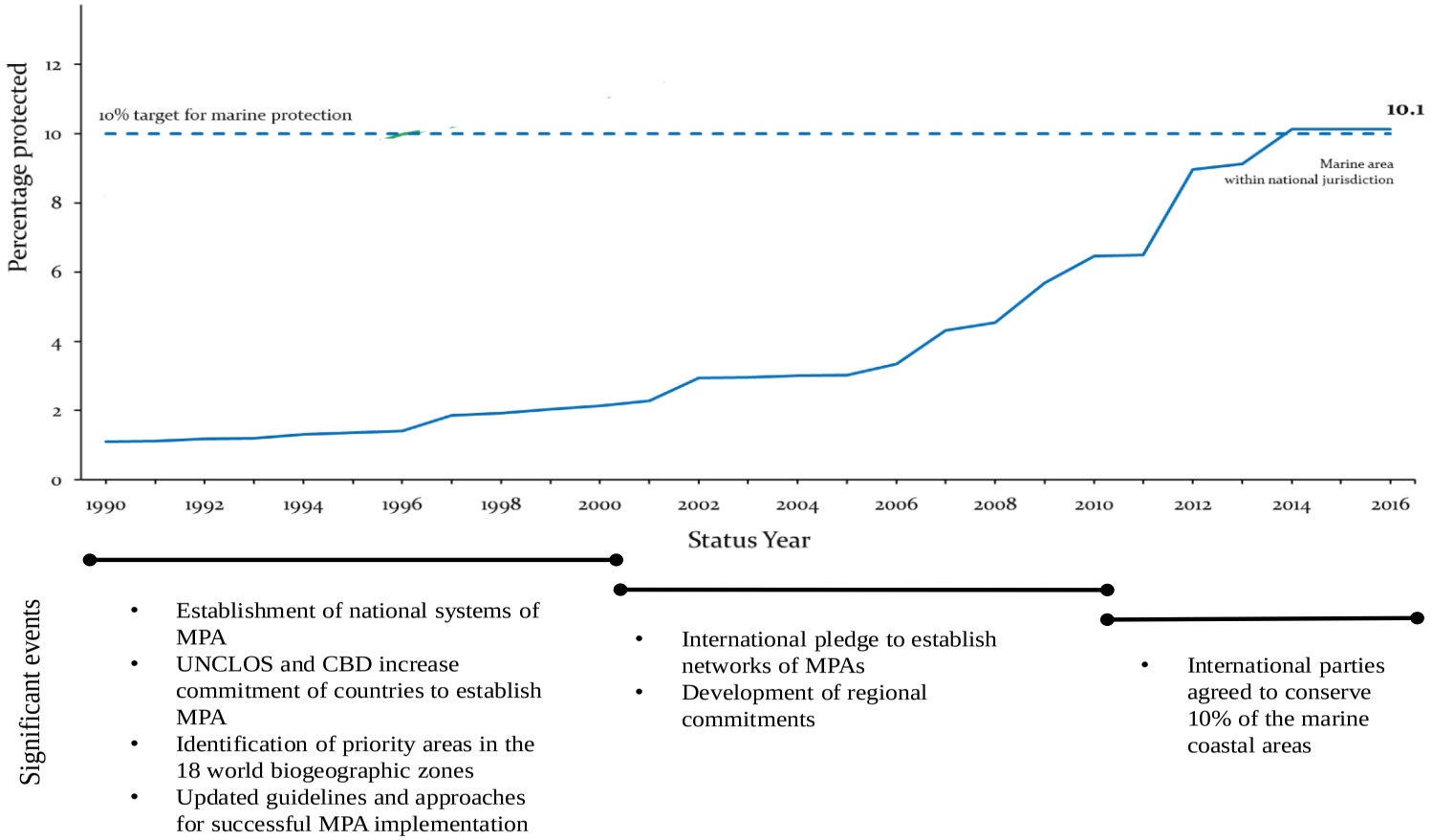


Figure 1.2. Trend in the global establishment of MPAs, 1990 – April 2016 (Source: revised and modified from IUNC and UNEP-WCMC, 2016; NRC 2001)

1.2 Benefits from and Total Economic Value of Coastal and Marine Resources

The economic value of coastal and marine resources as conserved by MPAs is generally based on the Total Economic Value (TEV) framework as shown in Figure 1.3. The calculation of the TEV of MPAs is based on the identification of its use and non-use values.

Use value measures the consumptive value (direct use value) of the natural resources (e.g. extractive: fish, shellfish, etc.; non-extractive: aesthetic benefit from the ecosystem) and non-consumptive (indirect use values) ecological and recreational uses (Samonte et al., 2016). The direct use values classified as goods were usually estimated using the net present value while the indirect use values are generally classified as services and the monetary values were estimated using variety of economic valuation techniques because this is not usually reflected in market transactions.

Non-use values are those that do not encompass direct or indirect uses of the marine ecosystem. They divulge the satisfaction that individuals derive from the knowledge that ecosystem services are preserved and other people will have right to use to them (Kolstad, 2000). Non-use values are usually divided into: *option values* (sometimes considered as use values) which is the value of preserving the area in its natural format in order to have an option to use it in the future; *existence values* which is the value of leaving an area intact for the general population; and *bequest value* which is the value of leaving an area for future generations (Becker and Choresh, 2006).

These environmental goods and services generated from the establishment of MPAs are classified as either internal or external economies. Internal economies refer to the benefits associated with the MPAs which are enjoyed by the fishers and communities who manage the area while external economies are benefits linked with the MPAs that

are relished by people other than those who manage the MPAs. Table 1.1 summarizes these benefits and classify it according to who benefit (internal or external economy) and distinguish it between use and non-use values as this connotes important information in the economic valuation of resources.

Several benefits from well-managed MPAs have been identified by Becker and Choresh (2006) such as increase production of fisheries resources, better opportunities for recreation and tourism, species diversity conservation, ecosystem services, potential gains from bio-prospecting and opportunities for education and research. By protecting the habitat through the establishment of MPAs, internal economies include enhanced fisheries production and improved biodiversity conditions which brings prospects and opportunities for ecotourism. These internal benefits increase the catch and income of fishers directly involved in the management of MPAs as well as creates alternative source of livelihood to the local community with the development of ecotourism due to improved environmental conditions. In addition to these, fishers and local residents managing the MPAs also generate other ecosystem services from the MPAs such as control of climate disasters and support to nutrient cycles among others. Meanwhile, the MPAs also provide external economies to other coastal communities, tourists and to the general population. External economies include both use and non-use values such as: spill-over effect to other fishers and recreational resources to tourists and protection from natural calamities (e.g. storms, erosions, etc.), resilience of fisheries population to environmental changes, increase capacity of the ambient environment to accept and dissipate pollutant discharges, biodiversity conservation which can be enjoyed by the entire human population.

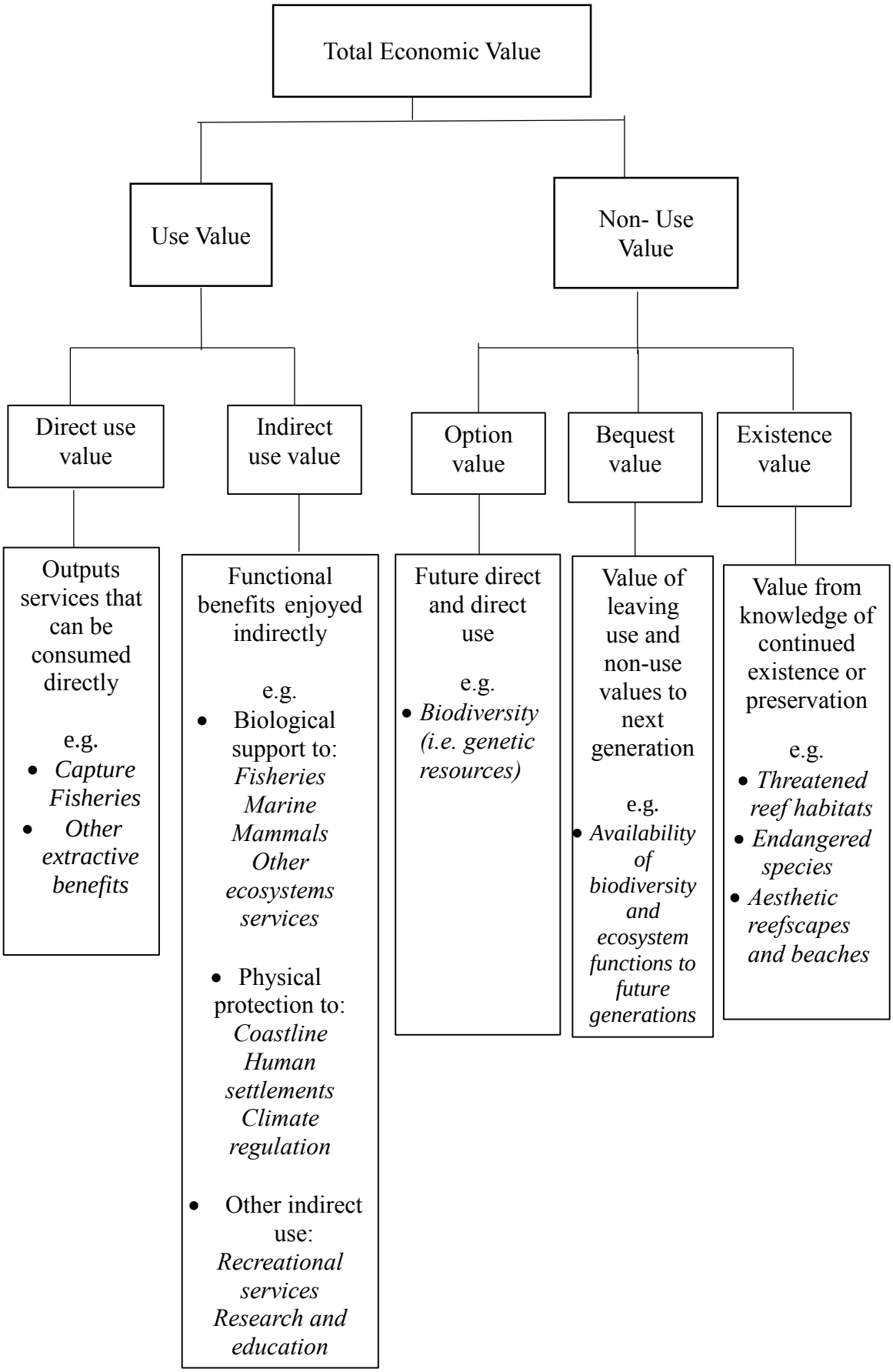


Figure 1.3 Total economic valuation framework (Adopted from Samonte et al., 2016)

Table 1.1 Classification of benefits generated from MPAs by beneficiary and economic values

Type of Benefits	Benefits	Beneficiary
I. Internal economy		community who manage the MPAs
-Use Value (direct use)	enhanced fisheries production	
-Use Value (indirect use)	recreational services; physical protection (control of climate disasters); support to nutrient cycles	
-Non-use (option value)	future personal use (e.g. biodiversity)	
-Non-use (bequest value)	recreation or nature preservation for future generation	
-Non-use (existence value)	preservation of biodiversity	
II. External economy		
-Use Value (direct use)	enhanced fisheries production by spill-over	other coastal communities
-Use Value (indirect use)	recreational services physical protection (control of climate disasters and support to nutrient cycles) research and education	tourists other coastal communities researchers
-Non-use (option value)	biodiversity conservation (genetic resource; bio-prospecting)	general population
-Non-use (bequest value)	recreation or nature preservation for future generation	general population
-Non-use (existence value)	preservation of biodiversity	general population

Classification of benefits and identification of beneficiaries are important considerations in identification appropriate approach for policy makers in instituting policies related to economic valuation of resources. For instance, imposition of user's fee can be considered for tourists while institution of tax for general population can be deliberated.

1.3 Nature of Goods and Services and its Challenges in the Establishment and Maintenance of MPAs

As the MPAs produce goods and services that are non-excludable but can be either rival or non-rival (i.e. common pool resources or public goods), challenges in the establishment and maintenance of MPAs arise. This section shows how challenges in MPAs occur due to this nature of goods and services.

1.3.1 Common Pool Resources (CPRs)

Firstly, the direct use values of marine resources is categorized as a common pool resource (CPR). A CPR is a good that is non-excludable but is rival in consumption, which means that anyone can consume the good, but once consumed by others, it will be no longer available to others (Krugman and Well, 2009). This further means that the ownership is held by all hence, it can be exploited at the individual's interest. Therefore, as CPRs are non-excludable but subtractable, these resources are subjected to continuous overexploitation which leads to degradation of resources.

The fisheries resource which was once considered as inexhaustible due to continues reproduction of fishes given an optimal conditions (renewable resources) is an example of CPR. Schaefer (1954) modelled the growth of fisheries resources as a function of fish stocks (Figure 1.4a). The growth function elaborates the mechanisms for the instability of fish population: the growth rate of stocks that keeps the propagation of the population and the carrying capacity that cause the limited growth of the population. At the initial stage, fish are not yet sexually matured so reproduction occurs slowly and so the population is still low. Upon reaching maturity, increase in stocks is observed due to the breeding process. A decline of stocks is observed once the number of population needs to compete for food and space until reaching the carrying capacity (the number of stocks

enough for the particular space) which is the stable point of the population. Figure 1.4b illustrates how Schaefer (1954) perceived to sustain the level of stocks by having a catch equal to the growth rate (point A). However, he pointed out that the maximum sustainable yield (MSY) is at the point where the maximum number of individuals that can be added to the population by natural reproduction processes (point B) which is typically half of the carrying capacity. The MSY for an assumed fish population is the highest probable catch that can be sustained over time, by ensuring the population at the level of generating maximum growth.

However, Schaefer's model does not consider the behavior of the fishers to which Dasgupta (1982) developed a dynamic model incorporating how fishers behave in an open accessed CPR. Using Figure 1.5, Dasgupta (1982) analysed the convex-concave growth function of fisheries resources embedding fishing behaviour of humans. He denotes fish stocks as *K* and assumed the fishery's growth function as:

$F(K) = -a + bK - cK^2$ if $K > 0$;

and $F(K) = 0$ if $K = 0$

where K is stocks and c is the cost (assuming a, b, c > 0)

The model also showed that cost is a major considerations in fishing, as the unit cost of harvest is an increasing function of harvest (i.e. crowding among fishermen, search cost increases) then it can be denoted as:

$c = \beta K^{-\delta} C^{\mu}$ where $\mu > 1$ and $\beta, \delta > 0$ (*C* is catch)

As the fishing activity is considered as a competitive market, free entry and exit is assumed to be a continuous process which results to zero profit at all times. Then the derivative of the total cost gives the value of the marginal cost which is equivalent to the market price in a competitive market, then price (*p*) can be specified as:

$$p = \beta K_t^{-\delta} C_t^{(\mu-1)}$$

while catch (C) can be denoted as:

$$C = \left(\frac{P}{\beta}\right)^{\frac{1}{\mu-1}} . k_t^{\delta\frac{1}{\mu-1}}$$

Then this confirms that price and stocks (biomass) can specify the level of catch. Following this and writing q = p/β, the change in the stocks over time considering human intervention (fishing activities) assuming $K_t > 0$ is:

$$dK_t/dt = (-a + bK_t - cK_t^2) - q^{1/(\mu-1)} K_t^{\delta/(\mu-1)}$$

where a, b, c, μ, δ and q are parameters of dynamic system.

Dasgupta (1982) reflected these equations in describing the effect human fishing behavior towards fish stocks (Figure 1.5). A critical value of q (named as q*) is presented such that when q = q* then the curves of the two terms in the above equation are at tangent with each other. This then described that if q > q*, then overfishing occurs and a possibility of extinction may happen while q < q* at point K** and K = 0 is the stable points, while K* is unstable. Technological advancement for fish capture and increasing number of fishers contribute to the depletion of the resources, however, if the price level or cost of extraction is relatively higher than the value of the fish or resources, then there is a limitation from the free entry of fishers.

In the case of a monopolistic market, the monopolist's profit-maximizing quantity is at the level where the marginal revenue is equal to marginal cost. As the cost function specified cost as $c = \beta K^{-\delta} C^{\mu}$, then its derivatives is $\frac{dc}{dC} = \mu\beta K^{-\delta} C^{\mu-1}$, which should be equal to p; $P = \mu\,\beta K^{-\delta} C^{\mu-1}$. Solving this equation for C, we get:

$$C = \left(\frac{P}{\mu\beta}\right)^{\frac{1}{\mu-1}} . k^{\delta\frac{1}{\mu-1}}.$$

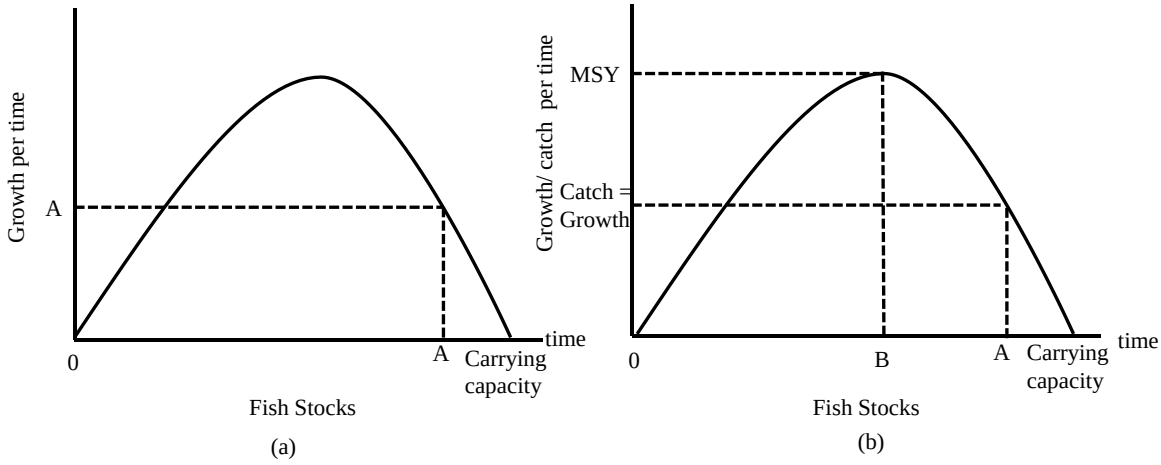


Figure 1.4. Schaefer's Model on the (a) growth function of fish and (b) concept of maximum sustainable yield

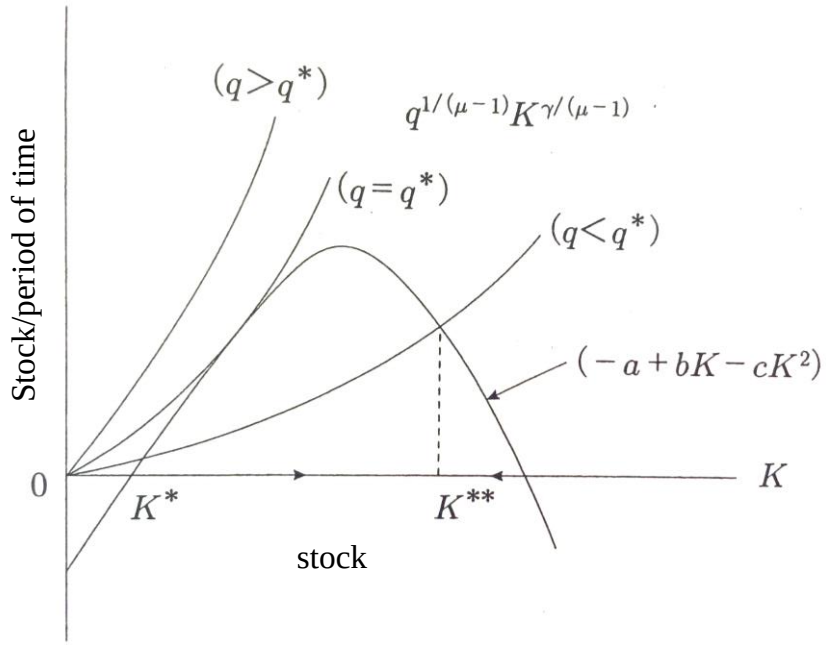


Figure 1.5. Relationship of fishing effort, total costs and fish population (Source: Dasgupta, 2011)

Because of $\mu>1$, this condition shows that a monopolistic fisher behavior curve will shift higher than that under perfect competition. It means that the monopolistic fisher behaves more conservative than that of fishers in competitive market. This further confirms that population pressure (i.e. many fishers in the competitive model compared with monopolistic) have tendency to catch more fishes and exhaust the resources.

Nevertheless, considering these human behavior, the optimal point (MSY) cannot be achieved. Though fishers aim to maximize the profit individually and separately, they failed to achieve it because of the non-cooperative management of fishery resources commonly called as "prisoners' dilemma". And since conditions under which the users of a fishery resource will cooperate is not well established, the predictable "tragedy of the commons" may occur. The phenomenon named as "tragedy of the commons" (Hardin, 1968) take place as every individual attempts to acquire the maximum benefit from the resources without considering rationally the social costs of such behaviour, thus exploiting the resources beyond its capacity to regenerate for future use.

Therefore, free riding (enjoying the use of resources without paying for its total costs) as well as the non-excludability property (anyone can consume it) of the CPR causes the difficulty in the consensus building among MPA stakeholders. Whenever an individual is not barred from the benefits that are provided by the others, the individual is not encouraged to contribute to the joint effort, but to rather free-ride on the other's effort. And as all individuals choose to free-ride, then optimum benefit cannot be achieved.

1.3.2 Public goods

On the other hand, public goods (non-use value and indirect use value) are characterized as being non-rival in consumption and non-excludable which means that anyone can enjoy the consumption of the services and the same unit of that goods or

services can be consumed by more than one person at the same time (Krugman and Well, 2009). The public goods can be enjoyed without limitations by several people at the same time, hence, sensible consumers will reasonably take a free ride on anybody who willing to pay for it. With the absence of market price, public goods are usually undervalued and is therefore inefficiently exploited (Turner et al., 1993).

As most of the external economies derived from MPAs are public goods in nature, nobody cares to use them in a sustainable manner. Because it is non- excludable, these goods suffer from free-riders and with its non-rival characteristics, it would be inefficient to collect fees from people for consuming them. Some stakeholders such as tourists and other industry players do not pay enough money for the conservation of resource. As the result, the payment for conservation is too little compared with the optimal amount.

1.4 Strategies to Address the Challenges in MPAs

As a countermeasure to the challenges brought by the nature of goods and services in the marine resources and for further development of MPAs, some strategies are suggested.

1.4.1 Strategies for CPRs

As CPRs pose problems that could lead to the "tragedy of the commons", the assignment of property rights is seen as a strategy to protect the resources against its free access nature as it create incentive to protect rather than exploit. Property rights refer to a bundle of entitlements, privilege and limitations defining the owner's rights to use the resource (Tietenberg, 2004). It is generally characterized as universal, exclusive, transferable and enforceable. Property rights provide incentive for proper use of the

resources because any deterioration in quality translates into a personal loss (Becker and Choresh, 2006).

In the case of the CPR, Hardin (1968) suggested two specific strategies: state-manage and privatization. However, Ostrom (1990) argued that neither the state nor the market can effectively enable individuals to sustain the long-term efficient use of the natural resources so she proposed another approach called management by the commons (community management).

The state-managed approach or centralized management has been the most typical governance scheme in countries with forceful and powerful national governments (Christie and White, 2007). With well-equipped laws and control system, state-management is effective in developed countries. In particular, the number of fishers or fisheries enterprises is limited, hence the state can easily impose and control regulations. Privatization or private management, on the other hand, is not normally practiced especially for natural resources, although some MPAs can be de facto privately managed (Christie and White, 2007). For instance, privately managed MPAs has been considered as a mechanism for the resource conservation in Vietnam (Svensson et al., 2009), Tanzania (Riedmiller, 2003) and Malaysia (Teh et al., 2008). All the MPAs mentioned were privately managed for tourism purposes and gaining income from the tourists which is used to finance the conservation initiatives such as monitoring and surveillance. Recently, an unusual MPA management in Bicol, Philippines is presented by Soliman et al. (2016) and referred it as hidden MPA or privately owned. It is stringently guarded and any activity is prohibited in the area. Nevertheless, the result of the assessment conducted showed the good coral cover and high fish biomass, which opened the views for the possibility of having this regime as a new way to manage the MPAs (Soliman et al., 2016).

The management by the community, as Ostrom (1990) proposed, is focused on the process of self-organization and self-governance where-in the capabilities of individuals to organize collective actions can be enhanced. She further discussed that this approach could cope with the free-riding problems, solve the predicament on the commitment of the individuals and has the ability to monitor the individual's compliance with set regulations. Therefore, this approach will be more beneficial for the less developed regions. The numerous number of individual fishers including the increasing population in the coastal areas make it difficult for the government to monitor and control, therefore, management by the commons is more appropriate. As Bromley (1991) pointed out, MPA is an example of social regulation of CPR because it is used to manage the behavior of people in the use of the marine resource.

The widespread use of community-based MPA among the less developed regions like the Philippines, has been observed after several studies which confirm its effectiveness as an MPA implementation approach (Christie and White, 1997). Whereas several studies were conducted relating on the community-based MPAs, most of it deals on the efficiency and affectivity of this approach in attaining the ecological objectives of MPAs (McClanahan et al., 2006; Weeks et al., 2010). And while the human dimensions is important in the community-based management, researches were limited to the effects of socio-economic and demographic factors on the attitudes and perceptions of fishers towards MPAs (Fernandez and Subade, 2015; Hamilton, 2012; Launio et al., 2010). Therefore, it is imperative to look on the other social dimensions of community-based management particularly on the institutional arrangements and governance that built this management approach including the relationships of the socio-economic factors that influence the participation of the community. In addition, the role of incentive programs

(e.g. livelihood projects, government subsidy) to the willingness of community to participate in resource conservation programs such as MPA management has not been evaluated.

1.4.2 Strategies for Public Goods

In the case of public goods, its characteristics (non-rivalry and non-exclusivity) make it difficult to assign property rights. Collection of fees or budgetary considerations to improve services and reduce inefficiency is therefore seen as a solution for this challenge. Concerning this issues, economic valuation is primarily essential to attain efficiency. As most of the services in the MPAs are prone to the free-riding, it is difficult for the market to attain the socially optimal level, which results to inefficiency. With this, economic valuation is used as a decision-making tool as the estimates help the policy makers to understand the contributions of a particular goods and services to the communities. The economic valuation of resources conserved by the MPAs can help identify the total benefits of conservation. Valuation studies are also vital in encouraging the government and donor organizations to invest in coastal resource conservation through MPA.

Valuation studies were generally used to generate essential information to policy makers that would facilitate necessary action for the protection of valuable marine resources in the less developed countries particularly in the Southeast (SE) Asia (Akhter and Yew, 2013). Several valuation techniques have been used to estimate values of MPAs for various policy implication in countries in SE Asia. However, most of it used tourists as respondents using stated preference approach to obtain data on their willingness to pay (WTP) (Asafu-Adyade and Tapsuwan, 2008 in Thailand; Parid et al., 2005 in Malaysia; Pham et al., 2005 in Vietnam). In the Philippines, valuation studies were used to identify

possible financial sources for marine conservation program (Subade, 2005) and mostly these researches focused on the WTP of international and domestic tourists in well-known areas in the country with developed tourism activities and excellent coral reefs such as a marine sanctuary in Mactan Island in Cebu (Arin and Kramer, 2002), Tubbataha Reef National Marine Park in Palawan (Subade, 2005) and reef ecosystems in Lingayen Gulf in Pangasinan (Cruz-Trinindad et al., 2011).

While valuation studies has been done extensively in the less developed regions, it has limited information on the valuation of the local residents in support to the existence of a community-based MPAs. The value that these locals put into the marine resources adds up to the estimation of its total economic value which is essential in setting up environmental policies. With less economic activity in the rural areas, the concept of willingness to work (WTW) is also worthy to explore. Casiwan-Launio et al. (2011) used WTW as an eliciting method in in assessing island villager's valuation on a small marine fishery reserve in San Miguel Island, Philippines. Nevertheless, the uniqueness of social and cultural characteristics of coastal villages in the country as well as the varied MPA systems contribute to the inquisitiveness to study how local residents in in other coastal areas endowed with other institutional support system (e.g. ecotourism; alternative livelihood projects) value the resources conserved by MPAs.

1.4.2.1 Economic Valuation of Non-Market Benefits of MPAs: Revealed and Stated Preference Techniques

Several economic approaches were used to express the monetary values of ecosystem goods and services. Two main techniques were used to value these goods and services – (1) indirect approach or revealed preference approach as the actual behaviour of the person is considered in estimating the value and (2) direct approach or stated

preference as the respondent state their preference on the services or goods being valued (Becker and Choresh, 2006).

Economic value is a measure of what the maximum amount an individual is willing to forego in other goods and services in order to obtain some good, services or state of the world (Lipton et al., 1995). As the value is measured as trade-offs, it is therefore relative to the human preferences. Non-market benefits are goods that do not have observable market prices. Non-market goods can also be valued based on information provided by the market transactions for related products (e.g. recreational value by travel expenses). These measure of benefit and cost underlie the concept of economic efficiency. Economic efficiency rests on the theories of welfare economics and if money is used as the standard to measure welfare, the measure of benefit is willingness to pay (WTP) to secure that benefit, or willingness to accept (WTA) to forego the same (Bateman et al., 2002).

Non-market valuation techniques are used to estimate the welfare benefits accruing from the use and non-use of natural resources. Since the values of environmental services are not usually revealed in market transactions, non-market valuation techniques are used to measure their true economic values and to uphold efficiency. Figure 1.6 summarizes the methods used in non-market environmental valuation. Use values relate to traceable economic behavioral trail, so they can be estimated using revealed preference (RP) techniques while non-use values have no clear behavioral footprints and data were derived from what people state when directly asked to declare their choice hence these values can be estimated using stated preference (SP) techniques (Cruz et al., 2014). The SP methods uncover the economic values attached to non-marketed goods or services by asking people what economic value they attach to those goods or services while the RP

techniques use information among markets that are associated with good or service that is being evaluated (Bateman et al., 2002). Among the RP methods, the travel cost method (TCM) is the most widely used while the contingent valuation (CV) is the most well-known among the SP methods (Cruz et al., 2014). These two techniques were used to estimate the non-market values of MPAs in Cagayan Province. The CV was used to evaluate the indirect and non-use values generated by MPAs to the local community while TCM was used to estimate the recreational services of an MPA to tourists.

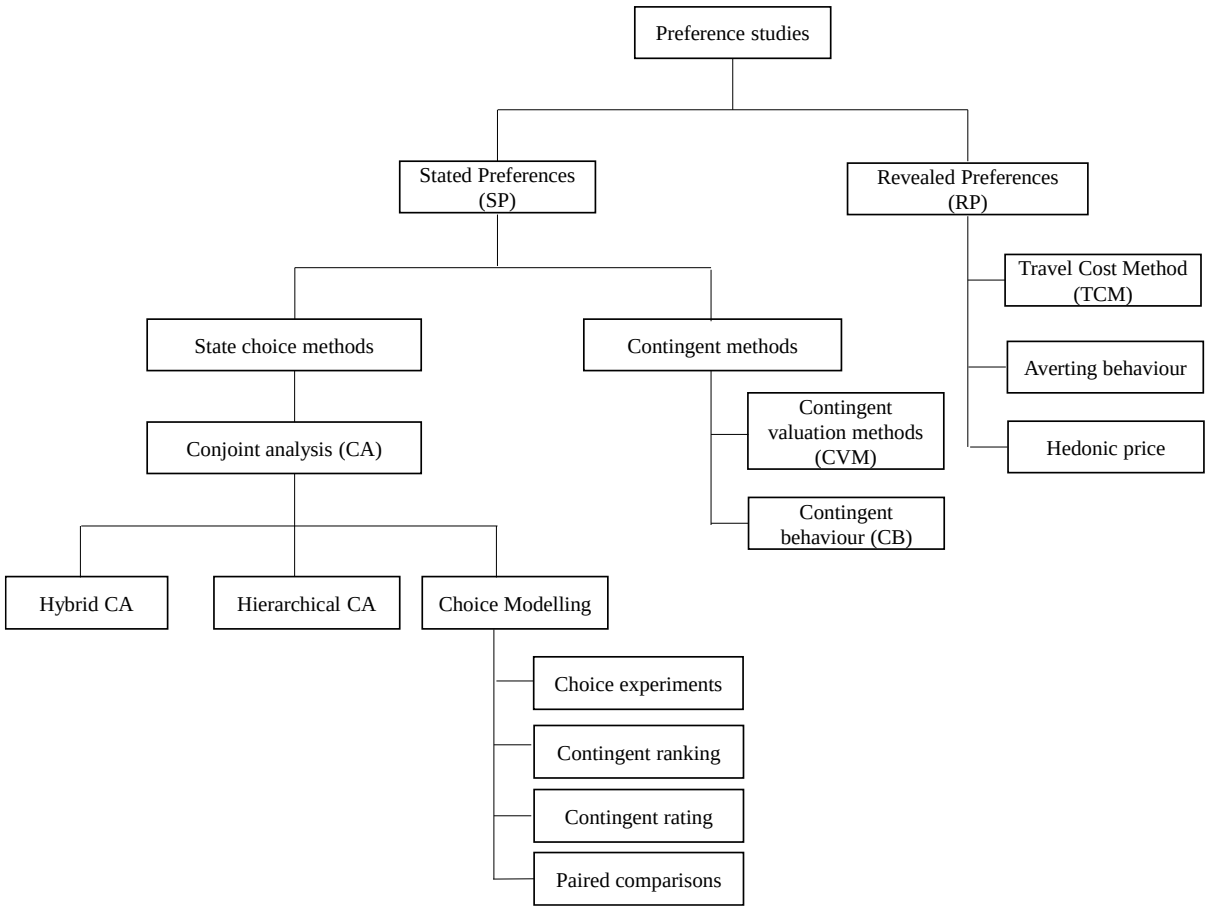


Figure 1.6. Non-market environmental valuation techniques (Source: Cruz et al., 2014 as adopted from Alriksson and Oberg, 2008)

1.5 Theme of this dissertation

To provide further approaches and to address the challenges in the coastal resource management, specifically on the use of community-based management and budgetary considerations, this dissertation focused on analysing the functionality and sustainability of MPAs by clarifying the actual conditions of the coastal communities and coastal resource management policies as well as interactions among villagers, public institutions and other stakeholders through the following pillars:

(1) Examination of the institutional mechanisms in the establishment of MPAs.

