Graduate School of Development Studies

Knowledge, Power Relations and Resource Control as Drivers of Local Adaptation Strategies to Sea Level Rise: The experience of two small island communities in Central Philippines

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Luz Angeles Almagro-Blanco
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Members of the examining committee:

Dr Thanh-Dam Truong [Supervisor]
Dr Murat Arsel [Reader]

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Inquiries:

Postal address:	Institute of Social Studies P.O. Box 29776 2502 LT The Hague The Netherlands
Location:	Kortenaerkade 12 2518 AX The Hague The Netherlands
Telephone:	+31 70 426 0460
Fax:	+31 70 426 0799

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This is for all of you.

Contents

List of Acronyms

ASLR	Accelerated Sea Level Rise
BFARMC	Barangay Fishery and Aquatic Resource Management Council
CC	Climate Change
CCC	Climate Change Commission
CLE	Coastal Law Enforcer
CLEC	Coastal Law enforcement Council
COP	Conference of Parties
CRM	Coastal Resource Management
DRM	Disaster Risk Management
DRMCC	Disaster Risk Management Coordinating Council
DBDBR	Danajon Bank Double Barrier Reef
DSWP	Democratic Socialist Women of the Philippines
DRM	Disaster Risk Management
DRCC	Disaster Risk Coordinating Council
FISH	Fisheries Improved for Sustainable Harvest project
FP	Family Planning
GAD	Gender and Development
GDP	Gross Domestic Product
INCCC	Initial National Communication on Climate Change
IPCC	Intergovernmental Panel on Climate Change
IZCM	Integrated Coastal Zone Management
JICA	Japanese International Cooperation Agency
KI	Key informant/s
LGU	Local Government Unit/s
LCCAP	Local Climate Change Action Plans
MFARMC	Municipal Fishery and Aquatic Resource Management Council
MPA	Marine Protected Area
MO	Manila Observatory
NAMRIA	National Mapping and Resource Information Authority
NFSCC	National Framework Strategy on Climate Change
NGO	Non Government Organization
PAG-ASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PAR	Philippine Areas of Responsibility
PSCCA	Philippines Strategies for Climate Change Adaptation
PCW	Philippine Commission on Women
PDPW	Philippine Development Plan for Women
PPGD	Philippine Plan for Gender-Responsive Development
SLR	Sea Level Rise
UNDP	United Nations Development Program
UNFCC	United Nations Framework for Climate Change
UP	University of the Philippines
VAWC	Violence Against Women and Children

Abstract

This research paper tries to look at the various experiences of fishing communities and government units at addressing impacts of CC and SLR. This research explores how these experiences are shaped by the differing knowledge, power, and resources interplay within a social system. To address this, an analysis of the social, economic, political, and cultural situations in the study areas as well as the local ordinances that relate to coastal resource management, gender, disaster risk management will be made. The research findings indicate that social actors interact, challenge, and maximize their knowledge, resources and power to produce either individual or collective measures and strategies for adaptation and resilience to CC and SLR across time. Generally, strategies undertaken by fishing households and communities reduce their vulnerability to CC and SLR impacts in the short term. The local governments' challenging role is to provide development and adaptation continuum, where transformation of coping strategies into effective adaptation strategies can become more meaningful to local people.

Relevance to Development Studies

The growing and intense impacts of SLR in small island communities are concerns that need immediate attention. The knowledge to be gained from this study may help to understand that vulnerabilities and adaptation are socially constructed and thus requiring greater understanding on the complex interaction between social, political, cultural and economic factors.

Keywords

Climate change, Sea level Rise, Vulnerability, Adaptation, Resiliency

Chapter 1 Introduction

1.1 Statement of the Problem

The theme of climate change (CC) adaptation and mitigation has evolved from a focus on technologies and financial instruments as primary mechanisms to a view in which social relations are recognized to play an important role. For example, Kates (2000) observed that efforts to address climate change focused on mitigation than adaptation. More lately, Carter (2010) asserted that "adaptation has been investigated as a largely scientific and technical problem; albeit one that demands multidisciplinary approaches." While many researchers seek to estimate impacts and quantify vulnerability there was little about options to reduce risks and vulnerability or completely avoid adverse effects of CC and its related impacts. Blaikie (as cited in CCCKN 2001) pointed out how communities can become vulnerable in terms of their physical and social location. In addition, Rossi and Lambrou (as cited in Vallejo 2011) emphasized that norms including gender and power inequalities affect the capacities of social actors to adapt to climate risks and vulnerability. Critical views have point out the lack of attention to social, political, cultural and economic issues and how these can jeopardize efforts in coping, adaptation and resiliency among highly vulnerable communities.

Several studies show that successful implementation of adaptive planning through an integrated environmental management is a challenging task. Perez et al (1999) noted in a study made in Manila Bay coastal area in the Philippines that the tasks of adaptive planning in the context of integrated coastal zone management can be made with the technical and scientific efforts together with extensive information and education activities that inform people including the policy makers about the issues and concerns of accelerated sea level rise (ASLR). The study also proposed to improve the coordination among coastal stakeholders by integrating all measures, policies and plans to avoid waste of resources and encouraged the involvement of communities (ibid). Beyond these findings and recommendations, there is an absence in understanding about how people, particularly the most vulnerable sectors like the poor and women in small-island communities and the government units interact, decide, act, and re-construct coping mechanisms and adaptation strategies, taking into consideration their individual and collective perceptions and knowledge about CC and SLR.

Taking off from the above perspectives, this research is premised on the understanding that vulnerability and adaptation to the impacts of CC particularly on SLR are influenced by multiple and varying knowledge and where the interplay of factors like social, political, and culture affect the decisions and actions of social actors on adaptation strategies.

The study looks at how existing knowledge on CC and SLR from various local social actors interacts and influences each other to arrive at decisions and actions that reduce vulnerability and enhance adaptation. Similarly, the study

will also analyze how institutions particularly government units in the context of their social, political and cultural backgrounds interact and in consideration for the national policies and local ordinances which they are legally bound to observe will come up with knowledge, and influence decisions and actions that may reduce vulnerability and improve adaptive capacity or increase risks and obscure adaptation.

1.2 Justification and Relevance

Climate change studies undertaken in the Philippines focusing on SLR were limited to coastal areas along urban and metropolis and are in northern part of the country such as the Manila Bay (Perez et al 1999) and Cavite City (Sales 2009). The studies suggest an adaptive planning that reckons with a local framework on integrated coastal zone management. Studies on the social, political, cultural dynamics and relations of CC impacts of SLR in island-barangays located in fragile ecosystem, is highly relevant given the fact that a large of number of the population in the country are in the coastal and rural areas that are dependent on marine resources for their food and livelihood. The growing and intense impacts of SLR in small island communities are concerns that need immediate attention. As this phenomenon continues to manifest, the poor fishing communities remain exposed to the risks to CC impacts.

Another significant value for undertaking this research is to provide an understanding how social actors are affected and adapting to the impacts of CC and SLR in view of the interplay of the social, political, environmental, cultural and economic factors within and outside a fishing household and island community. It is essential to see how national laws and local ordinances implemented through government programs and projects influence the processes of building new knowledge and practices that enhance people's adaptive capacity.

The knowledge to be gained from this study may help to understand that vulnerabilities and adaptation are socially constructed and thus requiring greater understanding on the complex interaction between social, political, cultural and economic factors.

1.3 Research Objectives and Questions

The study aims to understand the decision making of fishing households and communities in island-barangays facing the impacts of CC and SLR. This study is designed to examine the relationships and interactions of fishing households, communities, and the government units to different levels of knowledge and perceptions on impacts of CC and SLR. To achieve this objective the main research question is to answer how fishing households in two island-communities are adapting to CC and SLR impacts. More specific research questions are as follows:

1. Whether different perceptions, understanding, and knowledge of risks and vulnerabilities to CC and SLR influence decision-making processes in the face of CC and SLR impacts?

2. What are the factors affecting behind the influence of perceived CC and SLR risks and vulnerabilities on households, communities, and social organizations' decision-making?

1.4 Research Methods

This study was conducted in the island-communities of Cabul-an East and Guindacpan in the municipalities of Buenavista and Talibon, respectively. The two municipalities are located in the province of Bohol in the Philippines. Actual field visits in the islands were conducted on July 18 to 22 and August 8 to 12, 2011. Data collection involving municipal and provincial offices in the town centers and provincial capital were made in four weeks from July 7 to 12, July 29 to August 4 and from August 16 to 19, 2011.

This study employs qualitative research that maximizes the use of primary data. Text analysis is likewise used to critically analyze the following: a) policies from the national to local levels; b) local government units' (LGU) plans and budgets related to coastal resource management (CRM), gender and development (GAD) and disaster risk management (DRM); c) project reports and statistics related to SLR in the target areas; and d) academic materials such as journals, publications, books, and website resources.

1.4.1 Sources of Data and Methods

Focus-group (FG) discussions, semi-structured and in-depth interviews were primary methods employed in the study. At the barangay level, a total of nine FG discussions were made involving the groups of married women, widows, coastal law enforcers, barangay officials and fishers. Semi-structured interviews were made with barangay midwives and former barangay chairperson. Eight of the nine FGs were held at the barangay hall. While the venue was convenient for most participants, presence of barangay officials may have triggered hesitancy on the part of the participants. Moreover, the FG with widows in one barangay exceeded the standard number of participants. The sudden influx of participants was due to the locals' expectations they can get material benefits from meetings called by or through the barangay. Factors used to gauge the eligibility to participate in the FG with widows are the number of years as widows and personal experience with SLR.

At the municipal level, semi-structured interviews were conducted with eight key government personnel, policymakers, women-leaders, and local representatives of donors. Meanwhile, a total of eleven semi-structured interviews were made at the provincial level with the heads of key offices on environment, social services, agriculture, disaster risk, and policymakers serving as key informants (KI). Majority of the semi-structured interviews were held at the offices of interviewees. They preferred to hold the interviews at their offices, which run for one and half hours each due to work interruptions. In-depth interviews made with the donors on gender and environment projects

and policymakers were held at the conference rooms of the provincial and municipal governments, respectively. The in-depth interviews with the representatives of environment non-government organizations (NGO) and donor-funded project on environment were held at the office and mutually agreed convenient place, respectively.

