Sorsogon City Climate Change Vulnerability Assessment

UN HABITAT
FOR A BETTER URBAN FUTURE

United Nations Human Settlements Programme (UN-HABITAT)
P.O Box 30030 00100 Nairobi GPO KENYA
Tel: 254-020-7623120 (Central Office)
www.unhabitat.org

Cover photos: © Sorsogon City/Joselito Derit

Disclaimer

The Cities and Climate Change Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The series includes draft tools which are at the stage of pilot testing and peer review and findings from cities where the Cities and Climate Change Initiative is active.

The designations employed and the presentation of material in this report do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or regarding its economic system or degree of development. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors and do not necessarily reflect the views of the United Nations Human Settlements Programme or its Governing Council. Mention of firm names and commercial products does not imply the endorsement of the United Nations.

Acknowledgements

Principal author: Adelaida Antonette Mias-Mamonong, Yen Flores
Contributors: Bernhard Barth, Eden Garde, Chris Radford, Christopher Rollo and members of the Sorsogon City Technical Working Group on Climate Change
Coordination: Adelaida Antonette Mias-Mamonong
Printer: This publication is issued electronically

For comments please contact: uepb@unhabitat.org

Table of Contents

I. Introduction

Cities and Climate Change:

Millions of people around the world are already, or will be, affected by climate change. Urban areas, which typically feature high concentrations of populations and buildings, are particularly vulnerable. Climate change is expected to compound the overall vulnerability of urban areas through rising sea levels, more frequent and stronger weather events, and inland flooding, among other challenges. At the same time, cities are major sources of greenhouse gases, and therefore must stand at the forefront of mitigation efforts. Mitigation and adaptation to the effects of climate change must take into account the vulnerable natural and human systems
existing in our urban areas and their surroundings.

In many countries, cities are located in coastal areas, beside rivers, on steep slopes or other risk-prone areas. Infrastructure such as roads, water networks, transmission lines, schools and hospitals providing basic services for urban populations, are vulnerable to extreme climatic events such as floods, storms or landslides. Cities located in tropical coastal areas are particularly vulnerable to cyclones or rising sea levels, the frequency and intensity of which have been on the increase over the past three decades. In addition, salt water intrusion restricts the availability of fresh water in coastal areas, jeopardizing food security as once fertile land becomes barren due to high salt content. Cities located in the hinterland or along rivers may be
vulnerable to flooding. Conversely, areas where climate change is expected to reduce rainfall may be affected by drought, shrinking water tables and food scarcity.

In urban areas, the poor are the most vulnerable to the effects of climate change, and particularly slum dwellers in developing countries.

UN-HABITAT's Cities and Climate Change Initiative:

Cities and local authorities have the potential to influence the causes of climate change and to find how to protect themselves from its effects. The Cities and Climate Change Initiative, a key component of UN-HABITAT 's Sustainable Urban Development Network (SUD-Net), promotes enhanced climate change mitigation and adaptation in developing country cities. More specifically, the Initiative supports the development of pro-poor innovative approaches to climate change policies and strategies. This Initiative builds on UN-HABITAT 's rich experience in sustainable urban development (through the Environmental Planning and Management approach of the Sustainable Cities Programme and the Localizing Agenda 21 Programme) as well as on well-recognized capacity building tools. The Initiative develops, adapts and disseminates the methodologies that put city managers and practitioners in a better position to cope with climate change. The Cities and Climate Change Initiative also promotes collaboration by local authorities and their associations in global, regional and national networks; the triple
rationale is (1) to enhance policy dialogue so that climate change is firmly established on the agenda; (2) to support local authorities' efforts to bring about these changes; and (3) to enhance

awareness, education and capacity-building in support of climate change strategies. A major outcome of the initiative will be the development of a set of tools for mitigation and adaptation.
This report comes under the Cities and Climate Change Initiative. Four pilot cities were selected in 2009, and one of their first assignments was for each to assess its vulnerability to climate change. In addition to Sorsogon, the other three cities are Esmeraldas, Ecuador, Kampala, Uganda and Maputo, Mozambique. The aim is to provide insights on climate change adaptation and mitigation capacity in cities in developing and least developed countries. The rationale behind this report is to disseminate the early lessons of the Cities and Climate Change Initiative.

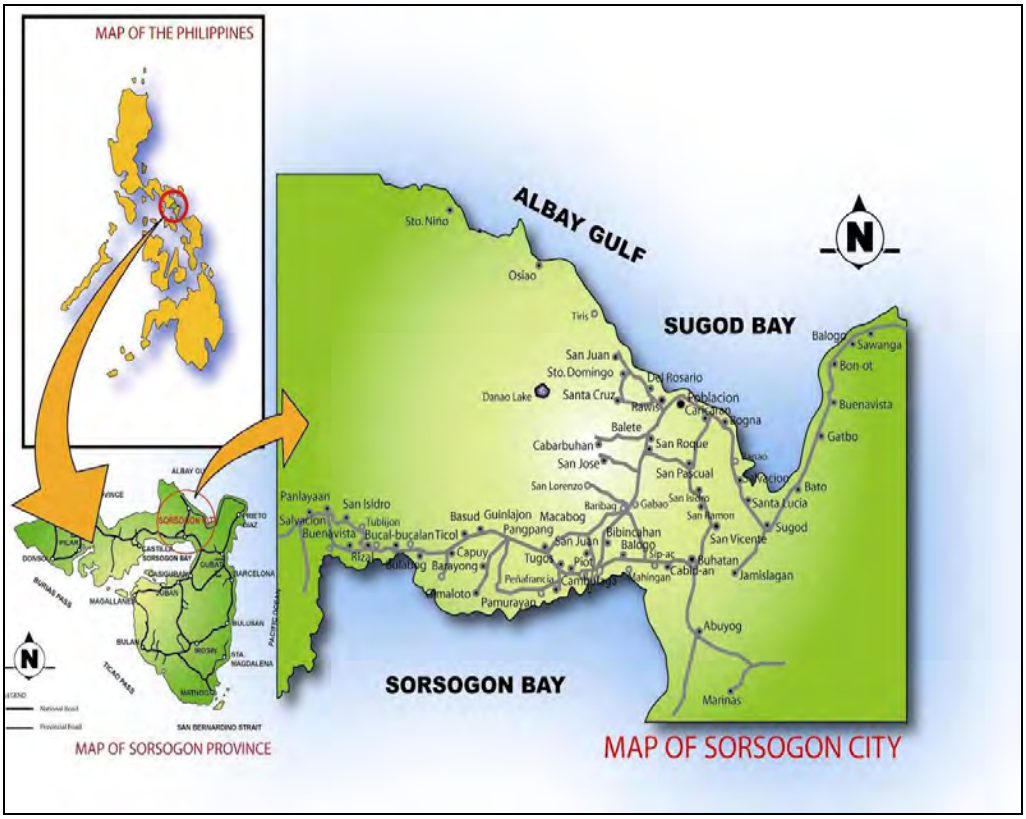
Assessment Methodology:

The Philippine assessment was carried out at two levels; the national and the city level. The national assessment reviewed existing national documents, researched on climate change and current policies, and utilised focus group discussions with key urban development stakeholders (government institutions and individual experts). It used as reference the most recent climate projections of the Philippine Atmospheric, Geophysical and Astronomical Services Administration and the National Urban Development and Housing Framework (2009-2016) support studies. At the City Level, the assessment looked into a small coastal city, Sorsogon City in the Bicol Region. The assessment used a participatory Vulnerability and Adaptation process looking into the city's exposure, sensitivity, and adaptive capacity of the area vis-à-vis projected climate scenario, previous climate related disaster events and more importantly people's account of the past events and observations. This document presents the city level assessment.

Geographic Background:

Sorsogon City lies from 123° 53' to 124° 09' east longitude and from 12° 55' to 13° 08' north latitude, and is situated in the Philippine's Bicol Region. It is 600 kilometres southeast of Manila and is located at the southernmost tip of Luzon. As part of the geographical chain linking Luzon to the rest of the Philippines, it is a transshipment corridor and serves as the gateway to the Visayas and Mindanao Islands. Its geographical location is such that it opens into the Pacific Ocean to the West and East, through Albay Gulf and Sugod Bay and the China Sea through the Sorsogon Bay.

Figure 1



Source: Sorsogon City

Sorsogon City was created by virtue of Republic Act 8806, which was signed into law on August 16, 2000 and ratified during a plebiscite on December 16, 2000. RA 8806, also known as the Cityhood Law, called for the merger of the municipalities of Sorsogon and Bacon into a component city of the province of Sorsogon. The City has a total population of 151,454 based on the 2007 national census of population. It is considered as the largest city in Bicol Region in terms of land area and one of the region's leading cities in terms of urbanization as it is one of the most populous cities in the region.

As a backgrounder, the Province of Sorsogon where the City is located has been identified by a study of the Manila Observatory and the Department of Environment and Natural Resource to be at a Very High Risk category relative to combined Climate Disasters (Figure 2). Previous disaster events caused massive destruction in Sorsogon City with the most recent of them Super Typhoons Milenyo (September 2006) and Reming (November 2006) which took place in the last quarter of 2006.

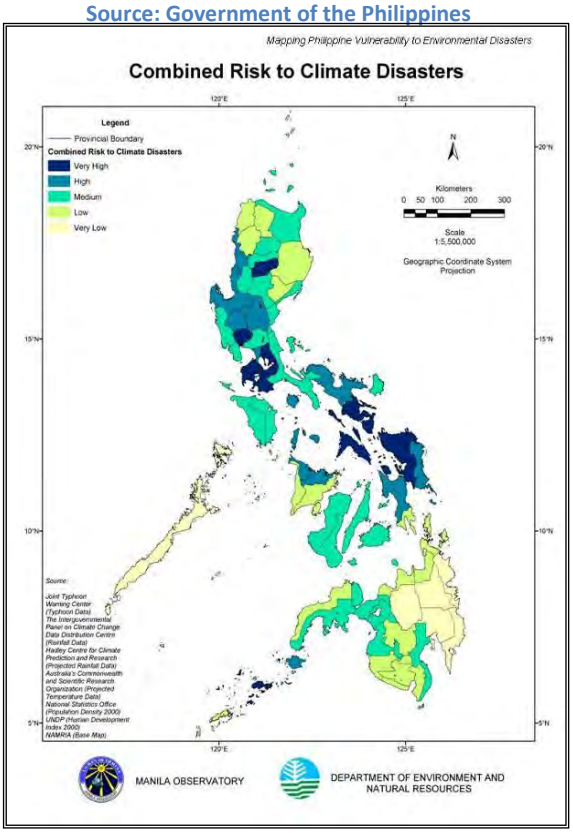
Table 1

Milenyo Damage	
Affected Families	27,101
Totally Damaged houses	10,070
(estimated) Damage to Agriculture and Fisheries sector	Php 234 Million
(estimated) Damage to Public Infrastructure	Php 208 Million

Source: City Planning and Development Office

Sorsogon City has a total population of 151,454 as of 2007 with a growth rate 1.78% for the same period. As the center of the Province, the city believes that it is faced with the challenge of balancing its three and often conflicting roles. Being the administrative, commercial, and educational center of the province entails a high degree of urbanization. Continuing as an agriculture and fishery production area requires the conservation of land areas needed by these economic activities. As an eco-tourism destination, the state of natural and man-made sites is often threatened by the first two roles.

Figure 2: Combined Risks to Climate Disasters, Source: Government of the Philippines



Facing this challenge all the more becomes difficult for the city as it year-on-year continue to face climate induced disasters which does not only affect physical structures but more so social infrastructures that dampens its momentum in achieving sustainable urbanization. With the growing discourse on and concern about what climate change impacts could further bring, Sorsogon City took on the challenge of starting an initiative that would help the city learn and analyze what climate change could bring them given their that indeed climate has changed and that what they initially thought of to be just a global or national issue, is really a local issue as the city (citing Reming and Milenyo experience) is at the front line of bearing the impacts and at the core of actions towards addressing them.

Given the city's established partnership with the United Nations Human Settlements Programme (UN-HABITAT), Sorsogon City worked with the said agency in a "learning by doing approach" to conduct a Climate Change Vulnerability and Adaptation Assessment (V&AA) using participatory approaches and processes.

Assessment Framework:

The climate change vulnerability and adaptation assessment used by Sorsogon City worked on defining the city's vulnerability context through assessments or estimates of its adaptive capacities, sensitivity, and exposure to climate variability and change (figure 2). The assessment process considered the recommendations and discussion frameworks presented in the Intergovernmental Panel on Climate Change (IPCC) Third and Fourth Assessment Reports, the UNDP-Adaptation Planning Framework, Vulnerability and Response Approach (VARA) by the Oakridge National Laboratory, World Bank's Climate Resilient Cities Primer, the UNEP Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies, and most especially UN-Habitat's Sustainable Cities Programme (SCP) local assessment tools and methodologies.

Figure 3

Vulnerability = f (Exposure, Sensitivity, Adaptive Capacity)

As defined by the IPCC, adaptive capacity describes the ability of a system to adjust to actual or expected climate stresses, or to cope with the consequences while sensitivity refers to the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli. Exposure meanwhile relates to the degree of climate stress upon a particular unit of analysis. It may be represented as either long-term change in climate conditions, or by changes in climate variability, including the magnitude and frequency of extreme events.

With the above, vulnerability is generally understood as a function of a range of biophysical and socio-economic factors, commonly aggregated into three components that include an estimate of the above elements namely (adaptive) capacity, sensitivity, and exposure to climate variability and change.

Initial/Preparatory activities:

Preparatory activities were conducted to ensure that the V&AA process will have strong support from both the elected officials and the technical staff of the city government. These activities centered on laying the foundation of the assessment such that there will be clarity in the scope of the process that will be undertaken and to which end it will deliver- that is to contribute to the cities sustainable development plans. The following activities were purposely undertaken:

- briefing for the Local Chief Executive and key technical staff on Climate Change overviews that critically included both global and national climate change basic information, facts, and emerging issues and concerns- as it all relates to local development.

- Creation of a technical team/working group (TWG) who are working for the city government on various sectors/discipline such that information/data could be successfully gathered and objectively analyzed.

- Dialogues/discussions on the scope and objective/s of the V&AA. The city government finds this pre-assessment action crucial having acknowledged the complexities of climate change projected impacts and concerns. Without intending to undermine or cut-short the science of climate change, the assessment team recognized to get into a more purposive track or

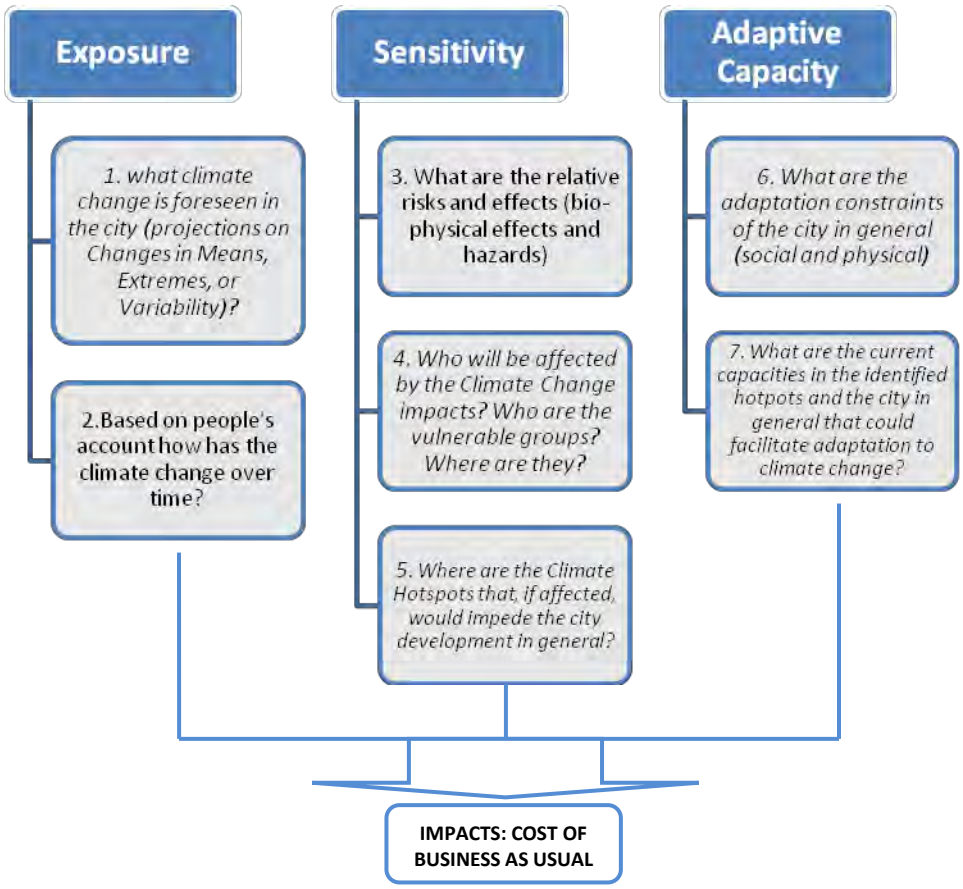
scope for the assessment wherein local realities would be the focus with highlights on the effects of CC to the city and its people.

An Administrative Order from the City Mayor was issued to ensure cooperation and participation from each of the city department/office working on sectoral concerns. This helped facilitate consistent flow and sharing of information that is needed for the assessment.

While the above, other local stakeholders apart from the city government were enjoined to participate in the whole process. The Key stakeholders critical to the process were identified by the city through mapping exercises which defined (possible) influence and inputs of local groups/individuals considering their mandate, knowledge/expertise, previous experiences or engagements, and role in local development processes. Initially, the identified stakeholders were engaged in key informant interviews and Focus Group Discussion and later on in data sharing, workshops, and multi-stakeholder consultations.

II. Purpose and Scope of the Assessment

Figure 4



The Sorsogon City V&AA was agreed to focus on determining its vulnerability by answering and analysing data/responses for each of the 6 questions posted in the figure above. Moreover, since at the end of the day the V&AA is meant to contribute to the city's sustainable development,

adaptation options was required to be identified at the end of the process. The scope of the options were agreed to be derived from the "projections of the cost of business as usual" by valuing impacts due to vulnerabilities minus adaptation. Such is viewed to be crucial in order to elicit decisions for: quick-win actions; short to long term policy development directions; joint or multi-stakeholder actions; national and local government partnerships; resource mobilization programming; etc.

III. Sorsogon City Climate Change Vulnerability

3.1 Factors of City Vulnerability

3.1.1 National Climate Change: trends and projections:

Based on recent studies[1] in the country, the observed anomalies in climate in the Philippines from 1951-2006 are as follows:

- increase of 0.6104 ^{o}C in observed annual mean temperature;
- increase of 0.3742 ^{o}C in observed annual maximum temp;
- increase of 0.8940 ^{o}C in observed annual minimum temp;
- increased number of hot days and warm nights;
- decreased number of cold days and cool nights;
- increase of annual mean rainfall and rainy days
- increase in inter-annual variability of onset rainfall;
- average of 20 cyclones cross the Philippine Area of Responsibility where 8-9 make landfall each year - an increase of 4.2 in frequency for the period of 1990-2003

Using the PRECIS modeling system of the Hadley Centre, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA[2]) issued the following climate change projections for the Philippines for 2020 and 2050:

- The mean seasonal temperatures are expected to rise by about 0.9^{0}C to 1.4^{0}C by 2020 and 1.7 ^{0}C to 2.4 ^{0}C by 2050.
- Projection of seasonal temporal rainfall variation is largest (-35 % to +45%) during the six month period from March to August.
- Projection of seasonal temporal rainfall variation is less (-0.5 % to +25%) during sixth months from September to February.
- The highest increase in rainfall during the southwest monsoon season, which is from June to August, is likely in Region 01 (44%), Cordillera Autonomous Region (29%), Region 03 (34%), Region 04 (24%) and **Region 05 (24%)** in 2050.
- The model indicated that climate change will probably lead to an active southwest monsoon in Luzon and Visayas with future increases in rainfall that is more pronounced in June to August, and becoming greater with time.