(2) Identification of the factors that influence the involvement of the local residents in the conservation initiatives through MPAs.

(3) Evaluation of externality and examination of practical methods for its internalization.

1.6 Selection of Study Site

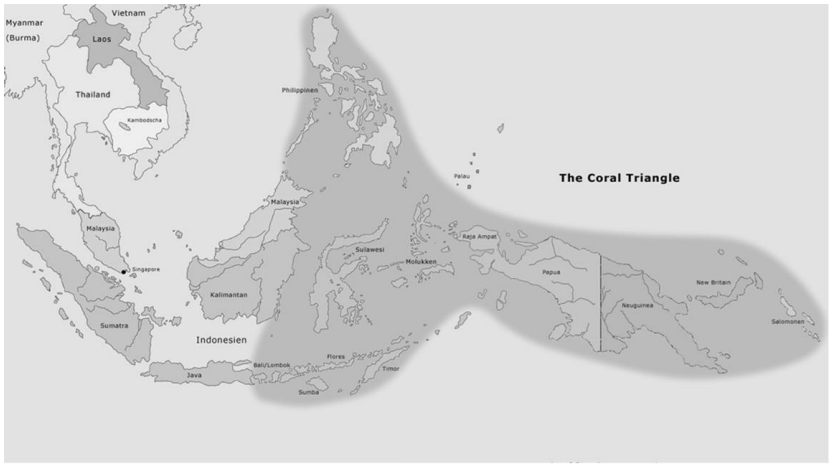
As this research put emphasis on the less developed regions, appropriate site was carefully chosen to study the mentioned pillars. The SE Asia was considered because of the existence of the hot biodiversity spots in the region. Among the countries in the SE Asia, the Philippines was selected due to its vast experiences in MPAs. From there, the Cagayan Province was chosen as the MPAs in the province is relatively new compared with other areas in the country, hence, not yet well studied. The study site is anticipated to represent a typical MPA to which the less developed regions of similar structure may draw reference to and gain experience with.

1.6.1. MPAs in the SE Asia

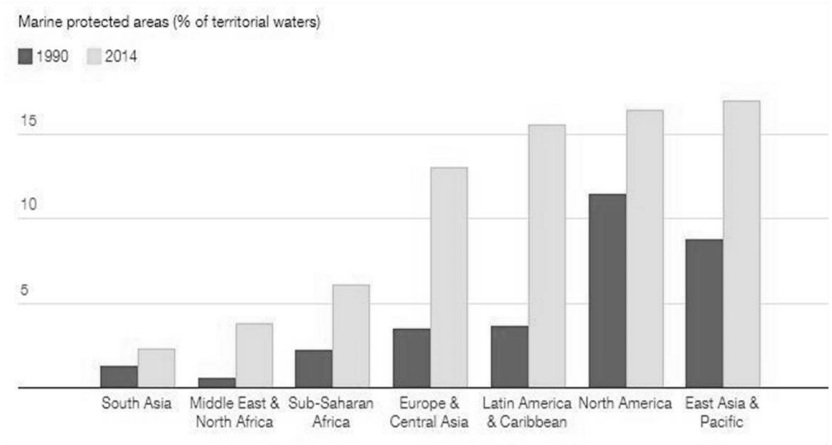
The SE Asia, composed of less developed countries, contains some of the most extensive coastlines and diverse coral reefs in the world but likewise the most highly threatened. This region is home to countries (Indonesia, Malaysia and Philippines) that are part of the Coral Triangle (Figure 1.7a), a marine area known as the global center of marine biodiversity and therefore a main concern for protection (Allen, 2007).

The World Development Indicators as cited by Brumnett and Pinlea (2016) illustrate the progressive increase of MPAs in all the regions of the world in the last two decades with the East Asia (which includes many countries of the SE Asia) and the Pacific regions having the highest share of MPAs (Figure 1.7b). The increase of MPAs in this region confirmed a growing consciousness on the need to deal with the increasing threats which lead to the degradation of the coastal and marine resources.

In the evaluation of the MPA coverage among the countries in the SE Asia, the Philippines has the longest official MPA listings (includes only MPA with substantial marine areas) with a total of 180 declared MPAs compared with Brunei (6), Malaysia (40), Indonesia (29), Singapore (2), Thailand (23), Vietnam (22), Cambodia (4) and Myanmar (4) (UP-MSI et al., 2002). This can be attributed to the long history of MPA in the Philippines and in addition to the fact that the country sits at the heart of the Coral Triangle and is considered as the center of the center of marine shore fish biodiversity where the highest concentration of species per unit area was observed (Carpenter and Springer, 2005) hence the prevalence of MPAs in the country is essential for resource conservation.



(a)



(b)

Figure 1.7 (a) Countries in the Southeast area and imposing the coral triangle area (Source: https://www.dive-videos.com/en/archive/biodiversity-coral-triangle-indonesia); (b) Comparative number of established MPAs (1990 and 2014) in the different regions of the world (Source: World Economic Forum, World Bank as cited in Brumnett and Pinlea, 2016)

1.6.2. MPAs in the Philippines: History and Structure

The unique and valuable biodiversity of the Philippines as well as the high vulnerability of its resources, contributes to the long experience of the country in MPA development. Figure 1.8 demonstrates the substantial increase in the cumulative number of MPAs established in the country. The expansion of MPAs is due to the strong interest

shown by the national government agencies (NGAs), local government units (LGUs), non-government organizations (NGOs) and funding institutions as well as to the innovations of coastal resource management thriving in the country (White et al., 2002).

From 1930s to 1970s, declaring fish sanctuaries and reserves was largely centralized at the national level and the first MPA established in the country was the Hundred Islands National Park in 1940 to preserve its pristine state (Alcala, 1988). With the escalation of marine habitat degradation in the 1970s to 1980s, a number of marine scientists recognized the need to improve fisheries management and accelerate the establishment of locally managed MPAs. As a consequence, municipal marine sanctuaries under community-based approaches were established in 1974 (Sumilon Island Marine Sanctuary) and in 1984 (Apo Island Marine Reserve) (Alcala, 1988; Alcala and Russ, 2006).

The devolution of authority from central to local governments as contained in the Local Government Code of 1991 as well as the presence of series of donor-assisted non-government organizations (e.g. Coastal Environment Program, Fisheries Sector Program, etc.) were the major forces that influenced the early proliferation of MPAs (White et al., 2002). In addition, the enactment of the National Integrated Protected Areas System (NIPAS) Act in 1992 and the Fisheries Code in 1998 made provisions for the establishment of MPAs. From that time onwards, MPAs were established in almost all coastal areas of the country with various institutional arrangements depending on its suitability in the area. The Philippine MPA database recently recorded a total of 1,800 MPAs in the country (Cabral et al., 2014).

In the Philippines, MPAs can be classified into two governance levels: nationally established MPAs and locally established MPAs and takes four forms: (1) marine

sanctuary or no-take zone, where all forms of extractive activities are prohibited; (2) marine reserve, where extractive and non-extractive activities are regulated; (3) marine parks, where uses are designated into zones; and (4) protected landscape and seascape, where protection may include terrestrial resources (Miclat and Ingles, 2004 as cited in Cabral et al., 2014). A typical MPA model in the country is a marine reserve with a no-take zone There are 33 national MPAs in the country, covering an area of 1,706,141 ha and 1,620 locally-managed MPAs covering an area of 393,994 ha (CTI-CFF, 2013).

Despite the widespread establishment of MPAs, works undertaken to evaluate the systems and approaches of MPA development and management, particularly focusing on the social and economic implications of MPA as conservation initiatives is lesser compared with ecological perspectives. Most of the studies conducted in the Philippines focused on the marine biogeographic region with the highest concentration of MPAs such as in the Visayan Sea and Southern Philippines (Pollnac et al., 2001; Samonte et al., 2016)

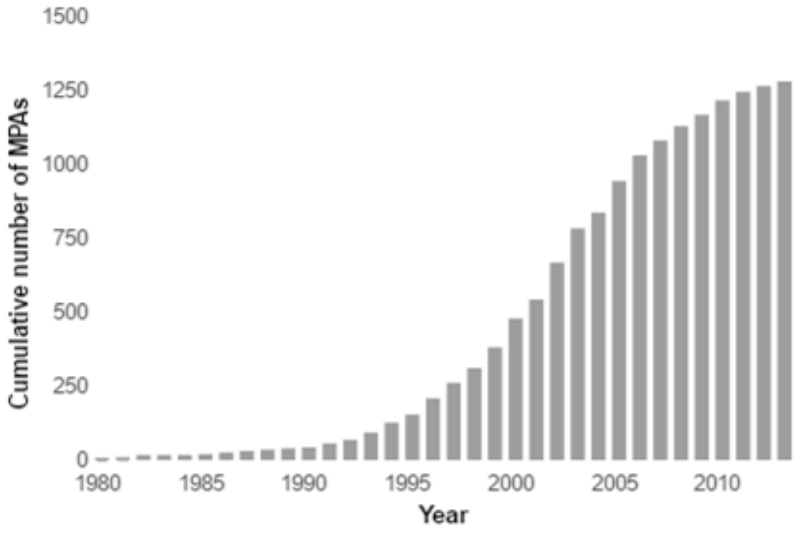


Figure 1.8. Cumulative number of MPAs in the Philippines (Source: MPA Support Network, 2014)

or on large-sized MPAs such as the Tubbataha Reef National Park, Apo Reef Natural Park and Siargao Protected Landscape and Seascape (Weeks et al., 2010; WWF Philippines, 2006).

1.6.3. Study Site: Cagayan, Philippines

To generate information on MPAs at the other key biodiversity areas which primarily focus on the social and economic aspects, this study takes the case of a province along the Northern Philippine Bioregion and is situated in the Babuyan Marine Corridor – the Cagayan Province (Figure 1.9). In addition, the coastal areas of the province are located along the flow of the Kuroshio Current, which is known to contain some of the country's most diverse ecosystems enriched by nutrients leached from the land (Ayson and Encarnacion, 2008).

With a coastline of 636 km, the province's northern coast faced the Babuyan Channel and the Philippine Sea (Pacific Ocean) is on its eastern coast which are the major fishing grounds in the province. Cagayan Province is the major fish producer in the northern Philippines from its marine municipal (fishing within the municipal waters up to 15km from the coastlines) and commercial fisheries (fishing beyond 15km) which translates to a value of ₱1.4B and ₱891M respectively in 2014 (PSA, 2015). However, like any coastal area in the country, declining tendency of coastal productivities which is due mainly to environmental degradation and indiscriminate fishing is occurring in the province. With this, community-based MPAs were established under the support of the LGUs and is managed by the community-level fisherfolk organizations.

MPAs in Cagayan, particularly those that were locally-established were relatively new (operations started in 2007) compared with other areas in the country, for instance, in the Visayas Provinces (e.g. Bohol, Cebu, Leyte, Negros, etc.) which started in the mid-

1970s and exponentially grew from 1985 to 2005 (Alcala et al., 2008). In addition, most of the households in the coastal areas of Cagayan Province directly use the marine waters to fish for subsistence. With the benefits obtained from these resources, it is essential to ensure the sustainability of resources to maintain its use in perpetuity and evaluate how local residents value the resources conserved by MPAs. While the establishment of MPAs helps enhance sustainability of resources, the implementation of MPAs which limits the fishing activities may cause deprivation on fishing opportunities for generating a daily income among the communities. The interaction of factors that may influence this situation is another key reason to study the dynamics of MPA implementation in the province.

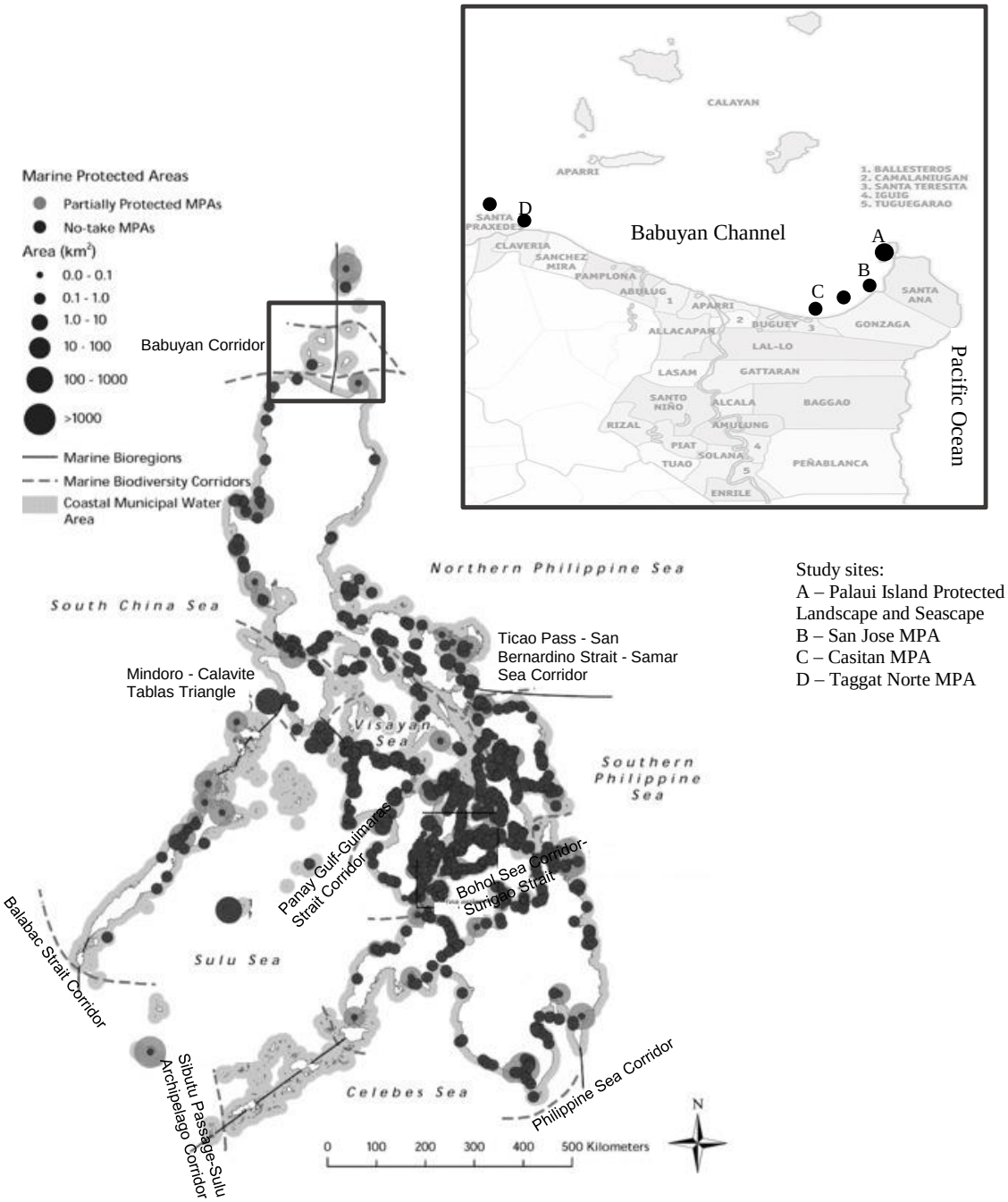


Figure 1.9. Distribution of MPAs in the Philippines showing the marine bioregions and corridors as identified by Ong et al. (2002) highlighting the location of Cagayan Province and its MPAs (Source: adopted and modified from Weeks et al., 2010)

1.7 Dissertation Outline

This thesis contains the empirical studies conducted in relation to the theme of this dissertation. It is arranged as follows:

Chapter 2 introduces the MPAs in the study site. By means of document analysis and key informant interviews, the institutional arrangements and developmental processes in MPA establishment, management structures, institutional support and MPAs' management problems and issues were examined.

Chapter 3 presents the livelihood structure and socio-economic characteristics of villagers within the MPAs. By conducting a randomized household survey, details on the social and economic status of the study sites were examined. The knowledge on the purpose and awareness on the presence of MPA as well as the factors that affect the participation of villagers on MPA management were analysed.

Chapter 4 shows how the marine resource conservation and protection is valued from the perspectives of the villagers. The willingness of the local residents to pay or work for the continued existence of the MPA was measured using stated preference techniques and the factors that influence their acceptance of the proposed bid were determined.

Chapter 5 contains the recreational value of an MPA with flourishing ecotourism activity from the perspectives of the local tourists. The revealed preference method supplemented with Contingent Behavior was explored to estimate the consumer surplus and the demand functions.

Chapter 6 reflects on the case studies conducted and draws out its contributions to the expanding literature on MPA management using the cases of the study sites. Policy recommendations and potential future undertakings were also discussed.

Chapter 2: Governance and Institutional Mechanisms of Marine Protected Area Establishment and Management in Cagayan Province, Philippines[1]

2.1 Introduction

For the reason that MPAs are protecting and conserving goods and services which are categorically characterized as common resources and public goods, it is important that rules and policies are well-developed and institutionalized among all the stakeholders in the protected areas. To realize the success of MPA development and management, convergence of institutional interests among resource users, stakeholders, community residents, LGUs, NGAs and other external agents (e.g. academe, NGOs, international organizations) is important (Pomeroy et al., 2007). MPAs, therefore, require effective governance and well-functioning management institutions for it to be ecologically and socially successful (Charles, 2004).

In the Philippines, national policies and laws provide jurisdictions for coastal management. It is within this legal framework that LGUs and NGAs exercise powers and assume responsibility pursuant to their mandates under the law. The power to establish and manage MPAs is held by three authorities - LGUs as mandated by the Local Government Code (LGC) of 1991, Department of Environment and Natural Resources (DENR) by virtue of the NIPAS Act of 1992 and the Bureau of Fisheries and Aquatic Resources (BFAR) as specified in the Fisheries Code of 1998 (White et al., 2006). Under the NIPAS Act, the DENR is mandated to establish national MPAs while the LGC authorized the municipalities or cities to exercise management powers and responsibilities over their 15-km municipal waters. The BFAR assists the LGUs in

[1] Parts of this chapter were contributed by the author and published in the Kuroshio Science Journal (Ballad and Shinbo, 2016)

establishing their MPAs as the Fisheries Code stipulates that at least 15% of coastal municipal waters are to be protected within no-take MPAs.

While there is an existing framework in the establishment of MPAs in the country, the uniqueness of each coastal area contribute to the various ways of instituting a protected area which follows a particular process. The mechanism of institutional progressions in MPA establishment shaped its management structures and strategies as well as the advancement of its management plans. However, these institutional arrangements involved in the course of establishment and operations of MPAs were not given much attention. Considering the increasing popularity of MPA as a key instrument in coastal resource management, there is a need to gather enormous data from practices of several MPAs to add to the expansion of enhanced models that will warrant its realization. Hence, this study reviewed and examined the governance and mechanisms of MPA establishment and management in the Cagayan province, focusing on how institutional conditions influence its implementation.

2.2 Methodology

A site survey was conducted in August 2014 to gather primary data and to get an overview of the MPAs in Cagayan, a province in the northern part of the Philippines. The Integrated Coastal Resource Management Program (ICRMP) -MPA Database recorded 6 MPAs (Figure 2.1) along the coast of the mainland Cagayan Province, facing the Babuyan Channel. These MPAs are: Palaui Island Protected Landscape and Seascape (PIPLS) in the municipality of Sta. Ana; San Jose MPA, Tapel MPA and Casitan MPA in Gonzaga; Taggat Norte MPA in Claveria and San Juan-Macatel MPA in Sta. Praxedes.

Further, key informant interviews were conducted in March and September 2015 to substantially collect in-depth information on the locally established MPAs. The key informants, consisted of village council members, officers of fisherfolk associations, *bantay dagat*[2] (sea guards) and technical employees of the Municipal Agriculture Office (MAO), provided significant information on the establishment and current status of MPAs, village economy and interactions within the community. Aside from the key sources from the villages who verified the initial data gathered, representatives from the Provincial Agriculture Office (PAO) and BFAR confirmed the facts and enriched the data collected.

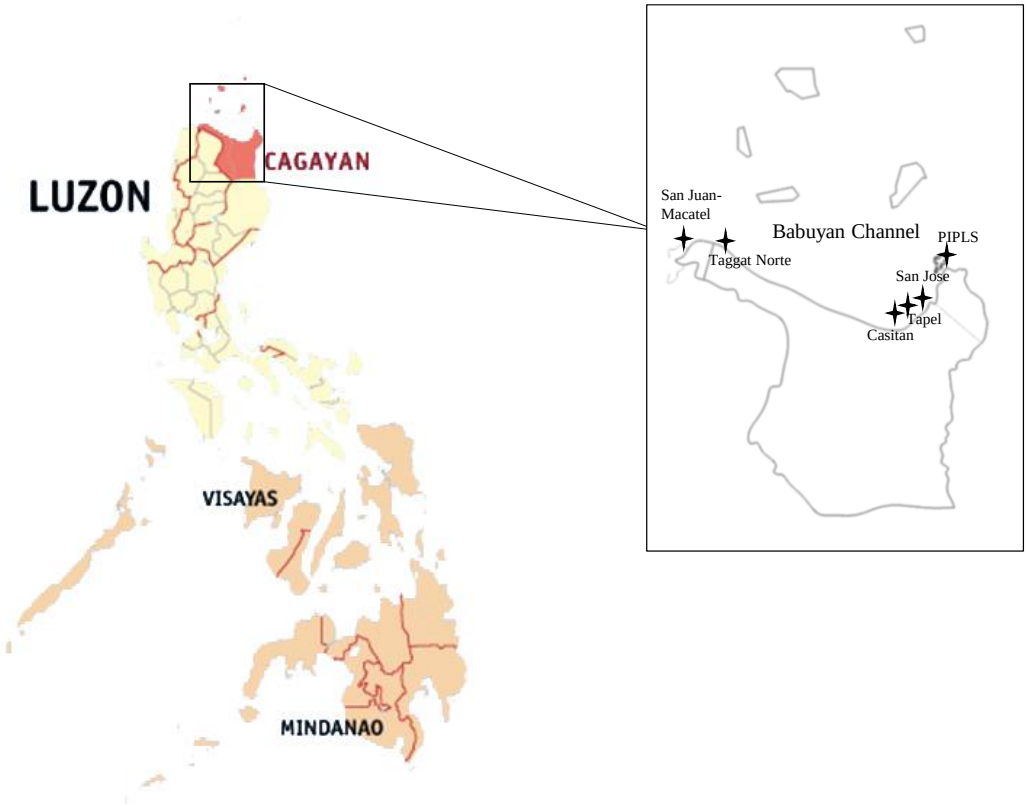


Figure 2.1. Location of Cagayan Province in the Philippines showing the distribution of the six MPAs

[2] *Bantay dagat* existed in the country since 1970s and is a participatory approach designed for coastal law enforcement (Gesellschaft fur Technische Zusammenarbeit (GTZ) 2003 as cited in Rosales, 2009).

Subsequently, key informant interviews with major stakeholders of PIPLS, a nationally-established MPA, were conducted in March and September 2016. Representatives from the Protected Area Management Board (PAMB) such as the DENR, BFAR, Cagayan Economic Zone Authority (CEZA), village council members, Peoples Organizations (Palaui Environmental Protectors Association (PEPA), Palaui-San Vicente Motorboat Association (PASAMOBA), Sta. Ana Motorboat Association (SAMOBA) and Indigenous People (IP) – Agta Daket) and vital departments of the Municipal Office (Municipal Environment and Natural Resources Office (MENRO) and Municipal Tourism Office (MTO)) acted as the key informants.

Examination of documents such as municipal ordinances, MPA Management Plans, tourists' information sheets and other technical reports were also done to enhance the accuracy of information. Further, this study takes the case of locally-established MPAs (San Jose MPA, Casitan MPA and Taggat Norte MPA) and a nationally-established MPA (PIPLS) to provide comprehensive and in-depth analysis of the developmental processes and institutional arrangements in MPA establishment in the province.

2.3 Results and Discussions

2.3.1 Marine Protected Areas in Cagayan Province

The specific details of the six MPAs along the coast of the mainland Cagayan Province were presented in Table 2.1. With the purpose of preserving and conserving the marine biodiversity, the PIPLS was the first MPA established in the province in 1994 under the NIPAS Act. After the approval of the Philippine Fisheries Code in 1998, the municipality of Gonzaga created its Basic Municipal Fisheries Ordinance in 1999. The

municipal ordinance identified portions of the coastal areas of San Jose and Casitan to be part of the 15% municipal waters intended for reserves and sanctuary as part of the municipality's coastal resource management initiative. This is the outset of the locally-

Table 2.1. Profile of marine protected areas along the coast of mainland Cagayan Province

Parameters	Nationally-established MPA	Locally-established MPAs				
	PIPLS	Casitan MPA	San Jose MPA	Tapel MPA	Taggat Norte MPA	San Juan Macatel MPA[a]
Municipality	Sta. Ana	Gonzaga	Gonzaga	Gonzaga	Claveria	Sta. Praxedes
Village	San Vicente	Casitan	San Jose	Tapel	Taggat Norte	San Juan Macatel
Coast line of the village[b] (km)	30.56[c]	2.8	13.9	2.7	1.27	15
Land Area of the village[d] (ha)	4,139	949	9,914	1,352	786	9886
Number of Households	841[e]	171[f]	256[f]	531[f]	363[g]	139[f]
Total Population	4,201[e]	745[f]	1391[f]	2423[f]	1269[g]	601[f]
Total Area of the MPA (ha)	2,740	146	342	447	903	402
Sanctuary (S)	100	42	72	97	21	19
Reserve (R)	2,640	104	270	350	882	383
S:R Ratio	4:96	29:71	21:79	22:78	2:98	4:96
Year Established	1994	1999	1999	2010	2011	2011
Management regime	Co-managed (Top-down)	Co-managed (Bottom-up)				

[a] MPA encompasses two villages
[b] Data from respective MPA Management Plan
[c] Costaline of Palaui Island
[d] Data from respective Municipal Coastal Environment Profile
[e] Data from 2010 Village Census
[f] Data from 2011 Management Plans
[g] Data from 2014 Village Census

established MPAs in the province which continued until 2011. However, the implementation of these MPAs started only in 2007 upon the initiation of the ICRMP. The ICRMP is a six-year project implemented by the DENR, BFAR and LGUs. The province of Cagayan was one of the areas covered by this project, which includes the provinces of Zambales, Romblon, Masbate, Cebu, Siquijor, and Davao Oriental. With the ICRMP, funds became available for the implementation of activities that focused on the sustainable management of coastal resources and increasing the income of the coastal communities.

All the MPAs in Cagayan province followed the common MPA model established in the country which consist of a marine reserve and a sanctuary (no-take zone). The sizes of MPAs in the province vary considerably depending on the technical feasibility as well as on the community acceptance. Since several of the households depends on fishing, either as a primary or secondary source of income, identifying the area of reserves and sanctuaries takes a careful deliberation at the community consultation during the planning stage. The extent of the sanctuaries in the provinces ranges from 2 to 29% of the total area of the MPAs. While the other MPAs have a small fraction of sanctuary in its design (2 - 4%), the municipality of Gonzaga maintains at least 20% of sanctuary in all of its three protected areas.

2.3.2 Governance Level and Developmental Processes of MPA Establishment

The MPA establishment in Cagayan province is classified into two categories according to governance level – (a) nationally-established and (b) locally-established (Table 2.2). As the PIPLS is declared under the national level, the local government losses exclusive jurisdiction in the area and the management responsibility is transferred to the 15-agency member multi-sectoral PAMB headed by the DENR. To avoid confusion, the

DENR does not use the term MPAs, but these are rather recognized under the "protected landscape/seascape" category created by NIPAS Act (La Viña et al., 2010). Locally-established MPAs such as San Jose, Casitan and Taggat Norte, are relatively small MPAs, managed by fisherfolk associations and supported by the LGUs as part of their mandate under the LGC and the Fisheries Code of the Philippines.

To finance the projects within the PIPLS, a trust fund known as Integrated Protected Areas Fund (IPAF) was created in 2013 which comes from the income generated from the user fee of ₱50 per tourist (US$1 = ₱ 49.7 average exchange rate in January 2017 (BSP, 2017)). The IPAF is managed by the PAMB and is allocated to projects that were approved by the board members during their meetings. From this, 75% of the revenue generated is used for the development and maintenance of the PIPLS (e.g. setting up of the visitor's information center; comfort room for tourists in the island) while the 25% is contributed to the national fund to support other protected areas that do not generate revenues for its operation. In addition, the LGU instituted an ecosystem fee of ₱ 20 per tourist (US$ 0.40) in 2015, of which 40% are turned over to the village council and 60% to the LGU for instituting projects in the PIPLS. Considering that the PIPLS is still in the initial stages of self-sufficiency, its revenue is relatively low compared with the other protected areas in the country such as Apo Island Protected Landscape and Seascape which generated a total revenue of ₱ 21,693,274 (US$ 487,818; US$1 = ₱ 44.47 average exchange rate in 2008 (BSP, 2008)) as of December 2008 (DENR, 2009). To supplement the funds for PIPLS, an annual budget is released by the Biodiversity Management Bureau of the DENR based on the project proposals which are primarily focused on habitat assessment, management and protection and ecotourism development.

Table 2.2. Comparison between marine protected areas proclaimed by the national and local governments in Cagayan Province

Parameters	Nationally-established MPA (Palaui Island Protected Landscape and Seascape)	Locally-established MPA (San Jose MPA, Casitan MPA and Taggat Norte MPA)
National policy	National Integrated Protected Area System Act of 1992 (RA 7586)	Local Government Code of 1991 (RA 7160) and Fisheries Code of 1998 (RA 8550)
Legal basis for the establishment of the MPA	Congressional Act (Presidential Proclamation 447)	Municipal Ordinance (Municipal Ordinance No. 9 s.1999 for San Jose and Casitan; Municipal Ordinance No. 04 s. 2011 for Taggat Norte)
Management body	Protected Area Management Board (PAMB) composed of 15 members with Department of Environment and Natural Resources as Chairperson	Organized Fisherfolk Association (San Jose Fisherfolk Association - San Jose MPA; Casitan MPA Development Association - Casitan MPA; Taggat Norte Fisherfolk Association - Taggat Norte MPA) in collaboration with the Local Government
Funding	Biodiversity Management Bureau (DENR)-annual budget for the assessment, management and protection, ecotourism development Integrated Protected Areas Fund (IPAF)	Appropriation from LGU (e.g. 50,000 – ₱150,000 ($1000-3000) annually)

For the locally-established MPAs, the LGUs appropriate an annual budget ranging from ₱50,000 –150,000 ($1000-3000) to cover the expenses for the maintenance, monitoring and patrolling of the MPAs. In the case of San Jose and Casitan, the LGU provided a patrol boat and allotment for fuel as well as the necessary amenities (e.g. binoculars, flashlights) for the regular surveillance in the area. In addition to these provisions, members from Taggat Norte receives a petty communication allowance for the reporting of illegal fishing activities in the area.

In terms of the developmental processes of MPA establishment, the nationally-established differs from the locally-established MPAs. The PIPLS was declared as a national protected area by reason of its unique physical and biological significance and to enhance its biological diversity by protecting it against destructive human exploitation. As one of the 33 MPAs proclaimed by the national government (Dizon et al., 2013), the PIPLS undergo phases of establishment prior to its proclamation in 1994. The developmental process for its establishment was patterned on the procedures as embodied in the NIPAS Act: (1) compilation of maps and technical description of the protected area by the DENR; (2) initial screening of documents and area; (3) public notification by the DENR to stakeholders through publication in a newspaper of general circulation; (4) initial consultation with the stakeholders; (5) census and registration of protected area occupants; (6) resource profiling for protected area sustainability assessment; (7) initial protected area management plan prepared by stakeholders headed by DENR; (8) public hearing organized by DENR; (9) regional review and recommendation by the Regional NIPAS Review Committee; (10) national review and recommendation by the National NIPAS Review Committee and finally (11) presidential proclamation (as decided by the Philippine President) upon receipt of the DENR recommendation and supporting documents. By the virtue of Presidential Proclamation 447, the Palaui Island was declared as protected landscape and seascape in August 16, 1994. The entire protected area, including the terrestrial part, measures a total of 7,416 ha. However, an additional procedure for fully legitimizing the MPA is through a congressional act which the PAMB is still working on up to this point in time. Demarcation of the area is also undergoing as part of the final process.

In the case of locally-established MPAs, the LGUs take active part in the MPA establishment in their respective municipalities. Table 2.3 shows the milestones in MPA developmental processes of San Jose and Casitan MPAs. All locally-established MPAs in the province followed almost the same pattern of MPA establishment which is LGU-initiated and highly supported by the NGAs particularly BFAR and DENR. The flow of activities in the locally-established MPAs in Cagayan is generally divided into three steps: (1) legitimization; (2) conceptualization and preparation and (3) implementation. The LGUs start the process through a municipal ordinance in consultation with the community. Upon declaration of the area as an MPA, the conceptualization phase was undertaken to ensure wider participation, involvement, awareness and understanding of the community. Stakeholders were trained and prepared for the implementation of the MPA. In addition, alternative livelihood projects were introduced in response to the short-term negative impact of less fishing grounds due to the conception of the sanctuary. The last phase is the implementation where the MPA is already launched. Guided by the MPA management plans, several activities for the operations of MPAs such as monitoring and patrolling are being undertaken. Livelihood projects were also continuously established during the early stage of MPA implementation.