In addition to the three central methods employed in the study, I reviewed relevant literature on gender, climate vulnerabilities, adaptation and mitigation, and DRM. The national policies and provincial and government ordinances and reports relating to fisheries, women and gender, and DRM were reviewed.

1.5 Ethical Dimension

My work experience with the fisher communities influenced my choice and sustained my interest on this topic, which is close to the original subject I was contemplating. I have considered gendered-vulnerability and adaptation to SLR at the early stage of the study. My limited academic knowledge about gender made me realize that a closely related topic that looks at the larger social and political spectrum of vulnerability and adaptation would give me fresh perspectives on gender and hopefully enable me to become better gender advocate.

My fieldwork gives me the opportunity to witness a local fisher negotiating with a village coastal law enforcer and a stranger that he be allowed to undertake an illegal fishing activity because they need money to defray for the interment costs of a family member. Without my knowledge, my presence on the island was used by the local coastal law enforcer, who is also one of my KIs, as the reason for disapproving the request. He however briefed me about his response to the request to make sure I will have a similar stance when the resident-fisher approaches me directly. Unexpectedly, the requesting-fisher visited me on the second day of my fieldwork. I supported the decision of the local coastal law enforcer, which would be what a marine conservation and fishery management advocate will do. The inclination to help was also strong at that moment. I gave a modest amount hoping to help ease the financial burden of the grieving family. I was reflecting on my actions right after the resident-fisher left. I would never know if the manner of assistance was appropriate.

1.6 Organization of the Paper

This paper is structured to have five main chapters. The first chapter is an overview of the research topic. The second chapter presents a brief background on the CC and SLR situation in the Philippines and the current adaptation strategies undertaken by the government. Chapter three provides elaborate discussions on different perceptions and knowledge on CC and SLR and the adaptation strategies employed by various local actors including the local governments. Chapter four contains an analysis of the research findings highlighting key concepts related to knowledge, power, and resources as vital elements that shape the adaptation strategies of each actor. The concluding part presents the main findings of the study and their implications on the

social, economic, and political factors that help evolve adaptation and resiliency measures against CC and SRL in island-communities.

Chapter 2 Climate Change, Sea Level Rise, and Adaptation Strategies in the Philippines: A View from the Government

This chapter provides a background on the policy environment that provides a framework both for fishing communities and local governments in the identification and formulation of adaptation strategies and approaches to resiliency as well as continued adaptation practices to combat the impacts of CC, particularly, particularly SLR. The national policies that are either translated into local ordinances or implemented locally are analyzed. These policies or ordinances include fisheries and gender and two recently approved national policies on CC and DRM. A description of the climate characteristics of the Philippines is first provided. This is followed by a discussion of key policy stipulations within the national policies and local ordinances, which are important guideposts for policy implementers.

2.1 A Description of the Philippines and its Climate Conditions

The Philippines, an archipelagic nation, is located in Southeast Asia. It is surrounded by four major bodies of water. On the east is the Philippine Sea and the Pacific Ocean. On the west and north areas are the South China Sea and the Celebes Sea. On the south are the coastal waters of Borneo. It comprises 7,107 islands and islets; and divided into three major islands-groups, namely; Luzon, Visayas,[1] and Mindanao. The country's coastline (36,289 km2) covers 80% of the country's provinces, 70% of the municipalities, and 28% of the largest cities. With the country's long coastline, it has rich and diverse marine and fishery resources that provide both source of livelihood and food to majority of its people. In 2000, about 4% of the gross domestic product (GDP) was contributed by the fishery (Guieb et al 2002). In the same year, persons employed in the fishery sector reach 806,929 where close to 50% of this came from the municipal sub-fishery sector (ibid). Majority of the rural population is residing in the coastal areas. Fishing communities in the country are among the poorest and marginal group (Christie, 2006).

The small islands and islets emerge and disappear during low and rising tides. The climate is divided into two major seasons. The rainy season covers the months of June to November while the dry season runs from December to May. The country is susceptible to various types of natural hazards, which is due to its geographic location and physical environment (Porcil, 2009). Is it

[1] It is at the heart of the country, which is divided into central, eastern, and western Visayas.

situated in the "Pacific Ring of Fire," where movement of two tectonic plates (Eurasian and Pacific) result to frequent earthquakes and volcanic activities (ibid). Moreover, the country is also frequently visited by tropical cyclones. The 2007 Manila Observatory (MO) study (as cited in Villarin et al, 2008) observes a noticeable rise in typhoon crossings in the Visayas region. As Yumul et al (2011:365) cite an annual average occurrence of tropical cyclones in the Philippine Areas of Responsibility (PAR) is about twenty. Seven to eight make a landfall (ibid). The Philippine Atmospheric, Geophysical and Astronomical Services Administration, (PAG-ASA) recorded five tropical typhoons, all happening from 1996 to 2006, that made the highest damage to properties in the country (PAG-ASA, n.d). Four of these 5 typhoons affect the Visayas area (ibid). Typhoon Ruping (International name is Mike) crossed central Visayas. Yumul (as cited in Yumul, 2011) identifies heavy rains brought by two wind systems, namely; 1) the northeast monsoon occurring from October to March), and 2) southwest monsoon happening from July to September as driving factors that greatly affect the changing climate in the country**.** The Appendix I, the Natural Hazard Map of the Philippines, show the natural hazards reported (Yumul 2011).

The changing climate situation in the country generates sizeable amount of reports from local and international sources. The (IRIN 2009) for example reports that the country tops in the list of nations worldwide that face frequent and stronger storms as CC impact escalates. In addition, (IPCC 1997) cites that the most apparent CC related impact is SLR. He also notes that low-lying areas like the Philippines together with Indonesia and Malaysia are at risk. Meanwhile, the MO (2010) also underpins that ASLR is one of the strongly felt manifestations of CC effects in the country. Cueto (2007) also take note of this when he reports the observation made by PAG-ASA that the country is slowly shrinking given the rising sea level. The Appendix II shows the indicative map of areas in the country that are vulnerable to SLR (NAMRIA, n.d.). Mapalo's study on the other hand (as cited in van Dam 1999:86) briefly points four major findings from different authors that can serve as basis for predicting the CC scenario for the Cebu[2] region of the Philippines in the coming 100 years.

- *A rise in sea level of 8–30 cm by 2030, and 15–95 cm by 2100 (Houghton et al 1990).*
- *An increase in mean global surface temperature of 0.1–0.5°C by 2010 and 0.4–3.0°C by 2030 (Whetton et al 1994; table 2)*
- *An increase in typhoon intensity by up to 20% that is linked to sea surface temperature, and increase in storm surges.*

[2] It is one of the 4 provinces in central Visayas, which also include Bohol.

2.2 The Philippine Government's Initiatives Towards Climate Change and Sea Level Rise Adaptation

Considering the country's alarming local climate condition as reported by studies on SLR, the Philippines participates in international discussions relating to CC since the country became a Party to the United National Framework Convention on Climate Change (UNFCC). It delivers its commitment to the international convention by submitting the Initial National Communication on Climate Change (INCCC) (CCC 1999). This INCCC was financially supported by the Global Environment Facility (GEF) under the United Nations Development Programme (UNDP) in April 1999 and in accordance with Article 4 of the UNFCC, requiring parties to "communicate to the Conference of Parties (COP) information related to the implementation of commitments, in accordance with Article 12" (ibid). Outcomes of other earlier governmental reports[3] were also used as input to the INCCC (ibid).

Quite interestingly, the Philippines has undertaken measures such as sustainable development, research and development, education, training and awareness raising, and some adaptation measures and capacity building assistance. The CCC 1999 noted that information dissemination on CC started even before the Earth Summit in 1992. At the legislative level, the country approves quite a number of national laws, which unintentionally help the creation of environments conducive for adaptation and mitigation among local communities.

In the case of the fishing sector, which is greatly affected by SLR for example, the Philippine Fisheries Code of 1998 (Republic Act No. 8550) helps build adaptive capacities in relation to the overall condition of the marine and coastal ecosystem. Additionally, there are other laws and regulations relating to the utilization, exploitation, protection, management and rehabilitation of resources along the coasts and marine areas. More concretely, the Philippine Country Study (as cited in CCC 1999) identifies six key adaptive measures for coastal resources to ASLR as follows:

- *Selective protection after thorough cost-benefit studies;*
- *Long-term planning in the perspective of coastal zone management to include proper resources exploitation and usage;*
- *Disaster mitigation and preparedness tie-up with climate change issues;*
- *Passage/implementation of policies and regulations on habitation and construction;*
- *Inclusion of measures to address climate change in the Integrated Coastal Zone Management (ICZM) program and;*
- *Information and education campaign to include government and the general public.*

[3] Reports include the Country Studies Program, the National Action Plan on Climate Change, the Asia Least Cost Greenhouse Gas, Abatement Strategy and sectoral plans and programs, Medium Term Development Plan, and the Philippine Agenda 21.

In similar development, policy measures that ensure the advancement of gender equality in the country are embodied in the following instruments: 1) Philippine Development Plan for Women (PDPW), 1989-1992; 2) Philippine Plan for Gender-Responsive Development (PPGD), 1995-2025 or Executive Order 273; 3) Women in Development and Nation-Building Act of 1992 (Republic Act No. 9729); and 4) Gender and Development (GAD) Budget Policy under the General Appropriations Act of 1995 (Republic Act No 8522). The government employs the strategy on gender mainstreaming to realize the twin objectives of women empowerment and gender equality. Ten other national legislations seek to improve the status of women (e.g., protection against women discrimination, protection against sexual harassment, minimum wage of domestic helpers, maternity benefits establishment of day-care center in every barangay, anti-violence against women, anti-trafficking against women among others). More concretely, (DSWP, n.d.) directs all national, regional to local government levels to do the following:

- *Take appropriate steps to ensure that policies, programs, projects and strategies outlined in the PPGD are fully implemented;*
- *Institutionalize GAD efforts by incorporating gender concerns when agencies formulate;*
- *Assess and update their respective annual plans and their inputs to the medium and long term development plans; and*
- *Include GAD in the annual budget proposals and work and financial plans of agencies and local government units (LGUs).*

The GAD budgeting as mandated by the RA No. 8522 (Section 28) and the Local Budget Memorandum No. 28 of 1997 (PCW, n.d.) institutionalize the gender-responsive budgeting in all government offices and LGUs, appropriating at least 5% of their annual budgets for programs and projects, that respond to gender issues. Briones (n.d) however, cites that implementation posed real challenges. GAD budgeting has become an exercise of complacency (ibid), which may be observed at varying degrees across LGUs in the country.