[1] UN-GoP MDG-F 1656: Tibig et al.
[2] PAGASA is an attached agency to the Department of Science and Technology of the Philippine Government.

- The drier seasons of March-April-May will become drier still, while the wetter seasons of June-August and September-November become wetter.

3.1.2 City Climate Change Exposure:

A. Existing Climate Data used for local planning and programming

Official Sorsogon City documents (i.e. Comprehensive Land Use Plan 2007-2012) uses as basis for planning their classification as an area with Type II climate (Modified Coronas classification system) wherein there is no pronounced dry season but with a very pronounced maximum rain period from November to January. Local data accounts that the rains start late September or early October. Annual rainfall ranges from 2,800 mm to 3,500 mm. and rain is expected 200 days in a year and even in the driest months unexpected downpour occurs.

Temperature ranges from 21 ^{0}C to 32 ^{0}C. Relative humidity is 82%. Prevailing winds are the monsoons and Pacific Trade Winds. The Northeast Monsoon (Amihan) occurs from October to March while the Southwest Monsoon (Habagat) occurs from June to September. The Pacific Trade Winds (Gurang na Habagat) occurs during April and May.

B. People's account on climate change

Scientific projections from climate models indeed are very useful for the V&AA, however in the absence of such information (as what the city experienced at the start of the assessment process) that specifically focuses on the geographical area of Sorsogon, local observations were very important. Such were critical to validate national and regional (Asian) climate change data against the realm or experiences of the city in order for the assessment to gather information on likelihood or probabilities of future changes as basis to measure factors of their vulnerability as experienced on-ground. The "ground-truthing" exercises, by way of FGDs and KIIs, provided a local dimension to the highly technical discourse of what lies ahead which seemed vague and "far off" in some sense especially to local communities.

The initial exposure analysis therefore solicited inputs from the communities themselves. Their observations, as evidenced by the changes they experience in their daily lives, were outlined based on how changes in climate are manifesting and affecting them. People who've been living in Sorsogon for more than 20 years were particularly asked to join and contribute their accounts on how they have observed climate (e.g. temperature, rainfall, and sea-level) to have changed over the years.

Based on people's account, the city has become warmer and warmer as manifested in (a) the change in their fishing and farming yields and activity patterns; and (b) the electricity/energy consumption of households as they are now requiring more cooling appliance. Further people account that summer months have proven to get hotter and hotter- thus the proliferation of resorts and swimming pool facilities in the city. More pronounced (than temperature change) for the people is the change in the volume of rain they are getting over the years. Serious erosion and flooding events have been

happening more frequently that affects their economic activities (trading, farming, vending, etc).

Another local observation highlighted by the people is the rise in tidal waters and sea level. People from coastal barangays during Focus Group Discussion shared their actual observation of inundation in beach areas and coastal shores especially in the Bacon District. Older citizens shared estimation that about 50 meters of land in Poblacion and about 15 meters of land along the shoreline in Cambulaga have been inundated by sea waters. Some people interviewed in Bacon Poblacion[3] recounted that during the 1950's the area where shore lines now are had actual access roads then and that it in fact served as their play area in those days and there were even houses there before.

Figure 5

People drew that the sea (level) has moved in ward and houses thus needed to move

Source: Project Team

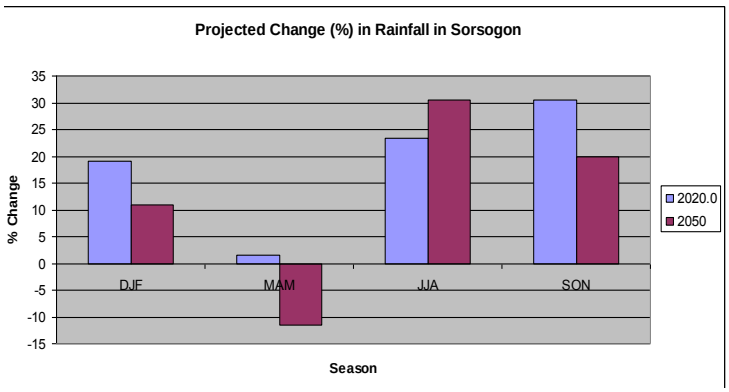
Beyond this line towards the sea is the flood prone area according to the community

[3] Bacon Poblacion faces the Pacific via the Albay Gulf

C. Projected Changes in Means (Model based)

Figures (4-5) below present the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) PRECIS projected climate change scenarios for the Province of Sorsogon relative to **temperature and rainfall** for 2020 and 2050 using the A1B scenario of the IPCC.

Figure 6



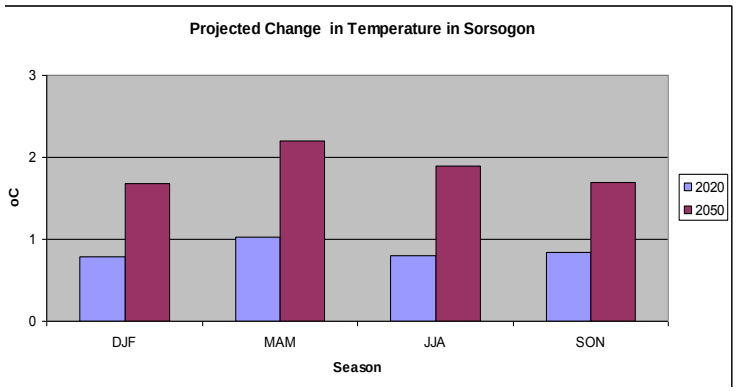


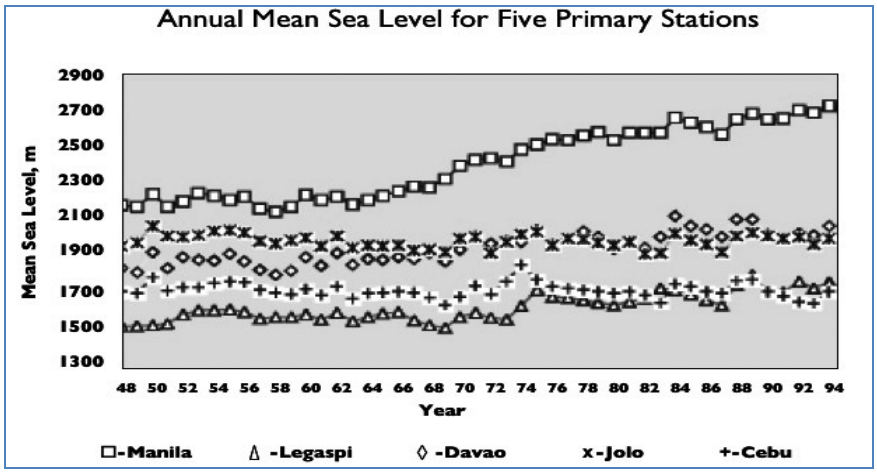
Figure 7
Source PAGASA

Generally, the figures show that Sorsogon will be more wet with temperatures getting hotter. Notably however in the 2050 scenario for precipitation, a clear change would be that Sorosogon could begin to possibly have a dry season contrary to the current climate where Sorsogon is pronounced to have year round rains (see MAM projections for 2050 in Figure 4).

Sea level rise observations presented in the PINCCC revealed that an increasing trend in annual mean sea level occurred since 1970s as observed from the tidal gauge station of the Coast and Geodetic Survey Department (CGSD) of NAMRIA in Legaspi, Albay. Legaspi and Sorsogon City faces the same pacific waters and in fact shares territory in the Albay Gulf. Given this, Sorsogon City assumes that SLR is likewise a threat in their low lying coastal areas. Minus an actual scientific observations, this was further substantiated and validated with community/people

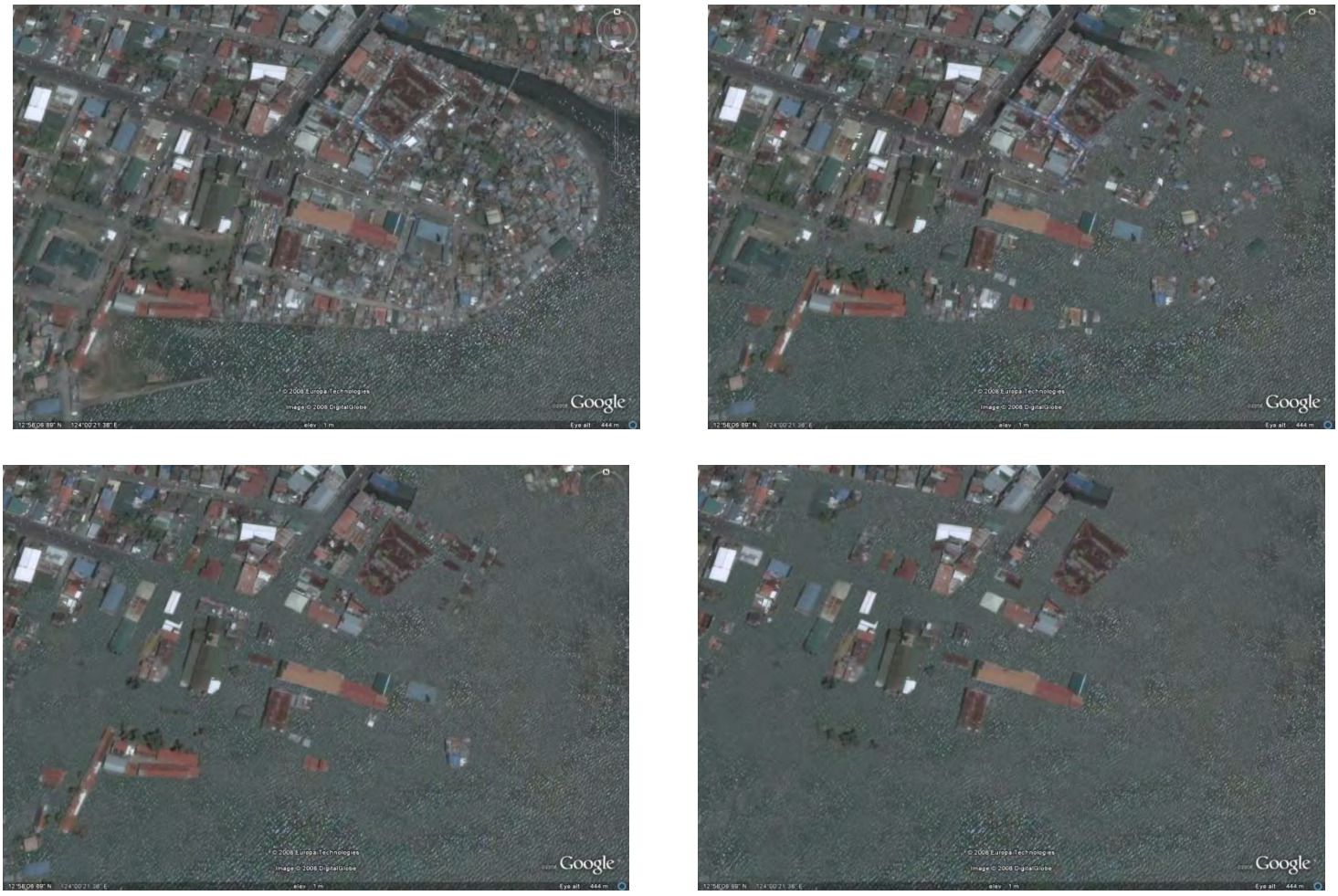
observations and personal accounts. Figure 6 presents the SLR obeservations as gathered in the five tidal stations in the country including that in Legazpi City, while Figure 7 is a manual simulation/visualization of SLR impact in one of the city's urban barangay.

Figure 8



source: Amadore, 2005; PINCC

Figure 9:
Top photos: Barangay Sirangan satellite image (Right) its image with image simulated with 0.5 SLR;
Lower photos: Same barangay simulated 1m SLR (right) and with 2m SLR (left)



D. Projected Changes in Extremes

Records of the **El Nino Southern Oscillation**, a drought and extreme wet phenomenon, presents that the Bicol Region have been affected severely and moderately in various occurrences with **drought events**- severely in the years 1968-69, 1986-1987 and 1997-1998, and moderately in 1982-1983 events (Figure 8). Although there is no scientific modeling done to present the projection of drought onsets in the future, Sorsogon City assumes that drought events that may affect them would be more intense and may occur in shorter intervals or return period.

Figure 10

List of Drought Events in the Philippines During the Period 1968 - 1998

Date of Occurrence	Areas Affected	Damages
1. 1968-1969	Moderate to severe drought over most of the Philippines with Bicol Region as most severely affected	Total of $5x10^5$ mt of rice and corn production
2. 1972-1973	Central Luzon, Palawan, Visayas and Mindanao	Total loss of $6.3x10^5$ mt of rice and corn production
3. 1977-1978	The whole of Mindanao except Davao	Total loss of $7.5x10^5$ mt of rice and corn production
4. 1982-1983 Oct. 1982 - March 1983 Apr. 1983 - Sept. 1983	Western and Central Luzon, Southern Tagalog Provinces, Northern Visayas, Bohol and Western Mindanao Moderate to severe drought affected most of Luzon, Negros Occidental and Iloilo	Rice and corn pro- duction loss of $6.4x10^5$ mt; insurance claims amounted to P38 M; hydropower generation loss was P316 M
5. 1986-1987 Oct. 1986 - March 1987	Severe drought affected Bicol Region, Southern Negros, Cebu and Western Mindanao	Estimated agricultural damages of P47 M
Apr. 1987 - Sept. 1987	Severe drought affected mainland of Luzon, Central Visayas and Western Mindanao	Estimated hydro energy generation loss was P671 M
6. 1989-1990 Oct. 1989 - March 1990	Drought affected Cagayan Valley, Panay Island, Guimaras, Palawan and Southern Mindanao; affected rice and corn area totalled 283,562 hectares; major multipurpose water reservoirs reduced inflow	Estimated $5x10^5$ mt of rice and corn production losses; hydropower gene-ration loss of P348 M; 10% cutback in water production in Metro Manila
7. 1991-1992	Severe drought affected Mindanao, Central and Western Visayas and Cagayan Valley; affected agricultural areas of 461,800 hectares	P4.09 Billion agri-cultural losses; 20% shortfall in Metro Manila water supply
8. 1997-1998	About 70 % of the Philippines experienced severe drought; about 292,000 hectares of rice and corn area completely damaged	622,106 mt of rice production loss and 565,240 mt of corn amounting to P 3 B; water shortages; forest fires and human health impacts

Source: DOST-PAGASA, Rosalina De Guzman, "Impacts of Droughts in the Philippines" presented in the International Workshop on Droughts and Extreme Temperatures: Preparedness and Management for Sustainable Agriculture, Forestry

Tropical Cyclones/Stronger Typhoons/Storm surge - Sorsogon city is situated in the country's geographical Zone 6 where 3 typhoons/cyclones pass in two years. The city, based on historical records, is also prone to storm surge as revealed by data gathered from the Natural Disaster Reduction Branch of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (NRDB- PAGASA). These are shown in figures 9 and 10 below.

The city is highly at risk to the impacts of tropical cyclones as evidenced by previous events like typhoon Sisang in 1987 and the two most recent which took place in the last quarter of 2006 when Super Typhoons Milenyo (September 2006) and Reming

(November 2006) caused massive destruction in Sorsogon. Although there is no observed significant trend on tropical cyclone (Figure 11), which means that frequency would remain the same, Sorsogon City based on experience in 2006 considers climate change to cause stronger typhoons that could cause massive destruction in the city.

Figure 12: Historical Storm Surge recorded up to 1985 (Source: NRDB - PAG-ASA)

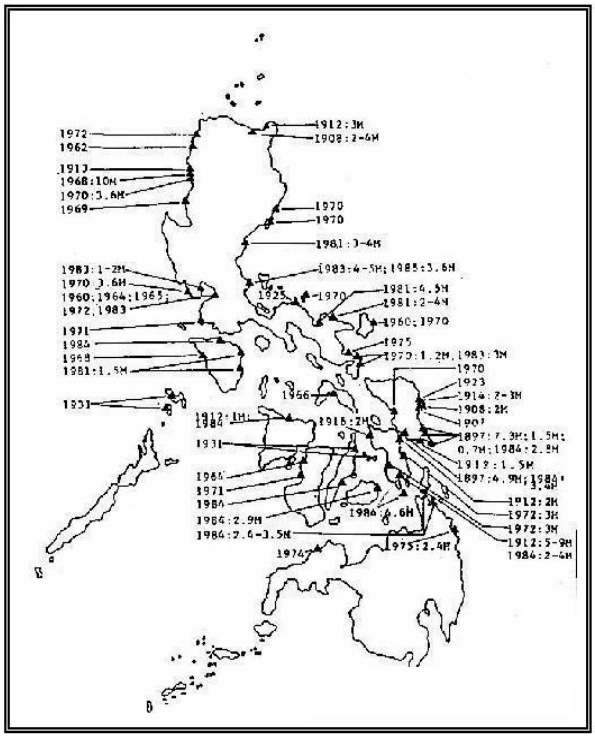


Figure 11: Frequency of Tropical Cyclone Passage over each Geographical Zone (source: PINCCC)

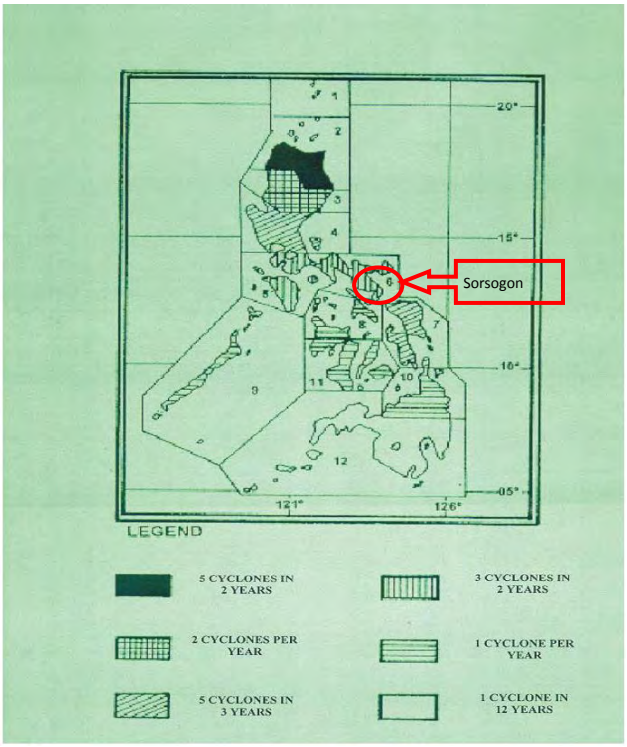
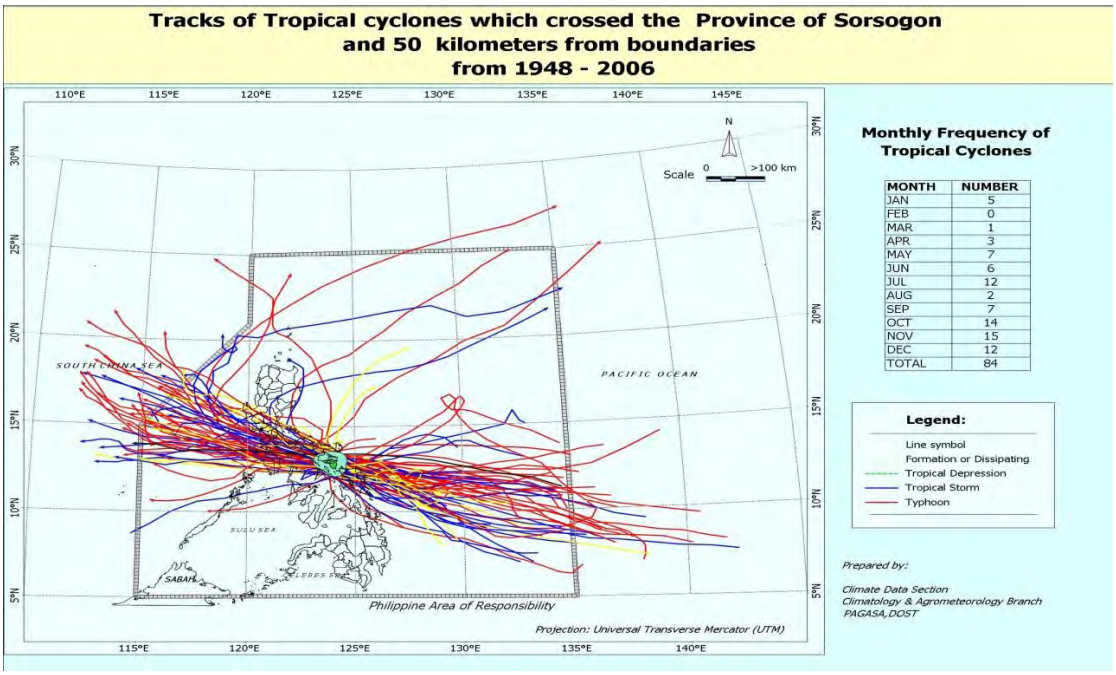


Figure 13



3.1.3 City CC Sensitivity: Biophysical effects and its bearing on socio-economic conditions

Having gained information on what the City is exposed to given climate change, local risk effects of such changes were then reviewed and assessed using various local information sources. Sectors and areas which would bear the impacts of the changes were then initially identified (see Table 2).