Table 2.3 Timeline showing the milestones in San Jose and Casitan MPA developmental process

Year	Highlights of Events	Remarks
1st step:	**Legitimization**	
1999	Passage of Municipal Ordinance declaring the MPAs	Section 50 of Basic Municipal Ordinance of Gonzaga (Municipal Ordinance No. 9, s. 1999) declared portion municipal water in San Jose and Casitan as marine reserve
2002	Validation of coral reef and reef fishes resources in San Jose	Conducted by DENR and identified Matara Reef to have a good coral reef cover
2004	Conduct of PCRA	Carried out by DENR in both villages
2nd step:	**Conceptualization and Preparation**	
2007	Consultative meeting with the community and Organization of Fisherfolk Association	Executed by the PAO under their CRM Program (SJ - March; C - June)
	Training on MPA Establishment and Management	Implemented by PAO with 82 participants in San Jose and 57 in Casitan (SJ - March; C - July)
	Validation of boundary of municipal fish sanctuary and reserve/ Assessment and delineation of the MPAs	Carried out by PAO, DENR, BFAR and LGU; realized smaller and manageable area compared with the coordinates in the Municipal Ordinance (SJ - March; C - July)
	Fishery Law Enforcement Training and deputation of members as fish wardens	Conducted by BFAR and deputized 47 and 54 fish wardens from San Jose and Casitan respectively (SJ - May; C - August)
	Awarding of Livelihood projects (1):	
	Payao	40 units artificial reef modules and 2 units payao to both villages (SJ - June; C - October)
	Mushroom Culture	1 mushroom house with 2 units seedling beds to both villages (SJ - August; C - March 2008)

con't: Table 2.3 Timeline showing the milestones in San Jose and Casitan MPA developmental process

Year	Highlights of Events	Remarks
3rd step:	**Implementation**	
2007	Launching of MPA Project	MPA signboards are likewise installed in both villages
2008 - 2009	Validation of resources through PCRA	Conducted by BFAR under its ICRM Program (SJ - October; C - 2009)
2010	Conduct of Rapid Underwater Assessment	Carried out by DENR, BFAR and LGU (SJ has 45.5% live coran cover; Casitan has 38%)
	Awarding of Patrol Boats	1 unit is awarded to each village for MPA monitoring and surveillance
2010	Awarding of Livelihood Projects (2):	
	Seaweed Culture	Provided by BFAR to SJ
	Fish Trap	Provided by BFAR to SJ
2011	Ecotourism: Reef Discovery	Provided by DENR to SJ
	Ecotourism: Nature Village	Provided by LGU to SJ
	Formulation and adoption of MPA Management Plan	SJ - Resolution No. 226 -2011; C - Resolution 227 - 2011
	Awarding of Livelihood Projects (3):	
2012	Lying-in cage culture of sea urchin and lobster	Provided by BFAR to both villages
	Fish Paste Production and Fish Trading Project	Provided by BFAR and DENR to SJ
	Hog Raising and Fattening	Provided by BFAR to Casitan
2013	Culture of sea cucumber	Provided by DENR to Casitan
2014	Abalone and oyster culture	Provided by BFAR and DENR to SJFA

Source: MPA Management Plans and Key informant interviews

Note: PCRA - Participatory Coastal Resource Assessment; SJ - San Jose; C - Casitan

DENR - Department of Environment and Natural Resources; BFAR - Bureau of Fisheries and Aquatic Resources

PAO - Provincial Agriculture Office of Cagayan; LGU - Local Government Unit of Gonzaga

Livelihood projects are awarded to the fisherfolk associations of respective villages

2.3.3 Management Structures and Governance Systems

The MPAs in Cagayan Province follows a community-based co-management scheme in MPA implementation. Community-based co-management involves shared responsibility between local residents and government (i.e. policy makers) in the process of managing (e.g. decision-making, implementation) the MPAs to meet both fishery management and biodiversity conservation objectives.

However, management structures substantially differ between PIPLS and the locally-established MPAs in the province. The PIPLS is controlled by the DENR and the top-down structure is observed in its management structure with two distinct groups – (a) policy-making and (b) regulations and implementation - are recognized in its management structure (Figure 2.2). The management structure of PIPLS is a combination of a principal group who is in-charge in the over-all control of the PIPLS and a devolved site management group. The PIPLS is primarily managed by the PAMB. The board's duty includes approval of policies, guidelines, plans and programs, proposals, agreements and other documents related to the management of PIPLS. It is a multi-sectoral body composed of 15- agency members chaired by the Regional Executive Director of DENR and meets on a quarterly basis. The members include representatives from: local governments (Provincial, Municipal and Village), NGAs (BFAR, Philippine National Police, Philippine Coast Guard and Philippine Navy), Government Owned and Controlled Corporation (CEZA), NGO (Process Luzon) and peoples' organizations (PEPA, PASAMOBA, SAMOBA, Sta. Ana Alliance for Social and Environmental Concerns and IP-Agta Daket). The respective agencies or groups nominate their representative to the PAMB and serves for a specific term without compensation from the board.

The second part of the management structure of PIPLS is involved in the actual regulations and MPA implementation in the field. It is headed by the Protected Area Superintendent (PASu) who is also serving as the head secretariat of the PAMB. The PASu oversees the management of the PIPLS and is responsible in the execution of the plans and programs of the protected area as approved by the PAMB. From 1994 up to present, five senior staff of the DENR has been designated as PASu of the PIPLS. At present, the PASu holds office at the DENR and visits the PIPLS at least once a week. To ensure the community cooperation, the PASu coordinates with the PEPA, the main people's organization who assists in the management of PIPLS. The PEPA, which was organized in 1994, is composed of residents of the island who are actively engaged in ensuring the protection of the area. The PEPA is led by 12 officers who serve at most two terms (2 years/term) and at present receives an annual honorarium of ₱ 2000- 4000 (US$ 40 – 80) from their association fund. The PEPA is engaged in the MPA activities such as law enforcement, coastal clean-up or waste disposal activities, tourist management assistance and information education campaign. All community members are welcome to participate in any of these activities. At present, there are 12 fish wardens (*Bantay Dagat*) from the islands who work in a voluntary manner. These wardens were trained by the BFAR but most of its activities were limited only on foot patrolling as there is a Navy Detachment within the island who is doing the sea-borne patrolling in the area because 2,000 ha of the marine waters was also declared as Naval Reserve in 1967. In addition, the Blue Green Brigade (consists of reef rangers), were organized to ensure the proper use of the reef areas for ecotourism purposes. A monthly coastal clean-up is also organized by PEPA for the proper waste disposal in the island. The community also assists in the tourist management and conducts information, education campaign by

acting as tour guide to warrant ecological-friendly tourism in the area. The local residents earn from eco-tourism activities while ensuring that visitors would not damage the area's natural environment during their stay.

In contrast, the bottom-up management is observed in the case of locally-established MPAs in the province as the policies and regulation were all structured at the community level (Figure 2.3). The municipalities were at the top of the structure, however, they provide independence to the fisherfolk associations (San Jose Fisherfolk Association (SJFA); Casitan MPA Development Association (CAMPADA); Taggat Norte Fisherfolk Association (TNFA)), in the decision-making particularly on MPA policies and rather maintain a passive role in the provision of logistic and technical support. The Municipal Fisheries and Aquatic Resources Management Council, a recommendatory body composed of municipal fisherfolk and other stakeholders, assists in the enforcement of fishery laws and acts as an advisory body of the local government in fishery matters including MPAs. In coordination with the LGU, the BFAR, DENR and PAO assist the fisherfolk associations in technical matters and provide necessary capability building activities to sustain operation of MPAs. The village councils have immense participation in the endorsement of MPA policies to the municipality as well as in law enforcement.

To effectively address prevailing issues in the management of the MPAs, four working committees under the fisherfolk associations were formed. These committees include: (1) Law Enforcement Team; (2) Core Monitoring Group; (3) Income Generating Project (IGP)/Ecotourism Unit and (4) Information Education Campaign (IEC) Team. The Law Enforcement Team is composed of the members of the fisherfolk associations who were deputized as *bantay dagat*. The LGUs provided patrol boat and cover the cost

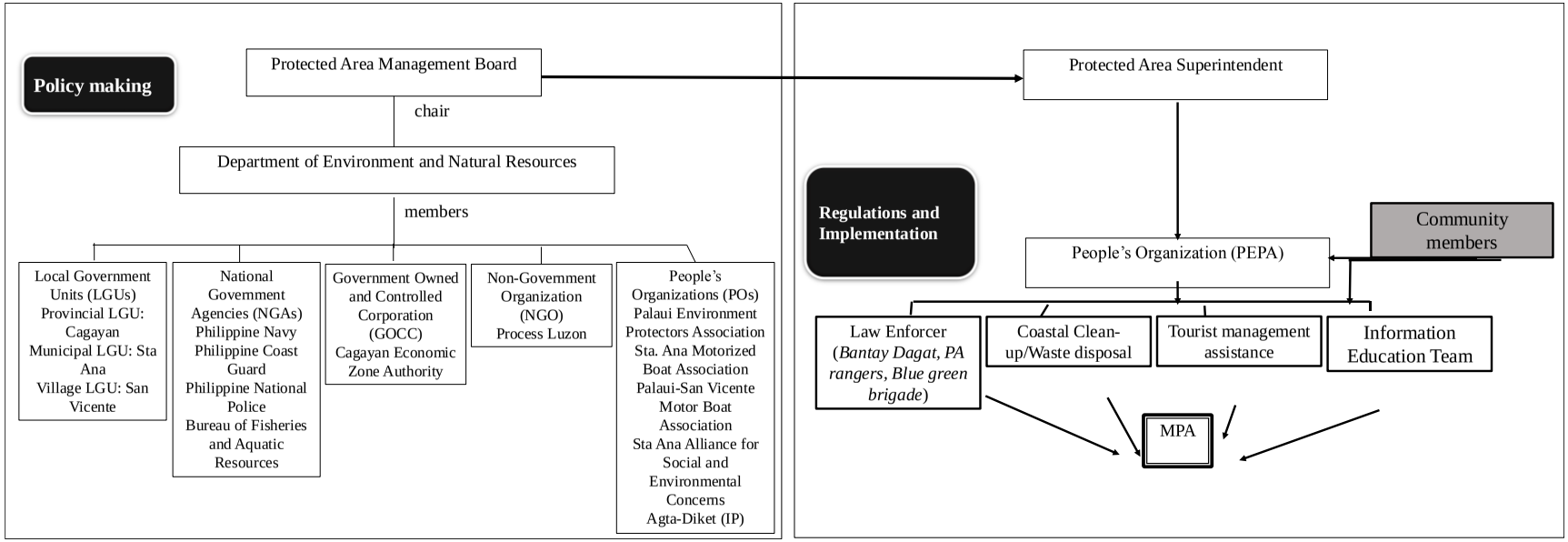


Figure 2.2. Management structure of Palaui Island Protected Landscape and Landscape, a nationally-established MPA in Cagayan, Philippines

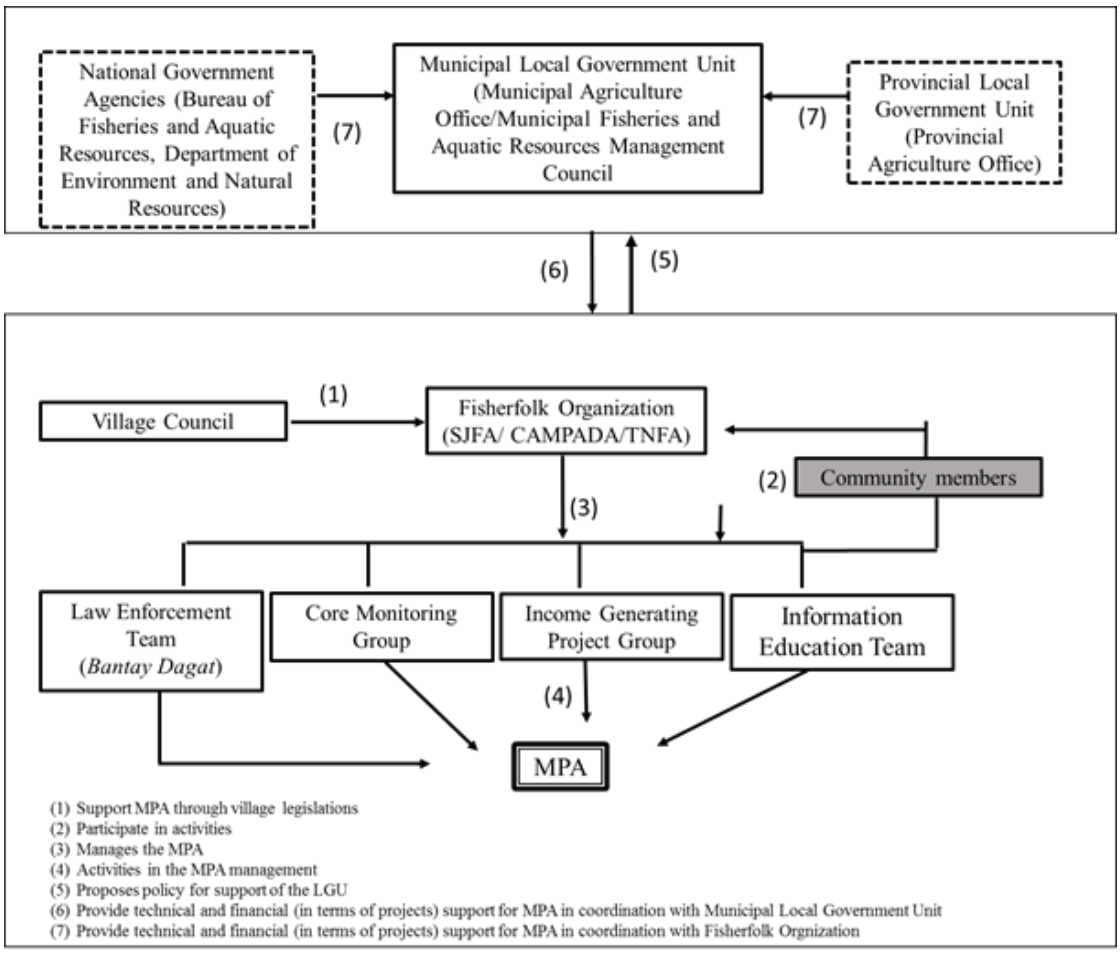


Figure 2.3. Management structure of locally-established MPAs in Cagayan, Philippines

fuel but members do the patrolling in a voluntary manner. The group divides themselves into small teams of four to five members for specific schedule of about three to five hours land surveillance or sea borne patrolling and persistently perform their duties despite of absence of monetary incentives. The Core Monitoring Group, in coordination with the technical staff from the external agents, conducts annual monitoring and assessment of the coastal and marine resources inside and outside the MPA. The IGP/Ecotourism Unit is in-charge in the supervision of the implementation of alternative livelihood projects provided in the community while the IEC Team spearhead the conduct of information

drive in the community. Community members, whether direct resource users or non-resource users can participate in any of these activities voluntarily.

2.3.4 Institutional Support in the Maintenance of MPA

After the establishment of MPAs in the province, NGAs and LGUs continuously support the maintenance of MPAs through various assistance as described in Table 2.4.

Several academic groups have technically supported the PIPLS in the evaluation of its resources as a reference for its management plan. The PIPLS also has strong institutional support for livelihood development through ecotourism. The Community-based Sustainable Tourism Project in PIPLS was launched in March 2006. The project was implemented by CEZA with a goal to establish a community-based enterprises that will economically encourage island residents and stakeholders to upkeep the pristine ecosystems of the island. In addition to this, a component of ICRMP implemented by the DENR, seek to provide sustainable livelihood for marginalized stakeholders through ecotourism while protecting the natural environment. The United Nations Development Program-Global Environment Facility's Small Grants Programme provided financial and technical support to island residents to ensure conservation and restoration of the environment while enhancing their well-being and livelihoods. With all of these supports, seven self-reliant groups were formed under the PEPA. These groups include: (1) weaver - group of women that produce native handicraft from *pandan* leaves that are sold as souvenirs; (2) honey hunter – group of islanders, most of are the Indigenous people (Aetas) that produce *Dorsata* honey that is gathered from the forests and sell the harvest to visitors; (3) Reef rangers - group of snorkelling guides that facilitate in-water experiences in the reefs surrounding the island; (4) Birding guides – group of men and women who took the birding guide training and acts as a guide to tourists; (5) Trek guides

– group of islanders who act as tour guide around the island; (6) Island Spa - the association of island residents who provide massage services to visitors and (7) Palaui Women Catering Association – group of women who works as part-time as cooks and service crew for tourists. While island residents earn from these activities, part of their revenue is also contributed to the PEPA's funds to support the association's activities.

The Philippine Navy assists in the law enforcement activities in the area in addition to the *Bantay Kalikasan* (Environmental Guards) hired by the municipality through the Protected Area Management Enhancement-GIZ Program to oversee both marine and terrestrial resources.

On the other hand, the ICRMP institutionalized and functionalized the locally-established MPAs. The technical support extended, mainly on participatory coastal resource assessment as well as the development of the Municipal Coastal Environmental Profile, became a big part of the MPA's management plan. The ICRMP is also responsible for the provision of alternative livelihood to local residents such as aquaculture (e.g. abalone, milkfish, seaweed, etc.) and non-fisheries projects (e.g. hog, goat raising) and facilities for the development of ecotourism (e.g. nature village, reef discovery). The LGUs and NGAs continuously supported the MPA activities through their regular programs (e.g. trainings, monitoring, strengthening of associations).

Table 2.4 Institutional support in the maintenance of MPAs in Cagayan Province

Programs Projects	Main implementer	Remarks
A. PIPLS		
1. ***Technical support***		
a. Socio-economic profiling	Department of Environment and Natural Resources; University of the Philippines Geography Department; PROCESS LUZON and Marine Environmental Resource Foundation (MERF)	
b. Identification of the flora and fauna along the existing trails of the island	Conservation International; University of the Philippines Institute of Biology	Conducted in various time from 2003 - 2009 of which results were used in the creation of the management plan
c. Identification and survey of corals and fishes in the marine sanctuary and the coral reefs	University of the Philippines Marine Science Institute (UP-MSI); Philippine Commission on Sports SCUBA Diving	
d. Monitoring of ecological habitats	Department of Environment and Natural Resources; Municipal Environment and Natural Resources Office	Regular monitoring and assessment
2.***Livelihood and Ecotourism Development***		
a. Community-based Sustainable Tourism Project	Cagayan Economic Zone Authority	Developed livelihood opportunities through ecotourism which paved way to the formation of seven self-reliant groups
b. Integrated Coastal Resource Management Project	Department of Environment and Natural Resources	
c. GEF-UNDP Small Grant Programmes	Process Luzon	
3. ***Law Enforcement and Patrolling***		
a. Protected Area Management Enhancement-GIZ	Municipality of Sta. Ana	Hiring of "Bantay Kalikasan" (Environment Guards)
b. Regular patrolling and surveillance	Philippine Navy	As part of the Naval Reserve

c. Deputy Fish Warden Course	Bureau of Fisheries and Aquatic Resources	Deputized community residents as *bantay dagat*
4. ***Infrastructure***	Department of Environment and Natural Resources; Seacology (California-based NGO)	Facilities for ecotourism activities
B. Locally-established MPAs		
1. ***Technical support***		
a. Integrated Coastal Resource Management Project	Bureau of Fisheries and Aquatic Resources	Conduct of participatory coastal resource assessment and launching of municipal coastal environmental profile
b. Regular activities of national government agencies	Bureau of Fisheries and Aquatic Resources; Department of Environment and Natural Resources; Department of Labor and Employment	Fisherfolk organization, Extension services including environment friendly fishing practices, Monitoring and evaluation
2.***Livelihood and Ecotourism Development***		
a. Integrated Coastal Resource Management Project	Bureau of Fisheries and Aquatic Resources; Department of Environment and Natural Resources	Provision of livelihood projects and development of ecotourism prospects
3. ***Law Enforcement and Patrolling***		
a. Law enforcement	Local Government Units	Provision of patrol boats and related amenities
4. ***Infrastructure***		
a. Integrated Coastal Resource Management Project	Department of Environment and Natural Resources	Facilities for ecotourism activities

2.3.5 MPA Management Issues and Problems

Interviews conducted revealed some issues and problems in the management of MPAs in the province. With different management and governance system, the MPAs were also faced with diverse concerns.

In PIPLS, the main problem lies on the increase of population within the area which contributes to the intensification of resource extraction. Although there is a policy to control the occupants in the protected area, the recent Survey and Registration of Protected Area Occupants showed an increase in the number of tenured migrants from 1996 to 2015 by 68.33% or equivalent to 41 households and an increase in the number of untenured migrants to 105.88% or equivalent to 18 households in the same period. The NIPAS Act defines tenured migrants as an individual occupant who has been actually and continuously occupying portions of the place for five years before its designation as a protected area. Upsurge in tenured migrants in PIPLS is due to the expansion of new households among families while the proliferation of untenured migrants is caused by the relocation of the people from the mainland to the island due to the promising resources of the island.

Meanwhile, in the locally-established MPAs in the province, sustaining the membership and active participation of fisherfolk associations which are delegated to manage the MPAs is a major problem. In the case of SJFA, only 45 out of the original 77 members are actively taking part in the management activities, while only 20 out 41 initial members of CAMPADA are aggressive in MPA activities. Although the members of TNFA increased from the initial numbers of 30 to 104 at present, the active participation of members is also a problem. Active members are those who participate in MPA activities, attend regular meeting and pay monthly and annual dues of the association. Members capitalize on time, effort and money in the association for ethical and moral responsibility of protecting the resources, hence the lack of defined incentive systems definitely contribute to this incidence. The presence of an incentive system that could

strengthen and sustain the motivation of members is needed to be investigated as the economic feasibility of the livelihood projects is not yet conclusive at present.

In addition, the vigorous and impartial execution of MPA rules and regulations is also a remarkable task to the associations as strong family tights and affinity is typical in the villages. This resulted in conflicts among members in the case of Casitan MPA. The change in village leadership was also a problem that was identified by the Taggat Norte MPA. This occurrence resulted in conflict among the community members which in a way affected the attainment of MPA goals. It is therefore necessary to have a mechanism to resolve disputes when conflicts arise concerning issues in MPAs.

2.4 Conclusions and Policy Implications

Governance is perceived as formal and informal arrangements, institutions and regulations on the utilization of coastal resources, including the evaluation and analysis of problems and prospects that affect the resource-use pattern (Juda, 1999). Several models were employed to implement MPAs (Christie and White, 1997) but in the province of Cagayan, MPAs are jointly managed by the resource users and government. Following the national policies and legislations in the establishment of MPAs, two governance levels (national and locally-established) were observed in the province. Despite differences in the institutional arrangements, all MPAs in the province is operating under the co-management regimes. Bradecina and Soliman (2014) found out that co-management regimes has greater viability to produce more positive outcomes than any other management regimes in Lagonoy Gulf, Philippines. The degree of co-management, however, differ between the nationally and locally-established MPAs in the

province. The top-down management is observed in the PIPLS while the bottom-up management strategy is prevalently in the locally-established MPAs in the province.

Generally, the governance levels caused the variations in the system of MPA establishment and management in Cagayan. However, it can be noted that the participation of the community and related stakeholders in all aspects of the MPA developmental process was an important consideration. Strong partnership between the local community and external agents contributed in keeping the MPAs in existence, six to 23 years since their establishment. In this case, the community felt a sense of commitment, reliance and cooperation that can be instrumental in promoting MPAs. From the experiences in these case studies, the following are the implications and recommendations:

(1) The NGAs and LGUs play an important role in the promotion of MPAs in Cagayan Province. Continued support from the LGUs or NGAs (i.e. provision of funds for MPA implementation) is necessary for MPA in carrying its activities and to uphold an effective level of management. MPAs assisted by multiple agencies (LGUs, NGAs, NGOs, academe) are more likely to become sustainable (Maypa et al., 2012). The PIPLS, for instance, is being supported by several external agents, however, clear definitions of assistance and participation among the supporting institution is needed to be delineated. The identification of logical and distinct roles of each external agent would encourage a better management system that would enhance the attainment of the objectives of PIPLS.

(2) Budget and sustainable financial mechanism is an important consideration for the sustainability of MPAs. Most MPAs that reached the level 4 (sustained phase with very good management) has a revenue generating system that support enforcement

and other MPA implementation activities (Maypa et al., 2012). Further, Maypa et al. (2012) found out that MPAs with functional entrance or user fee systems correlated well with higher levels of effectiveness. In Cagayan, only the PIPLS has an established user fee scheme in its ecotourism activities. The locally-established MPAs in the province also designated a recreational zones in its marine reserve in preparation for the development of ecotourism activities. At present, these MPAs already have some amenities (e.g. visitor's hut, swimming/snorkelling gears) for recreational activities. Although not yet on a commercial scale, local visitors are now starting to visit the areas. Noting that the prospect of ecotourism in these MPAs is possible, the institution of a user fee system for possible financial mechanism for MPA implementation is needed to be explored.

(3) The MPA management and enforcement activities in Cagayan Province are done in a voluntary manner. In the case of PIPLS, the ecotourism activities was postulated as the economic incentives that drove them to continuously participate in the MPA management activities. Conversely, the livelihood projects provided to the locally-established MPAs were not yet economically conclusive as it is still in its initial stage. The absence of economic incentives is one of the possible reasons in the disintegration of the membership and active participation of fisherfolk associations. Appropriate and feasible supplemental and alternative livelihood projects are necessary in any MPA endeavors to mitigate its short-term negative impacts. Maintaining the reasonable balance between human needs and environmental imperatives is an important consideration for MPA sustainability.

(4) In PIPLS, the increasing number of residents who moved from the mainland to the island which is declared as protected area is a problem identified in attaining the

purposes of the MPA (i.e. conservation of the resources). As the residents solely depend therein for subsistence (i.e. food, clothing, shelter and health), the increase in the number of households will surely entail difficulty in safeguarding the sustainable use of the resources. Although there is a legal basis to ensure that only tenured migrants should occupy the protected area, a strong political will is necessary for its implementation.

(5) All the management plans of the sampled MPAs contained a section on the monitoring and evaluation system that will be practiced in the MPAs. A regular bio-physical assessment is targeted in the MPAs however, this was a challenging task to all the MPAs. A qualified and quantified monitoring and evaluation process is indispensable to be conducted in the MPAs in the province to ensure promotion of learning experiences and improvement of management strategies. Regular inspection of the progress of implementation of the management plan would help monitor the status of the MPAs.

Chapter 3: Livelihood Structure and Participation of Villagers on the Management of Marine Protected Areas in Cagayan Province, Philippines[3]

3.1 Introduction

The direct use of value of coastal and marine resources, being a CPR, are subjected to continuous overexploitation which leads to degradation of resources. With this, MPAs were established to manage the use of the resources as this put limitations on the use of the critical habitats. In the Philippines, the management of MPAs, is best accomplished by community-based participatory approach (Oracion et al., 2005; Pollnac et al., 2001). In this case, the local coastal residents are directly involved in managing the resources, hence the sense of commitment, ownership and accountability is developed.

The involvement of the local residents was identified as one of the factors that contribute to the successful implementation of community-based MPA (Pollnac et al., 2001; Pomeroy and Carlos, 1997). The realization of MPA as a conservation tool improves when the local community participates (Pollnac et al., 2001) as it makes the management and monitoring of MPAs easy and inexpensive (Uychiaoco et al., 2005). Involvement of the community in the management of MPAs is essential because of their traditional knowledge and are direct users of the resources (Fernandez and Subade, 2015).

With the participation of the local residents in the coastal resource management, it is also important to understand the social and economic aspects in the locality as this may affect their behavior towards the conservation measure. The influences of the socio-economic and demographic factors on the attitudes and perceptions of fishers towards MPAs were extensively studied (Fernandez and Subade, 2015; Hamilton, 2012; Launio

[3] Parts of this chapter were contributed by the author and published in the Journal of Rural Problems (Ballad et al., 2016) and in the Asian Fisheries Science Journal (Ballad et al., 2017).

et al., 2010), however the correlation between the identified factors on the actual involvement in MPA management and the factors that contribute to their willingness to participate voluntarily is not clearly analysed. In this study, we contribute to understanding the socio-economic factors that influence the involvement of the community in the conservation initiatives through MPAs in Cagayan as a case.

It is postulated that the conceptual relationship among factors that influence the participation of respondents to community-based MPA management is shown in Figure 3.1. It is contemplated that limiting factors (demographic characteristics, personal commitment and dependency on marine resources) and support policy (capability building and alternative livelihood project) affect the participation of respondents in MPA management. It is further hypothesized that respondents who have access to the support policy activities of the government are more likely to participate in MPA management.

By means of enclosing some part of the marine waters, many villagers were deprived of fishing opportunities for generating a daily income. Since residents take part in managing the MPA (i.e. monitoring of the MPA, enforcement of regulations, dissemination of information, sourcing of funds), it is indispensable to assure extensive support from the LGUs and the national government agencies through the provision of extension support services including alternative livelihood projects and ecotourism.

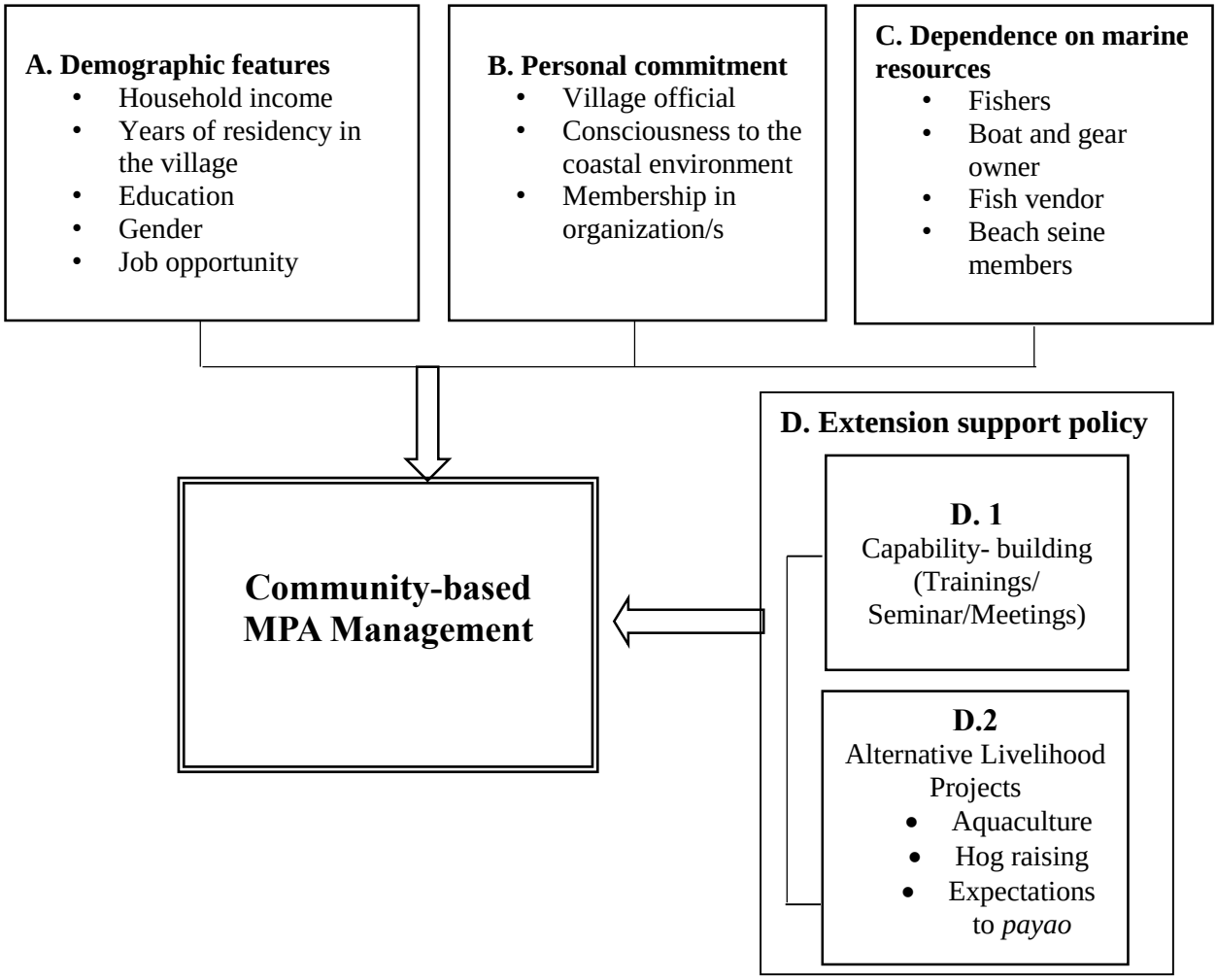


Figure 3.1. Conceptual relationships by category among factors that influence participation of villagers towards MPA management.

3.2 Study Areas

The Cagayan Province has established local and national MPAs since 1994 following its respective developmental processes. Three locally-established MPAs (San Jose MPA, Casitan MPA and Taggat Norte MPA) and a nationally-established MPA (Palaui Island Protected Landscape and Seascape) were selected as a case study to collect vast information on MPAs in the province. These MPAs are strategically situated along the Babuyan Channel (from east to west coast of the province), which is one of the main fishing grounds in the province.

The locally-established MPAs are all situated in the respective villages and managed by an organized fisherfolk association in the corresponding villages. The PIPLS, on the other hand, is located in the Palaui Island, which is politically under the jurisdiction of the San Vicente village of the municipality of Sta. Ana. The island is approximately 1.25 km away from the mainland and can be reached in 25 minutes by boat from the San Vicente Port. The PIPLS is managed by the organized group of people residing within the island who have been strengthened as partner in the protection and management of the protected area. For this study, we separated our analysis of the sample respondents from the island and the mainland part of the village.