In a more recent development, the government approves the national Climate Change Act of 2009 (Republic Act No. 9729) and the Philippine Disaster Risk Reduction and Management Act of 2010 (Republic Act No. 10121). Section 2, Rule II of RA 9729 urges the "incorporation of gender-sensitive, pro-children, pro-poor perspective in all climate change and renewable energy efforts, plans, and programs." Meanwhile, Section 3, Rule II of RA No. 10121 ensures that "disaster risk reduction and CC measures are gender-sensitive to indigenous knowledge systems and respectful of human rights." The approval of these laws demonstrates the government's commitment to the international convention on CC. More than emphasizing its commitment to the international arena, these newly-approved national policies intend to enhance the legal environment that address issues relating to the country's vulnerability to CC impacts and improving its adaptation capacities and resilience. It is important to note however that the absence of Local Climate Change Action Plans (LCCAP), which all LGUs have to comply

with a year after the April 2010 approval of the National Framework Strategy on Climate Change (NFSCC), are not yet available during the research period (CCC 2010).

At the local levels, the provincial and municipalities approve their respective ordinances relating to environment, fishery, women and development and CC. The Province of Bohol enacted Environment Code in 1998, which covers among others the fishery, agriculture, forest, minerals, water, air and noise. A recent revision has included CC and DRM. The municipalities of Talibon and Buenavista have Fishery Code of 2005 and CRM Code of 2005, respectively. These municipal ordinances are local expressions of RA No. 8550. Meanwhile, from the various national policies on women and gender, the municipalities approve their respective Gender and Development Code in 2008. The provincial government approved its GAD Code the following year.

The various national policies and local ordinances national government agencies and LGUs put in place in the past years indicate the extent to which policy frames, programs and projects are intended to achieve the long term objective of development. These policies provide the foundations for good development practices that look at the overall development process rather than simply reducing climate vulnerability and resilience. This approach supports what Stern (as cited in Vallejo 2011:8) mentions in his report that "the development itself is crucial for adaptation" and says that "much of adaptation should be an extension of good development practices to reduce vulnerability" (ibid). The earlier part of this chapter notes that the INCCC report integrates important national documents that contain relevant information pertaining to development initiatives government undertook as far back as 1992, which may imply that development efforts by the government are geared towards achieving long term development.

Chapter 3 Sea Level Rise and Adaptation in Bohol, Philippines[4]: A view from two island-barangays and their local governments

This chapter reviews the experiences of fishers within their households and communities in relation to their adaptation and resilience in CC and SLR; and the existing development initiatives undertaken by local governments for the purpose of building the adaptive capacities of local fishing communities. One equally important element the chapter underscores is the hierarchy of knowledge across the fishing households and local governments on CC and SLR and the various adaptation strategies and actions employed by these local actors. The findings from the field show how acquired knowledge, power, and resources of local people including the local governments shape decisions, policies, and actions as regard adaptation and resiliency. To do this, it is important that the environmental, economic, social, and political contexts of the local communities are well understood. The contexts will be discussed first and followed by a description of the local governments' knowledge and adaptation strategies to address CC and SLR in view of the experiences of the fishing communities.

3.1 Description of the Study Area

Bohol, one of the provinces in central Visayas, Region 7 of the Philippines, placed 9th among the 20 provinces with coastal areas and communities vulnerable to 1 meter SLR (Jabines et al 2007). The (PSCCA 2010-2012, n.d.) also notes the same observation three years after. Fifteen of the sixteen regions are vulnerable to 1 meter rise in sea level, with Central Visayas, Region 7 ranking as 7th most vulnerable region (ibid). These observations suggest an increasing trend in terms of SLR vulnerability in the country. In the same year, Fernandez (2010) reports an analysis done by the Climate Change Program of the University of the Philippines (UP) that a 1 meter SLR will affect 11% of the total number of towns in the country, 26% of which is in the province of Bohol5. According to the IPCC (2007), a centimetre rise in sea level erodes at least a meter of beach horizontally, threatening critical ecosystems. SLR is triggered most specially during storm surges and tsunami. Bohol stands susceptible to seven out of ten hazards identified by the READY project, including storm surges and tsunami [National Mapping and Resource Information Authority (NAMRIA, n.d). The Appendix IV, the Tsunami Hazard Map of Bohol, clearly depicts how small islands and the coastal areas

[4] *The Maps of the Philippines and Bohol are contained in Appendix III.*

[5] *One of the 4 provinces in central Visayas and is the location of the study area.*

can be affected by tsunami. The overlay of this map and another NAMRIA map in Appendix II helps visualize the degree of threat local people may encounter when these CC-induced weather anomalies occur.

The province of Bohol has safely moved out from the twenty poorest provinces in the country in 2006. This, however, does not imply that the Boholanos have escaped poverty. Being an island province, a large portion of its population is in the coastal areas. Of the forty-eight municipalities in the province, thirty are along the coast. One third of the thirty municipalities are within the Danajon Bank Double Barrier Reef (DBDBR). The entire ecosystem covers sixteen municipalities and one city in four different provinces in two administrative regions. Pichon describes that Danajon Bank is located at the northern part of the Bohol (as cited in Christie, 2006). The [Fisheries Improved for Sustainable Harvest (FISH) Project] study mentions that the ecosystem has an overall area of 272 km^2 and a total of 699 km coastline including forty islands (ibid). The study also registers approximately 8,854 fishers in 1997, including three other towns adjacent to Talibon (ibid). In the same study, Green notes that 60% of the fishing population earned an income of Php 6,000.00 (US$ 137) a month for a family of 5-6 members, which is below the poverty line in that same year (ibid). Danajon Bank is extremely under pressure due to the illegal fishing methods, sediment accumulation that degraded the reefs, increase terrestrial runoff resulting from mangrove conversion, and high density settlements (ibid).

Ten of the sixteen municipalities and city that constitute Danjon Bank are located in Bohol Province. All of these municipalities have component islands and islets. Approximately, more than 50% of these islands and islets can be found in Bohol. The municipalities of Talibon and Buenavista, two of the ten municipalities in Bohol, have a combined number of nine islands. Talibon, a 1st class[6] municipality, has a total population of 54,145 in 2000 (Talibon Municipal Profile, 2010). It has 25 barangays[7], of which eight are island-barangays, eleven are coastal barangays, and six are terrestrial barangays (ibid). Meanwhile, Buenavista, a 4th class municipality, has a total of 4,924 households and total population of 25,351 in 2009 (Buenavista Municipal Profile, 2010). It has thirty-five barangays, which are located in terrestrial area (24) barangays, an island (2 barangays) and coastal (11 barangays) (ibid).

The study areas[8] are the island-barangays of Cabul-an East, Buenavista and Guindacpan, Talibon. Cabul-an is the only island-community in Buenavista. It is located north of the municipality, nestled in a 15.60 hectare-land. It is part of a protected landscape and seascape area. It is about 11 km from the mainland and can be reached by motorized banca. Administratively, it has two barangays, the Cabul-an East and Cabul-an West. Cabul-an East has seven

[6] Municipalities, cities and provinces in the country are classified according to income levels from 1st class (from Php 55M and more) to 6th. Fourth class is between Php 35M to Php 25M.

[7] A barangay is the smallest local unit of administration in the country.

[8] Information about the 2 barangays is taken from the 2010 Barangay Profiles.

puroks[9]. As of 2009, Cabul-an East has a total population of 1,922 (Buenavista Municipal Profile, 2010) and the biggest among the thirty-five barangays representing 7.6% of the entire municipal population and seconded by Cabul-an West with 6.5%. It has an average of seven members per family. Fishing is the primary source of living on the island. The top five products from the area are fish, shells, seaweed, sea cucumber, and squid. Ninety percent of households have open wells as source of water, which is mainly for domestic use except drinking. Only 10% of the households have rain water collectors. Burying of garbage is the common practice for waste disposal management. This is followed by dumping, burning, and composting. Majority of the houses are made of light materials. Many of the households do not have toilets, use fuel woods and kerosene lamps. Electricity is provided by private individuals operating diesel-powered generators. Power is available only from 6pm to 11pm. Cellular phones are widely used as a means of communications. Elementary and high school education are offered in the barangay. It maintains training and recreational centers, three parks, and three small seaports. Health services are provided by a midwife, a health worker, a nutrition scholar and eleven social workers. The year 2008 registered the biggest number of child and maternal mortality. Leading causes of infant deaths are dehydration and ovary infection, while high blood pressure and dehydration are dominant causes of maternal deaths. There are twenty village police officers who maintain the peace and order situation. Illegal fishing is the primary peace and order problem in the area. A women's organization and a men's organization exist in the area. One credit facility is actively operating. Twenty-six percent of fishing households have benefited from fishery extension service that the municipal government provides. Cabul-an East maintains a marine sanctuary with the assistance from the municipal government. Six of the seven puroks declare that their fishing areas are already depleted. Storm surge is the leading hazard affecting all the residents. Evacuation teams are organized to provide assistance during emergency situations.

The second study area, Barangay Guindacpan, is located north of Talibon town center and is one of the eight island-barangays of the municipality. It is about five km away from the mainland and can be reached by motorized banca. The area is also part of a national protected landscape and seascape. It has 472 households with a total population of 2,390 sparsely distributed in seven puroks. A household has an average of five members. Fishing and seaweed culture are the main sources of income. Fishers sell catch to the mainland and Cebu City, the nearest commercial city from Talibon by sea. Twenty percent of the households grow coconut trees. Majority of the households use kerosene lamps while others use electricity from six to eleven in the evening. It has an elementary school with a teaching size of 12 teachers. About half of the population attended elementary. Health services are provided

[9] Small villages

by a midwife, a nutrition scholar, two social workers and eight health workers. In the last three years, the leading causes of infant and maternal mortalities are pneumonia and eclampsia, respectively. Peace and order situation is maintained by eighteen village police officers. Fire brigades and evacuation teams are organized to provide support in cases of disasters and emergencies. A boat ambulance is available for use during emergency. The small island has four small docking areas. There are two women organizations existing in the area. The entire island is vulnerable to typhoon hazard.