Table 2

Climate Driven Phenomena	Biophysical/Risk Effects (evidences from previous events)	Remarks (Data Source)	Critical Impact Areas/Sector
A. Changes Extreme			
Tropical Cyclones, storm surge	• Passing of more typhoons (exceeding the area average of" 3 typhoons within 2 years")	- City data and local observations	- Housing - Livelihood/Economy
	• More rain volume from Typhoons surpassing the average (2009)	- Case of Tropical Depression Dante (2009)	- Water drains, settlements - All sectors
	• Stronger winds (between 150 to 260 km/hr.)	- Super Typhoons Sisang (1987) and Milenyo and Reming in 2006	- Schools, Women, and

	• Increasing incidence of Evacuation of families from urban coastal areas especially those living in informal colonies/settlements • Occurrence of Storm Surge	- City Disaster Profile from CDCC - 1970 and 1983 as noted in the official records from NRDB-PAGASA	Children - Settlements, Livelihoods, basic infrastructure, sea-wall - Life lines (water, electricity power, communications)
Extreme rainfall, riverine floods	• Flashflood events • Riverbank erosion • Areas identified as land slide and erosion prone	- CDCC data - CDCC data - Local geo-hazard map (MGB-DENR)	- Agriculture, Livelihoods - Health - Land Use
El Nino/Southern Oscillation	• Recorded episodes of ENSO (El Nino and La Nina) that affected Sorsogon Province	- PAG-ASA - City Data	- Agriculture, Livelihoods - Health
B. Changes in Means			
Increased Precipitation	• Experiencing more than the average 200 days of rainfall/year; disrupted cropping pattern (e.g. drying of palay rice); decrease in palay rice production (lesser photosynthesis; water lag, bacteria); decrease in vegetable production; increasing "moss density"; decrease in salinity that affects production of cultured species (i.e. prawn, crabs, bangus (milk fish)) • Projected 1.0-1.5 change in rainfall ratio in the Bicol Region with 2x CO2 Scenario (Canadian Climate Change Model)	- City Agriculture Office - Philippine Initial National Communication on Climate Change (PINCCC)	- Watersheds - Agriculture, Livelihoods - Health
Increased in Temperature	• Projected 2-3 ^{o}C change in temperature in the Bicol Region with 2x CO2 Scenario (Canadian Climate Change Model)	- PINCCC	- Agriculture, Livelihoods - Water sector - Health

Sea-Level Rise	• Inundation of land in coastal Barangays • Changes in tides in Sorsogon Bay • Observed SLR in the Pacific side in Bacon District	- City visual records/accounts - City records - PINCC (Coast and Geodetic Survey Department or CGSD of NAMRIA in Legaspi, Albay)	- Agriculture, Livelihoods - Water sector - Health - Settlements, Land Use

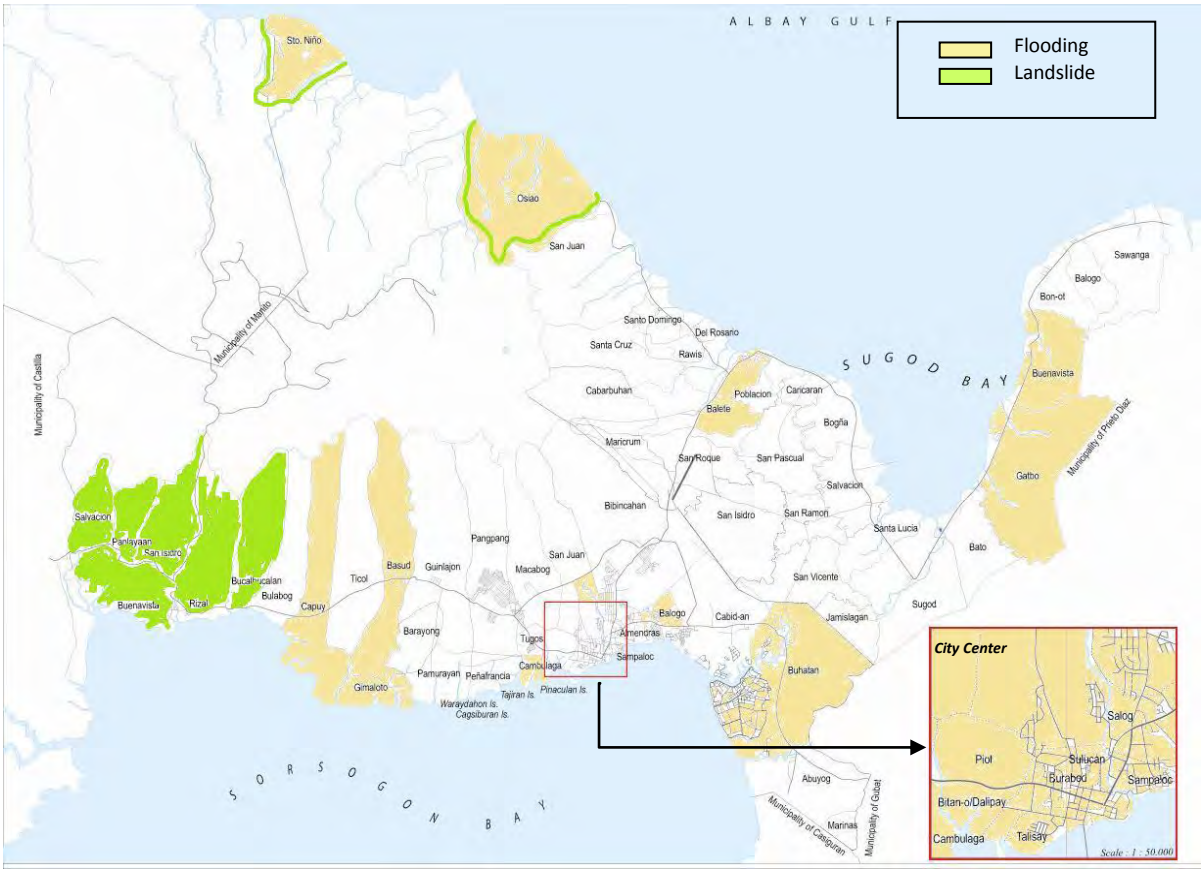
With the goal to identify highly sensitive areas based on the tabulation above. , the assessment tried to present impacts areas exposed to combined risks from storm surge, sea level rise, flooding, and landslide.

Generally, the impacts of increased precipitation and extreme rainfall expected in the city are soil erosion, landslides, flooding, flashfloods due to river overflow, and disruptions in both agricultural and fisheries economic activities. Table 3 provides the list of landslide and flood-prone barangays in the city. The total population for each area is presented in the table but the actual number facing the risks may still vary given a more detailed assessment per barangay. The location of the barangays presented in Table 4 is illustrated in Figure 14.

Table 3: Barangays at risk with Landslide and Flooding

Type of Hazard	Area	Total Population (2007)
Landslides	Osiao	2,721
	Sto. Niño	2,008
	Salvacion	1,089
	Panlayaan	1,398
	San Isidro	2,748
	Rizal	3.098
	Buenavista	1,455
	Bucalbucalan	2,312
Flooding	**East/West Districts**	
	Basud	2,430
	Buhatan	2,858
	Burabod	2,197
	Capuy	2,479
	Gimaloto	907
	Salog	2,586
	Sirangan	2,491
	Talisay	2,660
	Sampaloc	5,214
	Piot	2,572
	Bitan-O	3,028
	Cambulaga	4,097
	Balogo	5,251
	Sulucan	586
	Bacon District	
	Poblacion	4,882
	Balete	2,537
	Buenavista	1,279
	Gatbo	2,378
	Osiao	2,721
	Sto. Niño	2,008

Figure 14: Barangays facing risks from Landside and Flooding (source: Project Team)

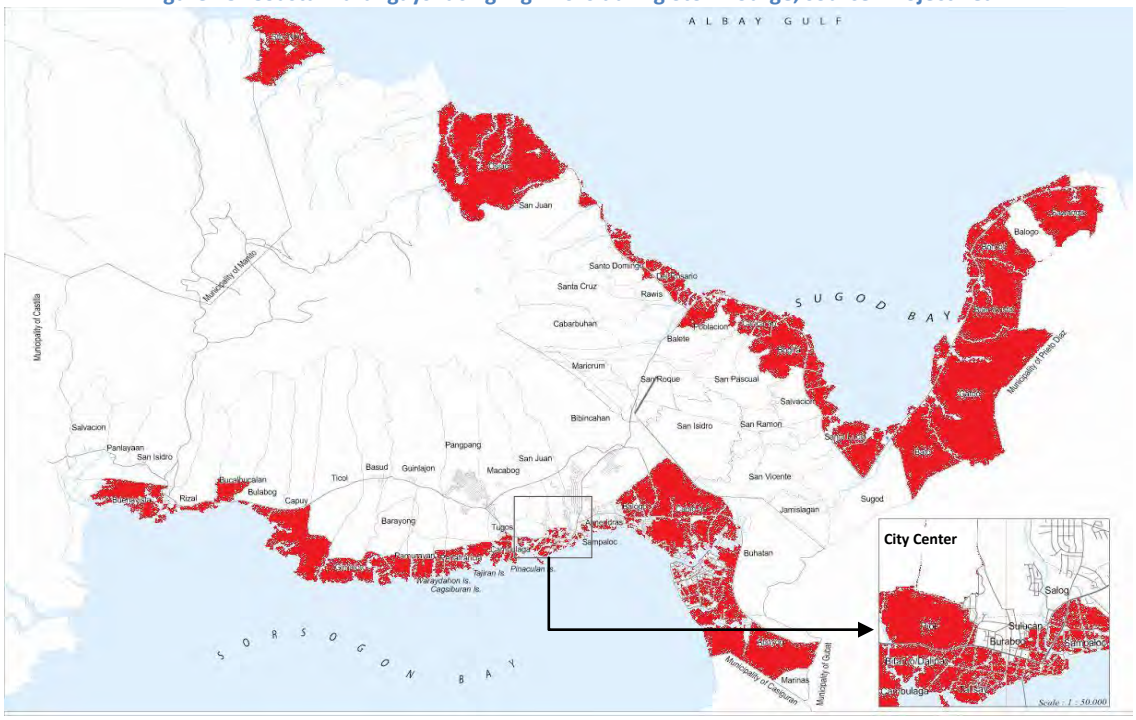


Further, the population of 34 coastal villages (Table 4) in Sorsogon City remains to be highly vulnerable to storm surges based on previous events as reported in the City Disaster Profile. In November 1987, the storm surge brought by Typhoon Sisang caused the death of more than 700 people in Sorsogon.

Table 4

EAST/WEST DISTRICT Coastal Areas		BACON DISTRICT Coastal Areas	
Barangay	**Population**	**Barangay**	**Population**
1. Abuyog	3,880	1. Bato	1,616
2. Balogo	5,251	2. Bogna	1,321
3. Bitan-o-Dalipay	3,028	3. Bon-ot	576
4. Bucalbucalan	2,312	4. Buenavista	1,279
5. Buenavista	1,455	5. Caricaran	1,580
6. Bulabog	2,164	6. Gatbo	2,378
7. Buhatan	2,858	7. Del Rosario	903
8. Cabid-an	5,426	8. Osiao	2,721
9. Cambulaga	4,097	9. Poblacion	4,882
10. Capuy	2,479	10. Rawis	1,192
11. Gimaloto	907	11. Salvacion	1089
12. Pamurayan	1,879	12. Sta. Lucia	413
13. Penafrancia	1,506	13. Sto. Domingo	1,333
14. Piot	2,572	14. Sto. Nino	2,008
15. Rizal	3,098	15. Sawanga	1,495
16. Sampaloc	5,214	16. Sugod	1,919
17. Sirangan	2,491	---	
18. Talisay	2,660	---	
TOTAL	**53,277**	**TOTAL**	**26,705**

Figure 15: Coastal Barangays facing high risks during Storm Surge, source: Project Team

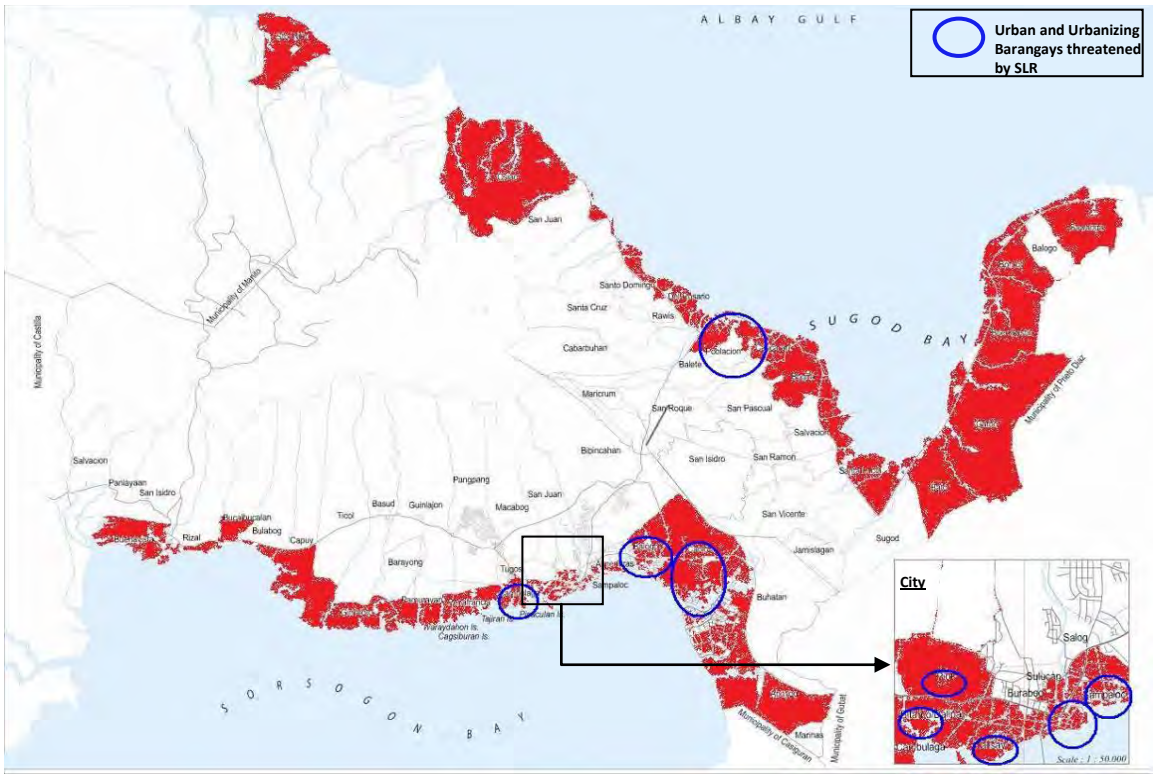


Though lacking official observation data, it is assumed that the 34 coastal barangays of the city would likely be affected by rising sea waters. A total of 8 urban and 1 urbanizing barangay (Cambulaga) faces the risks from sea level rise.

Table 5

Name of Barangay/Village	Population	Land Area (has.)
Balogo	5,251	152.85
Bitan-O	3,028	19.20
Cabid-an	5,426	223.56
Cambulaga (urbanizing)	4,097	37.10
Piot	2,572	65.96
Sampaloc	5,241	12.58
Sirangan	2,491	4.96
Talisay	2,660	12.40
Poblacion	4,882	174.51
Total	35,648	703.12

Figure 16: Coastal Barangays and identified Urban Areas at risk with Sea level Rise. Source: Project Team



A. Identified City Hotspots

In overlaying the projected climate change impacts in the maps above, there are Barangays which faces multiple risks and therefore were identified as the "city climate change hotspots". These hotspots and their urban/rural classification together, population data, and the growth rate for the last 7 years per area are presented in Table 6. Of the Hotspots, 8 are urban villages, 1 is urbanizing, and the last 3 villages in the table are rural areas.