3.3 Methodology

A questionnaire (Appendix 1 and 2) was carefully developed to acquire information about the respondents' demographic structure, household income sources, fishing activities, knowledge and awareness on the MPA, participation in MPA management activities and extension activities relating to MPA. Participation in MPA management means taking part in one or more of these activities: (1) overseeing the security of the MPA from illegal activities and enforcement of the laws; (2) conducting monitoring and assessment of the coastal and marine resources inside and outside the MPA; (3) assisting in sourcing of funds for the sustainable management of the MPA; and (4) organising an information drive in the community on MPA concepts and guidelines.

The respondents were randomly selected through methodical sampling from the list of registered households. The sample size was calculated using the formula:

$$\mathrm{n} = \frac{N}{(\frac{e}{z})^2 - \frac{N-1}{P(1-P)} + 1}$$

where n = sample size; N = total household number; e = acceptable error; z = normal distribution point corresponding to the confidence level and P = ratio to the population. For this calculation, the acceptable error is set at 5%, 95% confidence level; hence z = 1.96 and expected population rate at 20%. Using this calculation, 150 respondents were selected from San Jose; 100 from Casitan; 180 from Taggat Norte and 330 from San Vicente (96 from the island and 234 from mainland areas).

Face-to-face individual interviews were conducted in batches on corresponding municipalities (March 2015 - Gonzaga; September 2015 - Claveria and March 2016 – Sta. Ana) with the assistance of trained enumerators. The interviews were conducted using the local dialect (*Ilocano*) for coherence and comprehensibility among the respondents. To supplement and confirm the information gathered, key informants such as village officials, officers of the management group and technical experts from the MAO, PAO and BFAR were consulted. In addition, the DENR, CEZA, MENRO and MTO were interviewed to gather more information about the PIPLS.

The response data were structured as binary: 1 if a respondent participates in any of the four MPA management activities and 0 if there is no participation at all. Since the local community is composed of individuals with varied interests and effect on coastal resource management, likelihood-ratio (LR) Chow test was conducted to examine whether the data sets (e.g. per municipality; local and national MPA; fisher and non-fisher; island and mainland) should be pooled or analysed separately.

Interrelationship of variables was evaluated by probit regression analysis whereby the dependent variable (y), participation in MPA management, is a function of several explanatory variables (x). Following Wooldridge (2006), the probit model was derived from an underlying latent variable model:

$$y^* = \beta_0 + \beta x + u$$

where y^* is the unobserved, but what we do observe is,

$$y = 0 \text{ if } y^* \leq 0,$$

$$= 1 \text{ if } y^* > 0$$

β is the observable component which a function of measurable factors and u are certain unobservable factors. Assuming that u is normally distributed across observations, we normalize the mean and variance of u to 0 and 1, and we can calculate the response probabilities for y^* is less than or equal to y from the standard normal cumulative distribution function.

For the model building, exploratory variables were added to the theoretical variables to check whether they explain much variation in the dependent variable. All important predictors were considered in the model and deleted one at a time until reaching a point where the remaining variables all make significant partial contributions to predicting y. For the individual independent variable coefficients (βx), the sign conditions were used for interpretation. A positive coefficient means that an increase in the predictor leads to an increase in the predicted probability while a negative coefficient means that an increase in the predictor leads to a decrease in the predicted probability. Data sets were examined using the statistical software R.

3.4 Results and Discussions

3.4.1 Socio-demographic Characteristics of Respondents

Table 3.1 summarizes the socio-demographic characteristics of respondents who participated in the one-one interviews. In the villages with locally-established MPAs, the average age of respondents is between 45 to 48 years old with 34 to 41 average years of

residence in their respective villages. Most of the respondents from Casitan (81%) were born and raised in the village while 42% and 48% from San Jose and Taggat Norte respectively were in-migrants. They moved to the villages for various reasons such as marriage, jobs or to join their relatives. Respondents were dominantly males with 3 to 5 household members. Most of the respondents were functionally literate, having finished at least the elementary education equivalent to six years basic education. Respondents from Taggat Norte has the highest average educational attainment among the three villages. The same age and almost similar number of years in the area is observed among the respondents from the island and mainland parts of San Vicente village. The respondents were generally males and mostly stayed in the village since their birth. The respondents from the island, however, have higher household size and lower educational attainment compared with the mainland respondents.

Table 3.1 Socio-demographic characteristics of respondents

Parameters/MPA Village	Locally-established MPAs			Nationally-established MPA	
	San Jose	Casitan	Taggat Norte	Island	Mainland
Sample respondents	150	100	180	96	234
Average age	48	45	46	42	42
Average years in the village	38	41	34	33	31
In-migrants (%)	42	19	48	26[a]	39
Sex (% male: % female)	70:30	77:23	83:17	83:17	93:7
Average household size	4 - 5	4 - 5	3 - 4	5 - 6	4 - 5
Educational attainment[b]	3.89	3.81	4.56	2.93	4.29

[a]untenured respondents (those who were in the island less than five years prior to its proclamation as protected area)

[b]1-No education; 2-Elementary Level; 3- Elementary Graduate; 4-High School level; 5-High School Graduate; 6-College Level; 7-Vocational Graduate; 8-College Graduate; 9-Post Graduate

3.4.2 Livelihood Structure and Income Composition

In all the villages, the majority of the respondents depend directly on fish and other coastal resources for their livelihood. This connotes the high economic dependency of the households on the coastal resources. The household income composition in the villages as shown in Figure 3.2 revealed that fishing and other related activities were the main contributory in the household income of respondents from Taggat Norte (40.8%) and from Casitan (38.11%). In San Jose, the vast agricultural land and other agricultural prospects such as livestock raising contributed 28.82% of the respondents' household income followed by fishing at 23.24%. Aside from fishing and agricultural activities, other sources of income in these villages include: regular job as a government or private company employees and rural non-fishing or non-farming activities such as driving, small enterprises (e.g. "*sari-sari store*" – a neighborhood variety store, junk shops, etc.) and skilled labourer (e.g. carpenter, welder, construction worker, etc.). A substantial portion of household income of some respondents also comes from family members' remittance from working abroad. Due to lack of labor opportunities at the area, some household members work abroad to escape poverty and unemployment. In Taggat Norte, some respondents also received household income from the pension of a household member who previously worked in the Taggat Industries, a logging company which held office in the village but was closed in 1986.

In San Vicente, fishing and other related activities such as gleaning (e.g. seaweed collection, shell) is the main source of income for both island (50.85%) and mainland (34.93%) respondents. In the island respondents, major source of income comes from tourist related activities and salary from regular job. The island residents earn income from the tourism activities as tour guides, homestay owners, food service attendant and

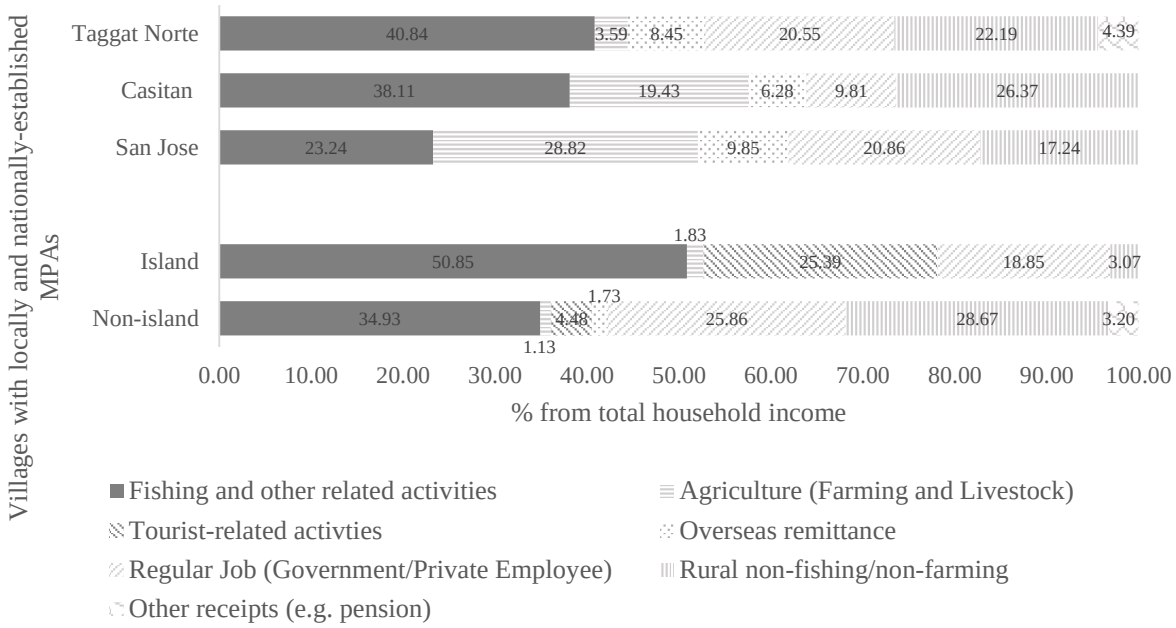


Figure 3.2 Household income composition in the MPA villages

seller of souvenir items among others. Some household members also go to the mainland area to work for a regular jobs. For the mainland respondents, other major source of income includes salary from regular jobs and revenue from rural non-fishing or non-farming activities.

3.4.3 Poverty Incidence and Income Distribution

The Official Poverty Statistics in the Philippines defines poverty incidence as the proportion of families or individuals with per capita income less than the per capita poverty threshold to the total number of families or individuals. It further explains that poverty threshold is the minimum income/expenditure required for a family or individual to meet the basic food and non-food requirements. In 2015, the Philippines recorded a poverty incidence of 16.5% and 13.3% in the province of Cagayan (PSA, 2016). For a family of five, the annual household poverty threshold in the country is ₱108,780 and ₱105,430 in the rural areas of Cagayan (PSA, 2016).

The mean annual household income of the respondents at ₱34,970 – ₱121,000 showed that nearly most of the households in the coastal areas are in the poverty level. The income distribution (Figures 3.3 and 3.4) showed that 64.16% of the 430 respondents from villages with locally established MPAs and 85.3% of the 330 respondents from San Vicente village were below the poverty threshold level in Cagayan .

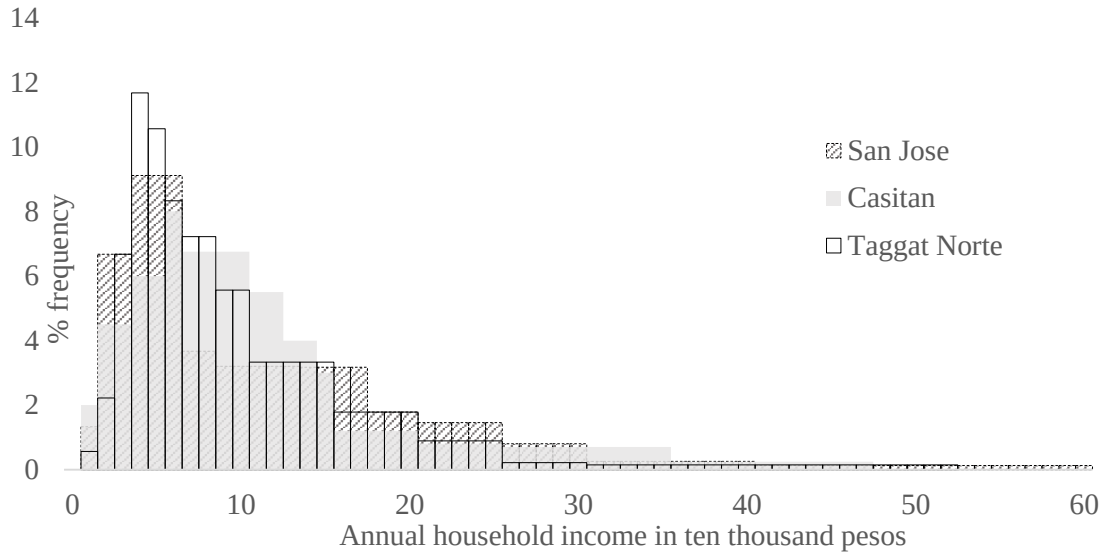


Figure 3.3. Distribution of annual household income in villages with locally-established MPAs

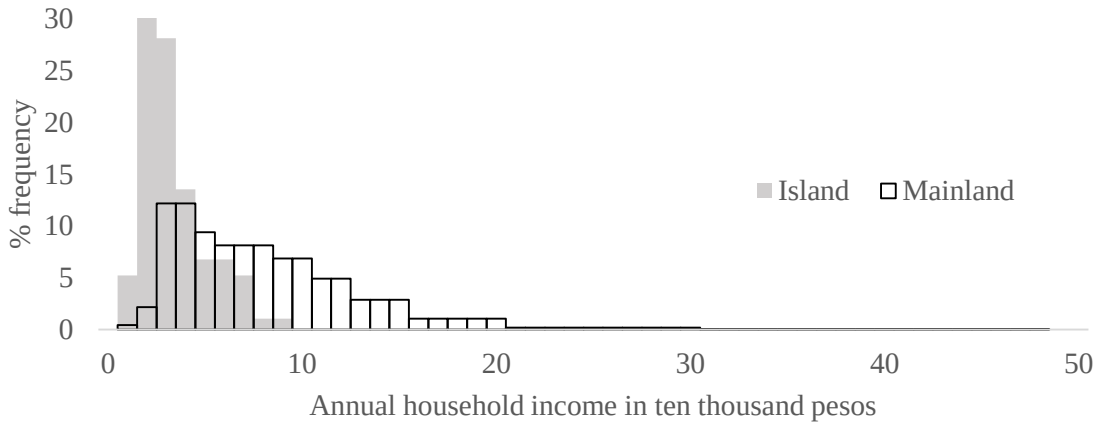


Figure 3.4. Distribution of annual household income in San Vicente village

The average annual household income in San Jose is ₱121,000 and a modal income of ₱60,000 confirmed that the villagers earn 49% less than the national average (₱235,000) and 38% less than the regional cohort (₱195,000) (FIES, 2012). In Casitan, the average annual household income is ₱114,500 and modal income of ₱52,000 which meant that the income in the village is 51% lower than of the national and 41% lower of the regional average. Taggat Norte has the lowest average annual income among the three villages with ₱98,800 and a modal income of ₱36,000. This revealed that the villagers earn 57.96% less than the national average and 49.33% less than the regional average. Comparing the three villages with a locally-established MPA, Casitan is relatively rich community, having a higher median income of ₱92,000 compared with San Jose and Taggat Norte with a median income of ₱84,000 and ₱77,000 respectively.

On income inequality, this translates to a wide income disparity in San Jose with a Gini coefficient of 0.4565 while Casitan and Taggat Norte has 0. 3983 and 0.3979 respectively. The Philippines has a Gini coefficient of 0.4605 while the region (Cagayan Valley) has 0.4096 (FIES, 2012).

Further, the island residents in the San Vicente village have an average household income of ₱34,970 which is relatively lower than that of the mainland residents which is ₱80,150. The Gini coefficient in the island is 0.3833 while 0.3445 in the mainland. The limited economic activities contributed to the low income of the island residents.

3.4.4 Fishing Profiles and Practices

Table 3.2 sums up the profile of fisher-respondents in each villages. It is common in the Cagayan province that many fishers have other part-time jobs to supplement their earnings. Only few fishers owned fishing boats and limited numbers possessed fishing gears. Boats used by these municipal fishers (i.e. fishing within the 15 km municipal

waters) were either motorized or non-motorized. Motorized boats were equipped with 3-12 HP gasoline or diesel powered engines while non-motorized boats used the paddle as a means of propulsion. Fishers who do not own boats and or gear usually join boat owners as a single craft usually has three to four crew members fishing together. Income from fishing is then divided among them with an accounted share for the boat and or gears.

The fishing activity in the province is characterized as a multi-species resources and multi-gear fisheries. This means that several types of gears are used depending on the species in the season. The common gears in the province include beach seine, gill net, cast net, single and multiple hook and line and spear. The major species caught, based on the know-how of the respondents, included dolphin fish (Local Name (LN): Durado; Family (F): Coryphaenidae), flying fish (LN: Burador; F: Exocoetidae), big-eyed scad (LN: Mataan; F: Carangidae), fusilier (LN: Baraniti; F: Caesionidae), short mackerel (LN: Kabalyas; F: Scombridae), trevally (LN: Talakitok; F: Carangidae), anchovies (LN: Dilis; F: Engraulidae), tuna (LN: Dumadara/Butnugan; F: Scombridae), mackerel scad

Table 3.2. Profile and characteristics of fisher-respondents

Parameters/MPA Villages	Locally-established MPAs			Nationally-established MPA	
	San Jose	Casitan	Taggat Norte	Island	Mainland
Fisherman[a](%)	34	70	65	80.21	61.97
Full time fisherman[b]	41.18	37.14	67.52	53.25	67.59
With fishing boat[b]	54.9	18.57	33.33	53.25	54.49
Number of boats (n)	37	16	57	46	80
With Fishing gears[b]	68.63	32.86	47.86	75.32	84.83
Member of fisherfolk association[b]	37.25	8.57	42.74	81.25	34.18
Average years in fishing	24	20	20	19	20
Average household income from fishing (₱)	82,800	62,400	58,100	19,100	43,500

[a]from all respondents [b]from fisher respondents

(LN: Galunggong; F: Carangidae), slip mouth (LN: Sapsap; F: Leiognathidae), moonfish (LN: Cadis; F: Menidae) and largehead hairtail (LN: Espada; F: Trichiuridae).

A distinctive fishing practice in Casitan is the use of beach seine. A beach seine ("*daklis*" in local dialect) is an active gear, but considered as a traditional fishing gear in the community hence its operation is authorized. The beach seine is used by several people in the village, thus, close and cooperative relationships were developed among the residents. A total of seven beach seine units were operating from the village and with permits to fish in municipal waters of Gonzaga outside its MPA and nearby municipalities. Some of the fisher-respondents also worked with beach seine owners in the community. The number of fishers involved in single beach seine operation ranged from 30- 40 including the people needed for towing the seine to the shore. Beach seine fishing became a tradition that fostered cooperation as well as collective action among villagers as many of them joined the activity for their source of income. The gear owners even developed a patron-client relationship among their workers. Credit tying or advance payment ("*bale*" in local dialect) had been a part of this system. A number of the fisher-respondents in Taggat Norte also worked with beach seine owners from other villages of the municipality of Claveria.

Gleaning (i.e. fishing method used in shallow coastal, estuarine and freshwaters waters or in habitats exposed during low tide) is also common in the coastal areas of these villages wherein villagers collect seaweeds and shells. The diverse fishing activities and characteristics, including number of household members involved in fishing contribute to the variance in the household fishing income in each village which ranges from ₱19,100 to 82,800 annually. The average years of fishing experience is between 19 to 24 years.

Fishers in the villages were organized to form an association. Joining the fisherfolk association is optional, but fisher who joins the association is required to pay a membership fee and monthly dues and is expected to actively participate in the association's activities. In return, members of the association have easier access to government interventions as the fisherfolk organizations are recognized groups in the community.

3.4.5 Knowledge on the Purpose and Awareness on the Presence of MPA

The study explored the respondents' knowledge on MPA and awareness on its presence in the village as presented in Table 3.3. Among the locally-established, respondents from Casitan were generally familiar about MPA (94%) and aware of its existence in the locality (100%) compared with San Jose (76% on knowledge on MPA and 90% on awareness on its existence) and Taggat Norte (86% on knowledge on MPA and 94% on awareness on its existence). This could be associated with the dependency of respondents to the marine resources. Many of the respondents from Casitan are fishers compared with San Jose and Taggat Norte. In addition, respondents from Casitan can

Table 3.3. Knowledge, awareness and support of respondents towards the MPAs in their respective villages

Statement	Locally-established MPA			Nationally-established MPA	
	%			%	
	San Jose	Casitan	Taggat Norte	Island	Mainland
1. Knowledge on what is MPA	76	94	86	98	72
2. Awareness on the presence of MPA in the community	90	100	94	100	80
3. Favor in the presence of MPA	83	87	77	100	74

easily recognize the location of MPA within the community because the village is smaller and more compact compared with the two villages. The respondents from the three villages claim support for the establishment of the MPA with 77 - 83% of them are in favor in the presence of the MPA in the community. Respondents who agreed on the setting up of MPA believed that it contributed to the increased chance of catching bigger fish, helped maintain natural habitat, developed recreation and tourism activities, added livelihood sources and considered it as beneficial for the future generation. Some respondents disagreed on the formation of MPA because of the reasons that it reduced fishing grounds and it became source of user's conflict. Further, there are respondents who were undecided and reasoned out that they are not aware on the concept of MPA hence they are not sure in showing support.

For the San Vicente village, the respondents from the island showed higher knowledge, awareness and support to the presence of MPA compared with the mainland respondents. The presence of the MPA within the island is the main reason for the observed difference between island and mainland respondents. This showed that respondents living near the MPA have better understanding and support towards MPAs.

3.4.6 Participation of villagers and extension support policy on MPA management

In spite of the high percentage of support for the establishment of the MPA, only 20 to 24% of the respondent in the locally established MPAs participate in its management while in PIPLS, 13% from the mainland respondents and 74% from island respondents participates in its management (Table 3.4). Participation in MPA management means taking part in the MPA activities mentioned earlier.

Respondents disclosed that understanding the long-term benefits of the resource management initiatives which translated to the advantage of the future generation

stimulated them to participate in MPA management. Moreover, respondents who do not participate reasoned out that: (1) they were not informed as they claimed that only members of the fishefolk association were invited to join; (2) they were not interested or (3) they do not have time to participate in the activities.

MPA management was principally undertaken in a voluntary manner by villagers from the community. However, to ensure that the MPA meets its management objectives, the government (local and national) promoted and facilitated community participation by providing necessary support. Extension services in the form of capability building programmes (e.g. trainings, seminars, meetings) and livelihood projects were presumed as key strategies to ensure the realization of MPA programmes. Extension services were provided to the villagers during the planning and establishment of the MPA, including the continuous support in its implementation phase. These were done to increase the interest and motivation of the community in resource management and to help them understand the concepts and benefits of MPA programmes. Experts from BFAR, DENR, PAO and MAO incessantly rendered extension services for the establishment and maintenance of livelihood projects in support of MPA. Continuing advice from the implementing organization and continued engagement of outside facilitators or extension agents contributed to the success of the MPA (Crawford et al., 2000).

Table 3.4. Percentage of respondents who participates in MPA management

MPA Villages	% of respondents who participates in the activities
San Jose	24
Casitan	21
Taggat Norte	20
San Vicente	
Island	74
Mainland	13

In addition, alternative livelihood projects were provided to support the community from the short term impact of the closing a portion of the fishing area for the MPA. In many cases, *payao* (fish aggregating devices) are set up in anticipation of the spill-over effects (net movement of juvenile fishes into adjacent fishing grounds) of MPAs, but the coastal areas in the province endure strong water currents in addition to being located in a typhoon path, hence the establishment of *payao* is not always effective. Only Taggat Norte has an existing *payao* at the present, but fisher-respondents from other villages felt bad that *payao* is no longer in the area (43% from San Jose; 24% from Casitan) and agree that it is necessary to install *payao* in their villages (80% from San Jose; 66% from Casitan). The ICRMP, which aimed for the sustainable management of coastal resources and increased income for coastal communities, was implemented by DENR and BFAR and paved the way to the establishment of projects on hog raising and fattening, sea cucumber culture and cage culture of milkfish. The development of ecotourism activities in the PIPLS served as alternative livelihood to both island and mainland residents. Table 3.5 describes the perception of the respondents towards the implementation of livelihood projects and ecotourism activities in the villages. Earnings from these projects, although not yet conclusive, were expected to provide additional income to household participants. Even with the presence of alternative livelihood projects and ecotourism activities, fishing activities were not reduced except for mainland respondents who used their boats as tourists' service rather than for fishing. Nevertheless, respondents showed increase support to MPAs with their participation to these alternative income sourcing activities.

Table 3.5. Perception of respondents towards the implemented livelihood projects and ecotourism activities in the villages

Perception towards the livelihood projects/ecotourism activities	Locally-established MPAs	Nationally-established MPAs	
		Island	Mainland
	%		
Change in family welfare since joining the livelihood projects/ecotourism activities			
Decreased substantially	-	-	-
Somewhat decreased	-	1.89	-
Remained the same	53.57	26.42	13.33
Somewhat increased	41.07	54.72	66.67
Increased substantially	5.36	16.98	20
Decrease in fishing due to livelihood projects/ecotourism activities			
No	80.36	71.74	22.22
Yes	19.64	28.26	77.78
Increase support to MPA due to involvement in the projects			
No (the same)	14.29	26.42	-
Yes	85.71	73.58	100

3.4.7 Factors Affecting Participation of Villagers on MPA Management

The results of the LR-Chow tests (Appendix 3) revealed that the data sets from the locally-established MPAs should be analysed separately from the data set of nationally-established MPA because the coefficients of variables is different among equations of each data set. Further, the same test was applied to the integrated data set of the locally-established MPAs and the individual data sets of each village, of which result confirmed that the data structure among the villages is the same and therefore the equation of the data set should be estimated as one. Moreover, the data structures of fishers and non-fishers data sets in the locally-established MPAs were also tested. Results showed

that the null hypothesis that the coefficients of variables is equal among equations of each data set be rejected and suggested that the equations should be estimated separately on each data set. The data structure of fishers and non-fishers data sets of the nationally-established MPA were also tested, but results showed that the coefficients of variables is equal so it should be analysed as one. Additionally, the test on data structures of the island and mainland data sets implied that data sets should be estimated separately.

From these outcomes, the probit regression analysis results of the models for each data sets were shown in this paper. For locally-established MPAs, the determinants of MPA participation were estimated using the fishers and non-fishers data sets while the island and mainland data sets were used in the model estimation for the nationally-established MPA.

Table 3.6 displays the probit estimates on the determinants of participation by fishers and non-fishers on management of locally-established MPAs. The result showed significant positive sign conditions on the household size, perception on the importance of *payao* and received benefits from livelihood projects for the fishers data set while significant positive sign condition on income and age were observed for non-fishers. In addition, access to extension services and commitment as village official also showed significant positive sign conditions as indicator to participation for both fishers and non-fishers group.

The positive sign condition on the household size in the fishers' data set indicated that fishers with more household members tend to participate in MPA management. This could be associated with the presence of other household members who could seek income so respondent can participate in MPA management. Another premise could be that the respondents is thinking for the future of his or her younger household members.

Fishers who perceived that it is necessary to install or maintain *payao* as well as to those who benefit in livelihood projects tend to participate in MPA management. With the changes on the fishing activities of the community due to establishment of MPAs, fishers expect so much on the alternative livelihood and easier access to fishing. The positive sign condition of the participation in trainings, seminars and other extension services signifies that formal or informal environmental education could be instrumental in increasing the disposition of villagers to participate in MPA activities. This case study also showed that village officials positively supported the MPA through participation in its management. Village officials were involved in the MPA developmental process as

Table 3.6. Determinants of participation on the management of locally-established MPAs

Variable	Type of variable	Fishers' dataset	Non-fishers' dataset
Intercept		-2.791***	-4.811***
		(-6.397)	(-4.852)
Total household income	numerical	-	0.000003217**
			(2.428)
Household size	numerical	0.188***	-
		(2.635)	
Age	numerical	-	0.04281***
			(3.190)
Village leader	dummy	2.135***	2.393***
	(1 = yes; 0 = no)	(3.068)	(5.061)
Necessity to	dummy	0.566*	-
install/maintain payao	(1 = yes; 0 = no)	(1.901)	
Benefit in livelihood	dummy	1.348***	-
project	(1 = yes; 0 = no)	(5.262)	
Received any extension	dummy	0.804***	0.9826***
services	(1 = yes; 0 = no)	(3.356)	(2.849)
Nos. of observations		238	192
Loglikelihood		-86.94	-40.36
McFadden's R Square		0.363	0.391
AIC		185.88	90.719

***Statistically significant at the 1% level or better; **at the 5% or better, * the 10% level or better.
value in parenthesis is z-value

key promoters of sustainable management of coastal resources. Participation of the villagers seemed to increase as village officials supported the programme.

Non-fishers with higher income and older tend to participate in MPA management. Cinner and Pollnac (2004) also found that higher income respondents are more likely to support resource management programs, invoking Maslow's theory of hierarchy of needs as possible justification. Older non-fishers tend to participate in MPA management and this can be attributed to the developed sense of belongingness in the area.

For the nationally-established MPA, Table 3.7 exhibits the determinant of participation for the island and mainland data sets. Significant positive sign condition on total household income, fishing household and benefit in ecotourism activities is observed in island data sets, whereas significant positive sign conditions on household income, age, recipient of extension services, members of fishers' organization and those who perceived that it necessary to protect the environment for the future generations is noted for the mainland dataset.

This case study revealed that as income increases the tendency to participate in management of nationally-established MPA also increases. Those who depend more on the coastal resources (fishing household) tend to participate in MPA management. This can be accredited to their desire to keep their source of livelihood. The support of external agents in the ecotourism activities as an alternative source of income as well as increasing their knowledge about the objectives and goals of MPA also increases the probability of respondents to participate in its management. Membership in the fisherfolk organization tends to increase the likelihood to participate in MPA management. The organization usually has regular meetings where members have a chance to discuss things. It is

therefore assumed that the learnings they received from their fellow fishers in the organization could help respondents develop good perception towards MPAs hence increasing their tendency to participate. Those who perceived that it is necessary to protect the environment for the future generations are more likely to participate in MPA management.

Table 3.7. Determinants of participation on the management of nationally-established MPAs

Variable	Type of variable	Island data set	Mainland data set
Intercept		-5.308***	-6.729***
		(-3.341)	(-4.702)
Total household income	numerical	0.0000564**	0.00000581***
		(2.015)	(2.760)
Age	numerical	-	0.03981***
			(3.237)
Fishing household	dummy	2.948***	-
	(1 = yes; 0 = no)	(2.801)	
Member of fisher's	dummy	-	0.5918**
organization	(1 = yes; 0 = no)		(2.015)
Benefit in livelihood	dummy	2.629**	-
project/tourism activities	(1 = yes; 0 = no)	(2.382)	
Received any extension	dummy	2.457***	3.913***
services	(1 = yes; 0 = no)	(4.307)	(5.653)
Perception statement	dummy	-	0.4271**
(necessary to protect the	(1 = yes; 0 = no)		(2.539)
environment for the future			
generations)			
Nos. of observations		96	234
Loglikelihood		-17.18	-47.52
McFadden's R Square		0.688	0.481
AIC		44.35	107.03

***Statistically significant at the 1% level or better; **at the 5% or better, * the 10% level or better.
value in parenthesis is z-value

3.5 Conclusions and Policy Implications

3.5.1 Enhancing the Livelihood Opportunities and Poverty Alleviation in the Coastal Villages

High marine and coastal resource reliance, low household income and apparent insufficient livelihood opportunities characterized the study villages. Despite the economic situation, villagers supported the establishment and the presence of MPA in the community. To intensify the participation of local residents in the resource management, the significant economic benefits that can be derived when resources and habitats are conserved and protected should be felt. However, with growing population and increasing dependence of local residents in the coastal resources, the introduction of alternative livelihood projects is necessary to improve the livelihoods of fishing families in the coastal communities. This study has clarified that the livelihood projects and ecotourism activities played a major role in encouraging local residents in MPA management. As the fishing grounds are designated as no-take zone due to the establishment of the MPA, fishers may temporarily lose their livelihood opportunities in the area, hence the institution of alternative livelihood projects is an important consideration. It should be noted that conservation programmes, at the very least, should not adversely affect and where possible should contribute to poverty alleviation (CBD, 2008). Nevertheless, comprehension of the social dynamics and existing livelihood in the community are essential in designing effective and acceptable livelihood projects. In this case study, the villagers in locally-established MPAs showed strong expectations for the setting up of *payao* inside their municipal waters despite the difficulty of maintaining it due to geographical conditions. This implies that they preferred to work more in the sea through their fishing activities under the sustainable use of the marine and coastal resources. This

preference was further demonstrated by a non-decrease of fishing activities despite the presence of alternative livelihood projects. For that reason, the challenge for policymakers and coastal resource managers is to determine how to obtain the economic benefits of the coastal resources while protecting them for future generations. Consequently, the following are the implications for policy and research:

(1) To cope with this situation and in addition to the present livelihood projects, technology development for establishing a durable *payao* system is suggested. However, the impacts of utilizing *payao* in the area need to be verified in relation to the spill-over effects in MPA to prevent collapse of resources due to high fishing effort. Further enhancement of the livelihood projects in the village is expected by most of the dwellers.

(2) The design of alternative livelihood projects needs to be based on an intensive participatory process with an exhaustive consideration of the necessary social and economic factors. It is also imperative to progress beyond the customary small scale alternative livelihoods and make an effort to expand recognized livelihood projects into microenterprises that are efficient of bringing the profit margins and employment potential up to higher economic levels. Such ideas of livelihood projects could at least alleviate the poverty level of the local communities.

3.5.2 Strengthening the Participation of Local Community in MPA Management

Despite the fact that community recognizes the importance of the MPA for the protection and conservation of marine resources, encouraging long term participation is still a challenge. Institutional support policies and mechanisms should be undertaken to enhance these factors to ensure long lasting participation of the community for a

successful MPA implementation. In relation to this, the following are implications for policy and research:

(1) This study suggests that the total household income positively affects participation in MPA management. Income is distributed in an uneven manner among the village population with the small-scale fishers as the low-income earners. As these fishers engage in daily fishing and fishing-related activities such as fish vending, they felt that protecting the resource is a way to secure their means of livelihood, thus they approved the MPA programmes. Villagers, especially artisanal fishers, who mainly depend on marine resources, showed a higher tendency to participate in MPA management activities. This opposes the findings of Fox et al. (2012) which showed that greater dependence leads to an increased likelihood that local people would not comply with restrictions on marine resource extraction. Pollnac et al. (2001), however, pointed out that the more important the fishing occupation is to the community, the more interested and committed they are in attaining fish production benefits by supporting MPA programmes. A sustainable source of income for villagers is therefore necessary to strengthen and encourage their involvement in coastal resource initiatives.

(2) Both fishers and non-fishers as well as local residents affected by MPA either directly (islanders) or indirectly (mainland residents) showed interest to participate in the MPA management. The result indicated that MPA is managed not only by the fishing sector, but jointly by both groups in the village. A holistic approach to rural development is necessary to gain wider support for coastal resource management.