3.2 A panorama of local fishers' perceptions

Local fishers in the two island-communities shared their real-life encounters with CC impacts over the past years. Among the glaring impacts cited relate with SLR, which is "one of the more recent outcomes of global warming" (Cazenave and Nerem, 2004; Church et al., 2001, 2004a; Holgate and Woodworth, 2004; Thomas et al., 2004; Church and White, 2006; Solomon et al., 2007 as cited in Gilman 2008). This study solicits different perceptions, beliefs, and knowledge from local people, particularly fishers and representatives of the local governments. By analyzing these experiences, the research investigates how perceptions, beliefs, and understanding about CC and SLR influence people's adaptation strategies and resiliency approaches. The research likewise attempts to understand how levels of knowledge, perceptions, beliefs, and norms of each social actor hold impact on social relations and resource allocation and use. Below are accounts of these experiences.

3.2.1 Perceived understanding, extent and realities about SLR

Local fishers and the barangay officials encounter SLR and develop an understanding about it. As narrated during the field work in the two island-barangays, local folks witnessed simultaneous occurrence of SLR during a strong typhoon in the middle of 1980's. Ms. Cerelina A. Gequillo, one of the woman-participants from Cabul-an East, recalls what happened when Typhoon Nitang (the international name is Ike), struck in 1984. This was very memorable to her because she got married on that year. It ruined a number of houses along the coasts. Typhoon Nitang is declared as one of the five tropical cyclones in the Philippines with the greatest number of casualties (PAG-ASA n.d). This event left sad memories in people. This major catastrophe introduced people the experience of simultaneous occurrence of storm surge and SLR. The high tides that people normally encountered many years back have accelerated dramatically that sea water now submerged almost the entire island. People think the size of the islands has reduced, resulting to narrower beaches. Local folks, mostly the elders, have vivid memories of the houses located along the shorelines. Inundation as described by Huppert (2009:286) is one of the five primary manifestations of CC. Mote (as cited in Huppert, 2009) mentions that high tides flood the lowest lying areas during SLR. The testimonies of local people suggest that tides slowly and regularly increase in level over the years. They realize that the local calendar, which often serves as tool to monitor the tides on daily basis, loses its purpose as tide levels now

change unpredictably. The increase in tide levels and frequency of occurrence has become alarming and people associate these with SLR, which they encounter many times within a year in the last five years. Based on testimonies of local fishers, SLR manifests in a very apparent manner. People observe significant differences in the height of tides indicating the landmarks located in the inner parts of the islands reach by sea water. In normal conditions, water reaches as high as the knee level in spots as far as 50-60 meters away from the shoreline. In worse instances, when storm surges accompany SLR, water reaches waist-level and on spots 100-120 meters from the shoreline, flooding the innermost part of the islands. The MO (2010:11) describes how people have come to take these things for granted as they have learned to cope with these impacts of the escalating frequency and intensity of typhoons occurring in the county, in general, and in the local areas, in particular, over the years. Moreover, fishers are generally unmindful about the rising sea levels for the following reasons. First, they have established a level of tolerance in confronting the impacts for a certain period now. Men, women, and widows have varying perceptions of tolerance to SLR. Tolerance level among fishers ranges from knee-high to waist-levels. Second, people could not simply attribute the impacts of SLR to their current state of economic and environmental situation because they have been living in poverty for a long time and they treat extreme high tide as "business as usual." Third, folks know that the islands are located outside of the typhoon belt areas. Knowing that SLR only aggravates only when typhoons and storm surges simultaneously occur gives them some kind of relief.

3.2.2 Perceived factors contributing to CC and SLR

Fishers are often quick in claiming they have contributed to the destruction of the fishery resources through illegal fishing. However, they could not determine whether illegal fishing causes CC/SLR. Illegal fishing ranks in the list of causes of fishery resource destruction (Christie, 2006).

My field work noted a firsthand encounter with a fisher actually requesting permission to commit an illegal fishing activity. As described in Chapter 1, the experience suggests that fishers negotiate for the use of resources to meet their needs. They understand fully that violations can lead to penalties, fees, and charges as specified in the municipal fishery ordinance. They have the notion that seeking permission from local law enforcers may spare them from the penalties. A firm decision has to be made to avoid setting a precedent that other fishers may follow. Fishers are keeping a close watch at this local law enforcer as his absence in the island normally equates with unabated illegal fishing. Below is a narration of an incident that happened while he was away.

> *Si Bernardo Calinawan, lalaki og nag edad og singkwentay-singko anyos, miingon na "ako raman ang bantayan nila Day! Katong didto ko sa Manila, nakadawat ko og text messages sa akong mga anak na sigi og boto. Sakit akong dughan maka dungog na dunay boto. Tungod kay dili ko mo sugot nga adunay illegal fishing sa isla, ang akong relasyon sa akong mga taga-isla na apektohan."*

> Bernado Calaniwan, male, aged 55, narrates that "they keep a close watch on me Maam! When I left for Manila, I received text messages from my children about the on-going dynamite fishing. It hurts me to know that illegal fishing activities are undertaken. Because I don't allow any illegal fishing activity in the area, my relationship with my co-fishers is affected."

Another reason cited by the fishers that contribute to the destruction of fishery resources and their coastal areas include extraction of sand, gravel, and stone along shorelines. Sand and gravel are used to construct houses and a number of barangay infrastructure projects, like the barangay halls, health centers, basketball courts, chapel, and sanitary toilets. Women also supported this observation emphasizing how sand and gravel extraction contributes to chronic inundation of the island. They cited that rampant use of these materials for housing construction by the local people is a major factor in the over extraction of these resources. As proof to this, almost all of the households in the two islands that have concrete and semi-concrete infrastructures use sand and gravel to construct concrete and semi-concrete houses, not to mention the construction of barangay halls, health centers, chapels, basketball courts, thin-layered cemented roads, wharf (Barangay Profile 2010). Illegal quarrying of stones from the shores, which are used to build rip-raps, is also highlighted as one of the factors that contribute to the destruction of the bio-physical condition and fishery resources of the island. Easy access, free use of these resources, and non-enforcement of the ordinance lead to rampant extraction of these resources.

3.2.3 Perceived understanding of a Higher Being

Widows strongly perceive SLR as an act of God because of the destruction inflicted by people to the environment. They were referring to the human activities that are harmful to the environment. Their perception is based on the understanding that very few calamities happened during their younger years. Presently, children suffer the most due to the disasters. The elderly fishers, ages 55 to 56, also recall that in the 1960's sea water did not get into the inner part of the islands. This observation is supported by Mapalo's study (as cited in van Dam 1999:77) noting that about three decades back, global warming issues were discussed only by very few people. Starting in 1990's the issues have become part of local realities to ordinary Filipino as they are often associated with disastrous phenomenon (ibid).

3.2.4 Perceived economic impacts and consequences brought by SLR

The advent of CC/SLR makes life in these island-barangays harder because fishing communities have already been suffering from dwindling incomes due to overfishing and use of destructive fishing methods among others. Fishers perceive that illegal fishing in the area pushed them to poverty and occurrence

of CC/SLR has further aggravated the situation. They observed that corals and seaweeds are destroyed and the sea is littered with garbage. Mapalo's study (as cited in van Dam 1999) mentions that loss of biodiversity and destruction of fish habitats are among the impacts of typhoons and storm surges.

Fishing households are heavily dependent on daily fish catch, both as source of income and food. Fishing is difficult during SLR as the sea becomes so deep and current too unwieldy. This brings in zero or low fish catch, leading to no or too little income and food at the table. In Guindacpan, seaweeds (eucheuma) is harvested and sold prematurely to compensate for the very low income from fishing. Meanwhile, the mobility of women who engage in small-scale non-fish trading activities is also affected. The absence of income during SLR amplified the burden of securing daily payments of existing loans. Some married and widowed-women observe that money borrowing further compounds their economic situation as income is very limited during SLR. Others still believe that there are opportunities to borrow money from local money lenders.

> *Si Lola Lucena Cabalena, ochentay-dos anyos, balo sa sulod sa beyenta ka tuig, mi ambit og estorya sa ilang kahimtang sa panahon sa pagtaas sa dagat. "usahay adunay bugas, usahay memorya."*
>
> Grandmother Lucena Cabalena, 83 years and widow for 25 years, describes their situation when sea water gets high. "Sometime rice, sometime memorize." This means that they may have rice or they simply go to sleep with empty stomach.

SLR exerts more economic pressure on local people. Local folks observe several infrastructure-related damages. The consequences require more financial resources to be able to restore the properties. These include among others the destruction of houses immediately located along the coasts, damage to fishing paraphernalia and other alternative source of income such as hogs, and shattered household fixtures and furniture. Expenses like repair of houses and relocation and re-construction of homestead in safer grounds require bigger sum of money. The construction and maintenance of rip-rap and establishment of fences like used-fish nets and bamboos and repair of household furniture and fixtures other costs associated with SLR. Mending the fishing boats and paraphernalia demand financial resources especially on men, who use the fishing equipment on a day-to-day basis. Inaction would mean further loss of income and food for the family. Vegetables grown at households and community levels perish. The vegetables serve as alternative source of food for many fishing households. Few other married and widowed women also share that they lost their livestock. These are few of the alternative income sources that are affected by SLR. Lost income and rising cost of repairs are directly associated with SLR. Mrs. Cecilia Otara, widow with eight children, shares her resentment of a damaged sewing machine. She has to spend for the repair of the sewing machine to be able to use it again.

At the household level, husbands are considered major income earners. They make final say on decisions that entail cost such as house repairs, purchase of household furniture and fixtures and rip-rap. A household's financial capacity determines its ability to put in place measures that can minimize impacts of SLR, such as construction rip-rap.