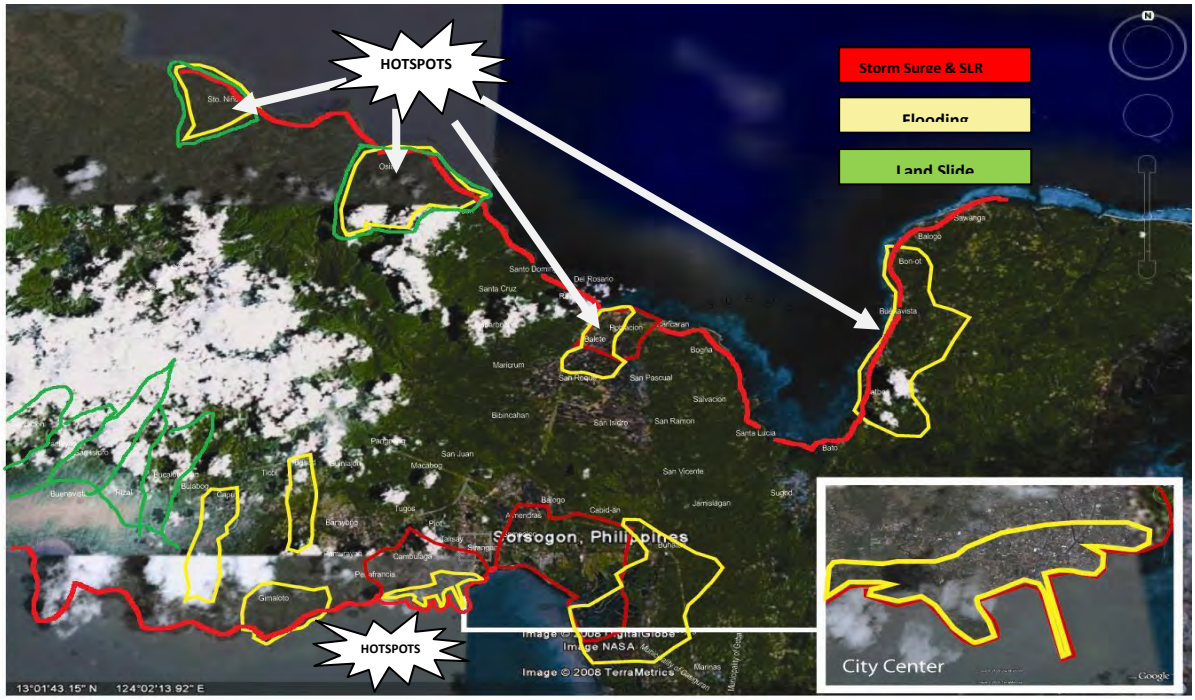
Table 6

Barangay	Classification	Land Area (Ha)	2007 Population	% Growth Rate (2000-2007)
Balogo	Urban	152.85	5251	11.46
Bitan-O Dalipay	Urban	19.20	3028	14.86
Cabid-an	Urban	223.56	5426	22.61
Cambulaga	Urbanizing	37.10	4097	22.03
Piot	Urban	65.96	2572	7.5
Sampaloc	Urban	12.58	5214	12.2
Sirangan	Urban	4.96	2491	14.3
Talisay	Urban	12.40	2660	6.58
Poblacion	Urban	174.51	4882	3.83
Sto. Nino	Rural	385.13	2008	4.78
Osiao	Rural	1015.66	2721	4.52
Gimaloto	Rural	143	907	7.17

The urban hotspots on the average are growing annually at the rate of 1.7%. Cabid-an registers the highest annual growth rate at 3.23% while four more areas are noted to

have growth rates higher than the average and these areas are Bitan-O Dalipay (2.12%), Sirangan (2.02%), Cambulaga (2%), and Sampaloc (1.74%). Projecting that the growth rate remains the same for these areas more people would become vulnerable to impacts of climate change. Risks will be higher and the costs for relief and rehabilitation would also considerably require more should a climate-induced disaster happen if anticipatory plans for climate adaptive social and physical infrastructures are not put in place.

Figure 17: Hotspots due to combined risks from Storm Surge, SLR, Flooding, and Land Slide, Source: Project Team



B. Risk Ratings

The assessment further worked on rating the sensitivity of the city vis-a-vis projected impacts of CC to people, places and activity sectors after the identification of hotspots. This rating exercise was deemed important to assess which areas must be focused on considering their vital contribution to sustain local development programs of the city as well to identify to which climate risk is the city more sensitive to. Results are shown in Table 7 to 9.

Table 7

CC Risk Indicator: Increased Rainfall																			
RISK EFFECTS	Flooding						Erosion						Landslide						Risk Rating *(total score over count of count of scores)*
Who/What will be affected?	Exposure			Sensitivity			Exposure			Sensitivity			Exposure			Sensitivity			
	Probability or Likelihood of impact			Possible Adverse Consequence/s (expected losses)			Probability or Likelihood of impact			Possible Adverse Consequence/s (expected losses)			Probability or Likelihood of impact			Possible Adverse Consequence/s (expected losses)			
	2010	2020	2050	2010	2020	2050	2010	2020	2050	2010	2020	2050	2010	2020	2050	2010	2020	2050	
People																			
- Population	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
Places																			
- Built-up Area	1	1	1	1	1	1	0.5	1	1	0.5	1	1	0.75	1	1	0.75	1	1	0.92
- Agricultural Zone	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
- Forest/Watershed Area	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
- Others…																			
Activity Sector (Local Economy and lifelines)																			
- Trading	1	1	1	1	1	1	0.25	0.5	1	0.25	0.5	1	0.5	1	1	0.5	1	1	0.81
- Tourism	1	1	1	1	1	1	0.5	1	1	0.5	1	1	0.5	1	1	0.5	1	1	0.89
- Agriculture (Fishing /Farming)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.94
- Service Oriented livelihoods	1	1	1	1	1	1	0.25	0.5	1	0.25	0.5	1	0.25	1	1	0.25	1	1	0.78
- Infrastructure Systems	0.87	1	1	0.87	1	1	0.5	1	1	0.5	1	1	1	1	1	1	1	1	0.93
- bridges	1	1	1	1	1	1	0.5	1	1	0.5	1	1	1	1	1	1	1	1	0.94
- communications /power	0.5	1	1	0.5	1	1	0.5	1	1	0.5	1	1	1	1	1	1	1	1	0.89
- Public School Bldg.	1	1	1	1	1	1	0.5	1	1	0.5	1	1	1	1	1	1	1	1	0.94
- Roads/ seawall/river control	1	1	1	1	1	1	0.5	1	1	0.5	1	1	1	1	1	1	1	1	0.94

Exposure Rating Probability/Likelihood: 1=Frequent or Very Likely; .75=Likely; .50=Moderately Likely; .25=Low probability

Rating for Possible Adverse Effect: 1= Very Severe Consequence; .75= Severe Consequence; .50=-Moderate Consequence; .25= Low Consequence (previous experience as basis)

Table 8

CC Risk Indicator: Typhoon/Tropical Cyclones																			
RISK EFFECTS	Flooding						Storm Surge						Strong Wind						Risk Rating (total score over count of risk effects)
Who/What will be affected?	Exposure			Sensitivity			Exposure			Sensitivity			Exposure			Sensitivity			
	Probability or Likelihood of impact			Possible Adverse Consequence/s (expected losses)			Probability or Likelihood of impact			Possible Adverse Consequence/s (expected losses)			Probability or Likelihood of impact			Possible Adverse Consequence/s (expected losses)			
	2010	2020	2050	2010	2020	2050	2010	2020	2050	2010	2020	2050	2010	2020	2050	2010	2020	2050	
People																			
- Population	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
Places																			
- Built-up Area	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
- Agricultural Zone	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
- Forest/Watershed Area	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
- Others…																			
Activity Sector (Local Economy and lifelines)																			
- Trading	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
- Tourism	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
- Agriculture (Fishing /Farming)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.94
- Service Oriented livelihoods	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
- Infrastructure Systems	0.9375	1	1	0.9375	1	1	0.87	1	1	0.87	1	1	1	1	1	1	1	1	0.98
- bridges	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
- communications /power	0.75	1	1	0.75	1	1	0.5	1	1	0.5	1	1	1	1	1	1	1	1	0.92
- Public School Bldg.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00
- Roads/ seawall/river control	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00

Table 9

CC Risk Indicator: Sea Level Rise													
RISK EFFECTS	Permanent Flooding						Salinitization						Risk Rating (total score over count of risk effects)
Who/What will be affected?	Exposure			Sensitivity			Exposure			Sensitivity			
	Probability or Likelihood of impact			Possible Adverse Consequence/s (expected losses)			Probability or Likelihood of impact			Possible Adverse Consequence/s (expected losses)			
	2010	2020	2050	2010	2020	2050	2010	2020	2050	2010	2020	2050	
People													
- Population	1	1	1	1	1	1	1	1	1	1	1	1	1
													0
Places													0
- Built-up Area	1	1	1	1	1	1	1	1	1	1	1	1	1
- Agricultural Zone	1	1	1	1	1	1	1	1	1	1	1	1	1
- Forest/Watershed Area	1	1	1	1	1	1	1	1	1	0	0	0	0.75
- Others...													0
													0
Activity Sector (Local Economy and lifelines)													0
- Trading	1	1	1	1	1	1	1	1	1	1	1	1	1
- Tourism	1	1	1	1	1	1	1	1	1	1	1	1	1
- Agriculture (Fishing /Farming)	1	1	1	1	1	1	1	1	1	1	1	1	1
- Service Oriented livelihoods	1	1	1	1	1	1	1	1	1	1	1	1	1
- Infrastructure Systems	1	1	1	1	1	1	0	0	0	0	0	0	0.5
- bridges	1	1	1	1	1	1	0	0	0	0	0	0	0.5
- communications /power	1	1	1	1	1	1	0	0	0	0	0	0	0.5
- Public School Bldg.	1	1	1	1	1	1	0	0	0	0	0	0	0.5
- Roads/ seawall/river control	1	1	1	1	1	1	0	0	0	0	0	0	0.5

C. Characterization of Social and Physical Sensitivities (People, Places and Activity Sectors)

This part tries to outline the possible interaction of CC exposure to specific socio-economic dimensions that contributes to greater city vulnerability. The intention is to provide qualifications of the ratings provided in Tables 7-9 by detailing more information on why and how local factors are likely to be affected by climate change.

C. 1 Social

The social conditions of the people in Sorsogon are critical factors of their sensitivity to climate change impacts as it would likely dictate how people could adapt to changes and develop response/action plans.

i. Poverty

Incidence of poverty in the city is at 43% based on latest (2006) estimates. As in the whole Philippines, poverty incidence is measured as "the proportion of families/population with per capita income less than the per capita poverty threshold to the total number of families/population. The 43.5% poor translates therefore to 65,882 individuals or about 13,445 families living below the poverty threshold of P15,687.

The National Statistical Coordination Board regional reports reveal that Sorsogon (Province) posted a 9.8 percentage point increase in poverty incidence between the 2000

and 2006 situation. Mainly, people account this to unemployment and lack of livelihood opportunities. Relating this to climate-induced hazards, it was in 2006 when 2 super typhoons struck the province and heavily devastated the city, and the province in general. In these events, people lost their assets including those valuably used for productive activities which enable them to earn and make a living. Those who are employed and engaged in micro businesses were likewise affected hence jobs were lost and/or daily wage earnings were negatively affected.

The people's poverty situation is believed to be closely linked with city's vulnerability to natural hazards. Poverty is a limiting factor for families to appropriately prepare and adapt to changes as their assets (physical, financial, technical, etc) are limited. During FGDs, there are stakeholders who raised that they think ***"the cycle of poverty in Sorsogon is very much related to the cycle of disaster-rehabilitation-disaster"*** that has been going on and on given its exposure to climate and other natural disaster. This is believed to be so given that poor people in the end suffers more (during disaster events) and requires more to rebuild and build back better, thus their limited earnings are further stretched thinly to sustain their family's basic needs and the need to re-invest in damaged physical assets.

ii. *Access to Water and Sanitation:*

In 2006, 25% of the total households do not have sanitary toilets, while 27.8% of the total households have no access to potable water supply. Most of the urban areas access their water source from the Sorsogon Water District (SCWD). Other households in the grassroots level get drinking water from artesian well built in their barangays while others have deep well put up through the Barangay Water System Administration (BAWASA) Project.

Typical water communal water supply in Sorsogon © Sorsogon City/Joselito Derit

Climate change impacts in the city would affect people's access to water especially those sourcing it from artesian well and deep wells - in the event of El Nino, water levels would recede while in longer rain periods water would be more prone to contamination and tends to be murky due to increase water run-off. In fact the Sorsogon City Water District projects that the city would lose its ground water sources starting 2013. The SCWD links this projection with their observations from their operations data that reveals a decreasing yield from thier sources. According to the water district, in 2000 the SCWD recorded an annual average yield of 155 liters per second, 150 lps in 2001, 120 in 2002 and 35 lps in 2003 when El Niño hit the Bicol region. The figures went up to 104 lps in 2004, down to 101 lps the following year and only 98 lps in 2006 and in 2007 to 92 lps this year. The increasing water demand and continuous environmental degradation (cutting of trees, pollution and improper waste disposal) and most especially climate change are all expected to further excacerbate the situation- hence the 2013 projection.

Given the depletion of groundwater, there were also some reported cases of salt water intrusion in coastal communities affecting potable water sources.

As an evidence of the critical effect of climate extremes to the city, tropical cyclones post disaster reports account that water supply of the city have been affected as water reservoir and distribution pipe lines were damaged. The 2 typhoons for example that hit the city in the latter part of 2006 disrupted the availability of water supply for at least a month- pushing further the vulnerability of the affected households to health and sanitation issues.

Table 10

	2005		2006	
	Percent	**Total**	**Percent**	**Total**
Access to safe drinking water	72%	17959	72.2%	18422
Access to safe means of excreta disposal	78.5%	19691	75%	19132
Establishments with sanitary permits	98.9%	897	88.53%	1055
Food handlers		1388		1475
Food establishments		405		810
Food handlers with health certificates	99.85%	1386	91%	1345
Households with complete basic sanitation facilities	70%	17557	71%	18098
Households with satisfactory garbage disposal	97.9%	24559	97	24767

In the urban-coastal hotspots (Poblacion, Sirangan, Bitan-O, Talisay, and Cambulaga) where FGDs were conducted, local leaders expressed that they have community members which lacks access to water and sanitation though no actual details were per provided given limited available data available during the conduct of the FGD.

iii. *Health and Nutrition:*

There are preliminary results at the national level that links health and climate change as indicated by increase in disease incidence especially those which are vector borne. The same however has not been done at the city level though the city is vulnerable to and anticipates increase in vector-borne disease especially Dengue Fever. Given increased precipitation and flooding of areas, urban slums given their conditions, are likely to breed more mosquitoes that may carry Dengue.

Children are seen to be highly at risk given the assessment done by the Provincial Nutrition Committee held early 2007. The assessment revealed that eight barangays in Sorsogon City belong to the nutritionally depressed category and it includes Barangay Bitan-O, one of the identified climate change hotspots. Less healthy children or those who are nutritionally deprived are very likely to succumb easily to diseases, including Dengue fever. This situation could be further aggravated when food security in the city becomes an issue due to the effects of CC to agriculture.

Apart from the Dengue fever, water borne diseases may also become prevalent due to climate change. These include Cholera, Leptospirosis, and diarrheal diseases. Given the water and sanitation conditions in the city where some 38% of the total households have no access to safe drinking water and sanitation, cholera and diarrheal diseases may rise due to contamination caused flooding that is brought by increased precipitation.

iv. *Social Capital:*

Social capital refers to norms and networks that enable collective action. It encompasses institutions, relationships, and customs that shape the quality and quantity of a society's social interactions. Urban poor groups and its federated network present in the City are actively working with most of the hotspots. However based on initial interviews, organizational capacities of the groups are still relatively weak.

During the FGD with communities and LGU assessment, no evidence has yet been found that inclusionary and collective action/cooperation is being done in the areas of disaster risks and preparedness measures towards building risk resilient communities. This could be attributed to the general public's limited knowledge and information on climate change risks and threats.

Non-Government organizations (NGO) are present and are operating in the city. They provide various services such as community organizing, livelihood support, environmental management assistance, and shelter provision. The city however has limited engagement to date yet with the NGOs operating in the area. This is mainly due to the fact that the NGOs directly work with the community for projects and does not necessarily work together with the LGU on their initiatives. Active NGOs in the city and those which are possible partners have been assessed *(See Annex)* in order to identify possible directions that could be taken relative to establishing partnership with these vital social groups that could increase peoples social capital especially in increasing their resilience to climate chance impacts.

The FGDs were able to gather from the communities that Gawad Kalinga and Habitat for Humanities have projects in Poblacion Bacon. Most of the hotspots mentioned that they have been assisted previously by NGOs like People's Alternative Livelihood Foundation in Sorsogon, Inc (PALFSI), and Cope Foundation, Inc.

v. *Women and Disaster Risk Reduction:*

Women in the City accounts to 49.7% of the total population (2000). Though the latest census does not present a gender disaggregated data of the actual population in the city for 2007, it is assumed that women still accounts for the same percentage of the population for the said year.

Generally, women are more vulnerable to climate variability and disasters than men because they have less access to resources, are victims of the gender division of labour

and are the primary caregivers to children, the elderly and the disabled even during disaster events. Women are also less able to mobilize resources for recovery and rehabilitation, more likely to be unemployed following the disaster and overburdened with domestic responsibilities, leaving them with less freedom to pursue sources of income to alleviate their economic burden. Also, lactating women during disasters are also prone to higher risks and stresses. On the other hand, experiences in previous disasters and coping strategies elsewhere indicate that women may also take the lead in accessing the natural resource base, rebuilding houses, caring for children or relatives, and working in community groups.

FGD with communities revealed that in previous disasters that devastated Sorsogon, women experienced heavy burdens especially that they needed to extend their roles to cope and recover from the damages in their homes and livelihoods. Women in Sorsogon City during the past two cyclones and in the context of disaster recovery expanded their roles to generate additional income to support the family. Immediately after the cyclone, the women were in the forefront of looking for resources that could be used to restore or augment their limited and damaged livelihoods. They have tried accessing financial resources support and small business information and training programs from local micro-finance organizations in the City like the case of PALFSI. The Self-Employment Assistance Kabuhayan (SEA-K) program of the Department of Social Welfare and Development (DSWD) through the LGU of Sorsogon City was also amongst the available livelihood programs that were accessed by affected women beneficiaries. Indeed, the women in Sorsogon played an important role in the overall livelihood and social recovery after the two super typhoons that devastated the city in the late 2006.

Women headed households given climate change impacts would have increased vulnerability especially in the occurrence of the following: decrease in potable water sources, damage to houses, disrupted livelihoods, increase incidence of vector-borne diseases in their family, flooding which limits mobility of those who are engaged in vending and services, among others. However, these gaps and limitations could be prevented or minimize through an integrated and community-based programmed approach to climate change adaptation and mitigation.

vi. *Education and limited knowledge/information on CC:*

Based on the latest literacy mapping report for the city, literacy rate is at 91%. This poses as an opportunity for a possible good reception and understanding of climate change risks. However, current situation is that the general public has very limited knowledge and information on climate change. Efforts at the national level to mainstream climate change issues and information in the national education curricula for students across levels has not yet translated or perhaps piloted in schools in Sorsogon. Also, limited IEC materials have been disseminated in the city to develop people's understanding of the basics of climate-related issues.