(3) MPA is basically managed through voluntary manner, however a strong support from the government regardless of governance level (nationally- or locally-established), is

indispensable to encourage insistent participation in MPA management. In the case of locally-established MPAs, community members expect much from the presence of alternative livelihood projects hence appropriate and sustainable projects that could boost participation is an essential consideration. Moreover, the villagers in the nationally-established MPA depend much on the ecotourism activities, hence improvement and expansion of this kind of undertakings is essential to obtain immense support from the local community.

(4) The findings from this study showed that capability building (i.e. trainings and seminars) as an output of extension services by external agents increased participation of villagers towards MPA management. Capability building is essential to develop the skills and capacity of members and a clear understanding of project objectives brings active participation among stakeholders (Christie et al., 1999). While analysing the governance of coastal resources in Southern Iloilo, Philippines, Boeh et al. (2013) suggested that strengthening of community through capacity building and empowerment is needed in order to achieve successful co-management arrangement. Education and empowerment are potential ways to increase awareness and understanding of coastal resource management. Leisher et al. (2012) demonstrated that investments in MPA education and outreach can generate improvement in local knowledge and positive attitudes which contribute to long-term compliance with MPA regulations. It is, however, vital to ensure a highly participatory procedure that ensures maximum input from the community members to guarantee successful empowerment (Crawford and Kasmidi, 2004). Therefore, a continuous environmental education that would elicit consciousness should be undertaken in the villages with MPAs.

Chapter 4: Evaluation of the Villagers' Willingness to Work or Pay for the Promotion of Community-based Marine Protected Areas in Cagayan Province, Philippines[4]

4.1 Introduction

With the high intensity fishing pressures exerted and other unregulated human activities in the marine environment, negative externalities occur, such as but not limited to: pollution, degradation of critical habits and loss of biodiversity. One of the management strategies that have been developed to overcome environmental externalities is the establishment of MPAs. MPAs attempt to protect and conserve the marine resources by regulating the human activities within the identified areas and so create positive externalities such as increase in fish stocks, improvement of marine habitats and so on. To fully appreciate the goods and services which are either over-exploited (CPRs) or under-utilized (public goods), there is a need to understand the true economic values of the resources conserved by the MPAs. However, most of the ecosystem services provided by the marine resources have no market value. With this, economic valuation is an important process to evaluate the values of ecosystem services. Economic valuation emphasizes the significance of the marine resources' ecosystem services to the economy of the coastal communities. The results of the estimates from economic valuation can provide justification for an adequate capital outlay for coastal management efforts.

MPAs are customarily dependent on several sources of funding, including government allocations, donations and trust funds, but all are subject to unpredictable fluctuations (Depont and Green, 2006). The sustained support of the national or local

[4] This chapter was submitted and under review for publication considerations (Ballad et al., under review for publication)

government on the monitoring, patrolling and enforcement of regulations is essential to MPA sustainability. For that reason, one of the most crucial factors in managing effective MPAs is ensuring the availability of continues financing.

To ensure long-term support and sustainability of MPA, a promising approach is to strengthen the community-based MPA management. The coastal community is an indispensable element that can contribute considerably to effective enforcement of the fisheries laws because they are the main users of the coastal areas which offer opportunities for them in terms of sustenance and income (Loot, 2007), hence, they make MPA management easier and cost-effective (Shinbo et al., 2014). It appears that operative and functional MPA enforcement is the precondition for positive externalities to transpire (Rossetto et al., 2010). However, poor law enforcement and prosecution system as well as the insufficiency of funds and logistics to carry out these activities are some of the major challenges in the management of MPAs in the country (Aliño et al., 2007). At present, voluntary patrolling through the *bantay dagat* and other members of the fisher's associations is observed in the MPAs of Cagayan Province. Community-based law enforcers such as *bantay dagat* were recognized for effective MPA management (Christie et al., 2009).

Using stated preference methods such as CVM and CB, this research tried to disclose the economic values attached in the continued existence of community- based MPAs by asking the villagers hypothetical questions about their possible behavior. To investigate the local residents' value of resource and environmental conservation, this study used CVM to find out for their willingness to pay (WTP) and CB to measure their willingness to work (WTW) then further estimate the monetary value from the cost of that behaviour. With limited monetary sources in the coastal villages as manifested by

earlier research of the author, the provision of voluntary labor (WTW) as an elicitation method is explored in this study.

Previous studies utilized CVM to quantity the recreational and conservation benefits of marine ecosystem, particularly coral reefs in the Philippines with tourists as respondents (Arin and Kramer, 2002; Ahmed et al., 2007) while CB was commonly used in evaluation of trip behaviors in recreational demand modelling (Englin and Cameron, 1996). While earlier studies focused on tourists' valuation on MPAs, this study evaluates the villagers' (within the MPAs) WTW or WTP to support the existence of community-based MPAs with emerging ecotourism activities in Cagayan Province, Philippines. The study aims to contribute to the existing literatures on the economic value of the existence of a community-based MPAs from the perspectives of the villagers and to generate estimates that will be beneficial for the resource managers and policy makers in the evaluation and development of funding sources for the management of the resources.

4.2 Study Areas and Methodology

4.2.1 Study Areas

This study takes the case of a nationally-established MPA with a flourishing tourism, the PIPLS, and a locally-established MPA with emerging tourism activities, the San Jose MPA. Both MPAs are known to have a fair to good coral covers, good seaweed beds and high species richness and abundance as reflected in their status quo conditions in Table 4.1.

The PIPLS win the interest of the tourists since it was used as the filming location for the international hit reality show "Survivor" on 2013 and earned the 10th spot in the CNN's World's 100 Best Beaches list on the same year (Domingo, 2015). The increase in

tourists' visits was encountered since then of which the Visitor Center recorded a total of 7,250 recreational visits from local and international tourists in 2015. This is a welcome development to the local residents as they can earn income from tourism activities as tour guides, boat operators, food servers, homestay owners and souvenir sellers. Meanwhile, the tourism activities in the San Jose MPA are still emerging with its reef ecosystem periodically visited by a number of local tourists.

4.2.2 Methodology

4.2.2.1 Survey Questionnaire

Using a properly designed questionnaire (Appendix 4 and 5), face-to-face interviews were conducted by trained enumerators to individual respondents. The questionnaire consisted of respondents' perceptions and awareness on MPA and coastal resource environmental issues; fishing and tourism activities in the protected area; willingness to pay or work for the promotion of the protected area and socio-economic information. To provide a comprehensive explanation in eliciting the WTW or WTP, interviewer used brochures with pictures showing the present condition of the area and a hypothetical scenario presenting a better condition of the marine resources and coastal environment if MPA is effectively managed through their participation in monitoring and patrolling.

The WTW valuation question in San Jose was presented in this way:

(1) *"With the establishment of the protected area, improvements in the marine resources were observed based from the initial conditions and constant monitoring of government agencies. A marine reserve, however, requires a certain management and enforcement cost for it to be sustainable. At present, in*

the case of San Jose MPA, municipal bantay-dagat and San Jose Fisherfolk Association members do the patrolling and ensure that the reserves are protected from illegal fishers. According to research, a community-based bantay dagat is an effective way to maintain and improve the status of the marine resources as local residents can easily monitor the environment because they are familiar with the area."

(2) The enumerator will show the brochure with the present status of the resources and the hypothetical scenario (Table 4.1).

(3) *"To guarantee this to happen, suppose there is a proposal to ask the help of residents to do the patrolling/ maintenance on a voluntary basis, meaning no salary or incentive. Giving a voluntary time to patrol will mean you will not be able to go fishing or go to work during the day or time you are assigned to patrol."*

(4) At this point, the enumerator will bluntly ask the respondent what he/she does to earn income and what is her/his average income per day. The enumerator then proceeds to say, *"This will mean you will sacrifice such amount for the MPA. I would like to request you to think carefully about whether you really care about the marine resources, and what value you put on the protected area"*. The respondent was encouraged to think seriously about the situation and identify the state of their monetary valuation or voluntary work as it entails opportunity costs.

(5) *"I would like to ask if you will be willing to work for _____ days per month for monitoring, maintenance and patrolling of the MPA? (a) Yes, (b) No, (c) No, but I am willing to work for lesser number of days? Please think carefully about this and remind yourself that there are works you might wish to spend this time on."*

If the respondent answered (c), he or she is asked on how many days per month he or she is willing to work.

The same content of WTW questionnaire was used in San Vicente but highlighting present scenario in the area. For the WTP, the same steps were done for the valuation question except that step 4 was omitted and the valuation question was framed as willingness to pay a voluntary contribution in Philippine peso (₱) as bid.

The bids used for WTW were 0.5, 1, 3, 5, and 10 days/month while the bids used for WTP were 50, 100, 200, 300 and 500 pesos/month. The workdays and monetary bids used were decided based on the earlier household socio-economic surveys, key informant interviews and pre-testing of the questionnaire. The five bids of the WTW and WTP were

Table 4.1. Status quo condition and hypothetical changes in the contingent scenario

Indicator	Status quo (good condition)		Hypothetical scenario (better condition)
	PIPLS[a]	San Jose MPA[b]	
Coral reef cover	Fair to good (28 – 73% cover)	Fair (43% coral cover)	Increased by 10%
Seagrass/ seaweeds beds area	Good (51 – 75% coverage)	Good (51 – 75% coverage)	Increased by 10%
Fish Species richness and (#species/500 sq.m)	193 species	105 species	Increased by 5%
Fish Species abundance (# individuals/500 sq.m)	3,498 individual fishes	1,056 individual fishes	Increased by 10%
Fish Biomass	37.9 kgs/500sq.m	4 MT/ha	Increased by 10%

[a]based on Municipal Coastal Environmental Profile and MERF-DENR
[b]based on 2013 Resource Assessment

equally distributed to questionnaires which were randomly used by the enumerators in interviewing the respondents.

To circumvent overestimation and bias common to CVM studies, the trichotomous choice as value elicitation format (Loomis et al., 1999) was used. Using this format, the WTW or WTP question has choices of "yes", "no" or "no, but willing to work/pay less". The third option minimize the warm glow effect or polite rejection which is common in the culture of rural residents in the Philippines. The reasons for unwillingness to work or pay was also asked to verify the validity of the answers and motives behind a negative response. The reasons such as: "The government should pay for this"; "Everyone should pay for this, not just local people"; "I do not believe that the money I will pay will actually be used for conservation" and "I need more information/time to answer this question" were considered as an invalid answer ("protest votes") as it do not reflect people's welfare changes from the services considered (Bateman et al., 2002). Protest votes were considered as non-zero value response and were not included in further analysis (Loomis et al., 1994).

4.2.2.2 Sampling Approach

The sample respondents used in this study were based on a random sampling from the earlier socio-economic assessment carried out (Chapter 3) in the villages. The distribution of respondents is presented in Table 4.2. A total of 300 respondents was selected from the San Vicente village and 100 from San Jose village. Since the San Vicente is composed of island and mainland residents and to assess the difference in the elicitation method, the mainland residents were divided such that one group were asked on WTW and another on WTP. Due to limited income as manifested in the earlier assessment, the island and San Jose residents were asked with WTW only.

Table 4.2. Household population and number of respondents

Village	No. of households	WTW	WTP
San Jose	256	100 (96)	-
San Vicente	841		
- Island (Palaui)	127	100 (100)	-
- Mainland	714		
near Port	638	100 (92)	100 (89)
far from Port	76		

Number in parenthesis are real number of valid responses

4.2.2.3 Statistical Analysis on WTP and WTW Estimation

For the statistical analysis, the WTW and WTP response data were designed as binary: 1 designated to yes responses and 0 to no and no but willing to work/pay less.

For the non-parametric method, the survival function was applied to estimate the mean and median values of WTW and WTP following Bateman et al. (2002). An empirical estimate of the survival function at each bid level (B_j) can be calculated as:

$$\boldsymbol{Probability}\left(\boldsymbol{B_j}\right) = \frac{n_j}{N_j}$$

where n_j is the number of respondents willing to pay the bid level B_j and N_j is the number of valid household samples facing the bid level Bj. This estimation procedure results in a valid survival function in which the probability of acceptance is technically never increasing as the WTP or WTW bids increases. However, in portions where the curve is not a non-increasing function, the pooled adjacent violators algorithm technique was applied. This technique involves pooling data for two adjacent bid levels if the estimate of the of the survivor function for the higher bid level is greater than that of the lower bid level. The survival function is recalculated as:

$$\boldsymbol{Probability}\left(\boldsymbol{B_j}\right) = \boldsymbol{Probability}\left(\boldsymbol{B_{j+1}}\right) = \frac{n_j + n_{j+1}}{N_j + N_{j+1}}$$

where n_{j+1} is the number of respondents willing to pay the next bid level B_{j+1} and N_{j+1} is the number of valid household samples facing the bid level B_{j+1}. The new estimate for the survivor function over the range of the two bid levels is calculated by dividing the sum of those responding "yes" to the adjacent bid levels by the sum of respondents in the two sub-samples.

Moreover, the mean value is calculated as the area bounded by the survivor function while the median is estimated at the point at which the survivor function reaches a probability of 0.5. In order to confirm the significant differences between the villages (San Jose and San Vicente) survivor function as well as that of the island and mainland, the Logrank test is used to examine the null hypothesis that there is no difference between the populations in the acceptance probability at any bid level.

The monetary values of WTW was then further calculated using the average daily income of respondents. Assuming that the conditions for valid aggregation were met, the aggregation of economic values is relatively straightforward as the product of the mean or median of WTW and WTP and the number of households in each village. If we denote the statistic of interest (mean or median WTW or WTP) as WTW and WTP and the total number of households in the population as N, then:

$$\text{Aggregate}_{\text{WTW or WTP}} = \text{N x WTW or N x WTP}$$

Furthermore, using a single-bounded binary response data, the volunteer work and payment behavior equations were estimated using a probit regression model. The dependent variable, acceptance of proposed bid, was first regressed with the basic

exploratory variables such as proposed bids, income and fishers dummy. Using the LR-Chow test, the data structure between the villages data sets along with the island and mainland data sets were tested for the consistency in the coefficient estimates for the different regressions.

Following Wooldridge (2006), the probit model is specified using the latent variable y^*

$$y^* = \mathbf{x}'\boldsymbol{\beta} + u$$

where x is a vector of explanatory variables, β is the unknown parameters and u is error term. Assuming that u is normally distributed across observations, we normalize the mean and variance of u to 0 and 1, and we can calculate the response probability for y* as:

$$\begin{aligned} y &= 1 \quad \text{if} \quad y^* > 0, \\ y &= 0 \quad \text{if} \quad y^* \le 0 \end{aligned}$$

from the Cumulative Distribution Function (CDF) of u: $F = \Phi(x) = \int_{-\infty}^{x} \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$

$$\text{Prob}(y = 0) = F\left(-\mathbf{x}_i'\beta\right)$$

$$\text{Prob}(y = 1) = 1 - F\left(\mathbf{x}_i'\beta\right)$$

By applying the regression diagnostic procedures, other potentially important predictors were included and delete those not making significant partial contributions at pre-assigned level of significance. The sign conditions of the factors specified to influence WTW and WTP were examined such that a positive sign directions means that an increase in the factor increases the probability to accept the bid, while a negative sign specifies the opposite.

4.3 Results and Discussions

After regulating the protest responses, the final number of responses considered in the analysis was 377; 288 for WTW and 89 for WTW.

4.3.1 Nonparametric Estimation of Acceptance Probability Curve

The internal validity of the behavior response confirms the overall pattern of the survival function which showed a decreasing tendency of acceptance as the proposed bid in terms of voluntary patrol days or monetary amount is increased (Figures 4.1 and 4.2). Table 4.3 summarizes the result of nonparametric estimation of the acceptance probability curve.

San Jose residents have a mean WTW of 5 days per month, which is comparable with the San Vicente village having a WTW of 4.5 days, although, there is no significant difference between the two villages (Table 4.4). The almost the same WTW of the two villages can be attributed to their direct jurisdiction on the MPA. Nevertheless, San Jose displayed higher median WTW which implies that most respondents accept bids higher than the average. This further denotes that San Jose has relatively higher WTW. The intact population in San Jose compared with San Vicente could be the possible reason for this.

Similarly, there is no significant difference on the WTW of the island and mainland residents of San Vicente. However, the island survival curve is generally above the mainland which suggests greater WTW for island residents compared with the minland. The estimated mean WTW for island residents is 5 days per month with a median of 4.6 while mainland residents have a mean WTW of 4 days per month with a median of 2.6. This reveals that residents within the MPA showed a higher disposition to support enforcement costs.

For the WTP, the mean is estimated at ₱187.50 (3.95US$/month at ₱47.43 = 1US$ average exchange rate in September 2016 (BSP, 2016).

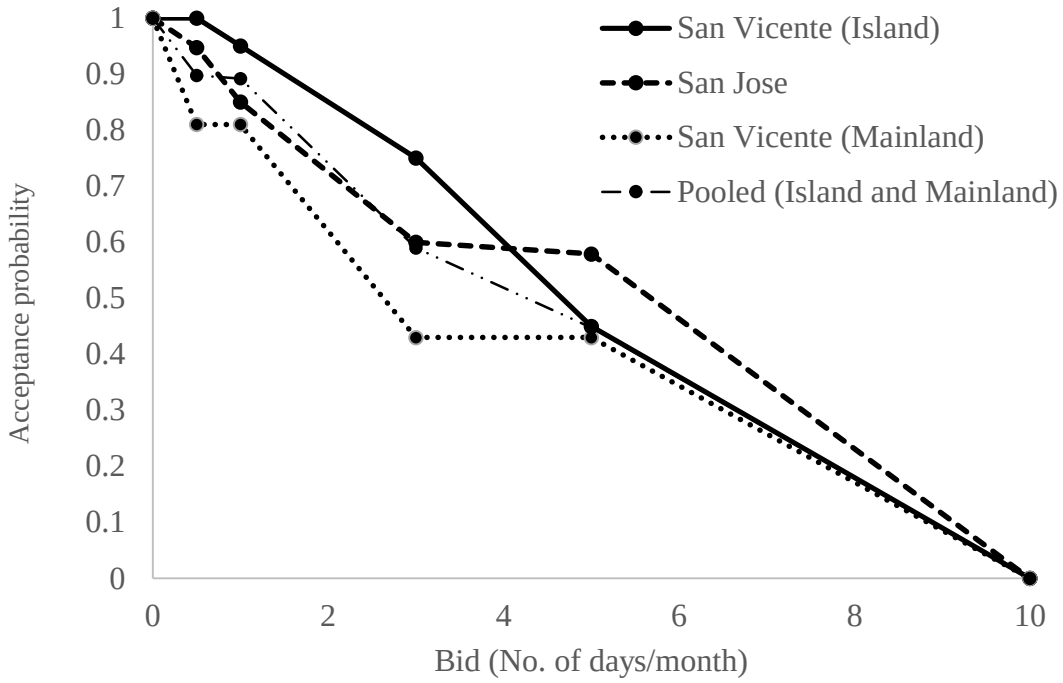


Figure 4.1. Survivor function of willingness to work among local residents in MPA villages in Cagayan Province

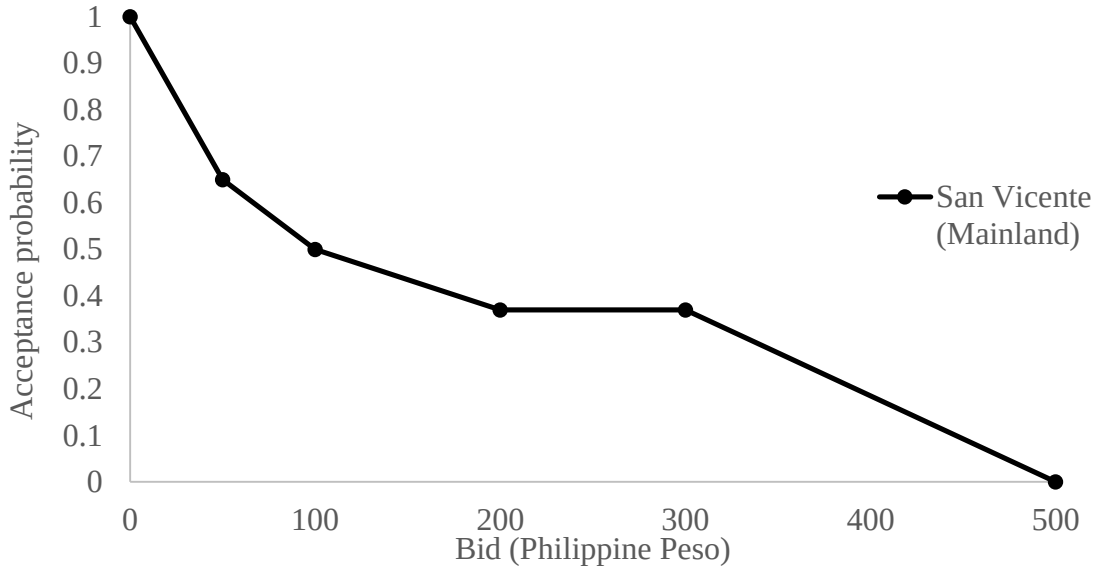


Figure 4.2. Survivor function of willingness to pay among local residents in San Vicente village in Cagayan Province

Table 4.3. Result of nonparametric estimation of survival curve

Statistic	WTW (days/month)				WTP (₱/month)
	San Jose	San Vicente (Pooled island and mainland)	San Vicente (island)	San Vicente (mainland)	San Vicente (mainland)
Median	5.68	4.26	4.67	2.63	100
Mean	5.01	4.56	5.01	4.03	187.50
Number of Household	322	841	127	714	714
Aggregated WTW/WTP	1614	3835	636	2879	133,875
Average Daily Income	195.5	224.67	144.3	251.3	-
Converted WTW in Monetary Term: Median	1110.8	957.2	673.9	660.9	-
Converted WTW in Monetary Term: Mean	979.9	1024.2	722.9	1012.7	-

Table 4.4. LogRank test on the difference of WTW acceptance probability curve

	Between San Jose and San Vicente	Between Island and Mainland
Test Statistic (Chi-square)	0.3	2.1
5% Critical Value of Chi-square (d.f. = 1)	3.84	3.84
Test result	accept	accept

4.3.2 Comparing the Monetary Value of WTW and WTP Estimates

Converting the WTW in monetary term by multiplying the mean WTW with the average daily income of respondents, the WTP estimates showed that the equivalent value of WTW is 3.9 to 5.4 times higher. This result is in consonance with that of the island villagers' of San Miguel Island, Philippines having a WTW value eight times higher than their WTP (Casiwan-Launio et al., 2011). This predisposition can be attributed to the

insufficient labor market in the area and therefore impel the respondents' preference for money over time. This result manifest the theory of exchange asymmetries, a phenomenon known as the endowment effect where respondents tend to overvalue something because they own it (Thaler, 1980).

4.3.3 Aggregation

Based on the village's household population, the aggregated monthly WTW for San Jose is 1,614 days and 636 days for the San Vicente island, which means that it is possible to assign 50 residents from San Jose and 20 from the San Vicente island for the daily monitoring and patrolling of the respective MPAs. The converted monetary value for this is ₱3.8 million (US$ 80,440) and ₱1.1 million (US$ 23,285) per year in San Jose and San Vicente island respectively.

For the WTP, the aggregated value is estimated at ₱1.6 million (US$ 33,870) per year for San Vicente. If this amount is used solely for patrolling and considering the present minimum daily agricultural wage of ₱280 per person (NWPC, 2016) (₱6,160 /month at 22days/month), this value is enough to pay 20 persons per month.

The average budget allocated for locally-established MPA such as San Jose MPA is around ₱50,000 to 150,000 (US$1,000 – 3,000) while the PIPLS received budget from the national government depending on the proposed activities and from the IPAF generated from the user's fee. However, much of these funding sources are generally used for infrastructure and ecotourism development.

4.3.4 Estimation of Volunteer Labor Equation (WTW) and Payment Behavior Equation (WTP)

The result of the LR-Chow test (Appendix 6) revealed that the coefficients of the variables are equal among equations of the three data sets (San Jose, San Vicente-island

and San Vicente-mainland) hence the data sets need to be analysed separately. Table 4.5 shows the estimated probit model of the three data sets for reference.

The coefficient sign condition of the proposed bid variable is negative and highly significant in all models implying that the probability to accept the proposed bid decreases as the bid level increases which is consistent with welfare economic theory.

For the WTW model of the San Jose data set, dummy variables on membership to fishers' association, gender and perception on the effect of a better environment to ecotourism showed positive sign conditions which suggest higher tendency to accept the proposed bid. A positive sign conditions on the dummy variables fishers and benefits from ecotourism were observed for San Vicente island data sets while fishers, membership to fishers' association and the number of years in the village were the determinants for San Vicente mainland data sets. The results confirmed that fishers or members of fishers' associations showed a higher probability to accept WTW questions. This result opposes the findings that greater dependence leads to an increased likelihood of not conforming with marine resource conservation (Fox et al., 2012) but supports the remarks which pointed that the more important the occupation of fishing is to the community, the more interested and committed they are in supporting conservation programs (Pollnac et al., 2001). The results also validated the importance of securing benefits from ecotourism activities as an influencing factor to the tendency to accept proposed bid for WTW. In San Jose, where ecotourism is still in infancy stage, perception that an improved environment would increase the number of tourist and tourism activities appeared to be a significant factor affecting the acceptance of the WTW bid. Similarly,

Table 4.5. Result of probit estimation on WTW and WTP

Variables	Explanation of variables	Volunteer Labor Equation (WTW)			Payment Behavior Equation (WTW)
		San Jose dataset	San Vicente		San Vicente
			Island data set	Mainland data set	
	Dependent Variable: Acceptance of proposed bid (days or amount)				
	Dummy variable: 1 = yes; 0 = no				
Constant	Constant term	-0.1265	1.0198*	-1.4192*	-7.9349**
		(-0.222)	(1.745)	(-1.782)	(-2.470)
BID	Proposed bid (days or amount)	-0.4568***	-0.5523***	-0.4379***	-0.0044***
		(-4.647)	(-4.275)	(-4.129)	(-3.813)
logHHinc	Natural logarithm of annual HH income	-	-	-	1.6822***
					(2.612)
dsex	Sex of respondents (dummy: 1 = yes; 0= no)	1.2118**	-	-	-
		(2.627)			
yrsbrg	Number of years in the village	-		0.03101**	-
				(1.984)	
dfis	Fisher (dummy: fisher = 1)	-	1.1381**	2.0146***	-
			(2.458)	(4.095)	
dFA	Member of fishers' association (dummy: 1 = yes; 0= no)	1.9566***	-	1.3577***	0.611*
		(2.560)		(2.868)	(1.746)
dIncTou	Received income from tourism activities (dummy: 1 = yes; 0= no)	-	0.9388**	-	-
			(2.071)		
dTourism	Believe that better environment increase number of tourist and tourism activities (dummy: 1 = yes; 0= no)	0.9435*	-	-	-
		(1.837)			
	Number of observations	96	100	92	89
	Log-likelihood	-27.5468	-24.4204	-28.3874	-43.7413
	McFadden's R Square	0.5725	0.6294	0.5545	0.261
	AIC	65.094	56.84	66.78	95.48

***Statistically significant at the 1% level or better; **at the 5% or better, * the 10% level or better.

Value in parenthesis is z-value

income coming from tourism activities is a significant determinant for the San Vicente island, where the MPA is located with thriving ecotourism activities. In addition, male respondents have a higher probability of accepting the WTW question in San Jose which is unsurprising considering the physical demand of MPA patrolling and maintenance. The longer years of residency in the village also contributed to the WTW of San Vicente mainland residents, which can be attributed to their sense of belongingness in the area.

For WTP, income and membership to fishers' association were significant variables with positive sign conditions. This suggests that higher income respondents and members of fishers' associations are more likely to accept the WTP questions. With the same trend on the effect of income, Ahmed et al. (2007) concluded that high income respondents put a premium on environmental conservation compared with the lower income and thus conservation value is intensely related to capacity to pay.

4.4 Conclusions and Policy Implication

This study confirmed that in general, local residents (in both nationally and locally established MPAs) are willing to voluntarily provide labor or money to support the patrolling and monitoring for the sustainable use of the coastal and marine resources. Villagers who have existing voluntary community-based patrolling activities or who are directly managing the MPA have higher WTW than those who have less participation on patrolling. This is confirmed by the results: $WTW_{San\ Jose} = WTW_{island} > WTW_{mainland}$. Prospects on ecotourism, which is seen as a possible source of income, increase the tendency of villagers to accept volunteer labor bids while income is an important factor in signifying payment behavior. Meanwhile, the aggregate WTP is huge enough to cover the prevailing cost of maintenance and patrolling of the PIPLS. The quantitative values

from this research can guide resource managers and policy makers in the management of MPAs (i.e budgetary support for the conservation of the resources). In relation to this, the following are implications for management, policy and research:

(1) Voluntary labor can be stimulated as a mechanism for MPA management in the developing countries which could be patterned from the existing rural activities (e.g. coastal clean-up). The formation and strengthening of fishers' associations in the villages is encouraged considering its positive effect in promoting the willingness of villagers to participate in MPA patrolling and maintenance.

(2) The quantitative values generated from the WTP of the villagers can be used to draw the attention of policy makers to deliver appropriate budget for resource conservation. Further, economic valuation from the perspectives of other residents (particularly tax-paying) residing within the municipality where the MPA is, is recommended for estimation to provide another plausible options for MPA financial mechanism.

(3) Attempt to upsurge labor market in the area to increase the income of the villagers which could increase the villagers' WTP is suggested to be considered. Introduction of livelihood activities that could generate income for the villagers may increase the tendency to participate in patrolling activities.

(4) The ecotourism potential of the MPAs could be explored to serve as a financial mechanism for MPA management and as a supplementary livelihood to villagers. The collection from the user fee in PIPLS is used to introduce new projects for the development of the area. In view of the emerging ecotourism activities in San Jose, the exploration of possible implementation of user fee system is recommended.

Chapter 5: Estimating the Recreational Value of Marine Protected Area in Northern Philippines in Support to Coastal Management and Rural Transformation[5]

5.1 Introduction

MPAs improved the quality of marine resources and with this remarkable effect, tourism and recreational opportunities were developed in these areas which brought economic benefits of the stakeholders. MPA objectives have expanded from biological and ecological issues to encompass social and economic concerns which include tourism activities. Marine tourism has become an encouragement to local communities to promote the establishment of MPAs.

Many MPA sites in the country have become popular ecotourism destinations, such as the Gilutongan Channel Marine Reserve and Apo Island Marine Reserve in the central Philippines, generating millions of dollars of annual tourism revenues in addition to improved income from fishery yields (Biña-de Guzman, 2010). The emerging demand of marine tourism in areas where MPAs are located has been identified as one way in which MPAs may be financed (Fabinyi, 2008). MPAs worldwide is reported as failing to attain their conservation objectives due to inadequate funds which results in its functional failure (Dharmaratne et al., 2000; Depondt and Green, 2006). Imposing entry fees is one way to guarantee applicable funds for effective MPA management (Bramwell and Fearn, 1996). Previous studies were conducted to evaluate the willingness to pay for a user fee among tourists in MPAs with existing recreational and tourism activities in the country. For instance, in an exploratory study conducted by Arin and Kramer (2002), they found that local and international divers in the Philippines showed a positive willingness to pay

[5] This chapter is contributed by the author and is published in the Proceedings of the 9th ASAE International Conference 2017: Transformation in Agricultural and Food Economy in Asia (Ballad et al., 2017).

to enter in three marine sanctuaries with annual potential revenues ranging from $850,000 to $1.0 million on Mactan Island, from $95,000 to $116,000 in Anilao and from $3,500 to $5,300 on Alona Beach. They further conclude that the revenues that can be generated from the tourism activities could be used to support the maintenance of MPAs as well as for provision of alternative livelihood opportunities for fishers who were barred from fishing activities.

The benefits provided by MPAs in the recovery of resources as well as its potential in facilitating the alleviation of poverty level in the coastal communities are documented by Leisher et al. (2007). Despite this positive implication, many of these MPAs received deficient funding from the government or donor agencies. Wielgus et al. (2010) suggested that a decentralized system of user fees is needed to be considered as financing mechanisms to MPAs to meet its objectives of protecting the coastal resources. However, Emerson (2003) noted that while user fees may contribute to finance the implementation of MPAs, it is usually low and its contribution is somewhat inconspicuously.

Since it is difficult to find the value of the scenic beauty or use value of the MPAs because such amenities is not normally priced in markets, this study used the TCM augmented with CB method to estimate the economic use values associated with the recreational trip to Palaui Island Protected Landscape and Seascape (PIPLS), a protected area with thriving tourism activities located in the Northern Philippines. This research would like to evaluate the economic use values of the PIPLS on its present condition using actual expenses data of the tourists with added information about how users might change their behavior if certain hypothetical conditions existed. Tourists visiting the PIPLS pay the current user fee, however, various studies have shown that in many cases, fees are too low to cover the costs associated with the tourists' use of the natural resources

(Dharmaratne et al., 2000; Depondt and Green, 2006). This study, therefore, attempts to calculate the welfare estimates of local visitors to contribute to the recreational value information for policy implications towards sustainable management of MPA and rural transformation.

5.2 Study Area and Methodology

5.2.1 Study Area

The PIPLS is located about 630 km from Manila, the capital of the Philippines. This island is separated from the mainland by the San Vicente Strait and bounded on the northeastern side by the Pacific Ocean and by the Babuyan Channel on the west. The island covers a 4,976 ha of marine ecosystems with about 30 km shoreline.