3.2.5 Perceived health, social and psychological impacts

SLR brings stress anxieties to women because they have to ensure that their household belongings are kept in safer grounds, while closely watching children as they enjoy swimming the flooded backyards. A night time SLR aggravates anxieties to many because electricity is only until 11 in the evening. Women have different preferences as to the occurrence of SLR. Some would prefer a diurnal occurrence while others prefer at night. The widows, especially the elderly, prefer a daytime SLR. A real concern about security and safety is greater among elderly women due to their inability and incapacity to swim. Furthermore, the elderly women who did not grow-up in the islands strongly feel about this concern. They perceive that a night time SLR increases their vulnerability.

Husbands normally go fishing after SLR. Women are left at home to clean the house aside from keeping up with the laundry that has been postponed. All these cause physical fatigue in women.

> *"Si Rowena Torreon, menyo, nag edad og kwarenta, ni-ambit of sulti na sobra ang kakapoy nga mahiaguman sa SLR, para nako maayo og mahitabo kini sa gabii kay ang kagabhion gihimo para mopahulay. Inig ka buntag lain napud na trabaho."*
>
> "Mrs. Rowena Torreon, married and 40 years old, narrates that SLR brings so much physical stress. I would prefer to have it at night because night time is intended for rest. The following morning will be spent for another work."
>
> "*Sa lain na bahin, si Jelma Panares, menyo, nag edad og baynte anyos, mingon na mas gusto nya na mahitabo sa buntag ang mag saka sa tubig kay ma-apektuhan ang akong magkatulog sa sigi pag huna-huna sa pwde na mahitabo sa panahon na molakaw akong bana para mangisda."*
>
> On the other hand, Mrs. Jelma Panares, married and 26 years old, says "I would prefer a day time SLR occurrence because my sleep will be affected thinking about all possible threats, most especially when my husband is out fishing."

The loss on income and shortage in food also bring anxieties, which in many occasions become a source of conflict between husbands and wives. There is a lot of pressure thinking about the daily economic requirements of the family for food, education, water, electricity, and increasing payables to money lenders due to loss of income.

The respondents share cases of death involving children due to drowning. One incident caused relational problems among relatives as the child was left under the care of an aunt while parents were in the hospital. The situation practically brings the family to deeper economic problem.

Sanitation is one of the greatest concerns in the island communities in general and to women in particular. The problem is aggravated during and after SLR. The absence of toilets by majority of the households in both communities is a major contributory factor. Children get a dose of water-borne diseases such as diarrhea. The barangays report cases of skin diseases and diarrhea in the last 2 years. This however could not be directly attributed to SLR as water-borne disease is a common ailment in the areas.

The perceptions, knowledge, beliefs, and understanding by local fishers about CC and SLR are at varying levels and are developed based on their experiences. Their description of SLR is grounded by their actual experience. These "experienced-based" encounters with SLR permeate aspects of physical, social, psychological, emotional, economic, political, and faith. Concretely, men, women, households have different perceptions about vulnerabilities and risks to SLR. The interplay of varying perceptions, belief, and knowledge about CC and SLR influence how local people decide and act on matters that best suit their adaptive capacities, resources, and circumstances.

3.3 Perceptions from among Local Government Officials

3.3.1 Perceived understanding, extent and realities about SLR

The municipal governments recognize the lack of better understanding about SLR. They attribute this limitation to lack of access to information, which government officials can also use as basis for decision making. The unreported cases of local incidents associated with SLR are perceived by the government units as proof of people's adjustment to the situation. Furthermore, absence of information on the impacts of SLR is also perceived by the LGUs as a matter of "business as usual". All these create an overall perception that SLR is a non-issue drawing lesser interest from the LGUs, where SLR is viewed as an inherent "naturalness" of the sea fishing communities in general face. The level of interest shown by the LGUs creates an impression that SLR impacts are insignificant, un-alarming and needing no immediate action.

The provincial government on the other hand perceives that CC and SLR are not understood well by the local fishing communities and some government personnel. A good number of KIs from the provincial government realize that they gained understanding about CC just very recently. Majority of the KI are more familiar with drought, which relate well with farmers. They also recognize that they lack understanding about CC scenario for the fishery sector. The assumption that the province is located outside the typhoon belt area dismisses SLR to a much lower degree of importance. Coupled with the limited understanding about SLR and the lack of scientific facts that prove its occurrence reduces SLR as a matter of lesser priority, thus

limiting the motivations for dialogue. Consequently, the absence of scientific data on CC and SLR and venues for dialogues encourage many of the KIs from the municipal and provincial governments to develop better understanding about vulnerability of fishing communities, gender-based adaptation capacities, and existing governance practices.

LGU perceptions and knowledge about CC and SLR are informed by different sources. Their perceptions and knowledge are drawn from feedback and stories from people who have first hand encounters with SLR. Their knowledge is also formed through their interaction with experts.

3.4 Local adaptation and resilience: Between local knowledge of the sea, faith, non-recognition of SLR and top-down legislation

Different perceptions and knowledge fishing communities and government officials have as described above influence decisions and actions in relation to their daily coping strategies. They form part of the basic considerations in the decision making processes in addition to resources. Fishers and government units show how these considerations help define the adaptation strategies each one pursues. A first-hand account of these adaptation strategies are described below.

3.4.1 CC and SRL strategies employed by the fishing communities

3.4.1.1 Economic strategies for adaptation and resilience

Fishers' actions include among others 1) installation of rip-rap and used-fishnets as barriers; 2) raising or re-constructing homestead to safer grounds; 3) safety and repair of fishing paraphernalia; 4) securing household furniture and fixtures in higher grounds; and 5) sustaining livelihood activities.

Households with extra financial resources are more able to establish rip-raps than households with bare resources. Households without rip-raps are affected more by SLR as water directly goes into their houses with all sorts of garbage and debris. Cleaning the house after SLR would literally cost some amount of money. But because wives, whose reproductive work is undervalued, are doing the household maintenance and there is no cash outlay involved for the effort and time spent in cleaning the house. Other women secure their homestead from the sanitation problem by enclosing it with used-nets. Raising floor areas of houses entail bigger financial resources compared to installation of rip-raps and used-nets. Re-building houses in safer grounds even require much financial resources.

Men automatically secure fishing boats and nets sensing when SLR is coming. They normally refer to the calendar that shows daily tidal patterns, to plan their fishing activities. The use of local calendar is traditionally the cheapest and most dependable means available to most fishers. It helps them determine high tide in the past years. They are well aware that high tides last

four to five hours within a day and three to four days a month for eight months in a year. Both men and women observe that the calendar is no longer fully dependable in determining high tides since its accuracy has seemingly been affected by the unpredictability of the country's weather condition. The radio and the television are also primary sources of latest information on current weather conditions and forecasts. However, there is some limitation to this as most islands only have electricity at night time. The mobile phone has emerged as another popular communication tool for many fishing households.

In Barangay Guindacpan some households engage in seaweed farming as an alternative livelihood. It has become the most dependable source of income especially during SLR. Some women provide labour for crab processing and seaweed maintenance activities, such as tying, cleaning, cutting, and harvesting. Women in Cabul-an East are also engaged in post-fishing activities, like fish processing and vending and seashell gathering. A number of young married women in both barangays, who normally take the initiative of accessing money from local money-lenders, consider money borrowing as a coping strategy. The "forced-savings" scheme attached to borrowing money from financial intermediaries is a factor that motivates these women to continue borrowing. Other women, mostly the widows and elderly, choose not to be tied up to indebtedness perceiving that money-lenders make more money from them. Some widows seek financial assistance from children working in nearby cities. Meanwhile, men provide labour to medium-scale seaweed growers.

3.4.1.2 Social, health, and psychological strategies for adaptation

Both men and women work hand-in-hand to secure their house belongings, fishing gears and livestock to safer grounds and bring them back after SLR. The availability of rip-rap reduces a family's worries about the immediate impacts of SLR on the household. Families check the calendar to know the tide levels and at the same time monitor news from radios and televisions during typhoons. They secure their properties by storing them in houses of relatives and friends before projected SLR and reported arrivals of typhoons.

Women establish and maintain vegetable gardens on vacant lots or pots. It is interesting to note that women consider vegetable growing as an alternative source of food especially during SLR. Their male counterparts did not think about this. Women also participate in communal vegetable gardening, mangrove planting, and clean and green activities. Except for the clean and green activity, women serve as representatives of their husbands, who are often recognized as principal beneficiaries of a national government's social welfare projects. Their representation enables them to receive rice subsidy, school, and medicine allowance. Women's participation to community activities such as the communal vegetable gardening and mangrove planting is a means to continue receiving the benefits of a project than being an avenue for participation in community decision-making processes. Meanwhile, the bereavement benefit attached to borrowing money from financial intermediaries is another motivation for women to continue availing of loans

3.4.1.3 Environmental strategies for adaptation and mitigation

Fishers recognize that uncontrolled extraction of sand, gravel and stones from the shores and seas contributed to the destruction of the marine and coastal resources. However, they feel that the most immediate and prudent step to avoid impacts of the SLR is through the construction of rip-rap, which ironically requires illegal extraction of coral stones. An existing policy stipulation disallowing the extraction of sand, gravel and stones did not deter local folks in the two-islands to extract these resources for their use. Easy access, free use of these resources and weak implementation of the ordinance cause the rampant illegal extraction.

Fishers' groups felt their participation in barangay coastal law enforcement (CLE) and marine protection and management could help improve their overall poverty situation and adaptation albeit minimal. They work with local peace and order officers in the barangays who are also mobilized for the CLE. Both the fisher-groups and the peace and order officers turned local coastal law enforcers are ill-equipped to apprehend illegal fishers, who include local fishers. The limited resources available at the barangay for CLE push fisher-groups to negotiate with the municipal governments. Efforts are often unsuccessful due to lack of coordination on the strategies and vested political interests.

Local communities are actively involved in the clean and green activities. They dispose of their garbage under the sand, both as garbage disposal management and CC and SLR adaptation strategy.

3.4.1.4 Spiritual strategies for adaptation

Widows strongly articulate their faith in God and in times of helplessness, including as SLR occurrences, the Lord has kept them safe and unharmed. Majority of the participants say that prayers have always been the more trusted weapon in many of their difficulties.