Table 11

	TOTAL POPULATION			Total # of literates			Total # of illiterates			Literacy rate		
	M	F	T	M	F	T	M	F	T	M	F	T
Bacon,E	9039	8623	17662	7100	6755	13855	732	700	1432	90.65	90.63	90.63
Bacon,W	11282	11083	22065	7217	6567	13894	2437	2335	4772	74.67	73.33	73.33
Sor. East	25420	23927	49347	22111	20786	42897	415	369	784	98.16	98.21	98.21
Sor.West	22234	21984	44218	18825	18951	37776	1143	912	2055	94.26	94.84	94.84
Total	67975	65617	133292	55253	53059	108422	4727	4316	9043	92.06	91.29	91.29

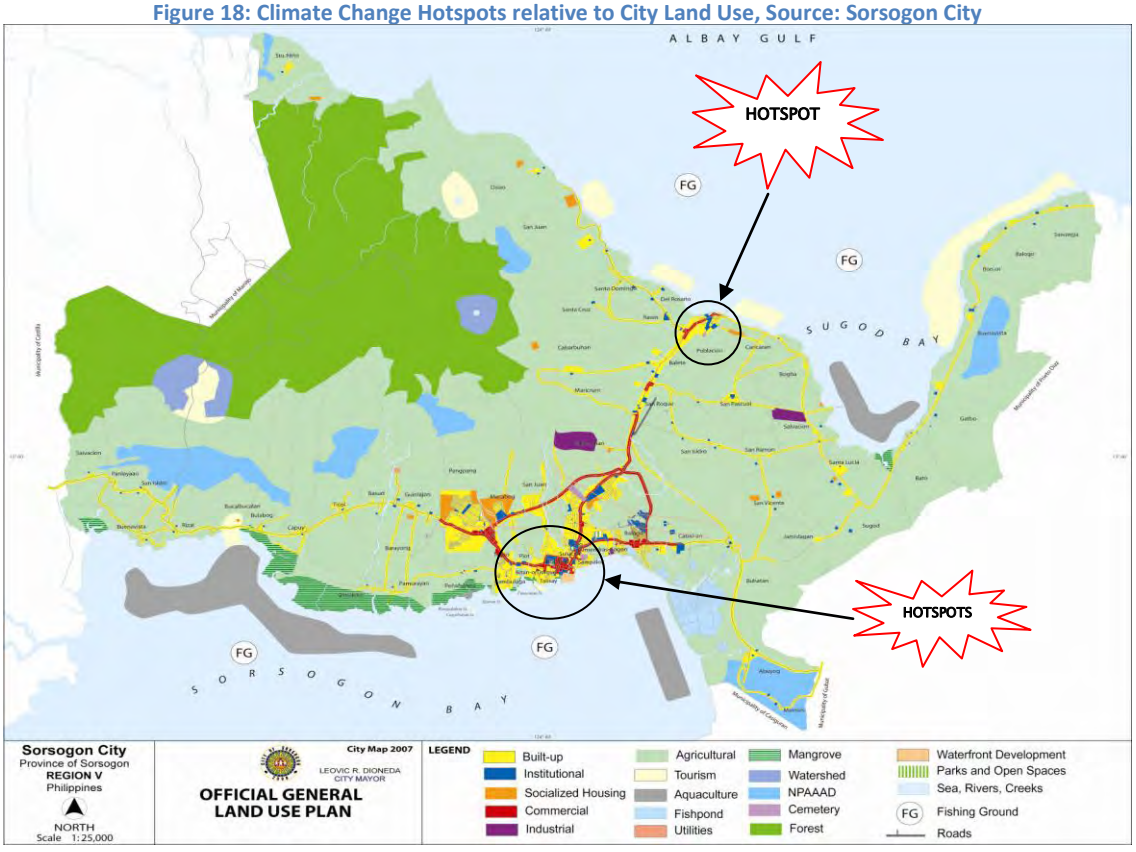
C.2 Location and Land Use

The location of people and land use are critically looked at in this V&AA considering that they are important to identify risks of CC impacts on an area level. Area sensitivity assessment is especially vital to establish the link of climate change with the city's spatial plan and resource management program.

i. Built-up Zone

Figure 18 presents the city climate change hotspots against the current general City Land Use Plan (CLUP). It could be gleaned that most of the hotspots are situated in built-up and commercial areas identified in the current approved CLUP (2007-2012).

Figure 18: Climate Change Hotspots relative to City Land Use, Source: Sorsogon City



- **Housing, Settlements and Commercial Spaces:**

Forty five percent of the households in the city have no rights to the land their houses are built on. According to the City CLUP, majority of the dwelling units are single detached houses, of recent construction, and made up of wood and temporary materials. Median floor area is 22 square meter.

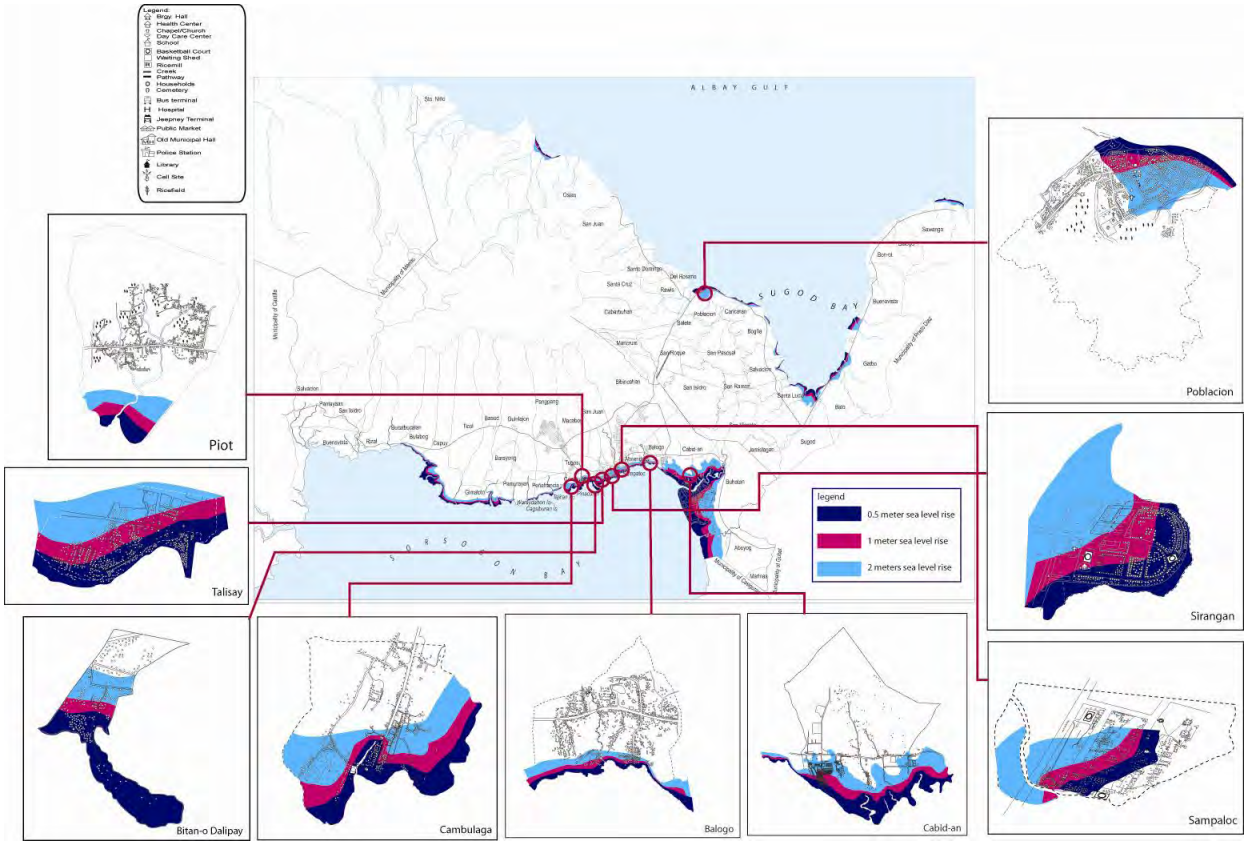
Informal settlements are usually situated in coastal areas, riverbanks, road-right-of-ways/roadway, and unlawfully dwells in private and government lands. Mostly, the houses in poor urban communities are either made of makeshift materials or light materials which are most susceptible to damages that could be brought by strong tropical winds and heavy rains.

House structure reinforcement and new technology to adapt to stronger winds, heavier rain fall, and the increasing sea level are not yet popular to the general public. The vulnerable urban communities because of because of the lack of security in tenure are hesitant to build stronger structures. People use indigenous means to cope with cyclones like tying their makeshift house to strong poles, and putting weight (e.g. old tires and stones/rocks) on the roof. However such indigenous ways have proven to be insufficient to protect their houses from damages. With about 5000 housing structures in the city being damaged yearly by typhoons, about Php 150 million is spent for housing reconstruction each year assuming a Php 30,000 cost of reconstruction for each.

Meanwhile, it is notable that the commercial spaces where businesses operate are located in the Hotspots (Figure 18). These commercial spaces are likewise exposed to flooding, strong winds, and sea level rise. It is noted that commercial structures which are technically sound would have greater resilience to these exposures especially when it was factored in the structural designs. What the city however notes is that during the Super Typhoon events in 2006 and even during the Typhoon Sisang in 1987, the strong winds, flooding and storm surge have caused major damage to structures in the commercial area. This makes the city account the “siting” of commercial spaces as their main factor for sensitivity.

Inundation of lands that could be brought by sea level rise in the hotspots is summarized in Figure 19. Dramatic movements are likely to happen as spaces currently used and occupied following the land use plan would be altered. The city however still has the capacity to adapt with the said event as there are still available lands that could be developed to address the future residential/commercial needs. The challenge now for the city is to do anticipatory planning and incorporate climate change parameters in their CLUP so that it becomes more responsive to projected impacts of the changing global climate.

Figure 19: Combined projected SLR mapping in urban hotspots, Source Project Team



- **Public Infrastructure and Linkage system:**

Public infrastructures and linkage systems are susceptible to damages from extreme weather events and sea-level rise. As experienced during the previous disasters brought by super typhoons Milenyo and Reming, there are bridges and roads in the city that became inaccessible. Electricity and communication transmission lines were down-communication services were down for three days while electricity were out for almost 3 months in some areas. When extreme events occur once again, extensive contingency preparation must be done to support these vital linkage infrastructures especially the bridges linking various areas in the City. The condition of the bridges in Sorsogon City as reported by DPWH is presented in Table 7.

The seawall that protects most of the coastal communities from storm surge has been heavily damaged by the two super typhoons in 2006. Though repair activities have already been done, only minor sections have been repaired due to limited budget from both local and national government. As revealed during FGDs, most of the hotspots considered the present condition of the sea wall in their areas as a major factor that increases their vulnerability to storm surge and sea level rise. The city government however lacks consolidated information on the structural gaps of the sea wall considering that the said protective infrastructure is managed and maintained by the national government through the Department of Public Works and Highways.

Table 12: Condition of Bridges in Sorsogon City (2006)

Bridge Name	Location	Year Constructed	Seismic Vulnerability Rating	Structural Condition of Bridge Components	Total Rating	Remarks
Buhatan	Buhatan (Maharlika Hwy)	1973	58	78	64.80	Damage detected is critical
Alice	Maharlika Hwy	1969	43	75	55.80	Damage detected is critical
Cawayan	Basud (Maharlika Hwy)	1977	73	55	65.80	Damage is slightly critical
Bagacay	Bulabog (Maharlika Hwy)	1961	73	25	53.80	Routine maintenance is necessary
Tublijon	Rizal (Maharlika Hwy)	1965	63	25	47.80	Routine maintenance is needed
Abuyog	Abuyog (Maharlika Hwy)	1973	50	43	42.20	Damage is slightly critical
Sorsogon	San Juan Diversion Road	2001	63	10	41.80	Painting is recommended
Gabao	San Roque Sorsogon-Bacon	1950	48	25	38.80	Routine maintenance is necessary
San Juan	Bacon-Manito	1979	48	25	38.80	Routine maintenance is necessary
Milabiga	Bacon-Manito	1979	46	25	37.60	Routine maintenance is necessary
Mati	Sto. Domingo Bacon-Manito	1979	43	25	35.80	Routine maintenance is necessary
Otoc	Rawis Bacon-Manito	1979	43	25	35.80	Routine maintenance is necessary
Rangas	Rawis Bacon-Manito	1979	43	25	35.80	Routine maintenance is necessary
Gomihan	Bibincahan Diversion Road	2001	43	10	29.80	Routine maintenance is necessary

Source: Department of Public Works and Highways

ii. Agricultural Zone

The agricultural area of Sorsogon City dominates the total land use with 22,970 hectares or 73.4% of the total land area still classified for agriculture use. Major produce of the area include rice, copra, abaca, vegetables, pili and other crops and fruits (Table 13).

Table 13

Crop	Production (metric tons)	Areas Planted	Number of Farmers
Rice	9,451.08	2,051.77	2081
Copra	6,318.67	9,930.00	7,277
Abaca	640	1,997.00	720
Vegetables			533
a. Leafy vegetables	160	20	43
b. Fruit vegetables	600	60	55
c. Root vegetables	60	5	30
Pili	152.21	112.59	116

Cassava	1530	85	249
Sweet Potato	810	54	160
Coffee	6.825	19.5	9
Pineapple	30	5	22
Banana	4,120	206	458
Papaya	90	5	160

Climate stresses to the agricultural zone is mainly associated with flooding and strong winds. Areas planted with rice would be at risk to flooding, while Pili and coconut plantations are highly sensitive to strong winds. As an indication of vulnerability, there are 25,598 of the total 903,919 coconut trees which were damaged by the 2006 super typhoons. To date, the trees are still trying to recover considering that it takes 3-5 years for it to begin producing fruit. There were no reports available on Pili tree plantation damages. Its susceptibility to losses and damages must be noted and further reviewed considering that the province is believed to be the major source (70%) of the total Pili production in the whole region.

iii. *Forest and Watersheds*

Table 14

FORESTLAND	FOREST RESERVE (PNOC)	MANGROVE FOREST RESERVE	MANGROVE TIMBERLAND	MANGROVE FOR FISHPOND DEVELOPMENT	TOTAL
A. Bacon	3,1566.41	199.00	-	-	-
B. Sorsogon	3,603.97	204.33	107.58	341.47	-
TOTAL	6,760.38	403.33	107.58	341.47	7,612.76

Source: City Environment and Natural Resources Office; CLUP

Classified forestland accounts to 24% of the total land area of the city. The CLUP accounts that secondary growth forest, which is equally accounted for by open and close canopy mature trees, covers the timberland. Some areas are cultivated, and the rest are brush land and grassland. Forestland is composed of the timberland area that is part of the PNOC geothermal field, the watershed area in the northeast part of the city, and the mangrove areas along the coasts of Sorsogon Bay and Sugod Bay.

There are no reports that further detail the biodiversity and effective forest cover of the city as well as the state of the watershed. Such are crucial in defining further the sensitivity of the city's environmental condition in view of climate change impacts. The city fully recognizes that forestland is very important in both their mitigation and adaptation actions much as it is crucial for heat absorption and evapotranspiration.

C.3 Activity Sectors – Local Economy and Lifelines

i. *Trade, Commerce, and Service Oriented Livelihoods*

Sorsogon City is the center of trade and commerce in the Province. Majority of the commercial establishments operating in Sorsogon are primarily geared towards retail

and wholesale while other economic activities fall under the service industry. Among these are hotels, lodging houses and restaurants, repair shops, groceries and supermarkets, hospitals, clinics, and transport and telecommunications companies. The Permits and License Division of the city report that as of 2007, 60% of registered business is service-oriented while 11% are small manufacturing shops.

Businesses are mainly concentrated in the downtown area near the public market and major commercial establishments. The presence of 12 financial institutions – nine of which are branches of national banks – further reinforces Sorsogon City's position as sub-regional center. With the onset of cityhood, two medium-scale malls have been constructed, and a third is in the planning and initial marketing stage. Also, a 300-hectare Economic Zone has been identified in the north-eastern part of the city. It covers the barangays of Buhatan, Cabid-an, and Bibincahan. Within the Economic Zone and along the diversion road a 50-hectare agro-industrial zone is being proposed. As support to the transshipment corridor role of the province, it will accommodate the food terminal (bagsakan), warehouses, storage facilities, and light industries.

The threat of climate-induced risks to Sorsogon City has far-reaching implications to trade and commerce. Increased precipitation threatens the commercial areas with flooding incidents while hotter days are expected to alter production patterns of the small manufacturing shops. With these, the service oriented livelihoods of the people are likely to be affected especially those which are dependent on climate and weather patterns (i.e. fish and agri products processing/ trading/vending; tourism; transport). Further, the health issues which may be brought by the changing pose a great threat to those engaged in service oriented livelihoods.

Following the sea level-rise scenarios of 0.5 m, 1.0 m of the IPCC as well as the 2.0 m worst case scenario, the downtown area where major commercial establishments are located would be inundated. This could be gleaned by comparing the succeeding Figures (21 and 22).