The PIPLS is a home to 127 households, mostly dependent on fishing and tourism activities as a means of livelihood. PIPLS is endowed with rich ecological communities such as coral reefs, seaweed meadows, mangrove forest, primary forest and riparian ecosystem. Despite its remote location, the island caught the attention and interest of the tourists when it was used as the filming location for the international hit reality show "Survivor" on 2013 and at the same year, it was recognized as the 10th spot in the CNN's World's 100 Best Beaches (Domingo, 2015). The influx of tourist was experienced since then and the Visitor Center recorded about 7,000 visits from local tourists in 2015 (Table 5.1). The different recreational activities in the PIPLS include swimming, snorkelling, island hopping, trekking, bird watching, mangrove planting and camping. An access fee of ₱70 (US$1.50 at 1US$ = ₱46.52 average exchange rate in April-June 2016) (BSP, 2016) per visitor is collected before entering the PIPLS. The fee is divided into: ₱50 as a user fee collected by the DENR and ₱20 as ecosystem fee collected by municipal of Sta.

Ana. The income generated from the user fee formed the IPAF while the ecosystem fee is managed by the LGU and both is used for infrastructure development. Henceforth, this study tried to calculate the tourists' recreational valuation on the site using their actual travel expenses and further observe their travel behavior once additional fee is introduced which will primarily be used for the protection and improvement of the marine resources. A typical visit to the PIPLS would require fees as shown in Table 5.2.

Table 5.1. Annual tourists arrival in PIPLS

Year	Type of tourists		Total Arrival
	Local	Foreign	
2012	476	13	489
2013	2,284	90	4,297
2014	9,000	310	9,310
2015	7,049	223	7,272
2016 (as of August)	8, 413	88	8, 501

Source: Cagayan Economic Zone Authority, Ecozone Visitor Center

Table 5.2. Expenses of a typical visit to PIPLS

Particulars	Collecting group	Cost (₱)	Remarks
Boat fare	PASAMOBA SAMOBA	500 – 3800	Depending on boat package (destination and time) Maximum of 8 passengers per boat. Only these boat operators are authorized by PAMB to bring tourists in the island
Tourist guide			Trained local residents and members of the Palaui Environmental Protectors' Association
Reef guide	PEPA	300	1 guide per 2 tourists
Gears	PEPA	250	Rate per set
Trek/birding guide		300	1 guide per 4 tourists
Accommodation			
Homestay	Registered San Vicente-Palaui homeowners	250	Houses of accredited island residents
Nature village	PEPA		A camp site in the area
Tent		250	Rate per day per person
Room		1200	Rate per day room (2 - 4 persons)
Catering (Meals/Food)	PEPA (Culinary group)	150 – 300	Local food served by the residents
Entrance fee			
User fee	DENR	50	75% Protected Area Fund; 25% National Treasury
Ecosystem environmental fee	LGU	20	60% LGU; 40% Village

Note: PASAMOBA – Palaui-San Vicente Motorboat Association; SAMOBA- Sta. Ana Motorized Boat Association; PEPA – Palaui Environmental Protectors Association; DENR – Department of Environment and Natural Resources; LGU – Local Government Unit of Sta. Ana

5.2.2 Methodology

5.2.2.1 Survey Questionnaire and Data Collection

The data used in the study were collected on-site over the 3-month period from April to June, 2016. These months constitute the period of highest tourists' visits and

represents about 50% of the total annual visits as per information from the tourism office of the municipality. A questionnaire (Appendix 7) was used to gather information regarding tourist's revealed preference and contingent behavior towards change in scenario. The questionnaire was divided into three sections. The first section gathered data on tourist's travel time and costs incurred for the trip and perceptions on the marine resources of PIPLS. In the second section, the respondents were asked with the contingent behavior questions such as how many visits they would take if the conditions of the resources will improve with the imposition of an additional entrance fee. To evaluate how the tourist's travel behavior change, Table 5.3 was presented to show the contingent scenario explaining possible changes in the marine habitat should there be an additional financial source which will be used to sustain the management of the MPA. The hypothetical scenario was posed as follows:

*"The table below shows the present and expected conditions of the marine ecosystem. According to research, a community-based bantay dagat ("sea guard") is an effective way to maintain and improve the status of the marine resources. To establish this, there is a proposal to institute a "**MARINE RESOURCES PROTECTION FEE**" to cover the cost of patrolling, monitoring and maintenance of marine resources. Please think carefully about how much you can really afford and try to be realistic as possible. There is no right or wrong answer to this question".*

If an additional fee of ₱ _____ will be collected, will you still visit PIPLS?

_____ Yes, If yes, how many times will you intend to visit PIPLS?

_____ No, If no, why? _____

Table 5.3. Present condition and hypothetical changes in the contingent scenario

Indicator	Present condition*	Expected conditions
Coral reef cover	38 – 55% cover	Increased by 10%
Seagrass/ seaweeds beds area	Good (51 – 75% coverage)	Increased by 10%
Fish Species richness (#species/500 sq.m)	193 species	Increased by 5%
Fish Species abundance (# individuals/500 sq.m)	3,498 individual fishes	Increased by 10%

*based on Municipal Coastal Environmental Profile and MERF-DENR

Exploratory visit, key informant interviews, training of enumerators and pre-testing of questionnaires and hypothetical scenario comprised the preliminary activities. This resulted in the use of final bid amounts of ₱ 20, 50, 100, 200, 500 and 1000 for the proposed marine resource protection fee. The sample respondents were randomly assigned to the bid amount. This study focused on the change in travel trips in response to changes in the resources rather than the reaction to the price increase. The last segment of the questionnaire collected the general socio-economic information which was used to guarantee that the samples were reliable and representative.

5.2.2.2 Data Analysis: TCM and CB Demand and Consumer Surplus Estimation

The TCM is a commonly used method to value the demand for outdoor recreation and its theoretical foundation is well discussed in literature (Haab and McConnell, 2002; Bateman et al., 2002). TCM is particularly significant in MPAs in which the use-value (e.g. fishing, diving, beach recreation, bird watching) comprise of a great portion of their value. The basic premise of the TCM is that the time and travel cost expenses that an individual incur to visit a site represent the "price" of access to the site, hence the individuals' willingness to pay to visit the site can be estimated based on the number of trips that they make at different cost (Becker and Choresh, 2006). The CB model was

supplemented to provide additional information on how the tourist's behavior change under a hypothetical scenario.

Count data model was used in this research since the dependent variable has a non-negative integer distribution (Hellerstein, 1991; Shrestha et al., 2002). The Poisson specification of count data model was applied in this study and issues on truncation of non-users and endogenous stratification was corrected by subtracting one trip from the independent variable (Haab and McConnell, 2002; Prayaga et al., 2010). Basically what the correction does is to adjust the dependent variable downward, thereby removing the effect of the on-site survey on over-sampling more frequent or avid users (Loomis, 2003). The correction for endogenous specification was applied for the TCM (Prayaga et al., 2010).

The demand model for trips (*V*) by an individual (*i*) at the recreation site (*j*) as a function of the cost of travel per trip (*TC*) and other explanatory variables (X_n) that might affect demand is specified as follows:

$$V_{ij} = \beta_0 + \beta_1 TC + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots\ldots + \beta_n X_n$$

TC include the cost of round-trip travel as reported by the respondents, including related expenditures as shown in Table 5.2. All answers provided by the respondents were counterchecked with the standard cost to ensure reliability of data. The opportunity cost of time (travel and recreation) is also included in TC using the commonly used fraction which is 1/3 of the hourly income rate of respondents (Parsons, 2003; Lew and Larson, 2005). This study further applies a single-site individual travel cost model to value the recreational benefit at the PIPLS. In the case of multiple purpose trips, respondents were

asked to give the percentage of cost associated with the travel to PIPLS based on the importance attached to the entire trip (du Preez and Hosking, 2011). The additional entrance fee ("*marine resource protection fee*") is included in the CB demand model.

The dependent variable is the visit rate over a one year period. For the TCM, this variable covers the number of trips taken by the respondents to the PIPLS in the last 12 months while for the CB, this variable covers the proposed number of trips to be undertaken by the respondents in the next 12 months under the hypothetical scenario. All potentially useful predictors were included in the model building and terms not making significant partial contributions at pre-assigned α-level were deleted. To uphold consistency, all explanatory variables included in the TCM were used in estimating CB models. The models were estimated using statistical software R. The operational definitions and a priori expectation of the explanatory variables used in estimating the models are listed in Table 5.4.

The consumer surplus (CS) per trip is calculated as the inverse of the coefficient of the travel cost variable derived from the demand model (Nakatani and Sato, 2010; Pascoe et al., 2014):

$$CS = - 1/\beta TC$$

Further, a demand curve was derived from the demand function to show the relation between the price of a trip and number of trips demanded, holding the effects of all other independent variables as constant at their average values. As the demand function is specified as a linear relationship, the slope and the regression coefficients provide a direct measure of the marginal relationships (Loomis and Walsh, 1997). The number of trips intercept of the demand curve is calculated by multiplying each regression

Table 5.4. Description of individual travel cost model variables

Variable name	Operational definition	Expected sign
Dependent variable		
Trips/year	TCM: number of recreational trips to the PIPLS in the last 12 months CB: expected number of recreational trips to the PIPLS in the next 12 months	
Independent variables		
Travel cost/trip	Total round trip cost including all other expenses while in the island as well as opportunity cost of time (TCM) and inclusion of proposed additional entrance fee (CB)	-
Enjoyed activities with marine resources	Visit include enjoyment of activities with the marine resources (i.e swimming, snorkelling, scuba diving, etc) 0 = if no; 1 = yes	+
Education	Educational attainment of respondents 0 = no education; 1 = elementary level; 2 = elementary graduate; 3 = high school level; 4 = high school graduate; 5 = college level; 6 = vocational graduate; 7 = college graduate; 8 = post graduate	+
Income	Monthly income of respondents	+

coefficient (except direct cost or price) by the mean value of the variable, sum these products and add them to the value of the constant term β. Consequently, the vertical price intercept can be calculated as the quotient of horizontal intercept and regression coefficient of price. The graphic representation of the demand curve is obtained by drawing a straight line between the two intercept points.

5.3 Results and Discussions

5.3.1 Socio-economic Profile of Respondents

The socio-demographic characteristics of the respondents are shown in Table 5.5. On the average, the age of the respondents is 34 years old and has a monthly income of ₱20,260 (US$435.51). These information imply that the average local tourists in PIPLS are young, educated and moderately affluent. Respondents' average monthly income is above the mean monthly household income in the country of ₱19,580 (US$420.89) (FIES, 2012).

Table 5.5. Socio-demographic characteristics of respondents

Parameters	n	%
Gender		
Male	225	36.41
Female	393	63.59
Educational Attainment		
Elementary Level	1	0.16
Elementary Graduate	1	0.16
High School Level	13	2.10
High School Graduate	28	4.53
College Level	24	3.88
Vocational Level	20	3.24
College Graduate	472	76.38
Post Graduate	59	9.55
Occupation		
Employed	531	85.92
Freelancer	41	6.63
Businessman/Entrepreneur	39	6.31
Pensioner	7	1.13

5.3.2 Respondents' Perception on the Marine Resources

Table 5.6 shows the respondents' ranking on the island's marine resources attractions based on the pleasure they obtained as follows: (1) beach scenery and islet formations; (2) coral reefs; (3) diverse number of fishes; (4) fine white sand; (5) clean

waters; (6) secluded beach locations; (7) variety of seagrass and (8) mangrove ecosystem. Using a five-point Likert scale (Table 5.7), the respondents perceived that attributes of the island's marine resources such as quality of beach front, cleanliness of the environment and quality of seawater as good while attributes such as sites for snorkelling, quality of corals and diversity of fishes as fair. Several tourists revealed no idea on the later island's characteristics. Further, the respondents affirmed satisfaction on their visit and approved the state of conservation in the PIPLS (Table 5.8).

Table 5.6. Tourists' ranking on the islands marine resources attractions

Palaui island's marine resources attractions	Number of responses by rank			Weighted mean	Rank
	1	2	3		
Coral reefs	93	41	41	1.703	2
Diverse number of fishes	28	57	30	2.017	3
Variety of seagrass	3	11	30	2.614	7
Fine white sand	92	127	121	2.085	4
Beach scenery and islet/rock formations	314	141	65	1.521	1
Clean waters	55	172	138	2.227	5
Secluded beach locations	22	58	122	2.495	6
Mangrove ecosystem	11	11	71	2.645	8

Table 5.7. Tourists' perception on the attributes of the island's marine resources

Attributes of the island's marine resources	No idea (0)	Worst (1)	Not good (2)	Fair (3)	Good (4)	Excellent (5)	Weighted mean
	Frequency						
Quality of beach front	3	0	3	70	372	170	4.133
Cleanliness of environment	1	0	9	66	403	139	4.083
Quality of sites for snorkelling	166	1	1	56	261	133	3.042
Quality of corals	130	1	5	46	288	148	3.303
Diversity of fishes	139	1	1	56	284	137	3.223
Quality of seawater	34	1	2	36	338	207	4.045

Table 5.8. Tourists' discernment on the state of conservation of PIPLS

State of conservation	Frequency
(1) Not at all conserved ("worst state")	0
(2) Not really conserved	11
(3) Undecided	10
(4) Somewhat conserved	391
(5) Very much conserved ("best state")	206
Weighted mean:	**4.28**

5.3.3 Model Estimation: TCM and CB Demand and Consumer Surplus

The individual regression coefficients in both TCM and CB conform to the expected signs and were found to be statistically significant. Initially, the demand function was estimated using variable travel cost which includes the opportunity cost of time (travel and recreation). However, further analysis revealed that the opportunity cost of time was disregarded while answering the hypothetical scenario as manifested by the enormous increase in consumer surplus. The hypothesis for this is that respondents think that employment opportunities are unavailable while they plan for recreational activities, so the opportunity cost of wages refrained from is zero. The estimation results of the trip demand equations are shown in Table 5.9. Therefore, for TCM, the model used the total cost which includes opportunity cost of travel time and recreation time valued at 30% of the average hourly rate of respondents while for CB, a separate variable is used for travel cost and leisure time (travel and recreation).

The demand model showed that visitation rate is negatively correlated with the travel cost per visit which suggests that the number of visits undertaken per annum is inversely related to the travel cost, hence producing a downward sloping demand curve.

Table 5.9. Estimation result of TCM and CB

Variables	TCM[1]	CB[1]	CB
Intercept	-3.550***	-3.546***	-3.400***
	(-3.288)	(-7.205)	(-7.002)
Travel cost/trip	-0.0007137***	-0.00009920***	-0.0004131***
	(-7.650)	(-5.030)	(-8.201)
Travel time	-	-	0.01463***
			(3.065)
Time spent in the site	-	-	0.01276***
			(5.197)
Enjoyed activities with	0.5749**	0.4648***	0.2682**
marine resources	(2.456)	(4.286)	(2.357)
Education	0.3439**	0.4429***	0.4648***
	(2.257)	(6.372)	(6.795)
Income	0.00003844***	0.00001899***	0.00001545***
	(7.644)	(7.698)	(6.658)
Nos. of observation	618	618	618
AIC	454.78	1598.2	1547.5
Loglikelihood	-222.3922	-794.0947	-766.7418

***Statistically significant at the 1% level or better; **at the 5% or better, * the 10% level or better. values in parenthesis is z-value

[1] - total cost includes opportunity cost of travel time and recreation time valued at 30% of the average hourly rate of respondents

Those who enjoyed activities related to marine resources (e.g. swimming, snorkelling, island hopping, beach bumming, mangrove planting) showed a positive sign coefficient. This implies that tourists who go to PIPLS for these activities have a higher visitation rate. Other activities in PIPLS include trekking, hiking, bird watching, and camping. Tourists who are more educated also showed higher visitation rate. This means that those tourists with higher education levels are more interested to visit PIPLS. Income level likewise showed a positive effect on the number of visits made to PIPLS, as income increases, more visits are made. This also confirms that the recreation is a normal good as shown by the increase in demand as income increases.

In the CB scenario, 44.82% (n = 277) of the respondents were willing to pay additional fee for an improved marine ecosystem while the 55.15% (n = 341) were

unwilling to pay additional fee for the following reasons provided: (1) too expensive; (2) cannot afford to pay; (3) government should have sufficient budget for this intervention; (4) objects the additional payment and (5) need more information to answer. This information is an important consideration in any future policy mechanism, particularly on expansion of user fee. Expanding the access fees should be taken into deep deliberation because it may reduce the number of visitors.

The result of this study revealed, however, that despite an increase in costs, the consumer surplus increases. The upsurge of the consumer surplus means there are some tourists willing to pay a high price to continue visiting the area. Table 5.10 displays the consumer surplus per tourist, which indicates welfare estimates, and estimated at ₱1,401.15 (US$30.12) for TCM and ₱2,420.72 (US$52.04) for CB. The result demonstrates that the tourists have a high value for the opportunity to visit the PIPLS especially in its improved conditions. The enormous increase in the welfare estimates of the CB model where the total cost includes the opportunity in time (CB^1 in Table 5.10) may be attributed to its tendency to be less restrictive due to its speculative nature due to the earlier explanation on the hypothesis of how respondents might consider the opportunity cost of time. Nevertheless, the point is clear that the increase in welfare estimates in CB confirms that the value that respondents place on the recreational activity is higher than the price that they actually pay.

With an estimated 7,000 annual visit of local tourists in 2015, this translates to an aggregated consumer surplus of ₱9,808,050 (US$210,835.13) at its present condition. Further, Table 5.11 displays estimates of individual demand for trips to PIPLS using a demand function. Assuming that independent variables are held constant at their average

values, the relationship between changes in cost (P) and changes in the number of trips demanded (Q) is expressed as:

$$Q_{TCM} = 3.4999 – 0.00071P$$

$$Q_{CB} = 4.185 – 0.00041P$$

Table 5.10. Welfare calculations

Estimation model	TCM[1]	CB[1]	CB
βtc/visit	-0.0007137	-0.00009920	-0.0004131
CS/visit	1,401.15	10,080.65	2,420.72
Aggregated CS/visit[2]	9,808,042.59		

[1] - total cost includes opportunity cost of travel time and recreation time valued at 30% of the average hourly rate of respondents

[2]Based on a recorded 7,000 local tourists visits in 2015

Table 5.11. Estimating individual demand for trips to PIPLS using a demand function

	TCM			CB		
Independent variables	Mean values of independent variables	Regression coefficients for the independent variables	Estimated total demand, trips per year (mean x RC)	Mean values of independent variables	Regression coefficients for the independent variables	Estimated total demand, trips per year (mean x RC)
Travel cost/trip	3836.9	-0.0007137	-2.7384	2709.99	-0.0004131	-1.1195
Travel time	-	-	-	18.33	0.01463	0.26817
Time spent in the site	-	-	-	21.93	0.01276	0.27983
Enjoyed activities with marine resources	0.71	0.5749	0.40818	0.71	0.2682	0.19042
Education	6.75	0.3439	2.32133	6.75	0.4648	3.1374
Income	20041.7	3.844E-05	0.7704	20041.7	0.00001545	0.30964
Constant			-3.550			-3.4
Total demand (Q)			3.4999			4.185

The demand curve is presented in Fig. 5.1. Like the typical demand curves, the figure shows that the lower the price, the higher the quantity is demanded. Using the above equations, the estimated choke price (price where the demand is zero) for TCM is ₱ 4,929 and ₱10,207 for CB. The figure also confirmed the outward shifting of the demand curve as brought about by the hypothetical scenario of a better environmental conditions. These quantitative values showed how local tourists value the recreational services of the PIPLS hence this can guide resource managers in the institution of policies for the management of the resources.

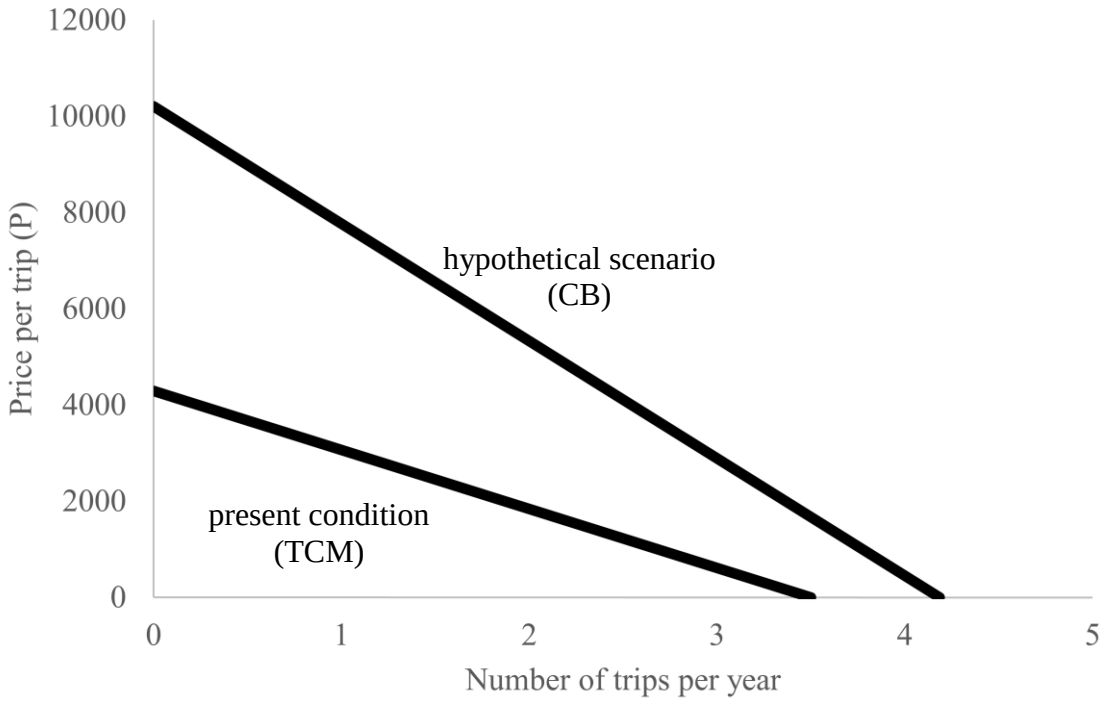


Figure 5.1. Effect of hypothetical scenario (better conditions) on the demand for recreation at the PIPLS

5.4 Conclusions and Policy Implication

The study demonstrates that the local tourists have a high value for the opportunity to visit the PIPLS. While the research is informative about the potential of collecting additional fees from the tourists to promote conservation of the resources through MPA, the results are merely indicative of the range of feasible access fees. The implications on MPA management and on TCM-CB research in less developed countries are as follows:

5.4.1 Implications on MPA Management and Policy

(1) The high tourists demand and the strong value attached to the recreational services provide justification for the conservation and protection of the marine ecosystems. Tourists showed willingness to spend money to visit the PIPLS. The high values associated with the recreational visits to the PIPLS highlights the importance of ecotourism and clearly suggest that policy makers need to consider tourists when considering policy changes.

(2) As many tourists showed reluctance in the expansion of user fee, establishing an effective sustainable financing mechanism need to be considered. For instance, the PIPLS can adopt a strategy of price discrimination in charging access fees to tourists (e.g. domestic and foreign visitors; young and adult; peak and off-season).

(3) The improved conditions of the PIPLS initiated the demand curve to shift outward, which caused the estimated consumer surplus to increase. However, the hesitation in too much accessed fee was expressed by the tourists. It is therefore suggested that the policy makers may think of a more passive way to encourage tourists to continuously visit the PIPLS with the improved conditions without making the tourists feel the burden of increased direct cost (e.g. donations can be considered, percentage of recreational activity's fees be contributed to resource conservation).

(4) The recreational demand is directly associated with the rural economic conditions in the island as several households received income on tourism activities. The ecotourism can therefore help local economies by generating revenue and jobs, which further encourages the local population to conserve its environment. The development of sustainable ecotourism by the government is recommended as it will facilitate the local populations in fostering a sense of environmental stewardship and possible reduction in fishing pressure as they can rely on ecotourism for income.

(5) In addition, the study is limited only on local tourist and reaction to the changes in the environmental condition, further research considering the preferences of foreign tourists and the use of contingent valuation method to generate information on the economic rationale of the expansion of user fee is highly recommended.

5.4.2 Implications on the Use of TCM and Contingent Behavior Model

(1) The identification of the actual value of work foregone due to the recreational activities should be considered in the design of questionnaires. The direct interview approach on the use of time (i.e. work, leisure, etc.) during the recreation activities need to be specified as not all leisure time has the same opportunity cost. In this way, it will be clearly understand whether respondents would have worked if they had not been engaged in the recreational activities which will give the research a clearer estimate of the opportunity cost of time.

(2) In order to properly predict the changes in the demand curve, the same circumstances should be asked to all the respondents. For example, the same proposed bid level (e.g. increased amount of access fee at an identified amount; increased percentage of direct cost; etc.) or hypothetical scenarios (e.g. better or worse conditions) be considered in the design of questionnaires.

Chapter 6: Conclusions and Policy Implications

6.1 General Discussions

The establishment of MPAs has been identified as a way to overcome the threatening conditions in the marine and coastal environment. MPA provides a clear system of taking advantage of the goods and services that the marine ecosystem can provide. However, in order to maximize the potential of MPAs as a coastal initiative, it is important to give solutions to the circumstances that cause difficulty on its implementation.

As MPAs involved a complex and dynamic relationship between the ecosystems and human dimensions, a multi-disciplinary approach encompassing both natural and social science perspectives is necessary to attain its objective of ensuring the optimum conditions of the coastal and marine resources. However, as the literature review of this research has indicated, little attention has been given to the social and economic aspects of MPA implementation. Hence, this study took a step to answer the basic problem in MPA implementation which is caused by the nature of the goods and services generated from coastal and marine resources focusing on the conditions of the less developed regions, like Cagayan Province in the Philippines.

This study has identified the use and non-use values associated with the coastal and marine resources particularly those that were generated from MPAs and classified it either internal or external economy. Thus, using the perspectives of environmental economics, the author tried to look on how to promote MPAs in the remote areas from the viewpoint of the characters of the coastal and marine resources such as CPRs and public goods taking into consideration on who are the end users or beneficiaries.

The capability of local communities to effectively manage their own coastal and marine resources is documented in the empirical studies presented. The various governance practices and institutional arrangements in MPA management in the province were identified. Apart from the nationally defined framework in the establishment of MPAs, the autonomy of the local government to protect and conserve their respective resources paved way to the institution of MPAs in their respective municipalities. In Chapter 2, institutional arrangements and management structures of the different MPAs in the province were presented. The study evidently showed that coastal resource management in Cagayan were under the two predominantly legal support mechanisms: (1) national government (which principally operates in top-down management scheme) and (2) localized management framework (which is mainly bottom-up management system). Despite differences in the governance levels and management structures, the mutual point in the MPAs in Cagayan Province is the involvement of the community. Therefore, aside from strong legal decrees and the structured management system, the affirmation for a functional MPA program in the province is influenced by its capacity to be community-based, participatory approach and people-oriented. The support from the government (i.e. national and local), both legal and institutional, is vital for the successful establishment of MPAs. The collaborative management or co-management approach worked appropriately in the province with continuous effort mutually coming from the government and the local community.

While no regular biophysical monitoring was conducted on the ecological status of MPAs in the province (e.g. movement of species within and outside of protected areas, stock abundance, species diversity) to tract the significant changes, the local community admitted that ecosystem health within the area were improved after the establishment of

MPAs. The closure of fishing areas (i.e. fish sanctuary) or restriction of fishing practices (i.e. marine reserves) unsurprisingly lead to diverse judgments among villagers particularly to the consumptive users who were directly impacted with MPAs.

The heterogeneity in the characteristics of households from the respective MPA communities is manifested in Chapter 3. These distinct features contribute to the uniqueness of the social structures in the corresponding community which influenced their recognition and perceptions on MPAs. Analysis of the data showed that stable household income, presence of alternative livelihood project, including *payao*, access to extension services for information, perceptions on MPAs and membership in organizations (e.g. fisher's association) were among the social factors that influence the involvement of the local residents in the conservation initiatives through MPAs.

Although voluntary involvement among local community is apparent in the province, institutional support policies and mechanisms is needed to carry out to strengthen the participation among local communities. Specifically, strategies to ensure a stable source of income among the households, particularly those solely depend on the coastal resource need to be taken into considerations. The case studies in the province confirmed that the presence of alternative livelihood projects enhances the participation of local residents in MPA management, however, it also revealed that fishing activities were not reduced despite the existence of alternative livelihoods. Economic feasibility of the presented alternative livelihoods and the fact that fishers were already got used in fishing activities (as manifested by their positive reactions towards *payaos*) were the possible assumptions for this. A profound exploration of this condition is recommended for further investigation.

The MPAs have been established to control fishing effort by closing portions of the sea, however, *payaos* had been installed in distant places in lieu of the closed portions (e.g. Taggat Norte MPA, Casitan MPA and San Jose MPA). Since MPAs are biologically link with the outside areas, the ecological effect of the presence of *payaos* as well as the change in fish structure consumption of the community need to be studied. The pelagic fish that congregate in the *payaos* lessen the fishing time and effort of the fishers roam in farther areas. In this way, it can also assumed that the fish consumption of the community shift from reef to pelagic fishes. However, the bioeconomics of *payao* fishing in areas with MPAs is needed to be studied as the fishing pressures exerted within the open areas need be regulated to guarantee the realization of sustainable resources.

In addition, the potential of developing non-consumptive uses such as recreation and tourism that may increase the local residents' revenue can be used as an approach to lessen the fishing pressure and thereby ensuring the long-term benefits of the resources. The revenues generated by the local residents from these kinds of activities, however, must enable to offset potential income losses should fishers decide to decrease fishing activities. The economic incentives from alternative livelihoods and sustainable ecotourism can encourage long-lasting support from the villagers, hence ought to be strongly considered to be supported by the government.

Externalities cause market inefficiency because of the non-market values that are not properly taken into account. Economic valuation is a way of estimating the values of the resources conserved by the MPAs. Evaluation from the standpoints of the villagers themselves and of the local tourists who actually experiences the services of the MPAs were assessed in the empirical studies as presented in Chapters 4 and 5. Estimates generated from these studies is expected to answer the challenge of lack of adequate and

sustainable financing mechanism to support monitoring and enforcement of regulations in MPAs.

In San Vicente and San Jose villages, for instance, local residents showed willingness to pay or work to maintain the existence of MPAs in the villages. The results in Chapter 4 clearly demonstrated the conservation values that the local residents associate with the preservation of marine resources through MPAs. The result showed an equal WTW of 5 days/month from the San Vicente island and San Jose residents compared with 4.5 days/month from San Vicente mainland residents. This suggests that people residing within the MPAs are more likely to accept higher bid.

However, the equivalent value of WTW based on average daily income is 3.9 to 5.4 times higher than WTP estimates of ₱187.50/month (3.95US$). This outcome is a clear evidence that respondents highly prefer money over time due to short supply of the labor market in the area. The aggregated monthly WTW for San Jose is 1,614 days and 636 days for the San Vicente island, which means that it is possible to assign 50 residents from San Jose and 20 from the San Vicente island for the daily monitoring and patrolling of the respective MPAs. The converted monetary value for this is ₱3.8 million (US$ 80,440) and ₱1.1 million (US$ 23,285) per year in San Jose and San Vicente island respectively. Furthermore, the aggregated value of WTP is estimated at ₱1.6 million (US$ 33,870) per year for San Vicente. If this amount is used solely for patrolling and considering the present minimum daily agricultural wage, this value is enough to pay 20 persons per month.

The quantitative values obtained from this empirical study can be incorporated in the decision making of government funding agencies for more sustainable MPA programs. The average budget allocated for locally-established MPA such as San Jose

MPA is around ₱50,000 to 150,000 (US$1,000 – 3,000) while the PIPLS received budget from the national government depending on the proposed activities and from the IPAF generated from the user's fee.

This study also presented the use of WTW as possible eliciting methods for economic valuation in coastal areas of less developed regions which is usually characterized with income limitation. Although a possibility of overvaluation of WTW or underestimation of WTP can be encountered due to shortage of labor market, the results of WTW can be used as indicative value on how respondents will voluntarily work for the MPA management, mainly for the externality parts. As such, a practical application of WTW results is for the government or any donor agency to be able to recognize how much subsidy they need to provide for the opportunity cost of time or labor in excess of the WTW of the residents.

Moreover, the tourists showed positive economic importance on the estimated recreational value of PIPLS. The consumer surplus per tourist is estimated at ₱1,401.15 (US$30.12) at its present condition and ₱2,420.72 (US$52.04) for the hypothetically improved condition. The estimated aggregated consumer welfare from the total recorded tourists is ₱9,808,050 (US$210,835.13) at its present condition. The research also revealed that the consumer welfare can possibly increase with improved environmental conditions. Opportunities for increasing management fund through expansion of user fee is possible, however, needs to be intensely scrutinized as many tourists showed hesitancy in increased user fee. The values generated from this research can be used to establish sustainable funding mechanisms to finance ecotourism in the area.

This study also revealed the potential of huge returns from ecotourism activities, both for supporting MPA activities (i.e. revenue from user and ecosystem fees) and for

alleviating the economic status of residents (i.e. income as tourist guides and other economic-related activities). The prospects of ecotourism can then be developed as a way to increase economic conditions of local residents while enhancing their participation in the preservation of the environment through MPAs.

Knowing the willingness of tourists to spend in order to visit the MPAs, then the "infant industry argument" can be considered as way to promote sustainable MPAs through internalization of externality. In MPAs with thriving ecotourism activities, this concept would provide promotional incentives for the local residents to start an investment. To support the progress of an emerging ecotourism, basic facilities (e.g. parking area, visitor's center, toilets, etc.) are necessary. As it would be difficult of individual or local residents to capitalize on these facilities, only certain level of these will be covered. However, if the government intervene by providing subsidy or any other invention programs to support the construction of such facilities, then many local residents can start tourism-related business and supply will be more than the individual enterprises. This kind of intervention from the government would also ensure inclusive growth as the community themselves will be supported to enter into enterprises rather capitalists from the outside of the area. The government will support only the initial investments and thereafter, it is expected that the ecotourism business will be self-sufficient. With this arrangements, some profit should be considered to be returned or contributed for the MPA management because of externality.