3.4.1.5 Community participation and political strategies for adaptation

The women-respondents of this research, who are members of women associations, candidly share that politics was instrumental in the groups' formation and organizational development. Their creation was made possible through the support of elected barangay and municipal officials. Through the support of the Barangay Cabul-an East LGU, the women's group gained better opportunities for education and livelihood assistance. The livelihood fund is still revolving and is benefiting the members through loans. A portion of the earnings from the livelihood fund is also used to provide bereavement assistance to its members and finance activities like Christmas and women's day celebration. The women groups in Barangay Guindacpan are generally dependent from the municipal federation of women's association, which is supported by the Talibon municipal government. The members of the federation are often mobilized during election and activities like the women's

month celebration. The municipal LGU has extended small livelihood assistance to members of the federation. Because the livelihoods are generally unsuccessful, the funding support is temporarily stalled. The rest of the women in the communities who are non-members of these groups do not have equal access to the benefits enjoyed by group members. This situation reveals how social locations of individuals or groups give better access to local resources. This is what Resurreccion (2008) refers about a statement of Brunt and Villareal on legitimacy which facilitates groups' access to resources including participation in government-initiated projects.

Each barangay has an existing fisher group. Both are male-membership type of organization. Their main coastal resource management activities are CLE and marine protection and management. These groups recognize the importance of their contribution towards local and effective law enforcement and marine protection management. They also understand how they could benefit from protecting their marine and fishery resources. Fishers can benefit from having rich and productive marine resources, which they used to enjoy in the past. These expected benefits motivate the groups to work with the LGUs particularly in law enforcement.

In Cabul-an East, wives of fishers support CRM activities by performing reproductive functions. Women's participation is limited to reproductive support (e.g., preparing food during meetings, doing secretarial work) and responsibilities are indirectly contributing to the protection and management of marine resources. They perceive that their involvement in fishing through fish processing and vending, seashell gathering, and crab processing are important. They consider themselves as part of the fishing sector. The situation in Guindacpan is different. While women in the area also undertake similar post-fishing activities they do not perceive the importance of their role in fishery sector. This may be the reason why they are not in any manner involved in the protection and management of the marine and fishery resources. JICA (2002:14) report confirms this observation where women are more involve in post-harvest activities.

3.4.2 Strategies for adaptation and resilience employed by government units on CC and SLR

At the level of the LGUs, strategies and programs for CC adaptation and mitigation entail a wide range of policy development processes and program and project implementation. National laws and local ordinances are carefully formulated and implemented across the country. Previous laws and ordinances that establish good practices for adaptation and resiliency are opportunities for building scales so that other communities may also benefit.

3.4.2.1 CRM as strategies for adaptation and resilience

The barangay LGUs extend assistance in the protection and management of marine sanctuaries, by primarily covering expenses related to CLE.

Both municipalities have CRM ordinances, which are local translations of RA No. 8550. This is a major policy instrument that addresses the twin

objectives of reducing poverty of small and marginal fishers and managing and protecting the marine and fishery resources. In the implementation of the ordinance, LGUs generate income through taxation, registration, and penalties. The income allows LGUs to finance three major CRM activities such as 1) strengthening the marine protected area (MPA); 2) intensifying CLE activities; and 3) enforcing critical policy stipulations in the CRM ordinance like 3.1) closing and opening of fishing seasons (for rabbit fish, anchovy, and sea hare); 3.2) fishing and fishing equipment licensing and regulation; and 3.3) regulating operation of seaweed, mud crab, fish cage, and oysters. Both LGUs invest in 1) hiring coastal law enforcers, 2) maintaining motorized boats; and 3) coordinating with adjacent municipalities for CLE purposes among others. Both LGUs take greater responsibilities for strengthening the MPA and the CLE.

There are stipulations in the CRM ordinance of the municipalities that can serve as mechanisms for sustaining local strategic adaptation pathways. Concretely, these are Barangay Fishery and Aquatic Resource Management Council (BFRAMC) and its municipal counterpart, the MFARMC. These are potential avenues for men and women fishers to participate in CRM decision making processes. The limited awareness by fishers on these policy stipulations may be a factor why fishers' groups are unable to take advantage of these mechanisms, while municipal governments are focused in doing the three major CRM activities.

The provincial government, on the other hand, is helping the municipal LGUs strengthen the MPAs and the CLE through the Coastal Law Enforcement Council (CLEC), a district level and multi-sectoral coordinating body responsible for the effective coastal law enforcement in the three legislative districts in the province.

3.4.2.2 GAD mainstreaming strategies for adaptation

The GAD ordinances of the provincial and municipal LGUs are local translations of various national laws that promote women empowerment and GAD. In general, these laws promote women's participation, health, rights and education, gender integration, violence against women and children (VAWC), anti-trafficking, and protection from sexual harassment among others. Salient features of these laws include the 1) creation of GAD committees at various government levels and offices and 2) development of the annual GAD plan and budget in all government offices and LGUs.

GAD committees exist at the provincial, municipal, and barangay levels. Gender plans are generally pre-identified following certain mandates from the highest to the lowest levels of government (from the provincial to the municipal and barangay levels). In the case of the barangay government units, the same gender plans are identified, budgeted, and implemented at least for the last two years, as revealed in the records reviewed during the fieldwork. These plans are mostly dedicated to activities that expand the reproductive role (e.g., clean and green activities, beautification projects) of women in the communities may be due for the lack of gender analysis. Barangay assemblies, which normally happen at least twice a year, serve as avenues for women to

discuss issues and concerns affecting them. The limited frequency of assemblies may constrain women from doing active lobby for the support of the seawall project. The fieldwork also revealed that majority of the women in these barangays, including the members of women-groups, are not familiar with the provisions of the GAD ordinance, including the GAD planning and budgeting. This limitation becomes a concern for women to ensure their participation in addressing gender issues, including their mounting vulnerabilities to SLR.

3.4.2.3 Disaster Risk Management (DRM) strategies for adaptation

The LGUs are implementing RA 10121. As provided by law, 7% of the annual budget of LGUs shall be allocated for disaster interventions in four key areas, namely: 1) preparedness, 2) mitigation, 3) rehabilitation, and 4) response. Lately, the LGUs are focusing on the formation of disaster-risk management coordinating council (DRMCC) and committees, 1) identification of membership in committees, 2) procurement of disaster preparedness equipment, and 3) trainings on disaster preparedness among barangay elected officials and staff and school children. A weather monitoring device is donated to Talibon and is being used to monitor the weather condition in the area. The DRM plan and budget formulation also follow the directives from the higher government offices with limited efforts of integrating gender concerns. The budget allocation of 7% becomes a handy tool for DRM plan and budget formulation by all government units. People's lack of understanding of the law may be a hindrance to their participation in the formulation of DRM plans. Such limitation increases people's vulnerability, especially the poor, women, and elderly who obviously have lesser access to public spaces where dialogues and education opportunities are provided.

3.4.2.4 Mitigation strategies employed

Mangrove planting has long been undertaken by Barangay Guindacpan and the municipality of Talibon as part of the government's environmental protection and management thrust. It is also being required by a national government agency project, which Talibon and Buenavista LGUs are coordinating. The Cabul-an East faces technical problems as regards mangrove planting. The physical environment of the island is not fit for mangrove. This limits the community to undertake mangrove plating as their previous initiatives were all unsuccessful.

Other efforts that the two municipal LGUs start to employ include provision of settlement areas into the land use plans. The land use plans are re-developed every 10 years. In addition, the municipal government of Talibon is completing its water zoning ordinance.

Local governments serve as facilities in the implementation of both national policies and local ordinances and programs and projects. Taking off from this perspective, their decisions and actions are generally within the bounds of these legal instruments and project agreements. The current activities in the field show how local governments implement the national laws,

local ordinances, programs and projects, which are all intended to attain sustainable development. The processes involved, however, indicate that implementation of the laws, ordinances, programs, and projects are full of challenges. One of the possible gaps revealed in the field work is in the implementation of strategic provisions in the local ordinances. The lack of understanding by local people on these strategic provisions may compound the problem of addressing the gaps in implementation. People's better understanding and knowledge about these strategic provisions (e.g., mechanisms for better participation in fishery management, GAD and DRM planning and budgeting) may enable them to participate in the identification and sustainability of development strategies, which may also at the same time address the much needed local adaptation strategies.

On the other side, fishers still remain vulnerable to the impacts of CC and SLR despite the various safety measures locally initiated and the interventions provided by the LGUs through the various programs and projects. The divergent perceptions and range of understanding by local fishers on CC and SLR show variations of coping and adaptation strategies and revealing some degree of independence from the technical inputs provided at least by the barangay, the government unit closest to the people. They relied on their local knowledge, resources, and capabilities to make decisions and actions and withstand demands and challenges of CC and SLR.

Chapter 4 Understanding SLR Adaptation and Resiliency as Interplay between Knowledge, Power, and Resources

"There is no purely technical solution to climate change . . . for public policy to be grounded in the hard-won results of climate science, we must now turn our attention to the dynamics of social and political change."

John Sterman
(Sterman, Science 2008, 322:532–533)

This chapter seeks to understand how knowledge, power, resources and their relations influence decisions and actions of women, men, fishing households, fishing communities, and government units as regards adaptation and resilience against impacts to CC and SLR. To aid this cognitive process, it is important to discuss some key concepts that serve as a backdrop in analyzing the various experiences of fishers, households, communities, and the government units.

4.1 Agency

Agency as Kabeer (1999:3-4) points is the "ability to define one's goals and act towards it." Pettenger (2007:6) similarly highlights that as agency makes choices within a structure, interactions between agent and structure are re-created. In addition, Agarwal (as cited in Kabeer 1999:438) indicates that besides actions made by an agency also encompasses in these actions are the meanings, motivations and purposes of these actions. An agency can either take a positive or a negative form (Kabeer, 1999:3-4). An affirmative form is when an agency is able to define and pursue goals despite oppositions while an overturn of one's goals and actions caused by violence, threat or coercion leads to a disaffirming form (ibid).

Agency is therefore a crucial concept that will provide an analytical lens in understanding the actions taken by the fishers, the fishing communities, the LGUs as presented by the local government officials, staff, and policy makers.

4.2 Resources

Kabeer (1999:3) defines resources to encompass material, human, and social resources that enable a person to make choices, which can be acquired through various social relationships to include among others family, community, market, and state. Moreover, she points out that apart from the actual allocation of resources that these social relations can provide, acquiring resources will also take the form of future claims and expectations, where rules and norms allow certain actors in an institutional context to distribute, allocate and exchange resources (ibid).