Figure 20: City Urban Land Use Map highlighting the Commercial/Trading Area, Source: Sorsogon City

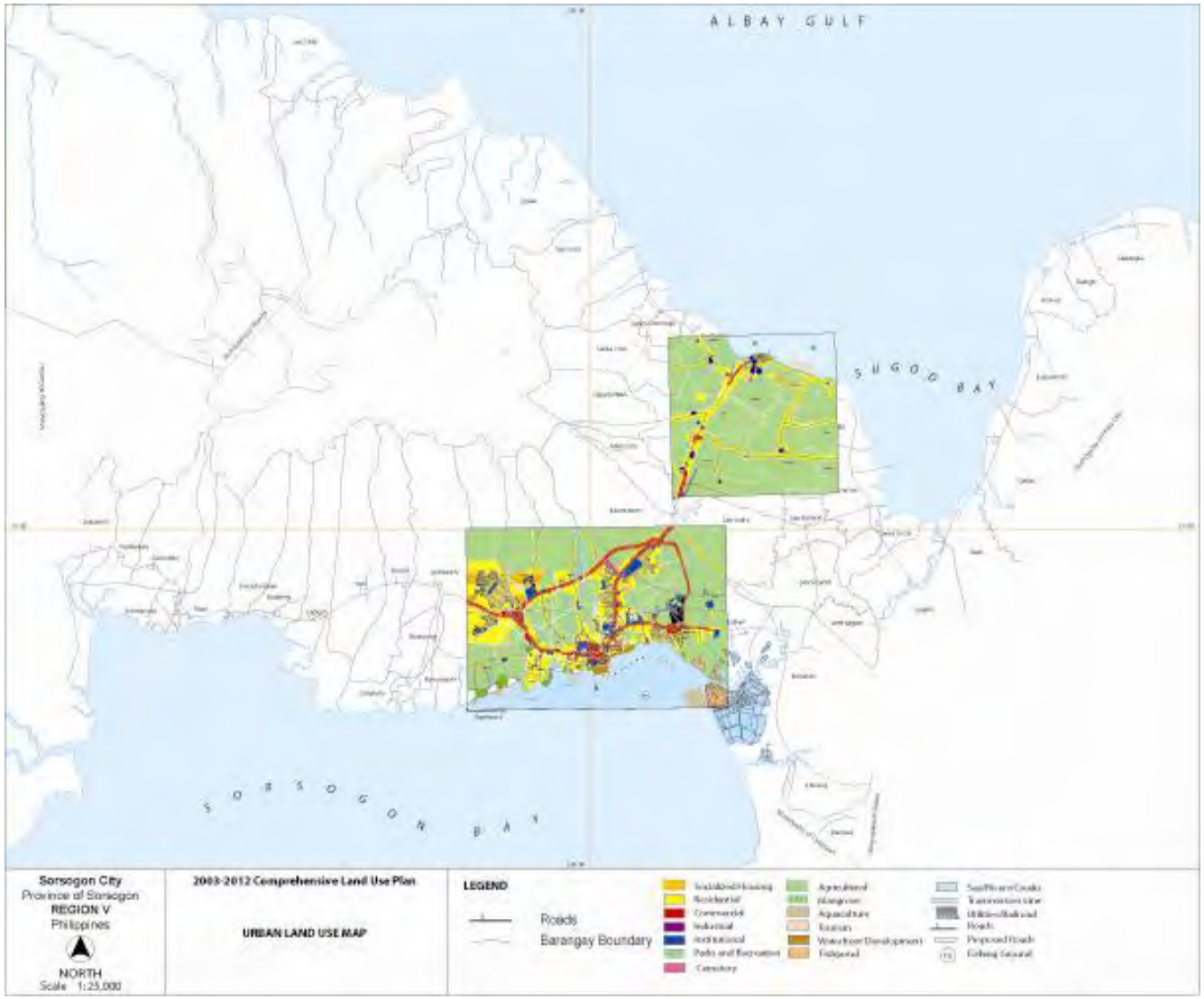
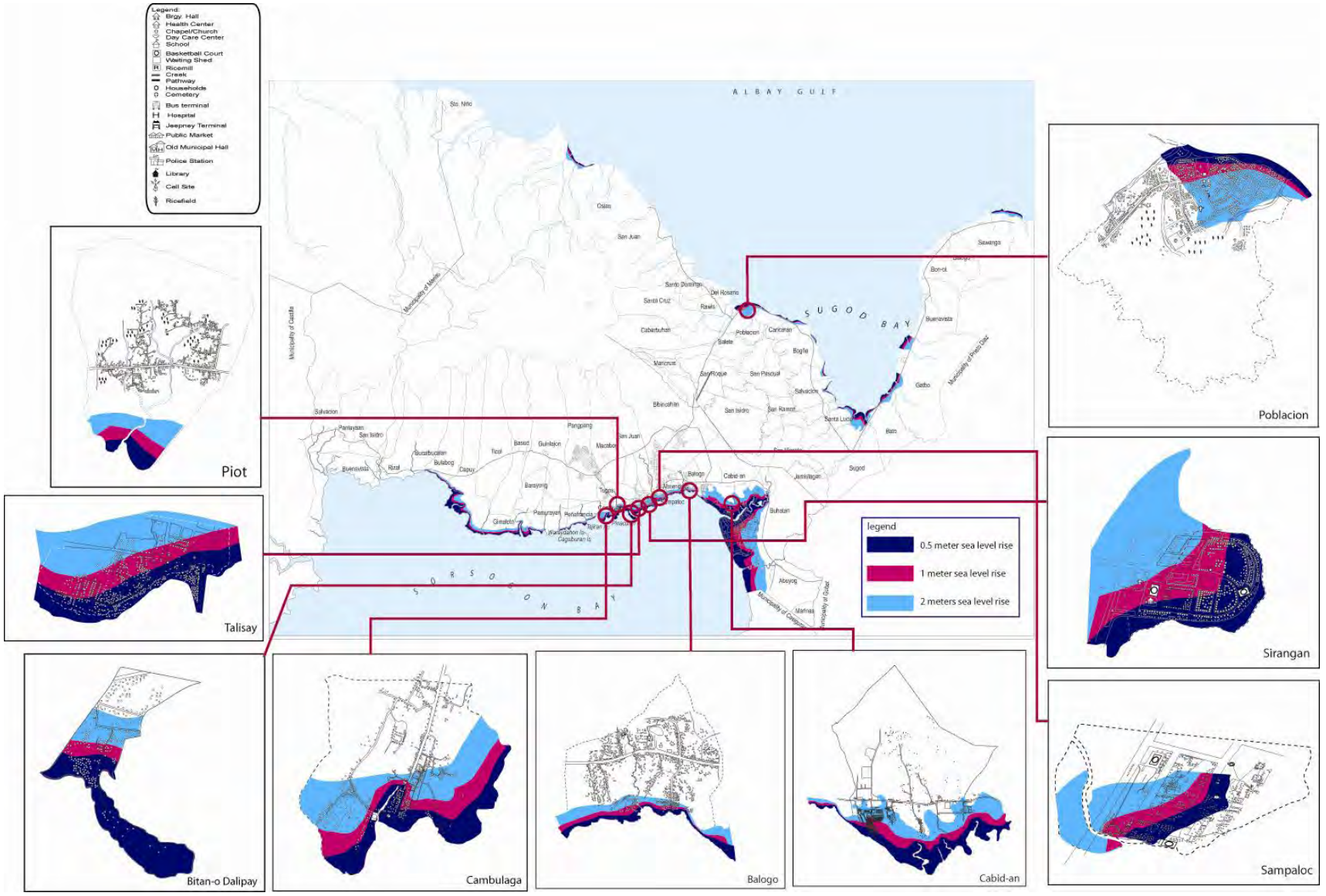


Figure 21, Source: Project Team



ii. Tourism

The presence of whale sharks in the town of Donsol placed Sorsogon Province in the world tourism map. Because of the city's role as administrative and commercial hub, foreign and domestic tourists invariably included the city in their itinerary. Besides historic turn-of-the century structures like the Provincial Capitol and the Sorsogon national High School, Sorsogon also serves as jump-off point to the tourist spots in the province.

It is for its many natural attractions, though, that Sorsogon is known. Rompeolas, with its walkway that serves as promenade, offers spectacular views of sunrises and sunsets, as does Paroja Hill and Grotto, which overlooks Sorsogon bay. Bucalbucalan and Palhi Springs in the West District and Busay Falls in the PNOC Exploration Site are ideal for cooling down, especially in the summer months. Bacon district has its beaches, limestone caves, lakes and a marine sanctuary. Most notable of these are Paguriran Beach, which is surrounded by dark basalt, Tolonggapo in Caricaran and the Bato Limestone Caves inside which were found prehistoric artifacts.

The City as the commercial hub of the province caters to the needs of the majority of 60,415 Filipino tourists, 38,881 foreign and 1,088 balikbayans that visits the province. *(Dept. of Tourism Region V Office, 2006)*

To attract more visitors and to highlight the City's tourism potentials, two festivals are held annually: The Pili Festival in June and the Kasanggayahan Festival, which celebrates the Province of Sorsogon's foundation in October.

The tourism sector is projected to be greatly at risk with multiple climate change exposure of the city especially that its activities are very much related to seasonal weather and climate patterns. The areas at risk are the beach resorts and the parks located at the coastal areas. This would also implicate the tourism related businesses in the area – affecting the livelihoods and revenues that will be derived in this sector. The area (Caricaran resort area) also should work on utilizing and adapting building designs and structures that are more resilient to stronger winds and more frequent and prolonged rainfall. As the area is directly facing the Pacific zone, the identified risks are mostly linked to extreme event hazards brought by cyclones (e.g. excessive rainfall and stronger winds).

iii. Agriculture

Agriculture plays a major role in the economy of Sorsogon City and its production is highly vulnerable to extreme rainfall and increased precipitation. Rice production covers a total land area of 2,482.4 hectares, where 23.42% or 581.4 hectares are cultured based on rain-fed system. The total rice production in the city involves 3,313 farmers. The city has a total area of 9,930 hectares of land devoted to coconut farming, in which there are 2,964 coco farms

Fisheries and Agriculture are key for livelihoods in Sorsogon © Sorsogon City/Joselito Derit

903,919 coco trees, 25,598 of which were damaged by past typhoons (2006). It also has 749,677 fruit bearing trees, while non-bearing trees account to 146,446. Other crops include banana, jackfruit, papaya, coffee, avocado, guava, santol, bamboo, cassava, gabi, camote, pineapple, and vegetables. Production of food crops, except for coffee and pili nut, is marketed as fresh. Sorsogon accounts for 70% of total Pili production in Bicol Region.

The City Agriculture Office through the support of the Department of Agriculture (DA) at the national level has produced and had been promoting new rice varieties that could more or less withstand the hazards and variability brought about by climatic conditions. For instance the City Agriculture Office is now promoting and distributing some seed stocks that are adaptable to excessive water (flooding) and strong winds and humidity. The IRRI 46 variety is an example of this adaptation. Table 9 shows the rice varieties that were developed and promoted by DA as adaptation to climate variability such excessive water, drought and strong winds. However, adaptation is deemed to be not enough to reduce the risk exposure of farmers to climate variability. Thus, preparedness measures and adaptation measures and farm planning that is based on "seasonality" (anticipating weather disturbances and climate variability) play a crucial role in this respect. Preparedness practices of the local farmers that could be enhanced further include the usage of open-pollinated seed stocks, diversification of farming systems like inter-cropping and integration of vegetable growing and root crops, backyard livestock, savings mobilization and community-based insurance scheme. In the long term, the city government should also embark on identifying alternative or buffer plots that could be used for agricultural production that are more secured from the risks of flooding, drought and sea level rise.

Table 15: Rice Varieties Adaptable to Specific Climate Variability and Shocks

Rice Variety/Breed	Resiliency Type
▪ IR 64 ▪ PSB Rc18 ▪ PSB Rc 76H ▪ IR 42	Adaptable to excessive rain water and flooding. Also classified as tall varieties.
▪ PSB Rc16 ▪ PSB Rc24 ▪ PSB Rc70 ▪ UPL Ri7 ▪ UPL Ri5	Less water/drought, dry seeded varieties and also suitable for upland and rain fed type of farming.
▪ PSB Rc8 ▪ PSb Rc6	Short stand varieties, more resilient to strong winds

The most vulnerable rice growers are the ones located in the 9 coastal areas (see Fig. xx).18). There are 211 rice farmers in these areas tilling a total of 205.75 hectares. However, extreme events such as strong typhoons (120km/hr or more) will make all the agricultural production vulnerable to damages and losses. By recognizing this scenario, the investments and actions for preparedness, adaptation and systematic agricultural recovery programming, therefore, become a major concern.

Also the existing irrigation systems in the city have a danger of being destroyed in the event of extreme cyclones and prolonged monsoon rains, which could further put a strain on the agricultural production.

Nine irrigation systems serve 1,332 hectares of rice land though most of the systems need repair and upgrading. Only 957 of the service area are effectively served. The old and partially damaged irrigation systems in the city put more pressure on the vulnerability of the rice growers, especially during the rainy and typhoon season (September to January).

- **Fisheries**

Sorsogon City is endowed with a wide array of fishery and aquatic resources being blessed with two (2) diverse city waters: the Pacific Ocean in Bacon District and China Sea in Sorsogon District. Major fishing grounds include marine waters of Albay Gulf and Sugod Bay for Bacon District and Sorsogon Bay for Sorsogon District. Both Districts other than the above marine waters are rich in rivers and inland fisheries where freshwater and brackish water aquacultures are tapped to supplement fishery production.

These resources, however, are threatened by manmade and natural ecological destruction and are also hard to come by in times of typhoon when fisherfolks are compelled to temporarily desist from their fish farming activities. Likely impact of climate change includes destruction to aquaculture sites and fishing implements such as fishing boats that are mostly traditional and small (less than 1 ton capacity).

Moreover, disasters could likewise alter fish, fisheries and aquatic resource distribution, diversity and production, in turn affecting socio-economic conditions of the people.

Capture fishery activity include the gathering of carpet shell (Baduy), Kapiz shell (Placuna placenta), and blue crabs. Majority of the mentioned products are highly valued for export except for the green mussel thriving in Sorsogon Bay due to high fecal coeliform contamination (REA by Ubitech, 1994) and is highly vulnerable to extended red tide contamination. (BFAR Shellfish Bulletin: Sept. 2006-present). Local authorities and local experts relate the prolonged incidence of red tide to massive soil run off and flooding brought by the 2 cyclones in the last quarter of 2006 (climate-induced hazards). However, no studies yet were conducted to scientifically attribute the incidence of red tide to climate change. In addition to this, aquaculture production covers a total area of 227.33 hectares and the average annual production per year per hectare was monitored at 44,268 kilograms. Aquaculture activities include that of Tilapia culture in freshwater fishponds, prawn, mud-crabs, milkfish, and shrimp culture in brackish water fishponds. Mariculture activities include that of Seaweed (Kappaphycus alvarezii) culture and Green Mussel (Tahong) culture in Sorsogon Bay. These are highly prone to typhoon, storm surge and flood damage.

There are 4,304 fisherfolks in the city. These fisherfolks are using small fishing boats- using motorized and non-motorized boats. Average daily fish catch is low - recorded at 2.75 kilos and the average number of boats unloading on a daily basis in the whole city is 1,530. This means that not all of the fisherfolks have their own or individual fishing boats. Most of the fishing households are below the poverty threshold, making them more vulnerable to day-to-day shocks and to climatic-induced hazards. The hazard mapping of the City and the CC-TWG has identified a total of 1,291 fisherfolks in 9 villages to be the most vulnerable to multiple hazard exposure. Furthermore, there are also 211 fish vendors (Bacon District) whose livelihoods are likely to be disrupted particularly during extreme events and majority of these vendors are women.

Table 16: Aquaculture, 2007

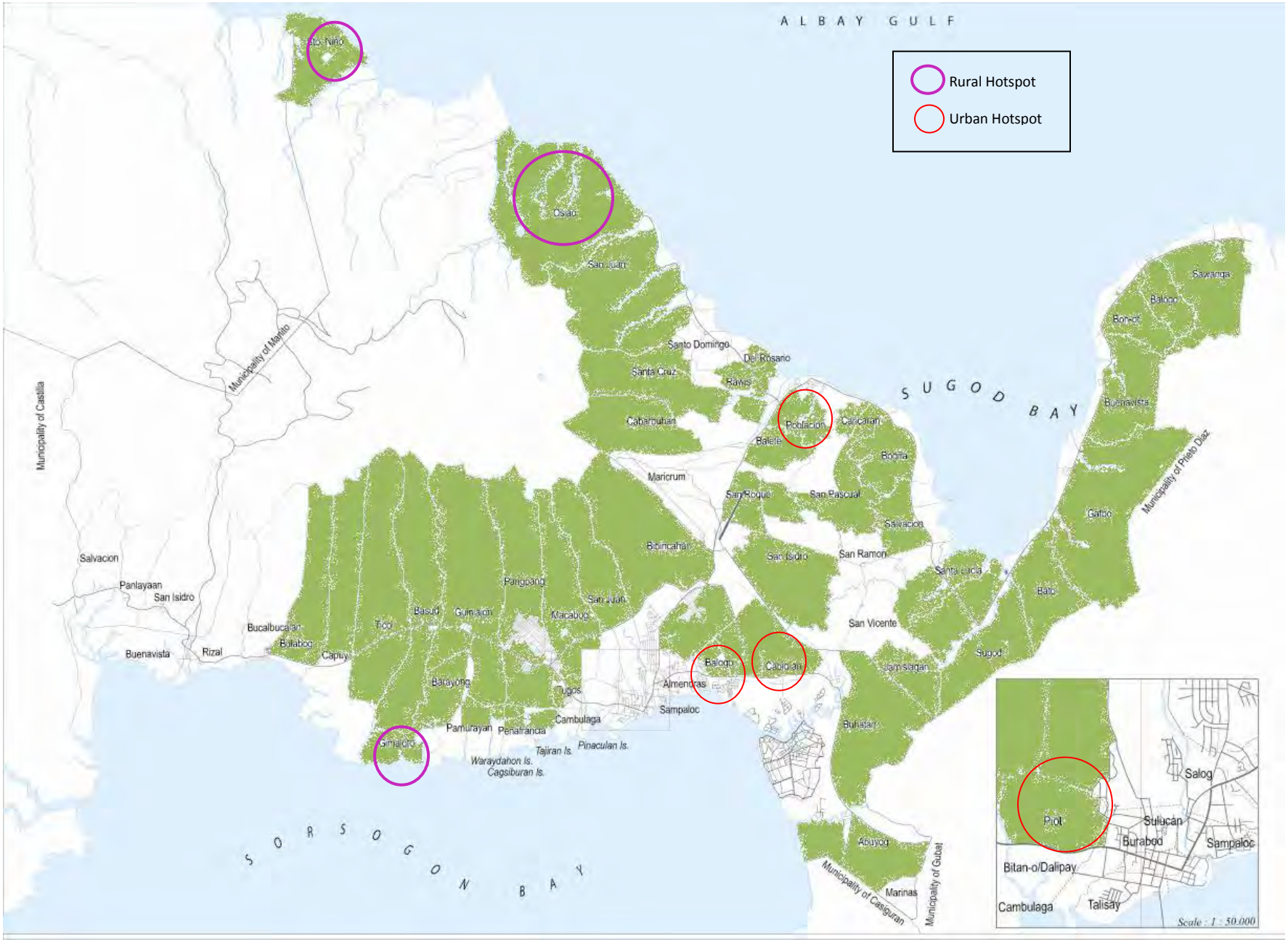
Fish production	
Municipal fishing	754.348 kg.
Backyard fishpond	123.4 kg.
Tilapia culture	123.4 kg.
Seaweeds (east and west dist)	11470 MT

S*ource: City Agriculture* Office

Small-scale processing plants produce semi-processed seafood for export. Post-harvest technology comes in a variety of activities which include preservation of fishery and aquatic products in different methods like icing, drying, freezing, glazing, smoking, and to some extent processing them into value-added products like fish balls, fish crackers, and the like. Of the above- mentioned post harvest techniques, icing, freezing, and glazing are the common methods adapted by one small processing plant existing in the city. These fishing-related business and livelihood activities are likewise to absorb the effects and impacts of climate change in the future.

Similar to the case of farmers, the fishing dependent livelihoods should expand their practices and technologies to be more adaptable to the potential impacts of climate change. The Bureau of Fisheries and Aquatic Resources (BFAR) and the local universities (Bicol University & Sorsogon State Colleges) could provide services in areas of research and extension work. As the current fishing methods in the City are of conventional and traditional type (with only minimal average daily fish catch of 2.75 kilos per fisherfolk), there is an increasing need to look for adaptable technologies that will enhance the economic and food security of the fishing communities. Extreme events such as strong typhoons (e.g. Sisang, Milenyo & Herming) and storm surge for instance in the past, greatly affected the fishing activities in the city. Common type of damages include the impairment of fishing boats, loss of fishing gears and nets, and damaged fish ports and aqua-culture plots. The current red tide in Sorsogon Bay after the cyclone Milenyo in 2006 has likewise disrupted the employment and incomes of at least 245 households that are dependent on “green mussel” culture with an estimated production of 141.8 metric tons in 2006 (prior to Typhoon Milenyo).

Figure 22: Rice Production Areas and Identified hotspots, source: Project Team



3.1.4 City Adaptive Capacity: People and Institutions

In initiating a quantitative assessment of adaptive capacity, the city used selected socio-economic indicators and proxy indicators for technology and infrastructure as measures of capacity. The chosen dimensions and indicators are presumed to be key resources and/or assets towards developing responses to climate change at the individual/community level. Weights were defined based on the judgment of the assessment team relative to the dimension's/indicators' degree of importance in off-setting negative climate change impacts. The results shows that from the highest possible value of 1, the city's adaptive capacity is found to be higher than the mid-point as it registered with a 0.61 rating.