With all the potential benefits (i.e. increased fish abundance by spill-over effects, eco-tourism potential) from the establishment of protected areas in the province, MPAs embodies a public investment that should be considered to ensure sustainability of such management approach. The benefits from the direct and indirect use values of marine

ecosystems in the MPAs in Cagayan significantly contribute to the local economy. The economic values associated with MPA as shown by the results of this study confirm that budget for conservation and protection of marine resources need to be prioritized.

6.2 Policy implications

Therefore, in the light of the findings from these empirical studies, the implications for sustainable and functional MPA management and policy in the study sites including the areas along the Kuroshio Region with similar structures are:

(1) Enabling management regime

The use of community- based co-management approach in the managing a CPR such as MPAs is of advantage to both ends (government and community). While the state has the responsibility to ensure full protection and preservation of the resources, this can be done efficiently with the assistance of the community who depends on it for their daily sustenance. Ostrom (1990) stressed the points on which management by the commons can be an effective way to manage CPRs. The empirical studies conducted showed that the involvement of the government or other external enforcers play a basic role in providing incentives for the participation of the villagers in MPA management. The roles of each stakeholders (e.g. NGAs, LGUs and community members), however, need to be identified and well-defined. A holistic approach is also recommended as this study showed that several groups (e.g. fisher, non-fishers, island and mainland residents) participate in MPA management.

(2) Improvement of the incentive system

An institutionalized incentive system is necessary for effective MPA management. While villagers within the MPAs showed the willingness to work for

the conservation of the resources, the degree of conservation attained through the MPA is influenced by their reaction to the government support policies which are regarded as a set of incentives. To keep the sense of volunteerism in the community, the government support can be indirect compensation (e.g. insurance policy for *bantay dagat*) or non-monetary incentives (e.g. livelihood projects, development of ecotourism). Livelihood interventions, however, should be aligned with the objectives of MPAs in ensuring the ecological protection of resources (i.e. viability of *payao* near MPA). In addition, the effectiveness between monetary and non-monetary incentive was not covered by the study and is recommended for future undertaking.

(3) Development of ecotourism activities

The development of ecotourism activities in the MPAs is another way to sustain its management. Empirical studies conducted clarified that participation and expectation to ecotourism activities increases the probability of local residents to participate in MPA management. Further, villagers have the tendency to divert fishing activities to tourism related activities, hence can decrease fishing pressure in the long-run. This suggests that opportunities from ecotourism offer rewards to villagers, hence, it acts as an incentive for them to be involved in MPA management. In addition, the imposition of user fee should be considered because aside from generation of funds for MPA management, this would also regulate the number of tourists that may potentially free-ride to the services of the MPAs.

(4) Re-assessment of valuation analysis

The management of MPAs can be strengthened and enriched through internalizing externalities. Valuation studies can provide estimates to evaluate the externalities and therefore minimize inefficiency in the consumption of goods and services. Policy

makers can use such estimate to craft appropriate regulations for better resource management. In cases where MPA has no ecotourism or at incipient stage, direct users (villagers) can be used as respondents to generate valuation data on the non-use values of MPAs (i.e. option, existence and bequest values). In a situation where income is a constraint, the use of WTW can be explored, however the possibility of over-valuation and under-estimation should be anticipated. For MPAs with existing ecotourism activities, valuation studies using revealed preference can be used to approximate the consumer surplus generated by the tourists in their visits. Such information is relevant in ensuring the appropriate financing scheme in the MPAs that can support promotion of conservation measures.

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Appendix 1

Survey Questionnaire for the Socioeconomic Assessment of Locally-established Marine Protected Areas (MPA) in Cagayan Province, Philippines

Sample Code ☐

Name of Enumerator: _____Date of Interview: _____
Purok: _____

I. SOCIO-ECONOMICS

1. Name of Respondent: _____
2. If migrated, previous place of residence (Brgy., Municipality, Province): _____
   2.1 When did you moved to this place? _____
   2.2 Reason/s for moving: _____
3. Household Member information:

Household Members	Age	Sex	Educational Attainment	Job Status
Respondent				
Spouse				
Children: 1				
1.				
2.				
3.				
4.				

(0) No education
(1) Elementary level
(2) Elementary Graduate
(3) High School level
(4) High School Graduate
(5) College Level
(6) Vocational Course Graduate
(7) College Graduate
(8) Post Graduate

4. Occupation and major source of income of Respondent: % income
   4.1 Main occupation: _____ _____
   4.2 Side Job/s: _____ _____
   _____ _____

5. Are you a member of any socio- civic organizations?
   (1) Yes (2) No
   5.1 If yes, what organizations and when did you join?

Organization	Year of membership
(a) Fisherfolk Organization	_____
(b) Barangay Council	_____
(c) Others, please specify _____	_____

6. Estimated household income from **fishing and fishing related activities** (reference: **Jan-Dec of preceding year)**

Household member	Source of income/ activity (fishing, fish vendor, aquaculture etc)	Specify fishing months	No. of days worked per month (only fishing months)	Species caught/ sold	Quantity caught	Average Price	To whom you sell your catch	Estimated gross income
Respondent				Fish a. b. c. d.				
				Seaweed a. b.				
				Shellfish a. b.				
				Others a. b				
Spouse				Fish a. b. c. d.				
				Seaweed a. b.				
				Shellfish a. b.				
				Others a. b				
Other household member, please specify _____				Fish a. b. c.				
				Seaweed a. b.				
				Shellfish a. b.				
				Others a. b				
Other household member, please specify _____				Fish a. b. c.				
				Seaweed a. b.				
				Shellfish a. b.				
				Others a. b				

6.1 Where do you land your catch for selling? _____
6.2. Reason for choosing that particular place _____

7. Agricultural Income (Crop and livestock, agribusiness, laborer or wage income)

Household Member	Source of income/ Activity (Pls. be specific as possible)	Crop/s planted/ Livestock	If crop, total area farmed (hectare)	Tenancy status (owned, share tenant, lease)	No. of cropping/year	Output per cropping (kg)	Price of output/kg (Php)
Respondent							
Spouse							
Children							

8. Income outside fishing and agriculture (wage and entrepreneurial, non-agricultural income, e.g. saleslady, tourist guide, sari-sari store, tricycle driving, hotel worker, etc.)

Household Member	Source of income/ Activity (Pls. be specific as possible)	Months of work in one year	No. of days worked per month	Estimated daily income from source (Php)
Respondent				
Spouse				
Children				

II. PROFILE OF FISHERMAN AND FISHING ASSETS

1. When did you started fishing? _____
   1.1 No. of years in fishing _____
2. Do you own a fishing craft? (1) Yes (2) No
2.1 If yes, how many? _____(Please fill table below for each type fishing crafts owned)

Item	**Name of Fishing Crafts**			
1. Type of Vessel/craft (motorized or non motorized				
2. For personal use or rented out				
3. Specification				
Length				
Width				
Fuel type (gas/diesel)				
Horse Power				
Gross Tons				

4. First or second owner				
5. Year acquired				
6. Cost of acquisition				
7. Method of acquisition a. own finances b. loan (source)				

2.2 If no, what craft/vessel/boat do you use? _____

2.3 Who owns the vessel you use? _____

2.4 What is the arrangement for the use of their vessel/craft (e.g. pay rent, sell fish catch to owner, etc.) _____

3. Do you own a fishing gear? (1) Yes (2) No

3.1 If yes, how many? _____ (Please fill table below for each type fishing gears owned)

Item	**Name of Gear**			
1. Type of gear (ex.: ring net, gill net, hook and line, beach seine, saprot etc)				
2. No. of units				
3. For personal use or rented out				
4. Stretched mesh size (cm)				
5. First or second owner				
6. Year acquired				
7. Cost of acquisition				
8. Method of acquisition a. own finances b. loan (source)				

3.2 If no, what do you use for fishing? (Ex. borrow, hired laborer etc) _____

3.2.1 What is your arrangements with the owner? _____

3.2.2 Are you a hired laborer for fishing? (1) Yes (2) No

What gear do you use? _____

How much are you paid? _____

3.3 Do you own a beach seine? (1) Yes (2) No

3.3.1 If yes, how many workers do you employ? _____

3.3.2 How many times do you operate in a month?_____ in a year? ____

3.3.3 How much do you pay the worker_____

4. What are the costs you incur in fishing on a monthly basis?

Item	Quantity	Unit of measure (e.g. liter, kg, etc.)	Price per unit (Php)	Amount (Php)
1. Fuel (Diesel/Gasoline)				
2.Kerosene (lamp)				
3. Engine Oil				

4. Ice				
5. Bait				
6. Rental				
Banca/Boat				
Fishing gear				
Others (specify)				
7. Repair				
8.Hired labor				
9. Others, pls. specify				

4.1 Do you hire laborer for your fishing activity? (1) Yes (2) No
4.2 How many laborers do you hire? _____
4.3 How much do you pay to hired laborer? _____
4.4 If you don't pay money in hiring laborer, what are your arrangements (wage rate, sharing system, etc)?_____

5. Are you aware of the presence of payao in the area? (1) Yes (2) No
6. Do you fish near the payao area? (1) Yes (2) No
6.1 If yes, how many kilograms do you get from the area per fishing trip? _____
How often do you fish in the payao area? _____
Is there any regulation of fishing in the payao area? _____
Schedule _____
Allowed Fishing Gears _____
Others, pls. specify_____
Who made the regulations? _____
6.2 If not, why? _____
7. Do you think it is necessary to maintain payao in the area?
(1) Yes (2) No
7. 1 If yes, why? _____
7. 2 If no, why? _____

III. AWARENESS, ATTITUDES AND PERCEPTIONS ON THE MPAs

1. Do you know what is a "marine protected area" (MPA)?
(1) Yes (2) No *(If no, enumerator must explain to the respondent about MPA)*
2. Are you aware of the presence of MPAs or marine fishery reserves/marine sanctuaries in the area? (1) Yes (2) No
3. Do you know where the MPA is? (1) Yes (2) No
3.1 If yes, ask for the following information:
a. Area of MPA _____
b. Year established _____
c. Distance from shoreline (meters) _____
d. time of travel from the shoreline (minutes) _____
write 0 if they don't know
4. Are you in favor of the presence of MPA? (1) No (2) Undecided (3) Yes
4.1.Why? _____
5. What is your participation or involvement in the management of MPA and when did

you started joining the activity/ies?

Activity/Group	Year started participating in the activities
Law Enforcement team	_____
Core Monitoring Group	_____
Alternative livelihood/Eco-tourism Unit	_____
Information Dissemination Campaign Team	_____
No participation	

5.1 What motivates you to participate? _____

1.2 If no participation at all, give reasons why you don't participate? _____

6. Please enumerate the benefits you can get from MPAs. *(Tick the item that the respondent says)*

(1) increase in catch of fish and other marine products
(2) greater chance to catch older/larger fish
(3) maintain natural habitat (good cover of live corals, less dead coral reefs,etc.)
(4) maintain genetic diversity and enhance biodiversity
(5) protection against natural calamities such as strong waves and floods
(6) recreation and tourism purposes (snorkeling, swimming, photography, etc.)
(7) research and scientific exploration purposes
(8) increase in employment from tourism industries
(9) others (pls. specify: _____)

7. Please enumerate the costs or negative impacts of reserves or MPAs in your opinion. (*Tick the item that the respondent says)*

(1) reduce fish catch due to reduced fishing ground (*estimate reduction per day* _____kg/day)
(2) reduce fishing area (*ask major fishing ground*:_____)
(3) higher fishing costs associated with change in fishing location
(4) require additional cost for management and enforcement, maintenance /patrolling
(5) source of user conflicts
(6) farther fishing ground which means higher risk in fishing
(7) others (pls. specify: _____)

8. How did you learn this things?

(1) attended assembly meetings
(2) attended seminars and trainings
(3) Information Education Campaign (IEC) materials (e.g. brochures/ posters)
(4) word of mouth
(5) others (pls. specify: _____)

9. In your opinion, do the benefits or positive impacts from marine reserves or MPAs outweigh the costs or negative impacts of marine reserves or MPAs?

(1) Yes (2) No (3) I don't know

10. In your opinion, has the fishery production become better, become worse, or stayed

the same compared 10 years ago?

(1) Fishery better (2) Fishery the same (3) Fishery worse (4) I don't know

11. In your opinion, how has the quality of the following components of the marine environment in your area changed before and after the establishment of MPA

Components of marine environment	Perception/Observation
a. Coral Cover	
b. Sea grass bed	
c. Fish catch outside the MPA (production)	
d. Fish size	
e. Fish Species Diversity	
f. Water Quality	

(0) No idea (2) No Change (1) Worse (3) Better

12. Kindly indicate what you think about the following statements. There is no right or wrong answer.

Statements	Perception/ Attitude (indicate the number that corresponds the answer to the respondent)
1. It is necessary to preserve the natural environment so that my grandchildren may benefit from it.	
2. I have a duty to protect the coral reefs, seagrass beds and mangroves.	
3. I want to protect the coral reefs, seagrass beds and mangroves because marine life depends on them.	
4. I am willing to spend money to protect the mangrove areas because they help protect the community from floods.	
5. I am not using the coral reefs, seagrass beds and mangroves now, but I am willing to spend money now to protect them in case I want to use them in the future.	
6. Establishing MPA is necessary for preserving the natural environment.	
7. Establishing MPA increases fisher's income from fishing.	
8. Establishing MPA only decreases the fisher's income from fishing.	
9. Sustainable alternative livelihood for fishers should be considered in establishing MPA	
10. I will participate in the management of MPA so I can avail livelihood project	

Note: 1 – Strongly disagree
2 – Disagree
3 – Slightly disagree
4 - Undecided
4 – Slightly agree
5 – Agree
6 – Strongly agree

13. How do you assess the management of MPA?

( ) 0 – I have no idea ( ) 2 – Average ( ) 4 – Excellent
( ) 1 – Poor ( ) 3 – Good

14. What do you think are the problems/ difficulties in MPA management?

(1) Insufficient financial and technical resources
(2) Lack of data for management decisions
(3) Lack of public support
(4) Impacts from activities in land (ex. pollution)
(5) Lack of clear organizational responsibilities
(6) Others, pls specify _____

15. What is/are your suggestion/s to improve management of MPA?
(1) Capacity building program (ex. leadership trainings) for those involved in MPA management
(2) Additional and sustainable livelihoods
(3) Sustainable financing of MPAs
(4) Ensure involvement of local people in MPA management
(5) Conduct information education campaign about MPAs
(6) Others, pls. specify _____

IV. LAW ENFORCEMENT AND PATROLLING ACTIVITIES IN THE MPA

1. Are you or any of your household members at any time since the establishment was involved in the enforcement or patrolling of the MPA? (1) Yes (2) No
1.1 If yes, when? _____
1.2 How many members do the patrolling activity? _____
2. Do you have schedule of patrolling in the area? (1) Yes (2) No
2.1 If yes, how do you the scheduling? _____
2.2 On the average, how much time do you spend in patrolling? _____
2.3 Do you received payment for this activity? (1) Yes (2) No
If yes, how much? _____
If no, what is your incentive in patrolling? _____
3. How does illegal fishing compared to the situation before the establishment of MPA?
(1) Decreased substantially (4) Somewhat Increased
(2) Somewhat Decreased (5) Increased Substantially
(3) Remained the same
4. What are the usual illegal fishing activities caught in the area?
4.1 If you witness these practices, who are the violators?
(1) People from the community
(2) People found outside the community, specify from which village _____
(3) Don't have idea
5.Do you receive incentives if you caught violators? (1) Yes (2) No
5.1 If yes, what incentives? _____

V. LIVELIHOOD PROJECTS (LPs) AS INCENTIVES ON THE MANAGEMENT OF MPA

1. Are you or any of your household members were involved in the livelihood project in the community? (1) Yes (2) No (proceed to question 9)

1.1 If yes, what livelihood project?

Name of Project (Please check)	Reasons for joining/not joining?	When did you join?	Number of members involved in the project
1. Fish Cage			
2. Oyster Farming			
3. Seaweeds Farming			
4. Abalone Culture			
5. Ecotourism Project			
6. Stock Assessment Project (Sea Urchin Lying-in Project)			
7. Goat Production and Fattening			
8. Others, please specify			
a.			
b.			
c.			

1.1 Do you have any ill-feeling with non-members? _____

2. Involvement/participation in the livelihood project and benefit received

Name of Project	Activity/ Participation	Time Spent/day/ month	Wage/payment received if any	Activities you gave up to participate	Income received as revenue from the project
1. Fish Cage					
2. Oyster Farming					
3. Seaweeds Farming					
4. Abalone Culture					
5. Ecotourism Project					
6. Stock Assessment Project (Sea Urchin Lying-in Project)					
7. Goat Production and Fattening					
8. Others, please specify					

3. What other benefits can/did you get from the project?

(a) Loan (Php _____)

(b) Others, pls. specify _____

4. Has your family's welfare changed since you joined in these livelihood projects?

(1) Decreased substantially (4) Somewhat Increased

(2) Somewhat Decreased (5) Increased Substantially

(3) Remained the same

5. Is your involvement in livelihood project, decrease your fishing activity?

(1) Yes By how many hours/days? _____

(2) No

6. Is your involvement in the livelihood projects, increased your support to MPA?

(1) Yes How? _____

(2) No

(3) Remained the same

7. Kindly indicate what you think about the following statements about your involvement in livelihood projects.

Statements	Perception/ Attitude (indicate the number that corresponds the answer to the respondent)
1. It helped create stronger social ties with other community members	
2. It helped create better coordination between residents and local government	
3. It helped you become a better business person	
4. Livelihood projects are necessary for the management of MPA	
5. It lessen dependence on fishing activities	
6. Fisherfolk/Beneficiaries should be consulted on what livelihood project to be established	
7. Livelihood projects should provide enough incentive to encourage MPA management	

Note: 1 – Strongly disagree 5 – Slightly agree

2 – Disagree 6 – Agree

3 – Slightly disagree 7 – Strongly agree

4 - Undecided

8. Did you received any extension-related activities in establishment and maintenance of livelihood project? (1) Yes (2) No

8.1 If yes, what kind of extension services?

Kind of extension services How many times

a. Training _____

b. Technical Assistance _____

c. Media service (pamphlets, hand-outs, radio info etc) _____

c. Others, please specify _____

8.2 Is it helpful for the maintenance and operation of the project? (1) Yes (2) No

9. If you are not a member of the livelihood program, why?

(1) I have no time to join

(2) I don't like to socialize

(3) I am not interested

(4) I don't believe in their ideals
(5) I am not qualified to join (pls. specify why) _____
(6) Others, pls. specify _____

10.Do you have any ill-feeling with the members of the livelihood projects?
(1) Yes (2) No

11. What is your suggestion to improve this program?
(1) Additional units of livelihood projects
(2) Increase capital of projects
(3) Involve all members in the management
(4) Others, pls. specify _____

VI. EXTENSION SERVICES IN RELATIONS TO THE MANAGEMENT OF MPA and LPs

1. Did you have any access to extension services (ex. training, technical assistance) related to MPA and LP? (1) Yes (2) No (proceed to question 2)

1.1 If yes, how many times did you attend any training?
MPA: _____ LP: _____

1.2 Who are the agents of extension services? (1) BFAR employee (2) LGU Technician (3) DENR Technician (4) Others, pls. specify_____

1.3 How frequent do they render extension services? _____

1.4 What kinds of information you received from extension agents?
(a) MPA/ Resource Management
(b) Livelihood Technologies, pls. specify _____
(c) Records Keeping
(d) Marketing
(e) Group formation/leadership skills
(f) Others, pls. specify _____

1.5 What is your perceptions of the extension agents?
(a) Punctual (e) Ability to demonstrate
(b) Energetic (f) Ability to get along with people
(c) Patient (g) Ability to offer solutions to problems
(d) Approachable (h) Others, pls. specify _____

2 If you do not have any access to extension services, why?
(a) Not interested
(b) Not informed
(c) Others, pls. specify _____

3 What is/are your suggestions to improve the extension services in the area? _____

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Appendix 2

Survey Questionnaire Used the for Socioeconomic Assessment of Residents in and around the Palaui Island Protected Landscape and Seascape (PIPLS) San Vicente, Sta. Ana Cagayan Province, Philippines

Sample Code ☐

Name of Enumerator: _____ Date of Interview: _____
Purok: _____

I. SOCIO-ECONOMICS

1. Name of Respondent: _____
2. If migrated, previous place of residence (Brgy., Municipality, Province): _____
   2.1 When did you moved to this place? _____
   2.2 Reason/s for moving: _____
3. Household Member information:

Household Members	Age	Sex	Educational Attainment	Job Status
Respondent				
Spouse				
Children				

(0) No education
(1) Elementary level
(2) Elementary Graduate
(3) High School level
(4) High School Graduate
(5) College Level
(6) Vocational Course Graduate
(7) College Graduate
(8) Post Graduate

¤4. Occupation and major source of income of Respondent:

	% income
4.1 Main occupation: _____	_____
4.2 Side Job/s: _____	_____
_____	_____

5. Are you a member of any socio- civic organizations? (1) Yes (2) No
   5.1 If yes, what organizations and when did you join?

Organization	Year of membership
(a) Palaui Environmental Protectors' Association (PEPA)	_____
(b) Palaui-Sta. Ana Motor Boat Association (PASAMOBA)	_____
(c) Barangay Council	_____
(d) San Vicente Environmental Protectors Association (SVCEPA)	_____

(e) Others, please specify _____

6. Estimated household income from **fishing and fishing related activities** (reference: **Jan-Dec 2015)**

Household member	Source of income/ activity (fishing, fish vendor, aquaculture etc)	Specify fishing months	No. of days worked per month (only fishing months)	Species caught/ sold	Average Quantity caught/ fishing trip (kg)	Aver age Price /kg	To whom you sell your catch (specific person/mar ket)	Estimated gross income
Respondent				Fish a. b. c. d.				
				Seaweed a. b.				
				Shellfish a. b.				
				Others a. b				
Spouse				Fish a. b. c. d.				
				Seaweed a. b.				
				Shellfish a. b.				
				Others a. b				
Other household member, please specify _____				Fish a. b. c. d.				
				Seaweed a. b.				
				Shellfish a. b.				
				Others a. b				

6.1 Where do you land your catch for selling? _____

6.2. Reason for choosing that particular place _____

7. Agricultural Income (Crop and livestock, agribusiness, laborer or wage income)

Household Member	Source of income/ Activity (Pls. be specific as possible)	Crop/s planted/ Livestock raised	If crop, total area farmed (hectare)	Tenancy status (owned, share tenant, lease)	No. of cropping/year	Output per cropping (kg)	Price of output/kg (Php)
Respondent							
Spouse							
Children							

8. Income outside fishing and agriculture (wage and entrepreneurial, non-agricultural income, e.g. saleslady, tourist guide, sari-sari store, tricycle driving, hotel worker, etc.)

Household Member	Source of income/ Activity (Pls. be specific as possible)	Months of work in one year	No. of days worked per month	Estimated daily/monthly income from source (Php)
Respondent				
Spouse				
Children				

II. PROFILE OF FISHERMAN AND FISHING ASSETS

1. When did you started fishing? _____

1.1 No. of years in fishing _____

2. Do you own a fishing craft? (1) Yes (2) No

2.1 If yes, how many? _____ (Please fill table below for each type fishing crafts owned)

Item	**Name of Fishing Crafts**			
1. Type of Vessel/craft (motorized or non-motorized)				
2. For personal use or rented out				
3. Specification				
Length				
Width				
Fuel type (gas/diesel)				
Horse Power				
Gross Tons				
4. First or second owner				

5. Year acquired				
6. Cost of acquisition				
7. Method of acquisition a. own finances b. loan (source)				

2.2 If no, what craft/vessel/boat do you use? _____

2.3 Who owns the vessel you use? _____

2.4 What is the arrangement for the use of their vessel/craft (e.g. pay rent, sell fish catch to owner, etc.) _____

3. Do you own a fishing gear? (1) Yes (2) No

3.1 If yes, how many? _____ (Please fill table below for each type fishing gears owned)

Item	**Name of Gear**			
1. Type of gear (ex.: ring net, gill net, hook &line)				
2. No. of units				
3. For personal use or rented out				
4. Stretched mesh size (cm)				
5. First or second owner				
6. Year acquired				
7. Cost of acquisition				
8. Method of acquisition a. own finances b. loan (source)				

3.2 If no, what do you use for fishing? (ex. borrow, hired laborer etc) _____

3.2.1 What is your arrangements with the owner? _____

3.2.2 Are you a hired laborer for fishing? (1) Yes (2) No

What gear do you use? _____

How much are you paid? _____

4. What are the costs you incur in fishing on a monthly basis?

Item	Quantity	Unit of measure (e.g. liter, kg, etc.)	Price per unit (Php)	Amount (Php)
1. Fuel (Diesel/Gasoline)				
2.Kerosene (lamp)				
3. Engine Oil				
4. Ice				
5. Bait				
6. Rental				
Banca/Boat				
Fishing gear				
Others (specify)				
7. Repair				
8.Hired labor				
9. Others, pls. specify				

4.1 Do you hire laborer for your fishing activity? (1) Yes (2) No
4.2 How many laborers do you hire? _____
4.3 How much do you pay to hired laborer? _____
4.4 If you don't pay money in hiring laborer, what are your arrangements (wage rate, sharing system, etc)?_____

5. Where do you fish? Pls. specify fishing ground _____

III. AWARENESS, ATTITUDES AND PERCEPTIONS ON THE PROTECTED AREA (PA)

1. Do you know what is a "marine protected area" (MPA)?
(1) Yes (2) No *(If no, enumerator must explain to the respondent about MPA)*
2. Are you aware that Palaui Island is a protected area? (1) Yes (2) No
3. Are you in favor of the status of Palaui island as protected area?
(1) No (2) Undecided (3) Yes
3.1 Why? _____
4. Are you aware of the Protected Area Management Board (PAMB)?
(1) Yes (2) No
4.1 If yes, are you aware of its role in the management of PIPLS? (1) Yes (2)No
4.2 If yes, name some of its role which you know _____
5. Are you aware of the Protected Area rules and regulations? (1) Yes (2) No
5.1 If yes, name some of the rules which you know _____
5.1.1 If yes, do you follow these rules (1)Yes (2) Sometimes (3) No
6. What is your participation or involvement in the management of protected area and when did you started joining the activity/ies?

Activity/ies	Year started participating in the activities
Law Enforcement/Bantay Dagat	_____
PA Rangers	_____
Coastal Clean-up	_____
Information Dissemination Campaign	_____
Tourist assistance	_____
Others _____	
No participation	

6.1 What motivates you to participate? _____
6.2 If no participation at all, give reasons why you don't participate?
_____

7. Please enumerate the benefits you can get from the marine reserves. *(Tick the item that the respondent says)*
(1) increase in catch of fish and other marine products
(2) greater chance to catch older/larger fish
(3) maintain natural habitat (good cover of live corals, less dead coral reefs,etc.)
(4) maintain genetic diversity and enhance biodiversity
(5) protection against natural calamities such as strong waves and floods
(6) recreation and tourism purposes (snorkeling, swimming, photography, etc.)
(7) research and scientific exploration purposes

(8) increase in employment from tourism industries
(9) others (pls. specify: _____)

8. Please enumerate the costs or negative impacts of reserves or MPAs in your opinion. (*Tick the item that the respondent says)*

(1) reduce fish catch due to reduced fishing ground (*estimate reduction per day* _____kg/day)
(2) reduce fishing area (*ask major fishing ground*: _____)
(3) higher fishing costs associated with change in fishing location
(4) require additional cost for management and enforcement, maintenance/patrolling
(5) source of user conflicts
(6) farther fishing ground which means higher risk in fishing
(7) limited source of livelihood due to restrictions (ex. no wildlife hunting, no gathering of shells, etc)
(8) others (pls. specify: _____)

9. How did you learn this things?

(1) attended assembly meetings
(2) attended seminars and trainings
(3) Information Education Campaign (IEC) materials (e.g. brochures/ posters)
(4) word of mouth
(5) others (pls. specify: _____)

10. In your opinion, do the benefits or positive impacts from marine reserves outweigh the costs or negative impacts of marine reserves?

(1) Yes (2) No (3) I don't know

11. In your opinion, has the fishery production become better, become worse, or stayed the same compared 10 years ago?

(1) Fishery better (2) Fishery the same (3) Fishery worse (4) I don't know

12. In your opinion, how has the quality of the following components of the marine environment in your area changed before and after the institution as a protected area:

Components of marine environment	Perception/Observation
Coral Cover	
Sea grass bed	
Fish catch outside the MPA (production)	
Fish size	
Fish Species Diversity	
Water Quality	
Seaweeds	
Mangrove Ecosystem	

(0) No idea (1) Worse (2) No Change (3) Better

13. Kindly indicate what you think about the following statements. There is no right or wrong answer.

Statements	Perception/ Attitude (indicate the number that corresponds the answer to the respondent)
1. It is necessary to preserve the natural environment so that my grandchildren may benefit from it.	
2. I have a duty to protect the coral reefs, seagrass beds and mangroves.	
3. I want to protect the coral reefs, seagrass beds and mangroves because marine life depends on them.	
4. I am willing to spend money to protect the mangrove areas because they help protect the community from floods.	
5. I am not using the coral reefs, seagrass beds and mangroves now, but I am willing to spend money now to protect them in case I want to use them in the future.	
6. Establishing MPA is necessary for preserving the natural environment.	
7. Establishing MPA increases fisher's income from fishing.	
8. Establishing MPA only decreases the fisher's income from fishing.	
9. Sustainable alternative livelihood for fishers should be considered in establishing MPA	
10. I will participate in the management of MPA if livelihood projects will be provided in return	

Note: 1 – Strongly disagree
2 – Disagree
3 – Slightly disagree
(4) Undecided
5 – Slightly agree
6 – Agree
7 – Strongly agree

14. How do you assess the management of the marine reserves?

( ) 0 – I have no idea ( ) 2 – Average ( ) 4 – Excellent
( ) 1 – Poor ( ) 3 – Good

15. What do you think are the problems/ difficulties in marine sanctuary management?

(1) Insufficient financial and technical resources
(2) Lack of data for management decisions
(3) Lack of public support
(4) Impacts from activities in land (ex. pollution)
(5) Lack of clear organizational responsibilities
(6) Others, pls specify _____

16. What is/are your suggestion/s to improve management of marine sanctuary?

(1) Capacity building program (ex. leadership trainings) for those involved in MPA management
(2) Additional and sustainable livelihoods
(3) Sustainable financing of MPAs
(4) Ensure involvement of local people in MPA management
(5) Conduct information education campaign about MPAs
(6) Others, pls. specify _____

IV. LAW ENFORCEMENT AND PATROLLING ACTIVITIES IN THE MPA

1. Are you at any time since the establishment was involved in the enforcement or patrolling of the MPA? (1) Yes (2) No

1.1 If yes, when? _____

1.2 How many members do the patrolling activity? _____

1.3 Are you a *bantay dagat*? (1) Yes (2) No

2. Do you have schedule of patrolling in the area? (1) Yes (2) No

2.1 If yes, how do you the scheduling? _____

2.2 On the average, how much time do you spend in patrolling? _____

2.3 Do you received payment for this activity? (1) Yes (2) No

If yes, how much? _____

If no, what motivates you to do this? _____

3. In your opinion, how do you assess the following activities compared to the situation before the establishment of MPA:

Situation	Perception/ observation
Illegal Fishing	
Unregulated extraction of *palay-palay* using *dusdus*	
Frequent collection of *maritangtang* (sea urchin)	
Frequent collection of sea cucumber	
Unregulated gathering of aquarium fish	

(1) Decreased substantially (3) Remained the same (5) Increased Substantially
(2) Somewhat Decreased (4) Somewhat Increased

4. What are the usual illegal fishing activities caught in the area?

4.1 If you witness these practices, who are the violators?

(1) People from the community
(2) People found outside the community, specify from which village _____
(3) Don't have idea

5. Do you receive incentives if you caught violators? (1) Yes (2) No

1.1 If yes, what incentives? _____

¤V. ECOTOURISM AND LIVELIHOOD PROJECTS IN MPA

1. Are you involved in the ecotourism and livelihood projects in the community?

(1) Yes (2) No (proceed to question 8)

2. If yes, what is your involvement/participation and the benefit received

Activity	Average number of days of operation/ month	Estimated income from the activity per month
Boat Operator		
Reef Guide		
Trek Guide		
Birding Guide		

Catering Services		
Homestay Accommodation		
Nature Village		
Spa/Massage		
Others Livelihood Projects		

3. Has your family's welfare changed since you joined in these projects/activities?

(1) Decreased substantially (4) Somewhat Increased
(2) Somewhat Decreased (5) Increased Substantially
(3) Remained the same

4. Is your involvement in ecotourism and livelihood projects, decrease your fishing activity?

(1) Yes by how many hours/days? _____
(2) No

5. Is your involvement in these projects/activities, increased your support to MPA?

(1) Yes How? _____
(2) No
(3) Remained the same

6. Kindly indicate what you think about the following statements about your involvement in livelihood projects.

Statements	Perception/ Attitude (indicate the number that corresponds the answer to the respondent)
1. It helped create stronger social ties with other community members	
2. It helped create better coordination between residents and local government	
3. It helped you become a better business person	
4. Livelihood projects are necessary for the management of MPA	
5. It lessen dependence on fishing activities	
6. Fisherfolk/Beneficiaries should be consulted on what livelihood project to be established	
7. Livelihood projects should provide enough incentive to encourage MPA management	

Note: 1 – Strongly disagree 4 - Undecided 5 – Slightly agree
2 – Disagree 6 – Agree
3 – Slightly disagree 7 – Strongly agree

7. Do you think the community needs more livelihood projects? (1) Yes (2) No

7.1 If yes, what type of projects? _____

8. If you are not a member of the livelihood program, why?

(1) I have no time to join

(2) I don't like to socialize
(3) I am not interested
(4) I don't believe in their ideals
(5) I am not qualified to join (pls. specify why) _____
(6) Others, pls. specify _____