This concept will likewise help in looking at how social structures make choices for adaptation given the resources at their disposal.

4.3 Power

Foucault (as cited in Felluga 2011) points out that "power exists only when it is put to action." Foucault further states that "power entails a set of actions performed upon another person's actions and reactions" (ibid). Meanwhile, Buchy (2008) mentions how Townsend described power being multi-faceted. Tanner et al (2011) also point out that "power can be seen both as relational and structural," where the latter refers to authority. In addition to this O'Reily (2008) cites that Cooke and Kothari consider participation as a form of power.

The concept on power is applied as one of handles in analyzing the various experiences and the relations exercised by social actors both at the micro and macro-levels of the social body in order to create individual or societal strategies for adaptation and resiliency against CC and SLR.

4.4 Knowledge

Routledge (Audi 2011, 2003, 1998) highlights that the sources of knowledge, which include among others perceptions, belief, memory, consciousness, and testimony and that justification is an important knowledge acquisition process. Foucault (as cited in Peci et al 2009) puts it

> *"Knowledge is simply the outcome of the interplay, the encounter, the junction, the struggle, and the compromise between the instincts. Something it's produced because the instincts meet, fight one another, and at the end of their battles finally reach a compromise. That something is knowledge."*

Another vital aspect for understanding this research study is to see how knowledge relates with power, which Foucault aptly recognizes "that knowledge and power are integrated with one another"(ibid).

The concepts of agency, knowledge, power, and resources will be analyzed as integral components of social structures where individuals, households, communities such as local organizations and government units meet, negotiate, decide, and act in shaping their personal and collective experiences towards building improved strategies for adaptation and resiliency. It is important to look at the manner by which knowledge, power, and resources are developed, negotiated, implemented, and re-constructed by the households, fishing communities, and the LGUs at different scales. The variations in knowledge, power, and resources applied in adaptation and resiliency will be analyzed from the perspective of the new sociology of knowledge.

4.5 Shared Knowledge, Power and Collective (In)/Action on Sea Level Rise Among Fishing Communities and Government Units

The differing perceptions, beliefs, consciousness and experiences of fishers, fishing communities as well as government units regarding the impacts of CC/SLR bring us to understand how relationships and decision making processes take place in each social unit while learning to develop a personal, collective or organizational adaptation and resiliency strategies. Taking off from the accounts shared by the majority of the participants, the perceptions and beliefs that form part of the knowledge about CC and SLR, held either individually or collectively, is derived from their exposures and primary encounter with CC and SLR and information from external sources through trainings and conferences. From these hosts of perceptions and beliefs, men, women, households, and their communities employ variations of social, political, economic, and spiritual capabilities that help them decide which strategies hold close to their circumstances.

O'Reilly (2008) mentions Guijt and Shah showing that gender, economic, social, and political lines divide the communities. This division enables some groups to gain more power, over the weaker groups particularly the poor and women, including the use of resources (ibid). This is shown at the levels of social structures and development interventions undertaken by the LGUs. First, we see how LGUs exercise power especially in terms of allocation and utilization of resources in the areas of environmental protection and management, gender development, DRM, and mitigation. Perhaps the top-down process of policy implementation particularly in the allocation and utilization of resources (e.g., GAD and DRM planning and budgeting) is a factor that triggers this situation. Another case in point is the municipal LGUs' active involvement in CLE, which may hinder the space for participation among fisher-groups. The interplay of power between and among hierarchy of authorities in organizations such as the government units, as shown in these examples, generally indicates how power is scaled down across a social organization. This explains the embeddedness of power in a broader organizational and societal context" a described by Haunschild et al (2009).

Other organizations like community-based fisher and women groups also experience the same situation. The women, who provide support activities (such as preparing food during meeting, secretarial work and others) in the overall management of the protected areas are excluded from decision making and equal access to the economic benefits in managing the coastal resources, and meaningful participation in gender development and disaster preparedness. These situations demonstrate how women are being disadvantaged in an intra-community context. Moreover, the vitality and sustainability of the women groups that depended on the support of the LGUs point out how authority may influence the development of adaptation capacities of the poor and women. These situations depict what O'Reilly (2008) states that "power relations are skewed against the poor and women."

As local folks especially the poor and women sectors have to respond to the impacts of CC and SLR, the concern for short-term responses to address short-term needs (e.g., cash, daily food supply, and protection through the use of sand, gravel, and stones) are coping strategies against imminent dangers brought by SLR. Apparently, these strategies are undertaken based on people's local knowledge, social, political, and resource capacities. The limitations or the profuse interplay of these capacities however may influence how social actors develop both short-term or long-term adaptation strategies and resiliency. The data and stories gathered from the field show how people translate their knowledge and values to express their preferences and interests. For example, the lack of knowledge and levels of understanding of impacts of CC and SLR that fishing communities face impedes the LGUs to develop adaptation strategies beyond their current programs and projects. Meanwhile, the lack of understanding by women on their role in the fishery sector in particular and local development in general incapacitates the individual and collective agencies of women to identify spaces for participation and negotiation, which may enable them to indirectly reduce their vulnerability in SLR. The fishers groups on the other hand identify the lack of logistical resources among other things as limiting factor in their active participation in CLE. The LGUs on the other hand perceive that government's strong involvement in CLE may help fishers create an environment for improved adaptive capacities as illegal fishing may be stopped or minimized.

In another development, the LGUs continue to undertake strategies and interventions that relate to CRM, DRM, and gender with minimal consciousness that all these links to and integrates with CC and SLR as adaptation strategies and practices. The continuing initiatives on CRM, GAD, and DRM may be perceived as the government units' way of looking at adaptation as a manner of providing broader benefits, beyond coping up with the demands of CC and SLR, being an integral part of the overall development process (Apuuli as cited in Adger et al 2008). This however, leads us to more explicit reasons such as the existence of knowledge gaps, coordination and operations problem, and limited technical capacities and financial resources, which the various experiences of the social actors have revealed during the field work.

The same observations were made by Berkhout (as cited in Adger et al 2008) who says that at the level of organizations the "lack of knowledge of CC and SLR impacts and their identifications; and difficulty in assessing and implementing adaptation options" are factors that limits adaptation. Moreover, like any other organizations, as covered in the research study that includes the government, are trapped in the problems of coordination and operations, which are products of categorizations (Baron 1986, Lansberg 1989 as cited in Swidler 1994:319). In concrete terms, the need for scientific information tops in the list among management and legislative officers at the provincial and municipal governments. This is a pull factor that drives governments to decide, act or otherwise delay or refrain from making decisions or actions at all. This need from among the government decision makers fits well with the old sociology of knowledge where formal systems of ideas are given much emphasis (Swidler et al 1994:305). While government units

observe this mode of thinking, the interplay of other forces such as social, economic, cultural, and political factors continue to influence their decision making processes thereby creating knowledge both from the formal and informal sources.

On the contrary, the data exhibit how fishing communities, despite their distance from the world of the scholars and intellectuals, are able to develop their own knowledge on matters that surround them and events affecting their daily lives either positively or negatively. The mature and elderly population rely on collective memories. They vividly recall the levels of sea waters between the past and the present and the intensity of typhoons they survived. This source of knowledge is what Mannheim (as cited by Swidler 1994:310) hypothesizes as the formative stage of the historical memory of a person, which happens during the adolescence and early adulthood. Their knowledge are influenced and re-enforced among other things by social elements such as power, perceptions, and norms. Considering these landscapes, it is apparent that these social actors in the island-barangays develop local approaches and strategies, which are explicit expressions of the interplays of knowledge, power, interests and values of each social actor. Actions that positively enhance the adaptation capabilities of local people are re-enforced and nurtured through their interactions. These actions include among others the constructions of rip-raps, enclosures of homesteads maximizing "used' fish nets, piling garbage under the sand, and use of calendars. In a separate development, the proposed seawall project that local folks, especially the women from the two island-communities, strongly fell about typifies how authorities exercise their power and how their authoritative on the use of resources may increase people's vulnerability or may improve people's adaptation capacities by shifting priorities for resource allocation. None of the barangay LGUs constructed the seawall as local officials zeroed in on the availability of financial resources and the cost-benefit ratio for resource utilization. In this example power and resources become key elements in the decision making process of barangay governments setting aside the utilization of scientific knowledge. From this particular example, the use of scientific knowledge is inconsistently employed by government officials who possess greater authority and power over the use of resources.

Chapter 5 Conclusion

The study aims to establish how social, political, and cultural relations and interactions influence the adaptation and resiliency strategies to CC and SLR of two island communities and local governments in Bohol, Philippines. To comprehend the nature of the interactions between fishers and local governments, local knowledge and perceptions, experiences on coping, adaptation, resiliency, and mitigation and relevant local ordinances that affect these local actions were reviewed. Using the new sociology of knowledge approach this paper discusses the influence of the interactions of social, political, cultural and economic elements on knowledge affecting the decision making processes of social actors in coming up with variations of adaptation strategies to CC and SLR. The objective of this chapter is to bring to the fore major findings into a conclusion in view of the questions in the study. This chapter also tries to convey the implications and potential utility of the study findings with the intent of helping fishing communities and the local governments build better coping and adaptation strategies and resiliency to CC and SLR.

Decisions of fishing communities to engage in multiple short-term coping, adaptation strategies and resiliency (e.g., rip-rap construction, enclosure of homestead with used fishing nets, family gardens, and continue livelihood activities) are reflections of the dominant decision-making processes employed by the local people. The conceptualization and execution of these coping and adaptation strategies, both at the community and household levels, brought immediate, tangible, and expected outcomes and benefits to people and families. Efforts to replicate and scale up these coping mechanisms enhance communities' collective perception of their ability to adjust to changing conditions brought about by SLR. For example, safety of properties and secured access to food are but few of the urgent and basic needs that these coping strategies have helped address. Other short-term coping and adaptation strategies (e.g., participation in communal gardens, clean and green, piling of garbage under the sand), introduced by external social actors, like local government units, are implemented as requirements to on-going projects unexpectedly enhanced resiliency of the communities. Implementation of medium-term and long-term adaptation measures (i.e. construction of sea wall, participation in CLE), although proposed and supported by local community members, are often delayed primarily because of resource constraints and the often complex pre-implementation processes and requirements

This study suggests that decision making processes ultimately leading to decisions to adopt coping and adaptation strategies are significantly influenced by the social actors' varying and differing knowledge and perceptions of the risks and vulnerabilities to impacts of CC and SLR. On the other hand, knowledge and perceptions about risks and vulnerabilities to SLR are significantly shaped by the social, political, and cultural relationships among social actors at different levels. At the household level for example, a couple's decisions to improve individual and collective adaptation conditions are influenced by social, political, economic, norms, and cultural realities, including

gender. Coping and adaptation strategies between men and women reveal gender inequality. Strategies that are introduced externally were undertaken using project resources and with support from project management arrangements set up by the implementing government offices.