QUANTITATIVE ASSESSMENT OF SORSOGON CITY CC ADAPTIVE CAPACITY

DIMENSIONS, INDICATORS AND RATINGS TO BE USED				CITY ADAPTIVE CAPACITY ASSESSMENT				
						Score	Wtd Score	Total Score
Socio-economic Dimension			**0.50**					**0.32**
HH above Poverty Threshold	*0.40*					0.57	0.23	
HH with secure tenure	*0.20*					0.46	0.09	
Literacy Rate	*0.20*					0.93	0.19	
PO/CBO/MFI membership	*0.20*					0.7	0.14	
							0.65	
Technology Dimension			**0.25**					**0.19**
Access to telecommunications	*0.30*					1	0.3	
Access to electricity	*0.30*					0.94	0.28	
Functional DRR Plan	*0.40*					0.5	0.20	
							0.78	
Infrastructure Dimension			**0.25**					**0.10**
HH with safe water access		*0.25*				0.72	0.18	
Paved Road		*0.25*				0.60	0.15	
Protective Infra		*0.50*				0.21	0.10	
-Sea Wall	*0.5*			0.7	0.35		0.43	
-Safe Housing Unit	*0.5*			0.16	0.08			
					0.43			
			1.00					**0.61**

Legend:

Assumed Weight per indicator

Total weight of indicators for the dimension

Score for poverty incidence is the % of households (HH) above poverty threshold/100

Score for informality is the % of HH with secure tenure/100

Score for literacy rate is literacy in the city/100

Score for PO/CBO/MFI membership is the % of HH (est) who have membership to associations (proxy of social capital)/100

Score for telecom is the % HH with access to communications (celphone, etc)/100

Score for electricity is the % of HH with electricity connection/100

Score for DRR is rated at 50% (based on judgment)/100

Score for safe water access is the % of HH with access to water/100

Score for paved road is the assumed % of road that are paved/100

Protective Infra is further divided by 2 sub-indicators: Sea wall where score is assumed rate of sea wall functionality/100; and safe housing where score is the % of HH estimated to have housing that were not affected during the last super typhoons

Wtd score = score x indicator weight

Sum of weighted scores

Dimension total score = sum of weighted score x Total weight of indicators for the dimension

Total Adaptive Capacity Score = Sum of Dimensions Total Score

The discussion below looks at the role and capacity of the city goverment's and as an institution to promote resilience from negative impacts of climate change. The city goverment, as the provider of policies, framework and services that would facilitate functionality in local systems and process in time of economic and natural distress, is deemed to be the core of the overall adaptive capacity of the city.

A. Governance

Decentralization of governance in the Philippines came upon the approval of the Local Government Code (LGC) of 1991. Politically and administratively, LGUs are categorised further into three sub-levels: the provinces at the highest level, followed by the municipalities or cities at the intermediate level, and the barangays (villages) at the lowest level. Each lower level LGU is under the administrative control of the next higher level LGU.

The central fiscal transfer system in the Philippines is classified into two major parts. First is the "revenue share" composed of Internal Revenue Allotment (IRA) and the Special Share in National Wealth/Taxes. The IRA is the share of sub-national governments (LGUs) in the internal tax revenues of the national governments, which include taxes on income and other levies imposed by the Bureau of Internal Revenue. The second is called the "categorical grant", which covers Municipal Development Fund (MDF), Countrywide Development Fund (CDF), Calamity Fund and other miscellaneous purposes. Under the LGC, the vertical sharing of the IRA is as follows:

Provinces	=	23%
Cities	=	23%
Municipalities	=	34%
Barangays	=	20%

City classification in the Philippines:
Highly Urbanized Cities - Cities with a minimum population of two hundred thousand (200,000) inhabitants, as certified by the National Statistics Office, and with the latest annual income of at least Fifty Million Pesos (P50,000,000.00) based on 1991 constant prices, as certified by the city treasurer. There are currently 33 highly urbanized cities in the Philippines, 16 of them located in Metro Manila.
Independent Component Cities - Cities whose charters prohibit their voters from voting for provincial elective officials. Independent component cities are independent of the province. There are five such cities: Dagupan, Cotabato, Naga (in Bicol), Ormoc and Santiago.
Component Cities - Cities which do not meet the above requirements are considered component cities of the province in which they are geographically located. If a component city is located within the boundaries of two (2) or more provinces, such city shall be considered a component of the province of which it used to be a

The LGC has paved the way for LGUs to be responsible in planning for and managing local resources. The LGC further requires the LGUs to prepare comprehensive land use plans (CLUP) and comprehensive development plans (CDP). The compliance in the development of the CLUPs is regulated, monitored, and approved by the Housing and Land Use Regulatory Board. CDP's on the other hand are discussed and approved by the city and regional development councils (CDC and RDC) under the direct supervision of NEDA.

There are three classes of cities in the Philippines: the highly urbanized, the independent component cities which are independent of the province, and the component cities which are part of the provinces where they are located and subject to their administrative supervision. Not having met the criteria for a highly urbanized city and without the prohibiting charter of an Independent Component City, The City of Sorsogon is classified as a component city of the Province of Sorsogon.

By looking closely into the institutional structure of the City Local Government, the key and critical Departments that could be tapped relative to climate change adaptation and mitigation actions are the following: City Environment and Natural Resources Office (CENRO); City Planning and Development Office (CPDO); City Engineering Office (CEO); City Social Welfare & Development Office (CSWDO); the City Health Office; City Agriculture and Fisheries Office; and the City Disaster Coordinating Council.

Results of LGU assessment however revealed the following critical factors that pose as constraints in the governance/institutional aspect of Sorsogon City in pursuing actions toward climate change mitigation and adaptation:

- limited technical capacity of city government staff relative to Environmental Planning and Management;
- limited knowledge on climate change projected impacts at the global, national, and local levels;
- lack of important hardware such as Geographical Information System as well that could support its environmental and development planning processes coupled with technical capacities in managing information management system;
- absence of a city shelter plan and appropriate governance structure that will focus on the needs and action for the shelter sector;
- weak disaster preparedness and contingency plan.

Despite the constraints mentioned above there are facilitating factors and opportunities within the City governance structure that could prove to be assets in pursuing local actions towards addressing impacts of climate change. This facilitating factors and opportunities include:

- Commitment of the local chief executive and the city council to face climate change issues by (a) learning from and partnering with external partners, (b) engaging stakeholders in the discussions, and sharing its available resources (human, technical, financial) in pursuing appropriate actions;
- Interest and commitment of LGU staff to learn and improve their technical capacities in Environmental Planning and Management;
- Acknowledgement of both the elected officials and the technical staff that they are highly vulnerable to climate change impacts considering their previous experiences from extreme events; and
- There are already local policies issued that are aligned with climate change mitigation and adaptation that could be utilized as spring-board(s) to creating a more focused or programmatic action.

Relief Assistance in Sorsogon
© Sorsogon City/Joselito Derit

B. Disaster Risk Reduction: Organizational Responses and Mechanisms

Disaster preparedness is at the core of the city's development agenda. It is in the hands of the City Disaster Coordinating Council (CDCC). In times of natural catastrophe and other man-made hazards, the city carries out its disaster preparedness plans and contingencies through the City CDCC headed by the City Mayor. The CDCC is mirrored at the barangay/village level with the existence of the BDCCs headed

by the Punong Barangay. Assisting also are the volunteers of the Sorsogon Emergency and Rescue Team and the Philippine National Red Cross for relief operations.

The CPDO provides data and information to CDCC with regard to risk reduction policies, strategies and plans. These include zoning ordinances; natural hazard maps (flood, landslide, storm surge); demographics and logistics and other facilities that could be used by the city to enhance its risk reduction planning and programs. Through CDCC, it has prepared its City Disaster Profile (Office of the Mayor, 2008). The document presents basic profile such as physical and demographic profile; environmentally constrained areas relative to natural hazards; inventory of available relief and emergency goods that are readily available during or immediately after disaster. Parallel to this, the City has also developed its Disaster Risk Management Plan for the fiscal year 2008-2009. The plan focused on two major components namely (1) Disaster Preparedness and Risk Reduction and (2) Mitigation Measures.

After the Super typhoon (2006): CDC at work

With regard to Disaster Preparedness and Risk Reduction, the document formulated specific activities that have been lined line-up for implementation:

- Activation and strengthening of the CDCC
- Identification of hazard-prone areas
- Identification and assessment of evacuation centres per village
- Public awareness campaign on disaster preparedness, prevention and mitigation including dry run and drills
- Organization of community volunteers
- Inventory of Equipment, Relief Goods and Personnel Resources
- Provision of engineering services especially in hazard-risk areas and rehabilitation and
- Constant monitoring and dissemination of the location and the possible direction of cyclones

Integrated to this plan are mitigation measures that emphasize actions on relocation of communities located in hazard prone areas; clearing of clogged water ways; inspection of infrastructures, reforestation programs and other institutional strengthening projects.

Furthermore, the CDCC has also identified its current institutional capacities and limitations/gaps as presented in the table below.

Table 17: The CDCC's Capacities and Gaps in Implementing Disaster Risk Management

Concerns	Capacities	Gaps
Response Plans and Strategies	• Active CDCC/BDCCs and presence of LD Composite Response Teams • Continued conduct of refresher course for frontliners • Trainings and seminars for new volunteers in the barangays • Inventory of supplies and equipment before onset of calamities and providing funds therefore	Lack of some equipment -- • service vehicle assigned to barangay affairs • harness • hard hats with search light • life vests • rubber boats • chainsaw • wet suit
Capacity to Implement	• Proper networking with concerned agencies in the conduct and	

Concerns	Capacities	Gaps
	implementation of the program • Active CDCC Task Units and physically fit Ligtas Disaster Composite Team	
Operational Support	• General Fund and 20% Development Fund • Active CDCC Task units	
Coordination Mechanism	• Established Action Center with satellite radio equipment for easy dissemination of information • Active and well-informed BDCCs/Volunteers • Use of trimedia, cellphones, landline, etc. in coordinating from the Action Center to the barangays • Established coordination strategies with the BDCC and other agencies and private group of volunteers of Composite Response and Rescue Team (CRRT) • Trained frontliners (Department of Education City Division) • Identified evacuation centers • Meeting of CDCC as a policy measure in case of natural disasters for the following purposes: • Deployment of different communities in their respective tasks • Actual identification and assessment of affected areas • Deployment of response teams per priority area • Consolidation of data in affected areas • Distribution of relief assistance	Insufficiency of communication equipment in some barangays like Osiao and Sto. Niño and their sitios, especially where there's no cellphone signal

Identified Evacuation Centers

Table 18: ECs in Bacon District

Barangay	Evacuation Centers
Balete	Central School Bldg., Chapel, Brgy. Hall, DCC
Balogo	Elementary School Bldg., Chapel, Brgy. Hall
Bato	Central School Bldg., Chapel, Brgy. Hall, DCC
Bogña	Elementary School Bldg., Chapel
Bon-ot	Elementary School Bldg., Chapel, Brgy. Hall
Buenavista	Elem./HS Bldg., Parish Church
Cabarbuhan	Elementary School Bldg., Chapel, Brgy. Hall

Barangay	Evacuation Centers
Caricaran	Poblacion Parish Church, Poblacion DCC/Brgy. Hall
Del Rosario	Brgy. Hall, DCC, Chapel
Gatbo	Elem./HS Bldg., Chapel
Jamislagan	Elementary School Bldg., Chapel
Osiao	Elem./HS Bldg., Chapel
Poblacion	Parish Church, DCC, Brgy. Hall
Rawis	Elem./HS Bldg., Chapel
Salvacion	Elementary School Bldg., Chapel, Brgy. Hall
San Isidro	Elem./HS Bldg., Chapel
San Jose	Elementary School Bldg., Brgy. Hall, Chapel
San Juan	Elementary School Bldg., Chapel
San Pascual	Elementary School Bldg., Brgy. Hall, Chapel
San Ramon	Elementary School Bldg., Brgy. Hall, Chapel
San Roque	Elementary School Bldg., Parish Church Brgy. Hall
San Vicente	Elementary School Bldg., Chapel
Sawanga	Elem./HS Bldg., Brgy. Hall, Chapel
Sta. Cruz	Elementary School Bldg., Chapel
Sta. Lucia	Elementary School Bldg., Chapel
Sto. Domingo	Elementary School Bldg., Chapel
Sto. Niño	Elementary School Bldg., Chapel, DCC, Brgy. Hall
Sugod	Elem./HS Bldg., Chapel

Table 19: ECs in East and West Districts

Barangay	Evacuation Centers
Abuyog	Elementary/HS Bldg.
Almendras-Cogon	SNHS/SCC Bldg.
Balogo	Elementary School Bldg., Brgy. Hall
Barayong	Elementary School Bldg., Brgy. Hall
Basud	Elementary School Bldg., Brgy. Hall
Bibincahan	Elementary School/ SNHS/SCC Bldg.
Bitan-o/Dalipay	Elementary School Bldg., Provincial Gymnasium
Bucalbucalan	Elementary School Bldg.
Buenavista	Elementary School Bldg.
Buhatan	Elementary School Bldg., Brgy. Hall, Soreco II Bldg.
Bulabog	Elementary School Bldg., High School Bldg.
Burabod	Elementary School Bldg., PAFC Bldg.
Cabid-an	Elementary School Bldg., Brgy. Hall NFA/BAI Bldg./Seabreeze Church
Cambulaga	Elementary School Bldg.
Capuy	Elementary School Bldg., NFA Bldg., Brgy. Health Care
Gimaloto	Elementary School Bldg.
Guinlajon	Elem./HS Bldg.
Macabog	Elementary School Bldg., Chapel
Marinas	Elementary School Bldg.
Pamurayan	Elementary School Bldg., Chapel
Pangpang	Elementary School Bldg., Brgy. Hall

Barangay	Evacuation Centers
Panlayaan	Elementary School Bldg.
Peñafrancia	Elementary School Bldg.
Piot	Provincial Gymnasium, Aemilianum College Inc.
Polvorista	SECS Bldg., Multi-Purpose Bldg
Rizal	Elem./HS Bldg., Brgy. Hall
Salog	SNHS/SCC Bldg.
Salvacion	Elementary School Bldg.
Sampaloc	Elementary/SNHS Bldg., PNP Provincial Head Quarter Pcs
San Isidro	Elementary School Bldg.
San Juan	Elementary School Bldg., Chapel, Home For The Aged
Sirangan	Sts. Peter & Paul Cathedral, SPES Bldg., SLMCS Bldg.
Sulucan	Sorsogon Shopping Center, PNP Provincial Hq.
Talisay	Elementary School Bldg., Chapel
Ticol	Elementary School Bldg.
Tugos	Elementary School Bldg., RHU Center

Source: CDCC, City Disaster Preparedness Plan

A closer look at the City Disaster Risk Management Plan will show no corresponding budget for the lined-up activities. Only the 5% Calamity Fund (5% of total City Development Fund Budget) was made available to support this plan. However, this calamity fund can be accessed only after disasters and are usually being allocated for relief and emergency purposes. Thus, DRM in the city is very reactive and response oriented and so consequently missing the equally important items that contributes to disaster mitigation and preparedness. Likewise, the pre-identified evacuation centers in the whole city were not built per se to address the needs during or after emergencies or disasters.

While their locations are evenly and strategically dispersed in the city, these evacuation centers cannot be treated for this purpose as they are basically public school buildings. The usage of these facilities during and after emergencies disrupts the conduct of regular classes and also threatens the sanitation and hygiene conditions in these areas. For instance, the past cyclone (Milenyo, 2006) disrupted the classes of the primary and secondary grades for almost a month time to give way to emergency needs (evacuation and distribution hubs for food and relief items). There is therefore, the need to consider on how could the city and the communities address this problem (e.g. emergency evacuation) without sacrificing the main purpose of the said school buildings. Thus, DRM in the city seem to be reactive and response oriented - consequently missing the equally important items that contributes to disaster mitigation and preparedness.

C. Local policies and legal initiatives

The following are local policies and issuances by the city Government that relates to environmental and other urban management issues/concerns.

Table 20: City Policies and legal initiatives

City Ordinances	Title/Description	Remarks relative to Climate Change (CC)
004-02	An Ordinance prohibiting the construction or establishment of fish corrals, green mussel farms and other fishing structures and paraphernalia	Contributes to CC Mitigation

City Ordinances	Title/Description	Remarks relative to Climate Change (CC)
	within 500 meters parallel to both sides of the Sorsogon Pier sea ward according to the requirements of safe navigation.	
001-05	An Ordinance providing for the comprehensive and continuing development program for the urban poor sector and appropriating funds for the purpose	Contributes to CC adaptation
007-05	The Ecological Solid Waste Management Ordinance of the City of Sorsogon	Contributes to CC adaptation and mitigation
013-05	An Ordinance providing for the development, management, conservation, protection, utilization and disposition of all fish and fishery aquatic resources within the city waters.	Contributes to CC Mitigation
014-05	Fish Sanctuary Ordinance	Contributes to CC adaptation and mitigation
003-07	An Ordinance establishing the 2007 Sorsogon City Anti-Poverty and Education Program	Contributes to CC adaptation
006-07	An Ordinance mandating Green Policy in Sorsogon City	Contributes to CC adaptation and mitigation
012-07	An Ordinance prohibiting all gasoline stations, auto repair shops, car washing center, funeral parlors, etc. from disposing and pouring used oil, waste water liquid and other polluting/toxic liquid into drainage canal that flow into the creeks and unto Sorsogon River	Contributes to CC mitigation
005-08	An Ordinance adopting Zoning Regulations for the City Of Sorsogon and providing for the Administration Enforcement and amendment thereof and for the repeal of all Ordinances in conflict therewith.	Contributes to CC adaptation
006-08	An Ordinance creating the Sorsogon Rivers Council, defining its powers and responsibilities and appropriating funds for its operation.	Contributes to CC adaptation
007-08	Resolution enacting an Ordinance requiring all owners of Residential and Commercial establishments within the territorial jurisdiction of Sorsogon City to clean the sidewalk fronting their establishments.	Contributes to CC mitigation
002-08	Ordinance establishing the Sorsogon City Zoning Regulations and Creating thereby the Office of the City Zoning Administrator for the purpose.	Contributes to CC adaptation and mitigation
013-08	No smoking Ordinance	Contributes to CC mitigation

In scanning the above policies, it was gleaned that the city would need to create and develop a more responsive policy environment that would address the encompassing challenges brought by climate change risks and threats. It is expected that mitigation as well as adaptation frameworks be mainstreamed in the local governance and development planning process of the city. Policy formulation should emphasize actions addressing gaps in local implementation of the national laws such as the Clean Air Act, Solid Waste Management Act, etc. Moreover, there must be complementary issuances at the local level on the promotion of the National Climate Change Framework and Agenda.