9. What do you think are the benefits brought about by tourism? *(Tick the item that the respondent says)*
(1) Increase income (by how much _____)
(2) Job creation
(3) Sense of pride
(4) Increase opportunities
(5) Better infrastructure
(6) Strict implementation of rules so more protection of the environment
(7) No idea
(8) Others, pls. specify _____

10. What do you think are the negative impact of tourism? *(Tick the item that the respondent says)*
(1) Depletion of resources
(2) Pollution
(3) Erosion of values
(4) Dilution of culture
(5) Crimes _____
(6) No idea
(7) Others, pls specify _____

11. What do you think are the threats on the marine resources brought about by tourism? *(Tick the item that the respondent says)*
(1) Littering
(2) Vandalism/ Graffiti
(3) Collection of souvenirs from the protected area
(4) Damage of corals (scraped by boats)
(5) No idea
(6) Others, pls. specify _____

12. What are your suggestions/ recommendations to improve ecotourism?
(1) Additional units of livelihood projects
(2) Increase capital of projects
(3) Involve all members in the management
(4) Strict implementation of rules and regulations (pls. specify _____)
(5) Others, pls. specify _____

VI. EXTENSION SERVICES IN RELATIONS TO THE MANAGEMENT OF MPA and Livelihood Projects (LPs)/Ecotourism?

1 Did you received any extension-related activities in establishment and maintenance of MPA and livelihood projects? (1) Yes(2) No (proceed to question No. 3)

1.1 What kind of extension services?

Kind of extension services	How many times		Agency	
	MPA	LP	MPA	LP
a. Training	_____	_____	_____	_____
b. Technical Assistance	_____	_____	_____	_____
c. Media service (pamphlets etc)	_____	_____	_____	_____
d. Others, please specify _____	_____	_____	_____	_____

1.2 Is it helpful for the maintenance and operation of the project? (1)Yes (2) No

2 What kinds of information you received from extension agents?

(a) MPA/ Resource Management
(b) Livelihood Technologies, pls. specify _____
(c) Records Keeping
(d) Marketing
(e) Group formation/leadership skills
(f) Others, pls. specify _____

2.1 How do you describe the extension agents?

(a) Punctual
(b) Energetic
(c) Patient
(d) Approachable
(e) Able to demonstrate
(f) Able to get along with people
(g) Able to offer solutions to problems
(h) Others, pls. specify _____

3 If you do not have any access to extension services, why?

(d) Not interested
(e) Not informed
(f) Others, pls. specify _____

4 What is/are your suggestions to improve the extension services in the area?

_____
_____
_____

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Appendix 3

(Results of LR-Chow Test of Data Structures for Chapter 4)

Appendix 3.1 Results of test whether data structure is same or between datasets of locally and nationally-established MPAs

Variables tested	Integrated data set	Locally established MPA data set	Nationally established MPA data set	degree of freedom	5% critical value of the chi-square distribution	LR test Statistic	Test result
Constant, total household income	-421.639	-206.978	-202.4874	2	5.991	24.346	**reject**
Constant, total household, benefit in livelihood projects	-274.123	-154.761	-107.3993	3	7.815	23.924	**reject**
Constant, total household, benefit in livelihood projects, participates in extension services	-249.988	-146.354	-78.95753	4	9.488	49.354	**reject**

Appendix 3.2 Results of test whether data structure is same or not among datasets of villages with locally -established MPAs

Variables tested	Integrated data set	San Jose data set	Casitan data set	Taggat Norte data set	degree of freedom	5% critical value of the chi-square distribution	LR test Statistic	Test result
Constant, total household income	-206.978	-73.422	-45.562	-86.770	2	5.991	2.449	**accept**
Constant, total household, benefit in livelihood projects	-154.761	-48.839	-32.501	-70.933	3	7.815	4.975	**accept**
Constant, total household, benefit in livelihood projects, participates in extension services	-146.354	-47.183	-28.126	-66.575	4	9.488	8.938	**accept**

Appendix 3.3 Results of test whether data structure is same or not among datasets of fishers and non-fishers in locally -established MPAs

Variables tested	Integrated data set	Fisher data set	Non-fisher data set	degree of freedom	5% critical value of the chi-square distribution	LR test Statistic	Test result
Constant, total household income	-206.978	-134.337	-63.726	2	5.991	17.829	**reject**
Constant, total household, benefit in livelihood projects	-154.761	-104.626	-44.769	3	7.815	10.732	**reject**
Constant, total household, benefit in livelihood projects, participates in extension services	-146.354	-98.138	-42.542	4	9.488	11.347	**reject**

Appendix 3.4 Results of test whether data structure is same or not among datasets of fishers and non-fishers in nationally -established MPA

Variables tested	Integrated data set	Fishers' data set	Non-fishers' data set	degree of freedom	5% critical value of the chi-square distribution	LR test Statistic	Test result
Constant, total household income	-200.383	-142.969	-54.517	2	5.991	5.793	**accept**
Constant, total household income, benefits in ecotourism activities	-106.592	-70.903	-33.161	3	7.815	5.055	**accept**
Constant, total household income, benefits in ecotourism activities, from the island	-91.078	-57.759	-31.251	4	9.488	4.135	**accept**

Appendix 3.5 Results of test whether data structure is same or not among island and mainland dataset in nationally -established MPA

Variables tested	Integrated data set	Island data set	Mainland data set	degree of freedom	5% critical value of the chi-square distribution	LR test Statistic	Test result
Constant, total household income	-202.487	-46.288	-89.071	2	5.991	134.258	**reject**
Constant, total household income, benefit in ecotourism activities	-107.399	-32.217	-56.676	3	7.815	37.012	**reject**
Constant, total household income, benefit in ecotourism activities, fisher	-106.557	-30.879	-56.631	4	9.488	38.094	**reject**

Appendix 4

Survey Questionnaire to Local Community Residents for Estimating the Value of Marine Resources in San Jose Marine Protected Area, Gonzaga, Cagayan

Good day! The Bureau of Fisheries and Aquatic Resources- Region 02 (BFAR-R02) in academic partnership with the Kochi University, Japan is conducting a survey to obtain general views for encouraging ecosystem services for conservation of marine resources. Your answers will be kept strictly confidential and shall only be used to improve marine and coastal resources. Thank you in advance.

Sample Code

Name of Respondent: _____ Date of Interview: _____
____ Matara resident, if not from what Purok are you from: _____
____ With house in Matara but do not stay there
____ With relatives in Matara

I. Perceptions and awareness on MPA and coastal resource environmental issues

1. Are you aware of the San Jose MPA/ Matara Reef? (1) Yes (2) No
2. What do you think is the main purpose of San Jose MPA?
   (a) Tourism (b) Nature protection/biodiversity conservation
   (c) Increase fisheries production (c) I don't know
3. Do you agree or disagree with the protection of Matara's beachscape beauty and its ecosystem? (1) Agree (go to 4) (2) Disagree (go to 5)
4. What is your reason for agreeing? *(Tick the item that the respondent says)*
   ( ) My livelihood (fishing/tourism) mainly depend on it
   ( ) It is my moral obligation to protect the environment
   ( ) I want to protect the environment for the future generation
   ( ) To enhance recreational activity in the area
   ( ) Others, please specify _____
5. What is your reason for disagreeing? *(Tick the item that the respondent says)*
   ( ) I do not believe that the coastal environment is degrading
   ( ) I do not care if the beach beauty is deteriorating
   ( ) I do not believe conservation initiative can stop coastal environment degradation
   ( ) I distrust institutions that implement it
   ( ) Conservation will marginalize the poor fishers and make resort owners richer
   ( ) Others, please specify _____

6. Kindly indicate what you think about the following statements. There is no right or wrong answer.

Statements	Perception/ Attitude (indicate the number that corresponds the answer to the respondent)
1. I have enough knowledge on the status of resources in the coastal area (fishes, corals, etc)	
2. I am interested in knowing the status of resources in the coastal area	
3. Tourists and tourism activities increase in Matara due to the better condition of resources	

4. Resources in Matara should be maintained and enhance to encourage tourism activities	
5. Tourism activities contribute in my economic well-being	
6. My fishing activities became better with the presence of marine reserves	
7. San Jose Fisherfolk Association and LGU is effectively managing the MPA.	
8. Community members should participate in managing the marine reserves.	

Strongly disagree ←---------1-----2-----3-----4-----5-----6-----7---------→ Strongly agree

Note: 1 – Strongly disagree (4) Undecided 5 – Slightly agree
2 – Disagree 6 – Agree
3– Slightly disagree 7 – Strongly agree

7. What do you think are the three most important natural and man-made activities threatening the beauty of Matara and its long term use? Please choose which is 1st, 2nd and 3rd .

Coastal environment issues	Rank
• Illegal fishing (cyanide/dynamite/compressor/others, _____)	
• Littering on the beach and disposal of domestic waste	
• Overcrowding of tourist	
• Unplanned and uncontrolled proliferation of houses and infrastructure	
• Cutting of mangrove trees	
• Coral bleaching	
• Others (please specify) •	

8a. From the scale of 1 to 5, please indicate your level of benefits from MPA for each of the following:

Benefits	Least benefits ----------→ Most benefits				
	1	2	3	4	5
Income from fishing					
Income from tourism					
General infrastructure improvement					
Road improvement					

8.b. From the scale of 1 to 5, please indicate the level of importance of the following reasons why local communities possibly not benefit from MPA:

Reason	Least important ----------→ Most important				
	1	2	3	4	5
Little or no access to natural resources within the MPA					
No direct income from the MPA					
Local resident's minimal or no involvement in the management					
Others, please specify					

9. What is your overall view on the protection of San Jose MPA?

Not at all satisfied ←---------1-----2-----3-----4-----5---------→ Very satisfied

1. Not at all satisfied 2. Somewhat dissatisfied 3. Neutral/Do not know
4. Somewhat satisfied 5. Very satisfied

10. Have you ever participated in any marine conservation activities (e.g. coastal clean-up; mangrove planting)?

(1) Yes, cite specific activity _____ Any payment received? _____
(2) No

II. Activities in the San Jose Marine Protected Area

1. Do you earn income from tourism activities in Matara? (1) Yes (go to 1.1) (2) No (go to 1.3)

1.1 Please indicate in what way _____
1.2 Estimated income from tourism _____
1.3 Other HH members benefit in tourism activity and estimated income _____

2. Do you feel that local residents take full advantage of the areas' economic potential related to tourism? Yes, definitely ←---------1-----2-----3-----4-----5---------→ No, not really

1. Yes, definitely 2. Yes to some extent 3. Do not know
4. No, definitely not 5. No, not really

3. Is Matara and its vicinities one of your fishing areas? (1) Yes (go to 3.1) (2) No (go to 3.5)

3.1 How many times per month do you fish in the area? _____
3.2 How many kilograms of fish do you usually catch per trip? _____
3.3 How many fishers go with you in your fishing trip? _____
3.4 Estimated income from fishing per trip? _____
3.5 Number of household members engaged in fishing in Matara areas _____
3.6 Where is your fishing ground _____

4. Are you a member of *bantay dagat* or a fish warden? (1) Yes (go to 4.1) (2) No (go to 4.3)

4.1 Since when were you a member? _____
4.2 Did/Do you receive honorarium, if yes how much? _____
4.3 Any HH member who is a *bantay dagat*/fish warden? _____

II. Willingness to Work for Marine Sanctuary/ Protected Area

With the establishment of the protected area, improvements in the marine resources were observed based from the initial conditions and constant monitoring of government agencies. A marine reserve, however, requires a certain management and enforcement cost for it to be sustainable. At present, in the case of San Jose MPA, municipal *bantay-dagat* and SJ Fisherfolk Association members do the patrolling and ensure that the reserves are protected from illegal fishers. According to research, a **community-based *bantay dagat*** is an effective way to maintain and improve the status of the marine resources as local residents can easily monitor the environment because they are familiar with the area. The table below shows the present and expected conditions of the marine ecosystem.

Indicator	Status quo* (good condition)	Hypothetical scenario (better condition)
Coral reef cover	Fair (43% coral cover)	Increased by 10%
Seagrass/ seaweeds beds area	Good (51 – 75% coverage)	Increased by 10%
Fish Species richness (#species/500 sq.m)	105 species	Increased by 5%
Fish Species abundance (# individuals/500 sq.m)	1,056 individual fishes	Increased by 10%
Fish Biomass (metric tons/ha)	4 metric tones	Increased by 10%

*based on 2013 Resource Assessment

To guarantee this to happen, suppose there is a proposal to ask the help of residents to do the patrolling/ maintenance on a voluntary basis, meaning no salary or incentive. Giving a voluntary time to patrol will mean you will not be able to go fishing or go to work during the day or time you are assigned to patrol. (*At this point candidly ask the respondent what he does to earn income and what is her/his average income per day and put in the blanks provided*).

Major income source: _____Average income per day (₱): _____
or Average income per month (₱) : _____ No days working in a month: _____ days

This will mean you will sacrifice such amount for the MPA. I would like to request you to think carefully about whether you really care about the marine resources or not, and what value you put on the protected area.

1. I would like to ask if you will be willing to work for _____ **days** per month for monitoring, maintenance and patrolling of the MPA? ***Yes, no, or if no, are you willing to work for lesser number of days?*** Please think carefully about this and remind yourself that there are works you might wish to spend this time on.

_____YES (go to 2) ____NO (go to 4) ____willing to work lesser days per month? (go to 1.1)

1.1 If you are willing to work on a lesser days, how many days per month? _____days

2. Please indicate the reason why you are willing to work for monitoring, patrolling or maintaining the marine reserve. (*One answer only*)

( ) I would like to ensure the continuous protection of the marine resources.
( ) I think it is very important to protect the marine resources so fish catch will increase.
( ) I would like to protect the resources for the future generation.
( ) I like to enhance the recreational and tourism benefits of the area
( ) I get satisfaction from doing a good cause
( ) My participation reflects my views on the need to preserve all MPAs
( ) I will not really have to work any extra time

3. If you are willing to contribute labor, how about if for some reasons, you got absent during the day you are supposed to watch the MPA, will you be willing to pay for an "*absent fee*" or a "*penalty*" equivalent to your day of absence? ( ) YES (go to 3.1) ( ) NO (go to 3.2)

3.1 If yes, how much are you willing to pay as penalty or absent fee per day? ***₱***_____
3.2 Please indicate the reason why you are not willing to pay for absent fee/penalty?
( ) I do not have money but I can offer labor in patrolling
( ) I have doubts about where the money will be used
( ) I can patrol in a different day if I get absent
( ) I can ask a friend or family member to patrol for me when I get absent
( ) Others, please specify _____

4. Please indicate the reason why you are not willing to work for patrolling and maintaining the marine reserve. (*One answer only*)

( ) I cannot sacrifice the income I will have if I will work instead of doing patrol
( ) I do not have time to spend in protecting the MPA
( ) I am not interested in this matter
( ) I do not live near Matara
( ) The government should pay for the patrolling activities
( ) Everyone should work for this, not just local people
( ) I need more information/time to answer this question

III. Socio-demographic information

1. Age _____ 1.1. Gender: ____ Male ____Female 1.2 Civil status _____
2. Highest Educational Attainment: _____ Elementary Level _____ Elementary Graduate
   _____ High School Leve _____ High School Graduate _____ College Level
   _____ College Graduate _____ Vocational Graduate _____ Post Graduate
3. Main occupation:
   _____ Fishing (boat owner? _____)
   _____ Farmer
   _____ Barangay Official (please indicate position, _____)
   _____ Others, please specify _____

   Secondary occupation: _____

4. What is your estimated personal monthly income? _____
   ( ) below ₱2,000 ( ) ₱3,000 – 4,000 ( ) ₱5,000 – 6,000 ( ) ₱7,000 – 8,000
   ( ) ₱9,000 – 10,000 ( ) ₱11,000 – 15,000 ( ) ₱16,000 – 20,000 ( ) more than ₱20,000
5. Estimated monthly income of other HH members:
   a. Husband/wife : ₱ _____
   b. Child 1 : ₱ _____
   c. Child 2 : ₱ _____
   d. Others: ₱ _____

6. Number of household members _____
   Number HH members engaged in fishing or related activities? _____
7. Since when are you living in this village? _____
8. Are you a member of SJFA? _____ Any other HH member who is a SJFA member _____
9. Membership to other organizations in the community _____

Name of Enumerator: _____

SALAMAT PO!

Appendix 5

Survey Questionnaire to Local Community Residents for Estimating the Value of Marine Resources in Palaui Island Protected Landscape and Seascape (PIPLS), Sta. Ana, Cagayan

Good day! The Bureau of Fisheries and Aquatic Resources- Region 02 (BFAR-R02) in academic partnership with the Kochi University, Japan is conducting a survey to obtain general views for encouraging ecosystem services for conservation of marine resources. Your answers will be kept strictly confidential and shall only be used to improve marine and coastal resources. Thank you in advance.

Sample Code ☐

Name of Respondent: _____ Date of Interview: _____
____ Palaui resident, if not from what Purok are you from: _____
____ With house in Palaui but do not stay there
____ With relatives in Palaui

I. Perceptions and awareness on MPA and coastal resource environmental issues

1. Are you aware of the Palaui Island Protected Landscape and Seascape (PIPLS)?
   (1) Yes (2) No
2. What do you think is the main purpose of PIPLS?
   (a) Tourism (b) Nature protection/biodiversity conservation
   (c) Increase fisheries production (c) I don't know
3. Do you agree or disagree with the protection of Palaui's beachscape beauty and its ecosystem? (1) Agree (go to 4) (2) Disagree (go to 5)
4. What is your reason for agreeing? *(Tick the item that the respondent says)*
   ( ) My livelihood (fishing/tourism) mainly depend on it
   ( ) It is my moral obligation to protect the environment
   ( ) I want to protect the environment for the future generation
   ( ) To enhance recreational activity in the area
   ( ) Others, please specify _____
5. What is your reason for disagreeing? *(Tick the item that the respondent says)*
   ( ) I do not believe that the coastal environment is degrading
   ( ) I do not care if the beach beauty is deteriorating
   ( ) I do not believe conservation initiative can stop coastal environment degradation
   ( ) I distrust institutions that implement it
   ( ) Conservation will marginalize the poor fishers and make resort owners richer
   ( ) Others, please specify _____
6. Kindly indicate what you think about the following statements. There is no right or wrong answer.

Statements	Perception/ Attitude (indicate the number that corresponds the answer to the respondent)
1. I have enough knowledge on the status of resources in Palaui Island (fishes, corals, etc)	
2. I am interested in knowing the status of resources in Palaui	
3. Tourists and tourism activities increase in Palaui due to the better condition of resources	

4. Resources in Palaui should be maintained and enhance to encourage tourism activities	
5. Tourism activities contribute in my economic well-being	
6. My fishing activities became better with the presence of marine reserves	
7. PAMB is effectively managing the MPA.	
8. Community members should participate in managing the marine reserves.	

Strongly disagree ←---------1-----2-----3-----4-----5-----6-----7---------→ Strongly agree

Note: 1 – Strongly disagree (4) Undecided 5 – Slightly agree
2 – Disagree 6 – Agree
2 – Slightly disagree 7 – Strongly agree

7. What do you think are the three most important natural and man-made activities threatening the beauty of Palaui and its long term use? Please choose which is 1st, 2nd and 3rd .

Coastal environment issues	Rank
• Illegal fishing (cyanide/dynamite/compressor/others, _____)	
• Littering on the beach and disposal of domestic waste	
• Overcrowding of tourist	
• Unplanned and uncontrolled proliferation of houses and infrastructure	
• Cutting of mangrove trees	
• Coral bleaching	
• Others (please specify) •	

8.a. From the scale of 1 to 5, please indicate your level of benefits from MPA for each of the following:

Benefits	Least benefits ----------→ Most benefits				
	1	2	3	4	5
Income from fishing					
Income from tourism					
General infrastructure improvement					
Others, please specify					

8.b. From the scale of 1 to 5, please indicate the level of importance of the following reasons why local communities possibly not benefit from MPA:

Reason	Least important ----------→ Most important				
	1	2	3	4	5
Little or no access to natural resources within the PA					
No direct income from the PA					
Local resident's minimal or no involvement in the management					
Others, please specify					

9. What is your overall view on the protection of PIPLS?

Not at all satisfied ←---------1-----2-----3-----4-----5---------→ Very satisfied

1. Not at all satisfied 2. Somewhat dissatisfied 3. Neutral/Do not know
4. Somewhat satisfied 5. Very satisfied

10. Have you ever participated in any marine conservation activities (e.g. coastal clean-up; mangrove planting)?

(a) Yes, cite specific activity _____Any payment received? _____
(b) No

II. Activities in the Palaui Protected Area

1. Do you earn income from tourism activities in Palaui? (1) Yes (go to 1.1) (2) No (go to 2)

1.1 How much do you earn per month and what ecotourism activities?

Tour guide, please specify _____	₱ _____
Boat operator/Boat assistant	_____
Homestay accommodation	_____
Salary (Catering, Nature Village, others _____)	_____
Others, please specify _____	_____

1.2 Other family members engage in tourism activities

Tourism Activities	Household members
Tour guide, please specify _____	_____
Boat operator/Boat assistant	_____
Homestay accommodation	_____
Employment in Catering, Nature Village, others	_____
Others, please specify _____	_____

2. Do you feel that local residents take full advantage of the areas' economic potential related to tourism? Yes, definitely ←---------1-----2-----3-----4-----5---------→ No, not really

1. Yes, definitely 2. Yes to some extent 3. Do not know
4. No, definitely not 5. No, not really

3. Is Palaui and its vicinities one of your fishing areas? (1) Yes (go to 3.1) (2) No (go to 3.5)

3.1 How many times per month do you fish in the area? _____
3.2 How many kilograms of fish do you usually catch per trip? _____
3.3 How many fishers go with you in your fishing trip? _____
3.4 Estimated income from fishing per trip? _____
3.5 Number of household members engaged in fishing in Palaui areas _____
3.6 Where is your fishing ground _____

4. Are you a member of *bantay dagat* or a fish warden? (1) Yes (go to 4.1) (2) No (go to 4.3)

4.1 Since when were you a member? _____
4.2 Did/Do you receive honorarium, if yes how much? _____
4.3 Any HH member who is a *bantay dagat*/fish warden? _____

II. Willingness to Work for Marine Sanctuary/ Protected Area

With the establishment of the protected area, improvements in the marine resources were observed based from the initial conditions and constant monitoring of government agencies. A marine reserve, however, requires a certain management and enforcement cost for it to be sustainable. At present, in the case of PIPLS, an organized group of the government agencies together with municipal *bantay-dagat* do the patrolling and ensure that the reserves are protected from illegal fishers. According to research, a **community-based *bantay dagat*** is an effective way to maintain and improve the status of the marine resources as local residents can easily monitor the environment because they are familiar with the area. The table below shows the present and expected conditions of the marine ecosystem.

Indicator	Status quo* (good condition)	Hypothetical scenario (better condition)
Coral reef cover	Fair to good (28 – 73% cover)	Increased by 10%
Seagrass/ seaweeds beds area	Good (51 – 75% coverage)	Increased by 10%
Fish Species richness and (#species/500 sq.m)	193 species	Increased by 5%
Fish Species abundance (# individuals/500 sq.m)	3,498 individual fishes	Increased by 10%
Fish Biomass (kgs/ sq.m)	37.90	Increased by 10%

*based on Municipal Coastal Environmental Profile and MERF-DENR

To guarantee this to happen, suppose there is a proposal to ask the help of residents to do the patrolling/ maintenance on a voluntary basis, meaning no salary or incentive. Giving a voluntary time to patrol will mean you will not be able to go fishing or go to work during the day or time you are assigned to patrol. (*At this point candidly ask the respondent what he does to earn income and what is her/his average income per day and put in the blanks provided*).

Major income source: _____Average income per day (₱): _____
or Average income per month (₱) : _____ No days working in a month: _____ days

This will mean you will sacrifice such amount for the MPA. I would like to request you to think carefully about whether you really care about the marine resources or not, and what value you put on the protected area.

1. I would like to ask if you will be willing to work for _____ **days** per month for monitoring, maintenance and patrolling of the MPA? ***Yes, no, or if no, are you willing to work for lesser number of days?*** Please think carefully about this and remind yourself that there are works you might wish to spend this time on.

_____YES (go to 2)_____NO (go to 4) _____willing to work lesser days per month? (go to 1.1)

1.1 If you are willing to work on a lesser days, how many days per month? _____ days

2. Please indicate the reason why you are willing to work for monitoring, patrolling or maintaining the marine reserve. (*One answer only*)

( ) I would like to ensure the continuous protection of the marine resources.
( ) I think it is very important to protect the marine resources so fish catch will increase.
( ) I would like to protect the resources for the future generation.
( ) I like to enhance the recreational and tourism benefits of the area
( ) I get satisfaction from doing a good cause
( ) My participation reflects my views on the need to preserve all MPAs
( ) I will not really have to work any extra time

3. If you are willing to contribute labor, how about if for some reasons, you got absent during the day you are supposed to watch the MPA, will you be willing to pay for an "*absent fee*" or a "*penalty*" equivalent to your day of absence? ( ) YES (go to 3.1) ( ) NO (go to 3.2)

3.1 If yes, how much are you willing to pay as penalty or absent fee per day? ***₱***_____

3.2 Please indicate the reason why you are not willing to pay for absent fee/penalty?

( ) I do not have money but I can offer labor in patrolling
( ) I have doubts about where the money will be used
( ) I can patrol in a different day if I get absent
( ) I can ask a friend or family member to patrol for me when I get absent
( ) Others, please specify _____

4 Please indicate the reason why you are not willing to work for patrolling and maintaining the marine reserve. (*One answer only*)

( ) I cannot sacrifice the income I will have if I will work instead of doing patrol
( ) I do not have time to spend in protecting the MPA
( ) I am not interested in this matter
( ) I do not live near Palaui
( ) The government should pay for the patrolling activities
( ) Everyone should work for this, not just local people
( ) I need more information/time to answer this question

III. Socio-demographic information

1. Age_____ 1.1. Gender: ____ Male ____Female 1.2 Civil status _____
2. Highest Educational Attainment: _____ Elementary Level _____ Elementary Graduate _____ High School Level _____ High School Graduate _____ College Level _____ College Graduate _____ Vocational Graduate _____ Post Graduate
3. Main occupation:
   _____ Fishing (boat owner? _____)
   _____ Boat operator/ employee/laborer (if member of association, please indicate _____)
   _____ Barangay Official (please indicate position, _____)
   _____ Others, please specify _____

   Secondary occupation: _____
4. What is your estimated personal monthly income? _____
   ( ) below ₱2,000 ( ) ₱3,000 – 4,000 ( ) ₱5,000 – 6,000 ( ) ₱7,000 – 8,000
   ( ) ₱9,000 – 10,000 ( ) ₱11,000 – 15,000 ( ) ₱16,000 – 20,000 ( ) more than ₱20,000
5. Estimated monthly income of other HH members:
   a. Husband/wife : ₱ _____
   b. Child 1 : ₱ _____
   c. Child 2 : ₱ _____
   d. Others: ₱ _____
6. Number of household members ____
7. Number HH members engaged in fishing or related activities? _____
8. Since when are you living in this village? _____
9. Are you a member of PEPA? _____
   Any other HH member who is a PEPA member _____
10. Membership to other organizations in the community _____

Name of Enumerator: _____

SALAMAT PO!

Appendix 6

Results of test whether data structure is same or not among datasets by Chow-type Likelihood Ratio (LR) Test: WTW data sets

Variables tested that coefficient is equal among equations of each data sets	Integrated data set	San Jose data set	San Vicente		degree of freedom	5% critical value of the chi-square distribution	LR test Statistic	Test result
			Island data set	Mainland data set				
Constant, Proposed days	-120.68	-40.81	-29.62	-44.91	2	5.991	10.671	**reject**
Constant, Proposed days, Log_HHIncome	-120.63	-40.45	-26.27	-43.86	3	7.815	20.124	**reject**
Constant, Proposed days, Log_HHIncome, Fisher dummy	-111.68	-40.36	-24.00	-33.45	4	9.488	27.747	**reject**

*Reject Null Hypothesis " Coefficients of variables is equal among equations of each data set"

*We should estimate equations of each data separately

Appendix 7

Survey Questionnaire to Tourist for Further Encouragement of Ecosystem Services in Palaui Island Protected Landscape and Seascape (PIPLS), Sta. Ana, Cagayan

Thank you for choosing Palaui as your vacation destination!
The Bureau of Fisheries and Aquatic Resources- Region 02 (BFAR-R02) in academic partnership with the Kochi University, Japan is conducting a survey to obtain general views for encouraging ecosystem services for conservation of marine resources. Your answers will be kept strictly confidential and shall only be used to improve the services for the tourist. Thank you in advance.

_____
(Date of visit)

I. This section would like to know some information on your travel time and costs incurred for this trip.
1. How many people joined you for this trip? ____ a. family members ___ b. friends ____
2. Where did you come from? (Place of origin) _____
3. Please provide your mode of transport for your travel route from origin to destination:

Example:			
	Name of Place/ City	Mode of Transportation	Cost of Transportation or Fuel Cost (if you used your own car)
Origin	Manila		
To	Tuguegarao	Airplane	3,000.00
To	Sta. Ana	Van	200.00
To	Port	Tricycle	20.00
PLEASE USE THE TABLE BELOW FOR YOUR ANSWER			
	Name of Place/ City	Mode of Transportation	Cost of Transportation or Fuel Cost (if you used your own car)
Origin			
To			
To			
To			

4. Time of travel to Palaui from your house: _____ (hrs or mins)
5. Is this your first time to visit this area? _____yes _____no
   5.1 If no, how many times have you visited Palaui? _____

5.2 When was the first time you visited Palaui? _____

6. Is Palaui your only destination for this trip? _____ yes _____no
   6.1 If no, Palaui is your: _____main destination _____ secondary destination
   6.2 Where is/are your other destinations? _____
7. How many days and nights did you stay in Palaui? _____days; _____nights
   7.1 If stayed for 1 day only, how many hours in total _____
   7.2 If stayed overnight, where did you stay? _____
   7.3 How much did you pay for the accommodation? _____
8. How much did your group spent for the:
   8.1 boat fare to your destination? _____
   8.2 food while in the island? _____
9. What recreational activities did you experience in Palaui Island?

Activity/ies	Time spent (in hours or mins)
Swimming	
Snorkeling	
Mangrove Transplantation	
Trekking to Baratubut Falls	
Trekking to Cape Engano	
Lighthouse viewing	
Others, please specify	

What attracted you to visit Palaui?

_____ mountain/forest area (trekking to falls/light house) ONLY
(***please proceed to questions IV***)

_____ marine resources and mountain/forest area (trekking/light house)
(***please continue from II onwards***)

II. This section would like to know your perceptions on the marine resources of Palaui Island.

1. Among the bundled attributes of the island's marine resources, what do you like most? Please select and rank 3 attributes you like most by choosing which is 1st, 2nd and 3rd

Marine resource attractions	Rank (1st, 2nd, 3rd)
Coral reefs	
Diverse number of fishes	
Variety of seagrass	
Fine white sand	
Beach scenery and islet/rock formations	
Clean waters	
Secluded beach locations	
Mangrove ecosystem	

2. Please indicate your perception on the different attributes of marine resources and other attractions in Palaui Island by checking the appropriate column using the scale of 1 to 5, 5 being the highest:

Attributes	Worst (1)	Not good (2)	Fair (3)	Good (4)	Excellent (5)	No Idea
Quality of beach front						
Cleanliness of environment						
Quality of sites for snorkeling						
Quality of corals						
Diversity of fishes						
Quality of seawater						

3. Encircle the level of your satisfaction with your current visit in the island:
   (1) Not at all satisfied ("worst possible experience")
   (2) Not really satisfied
   (3) Neutral
   (4) Somewhat satisfied
   (5) Very much satisfied ("best possible experience")
4. Encircle the state of conservation of Palaui Island according to your perception:
   (1) Not at all conserved ("worst state")
   (2) Not really conserved
   (3) Undecided
   (4) Somewhat conserved
   (5) Very much conserved ("best state")

III. This is just an assumption and we just want to evaluate how your travel behaviors change if this situation happens.

The table below shows the present and expected conditions of the marine ecosystem. According to research, a community-based bantay dagat ("sea guard") is an effective way to maintain and improve the status of the marine resources. To establish this, there is a proposal to institute a "**MARINE RESOURCES PROTECTION FEE"** to cover the cost of patrolling, monitoring and maintenance of marine resources.

Please think carefully about how much you can really afford and try to be realistic as possible. There is no right or wrong answer to this question.

Indicator	Present condition*	Expected conditions
Coral reef cover	38 – 55% cover	Increased by 10%
Seagrass/ seaweeds beds area	Good (51 – 75% coverage)	Increased by 10%
Fish Species richness and (#species/500 sq.m)	193 species	Increased by 5%
Fish Species abundance (# individuals/500 sq.m)	3,498 individual fishes	Increased by 10%

*based on Municipal Coastal Environmental Profile and MERF-DENR

If an additional fee of Php _____ will be collected, will you still visit Palaui?
____ Yes, If yes, how many times will you intend to visit Palaui? _____
_____ No, If no, why? _____

IV. Socio-economic Information

1. Age _____ 2. Sex: ____ Male ____Female

3. Highest Educational Attainment: _____ Elementary Level ___ Elementary Graduate
_____ High School Level _____ High School Graduate ___ College Level
_____ College Graduate _____ Vocational Graduate ____Post Graduate

4. Job status: _____student _____employed _____freelancer _____unemployed
_____pensioner _____ businessman/ entrepreneur others, pls. specify _____

5. What is your estimated monthly income? _____

FREE SPACE (Comments/ Suggestions for the improvement of Palaui/ problems encountered during the visit)

_____

_____

_____

_____

***Disclaimer**: BFAR do not have any intention to increase or introduce any fee.*

Should you have questions, comments, feedback etc. regarding this survey, please feel free to reach us through this email address: elballad@gmail.com

Thank you very much for participating in the conduct of this survey.
Have a safe trip back home!

SALAMAT PO!!!