Meanwhile, decisions of fishing communities to take interest, engage, and participate in CLE and gender-based community mobilizations are indications of their strong motivations for investing in adaptation strategies with long-term benefits. Their active involvement in mangrove rehabilitation is an example. While community decisions towards achieving these long-term adaptation strategies are aligned with the overall development direction and objectives of local governments, the decision making processes that are affected by the social, political, and cultural relations between the communities and the local policy and decision makers significantly influence the outcomes, and, thus, the adaptation options and strategies.

Moreover, research findings reveal that local governments develop good practices from the various government programs and projects, which are implementable constructions of existing laws and local ordinances. With the aid of these development practices, it is envisioned that the goal for development can be achieved. The current practices along CLE, CRM, GAD, and DRM offer avenues for adaptation and development that promoted more community and women participation. Furthermore, the knowledge that permeates across adaptation and DRM planning and budgeting needs gender to be as visible. Such absence highlights how social, political and cultural interactions within government units determined what knowledge is to be conceived and acted upon.

Finding a balance between the immediate need for coping, adaptation and resilience, without losing sight of the long-term development, is a mutual concern of local fishers and local governments. The study shows how social actors, like fishing households, fishing communities and local governments, interact, challenge, and maximize their knowledge, resources and power to produce either individual or collective measures and strategies for adaptation and resilience to CC and SLR. The findings further suggest that households and fishing communities are more inclined to undertake variations of coping, adaptation strategies, and resiliency measures during and immediately after experiencing CC and SLR impacts. Generally, strategies undertaken by fishing households and communities reduce their vulnerability to CC and SLR impacts in the short term. The local governments' challenging role is to provide development and adaptation continuum, where transformation of coping strategies into effective adaptation strategies can become more meaningful to local people, as they aspire for a more secure, safer, and dignified living conditions. In the process, a robust decision-making among social actors can help achieve the interrelated objectives of establishing coping mechanisms, adaptation strategies, and resiliency and long-term sustainable development goals. The growing demand for timely and sound decisions and actions provides the rationale for an efficient decision making process. The study also provided a glimpse on gender issues relating to adaptation, which may be explored in light improving the gender situation in the fishery sector.

There is no reason or action more justified for waiting greater threats and risks to happen.

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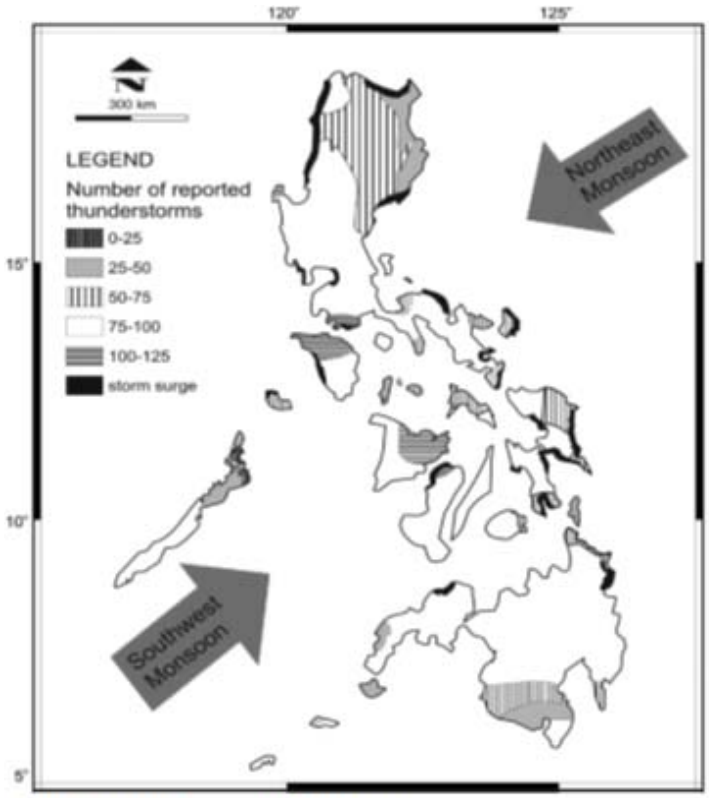
Talibon Municipal Fishery Code

Talibon Municipal Gender and Development Ordinance

Appendices

Appendix I
Natural Hazard Map of the Philippines



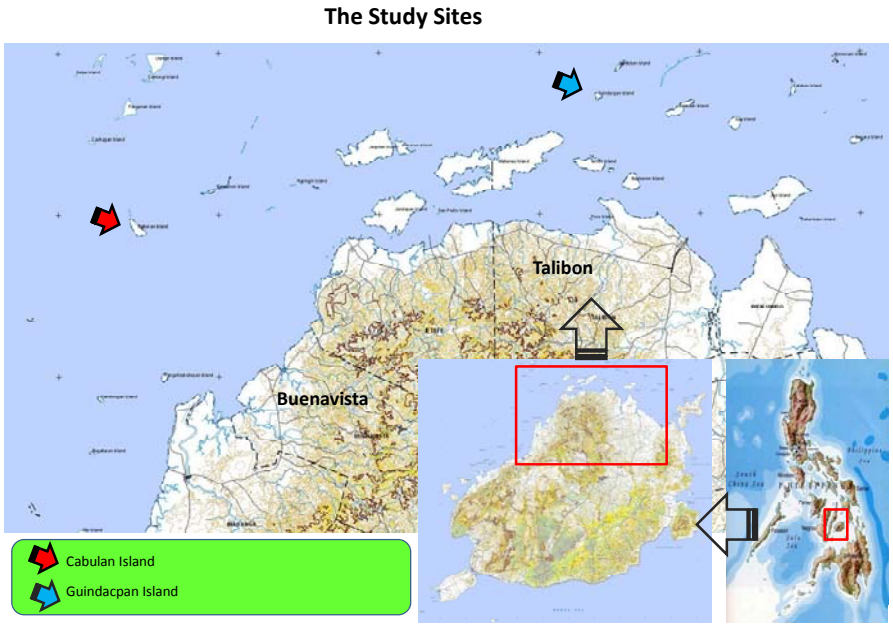
Natural hazard map of the Philippines

The map shows some of the natural hazards that affect different parts of the Philippines, including storm surges and thunderstorms. Some areas experience up to 125 thunderstorms per year. Black shaded areas have been affected by storm surges. ***Source***: DOST-PAGASA, 2008b (as cited by Yumul, 2011)

Appendix II
Indicative Map of Low-lying Areas Vulnerable to SLR

Source: NAMRIA (n.d.) Indicative map of low-lying areas vulnerable to sea level rise Date Accessed November 9, 2011 http://www.namria.gov.ph/

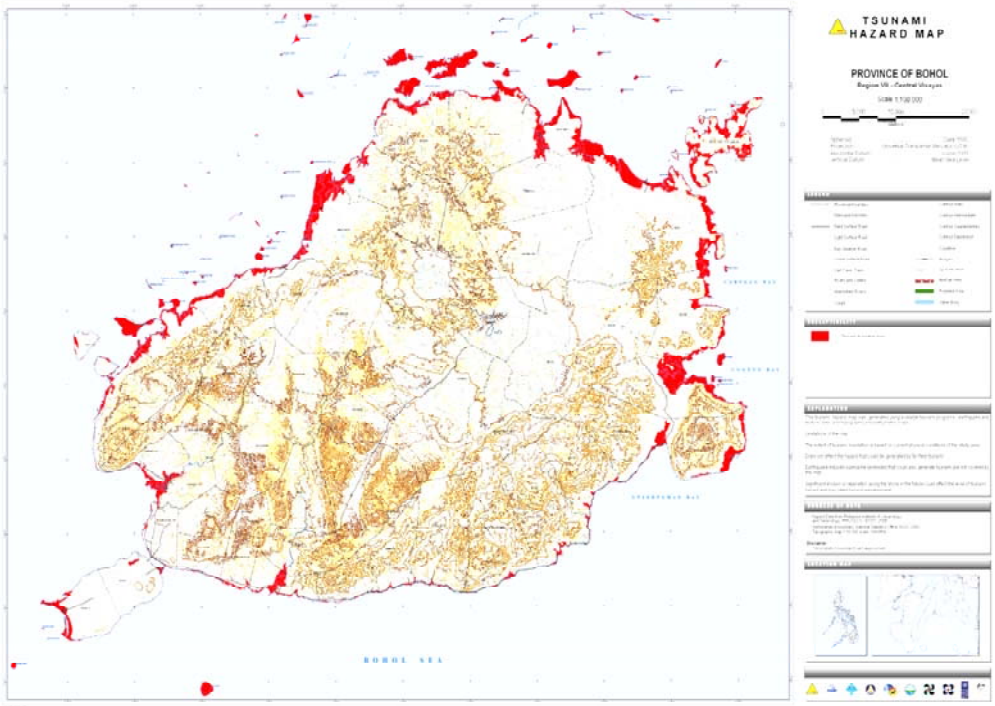
Appendix III
Map of the Research Site



Source:
Map of the Philippines
http://www.flickr.com/photos/29079010@N08/3368750418/

Map of Bohol
(http://www.namria.gov.ph/Images/READY/Bohol/Bohol%20Earthquake%20Induced%20Landslide%20Hazard%20Map%20Final.jpg)

Appendix IV
Tsunami Hazard Map of Bohol



Source: http://www.ppdobohol.lgu.ph/maps/hazard-maps/tsunami/