3.2 A closer look at the "Urban Coastal Hotspots"

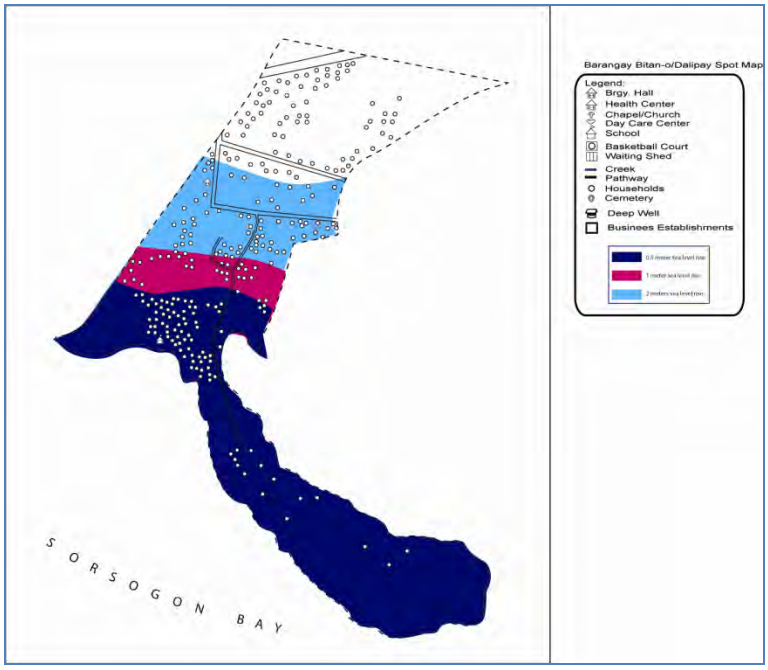
The next discussions present the profile of select hotspots from household survey, FGDs and KIIs. This part of the assessment exercise provided the V&AA process the opportunity to validate and "ground-truth" climate change manifestations and people's sensitivity using as proxy core local poverty indicators. To sample from the hotspots, four out of the 8 urban hotspots were profiled through 100% household survey. The survey covered Barangays Bitan-O Dalipay, Sampaloc, Sirangan and Talisay. Total population of these Barangays is 13,211 which is about 43% of the total population of the 8 urban hotspots.

3.1.5 Barangay Bitan O Dalipay

Bitan-O Dalipay occupies 19 hectares of land with a population of 3,237 or 685 Households. Females account to 1642 individuals while male population accounts to 1595 in total. 83% of the households are male headed and only 17% have females as household heads. Families in Bitan-O Dalipay mostly source their income from fishing activities and shellfish vending (50%). They consider the sea as their major income and food source. Given the ban in shell-fish because of the red-tide phenomenon in Sorsogon Bay, the people engaged in the said fishing activity have all the more become poor. They survive by engaging into informal work within the city and by selling/trading goods.

The barangay is facing the risks that could be brought by: (a) extreme typhoons as their houses are relatively weak in structure, (b) extreme rainfall that could cause flooding as they are situated in a low-lying area, (c) storm surge given their location and as experienced during Typhoon Sisang (1987) where 78 persons died in their Barangay, and (d) sea level rise as presented in the figure below. In fact there are instances that during high tide the classes in the school at Bitan-O Dalipay are disrupted because (knee high) water from the bay already gets into the class rooms.

Figure 23: SLR simulation relative to area elevation and projected against Barangay Bitan-O Dalipay's base map, source: Project Team



Survey revealed that poverty looms in the area with 50% of the households earning below the poverty threshold. Of the 118 households which are “female headed” 66% or 78 female headed households are poverty stricken.

Figure 24, Source: Project Team

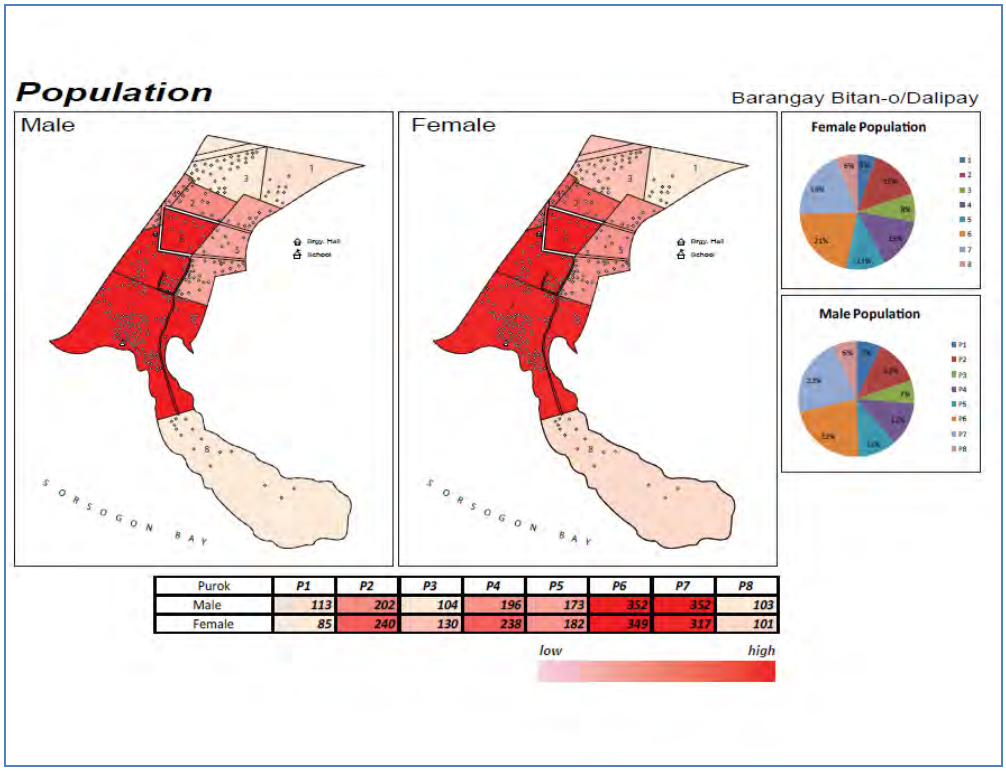
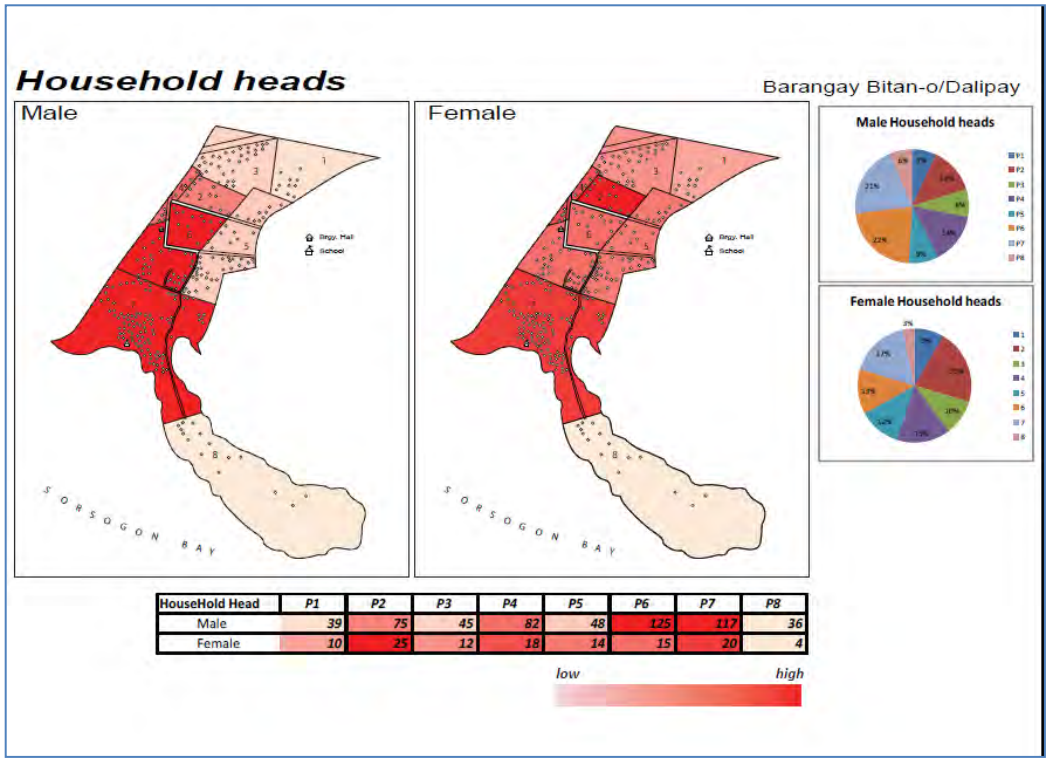


Figure 25, Source: Project Team



Although 65% of the total households report that they have access to secure tenure, only 31% believe that their structures are safe from natural elements (i.e. typhoon, flooding, storm surge). Based on the survey, 23% of those who does not to have safe structures also claimed that they cannot afford to repair or improve their houses in the next six months. It has been noted that of the total female headed households, 24 reported that they cannot afford to repair their respective structures.

Figure 26, Source: Project Team

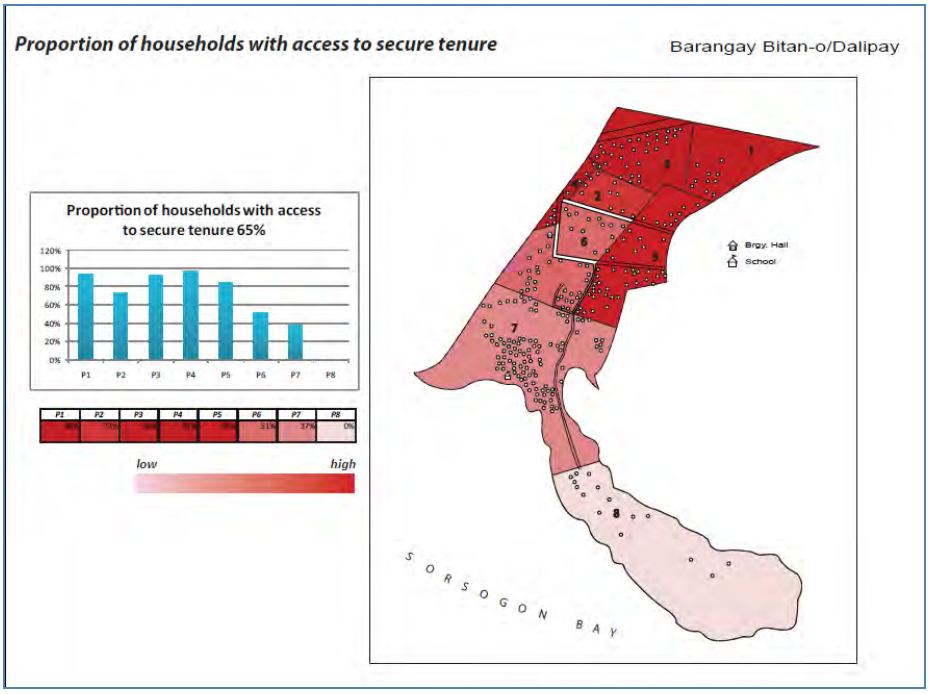
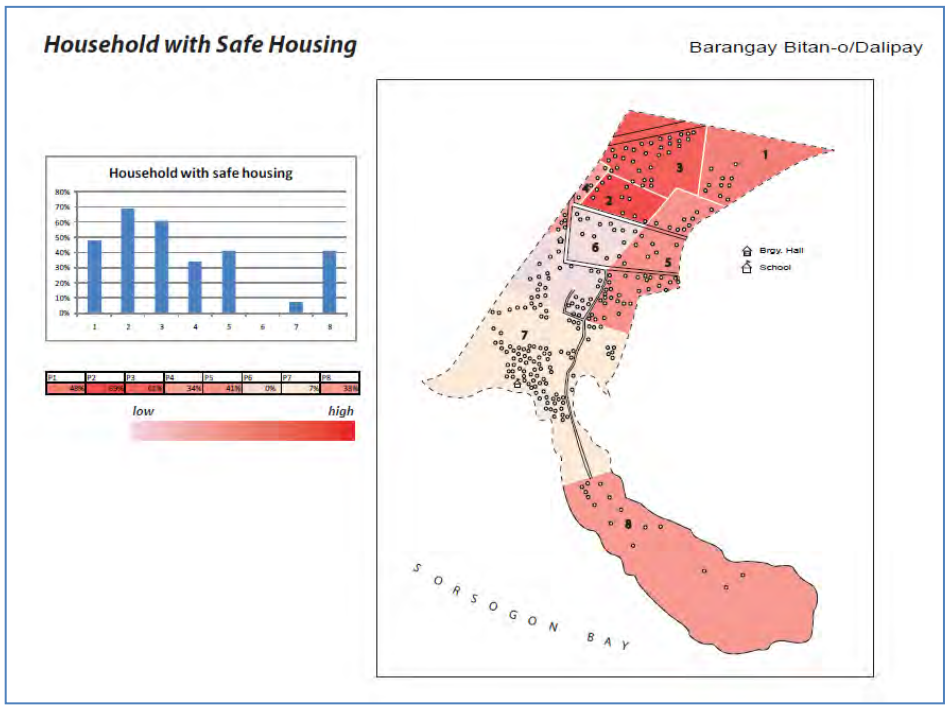


Figure 27, Source: Project Team



On water and Sanitation, 90% of families on the average have access to improved water source (level 2 and 3) while only 79.8% have access to sanitary toilet.

Figure 28, Source: Project Team

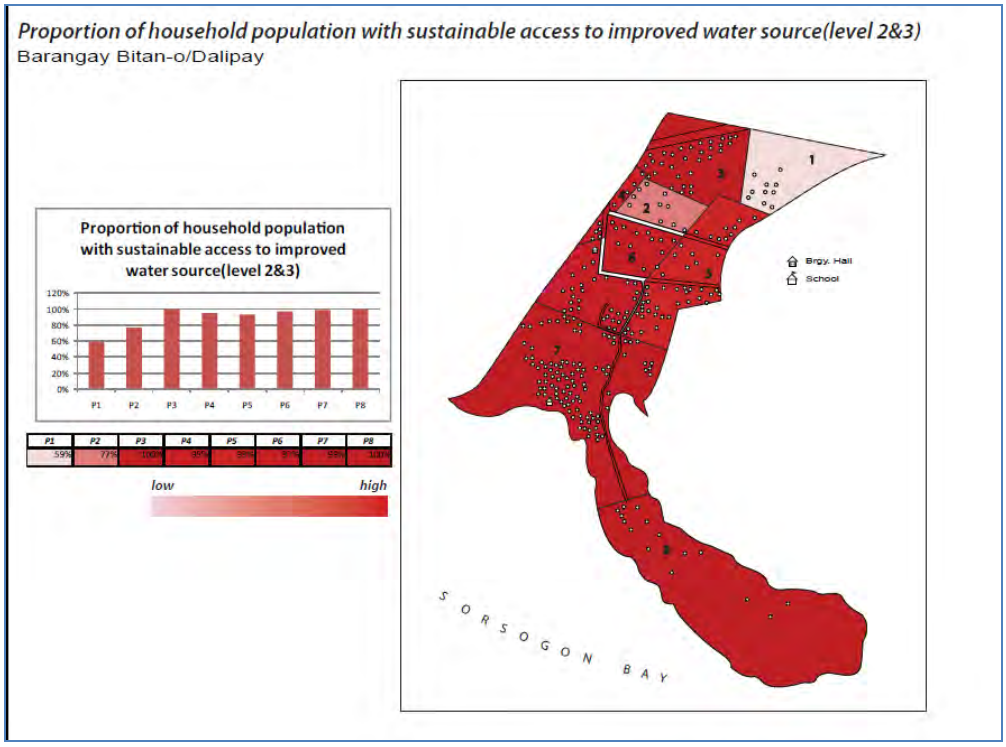


Figure 29, Source: Project Team

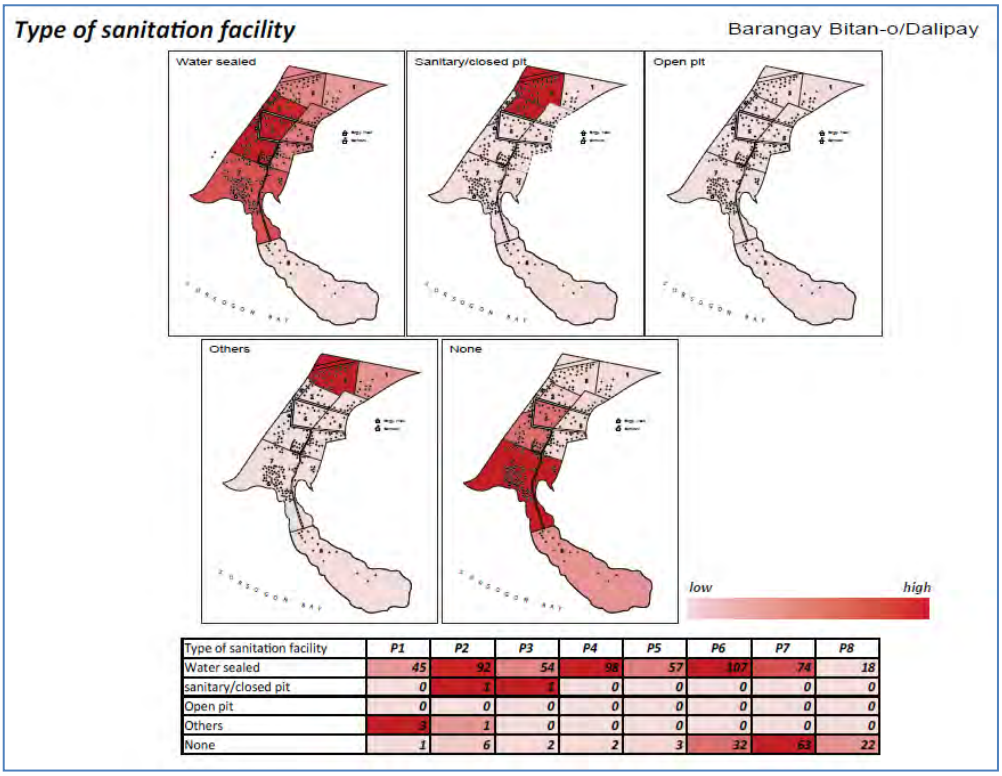


Table 21: Summary of Barangay Bitan-o Dalipay

Type of sanitation facility	P1	P2	P3	P4	P5	P6	P7	P8
Water sealed	45	92	54	98	57	107	74	18
sanitary/closed pit	0	1	1	0	0	0	0	0
Open pit	0	0	0	0	0	0	0	0
Others	3	1	0	0	0	0	0	0
None	1	6	2	2	3	32	63	22

Vulnerability to Climate Change and Options for Adaptation based on FGD

Prioritised Vulnerabilities and Potential Impacts	Who/What is vulnerable?	Triggers/Agents	Options for Adaptation
Damage to houses and village infrastructures: a. Endangered lives b. Water contamination c. Loss or damaged physical assets d. Disruption of fishing activities as source of livelihood e. Susceptibility to "red tide"	▪ housing units (made up of light materials and make shift) ▪ Informal settlers ▪ Water facilities and power lines ▪ Fisher folks and shell fish gatherers and fish vendors (mostly women)	▪ Cyclone ▪ Flood ▪ Storm surge ▪ Excessive rainfall ▪ Increase temperature	▪ Sea wall upgrading ▪ Improvement of power lines and water system ▪ Diversification of livelihoods; access to social protection and savings mobilization ▪ Implementing programmes controlling invasive species (red tide) ▪ Housing improvement (typhoon resilient) ▪ Foot bridge improvement and development of evacuation center
Inundation of land and alteration of coastline	▪ Estimated 60% of settlement areas ▪ Estimated 75% of land area ▪ Village facilities: 1 primary school; 1 day care center and Barangay Hall	▪ Sea level rise	▪ Upgrading of sea wall ▪ Relocation of affected HHs ▪ Path-walk improvement ▪ Identification of safer sites for village facilities
Disruption to livelihoods and employment	▪ Informal workers ▪ Fisherfolks ▪ Small/micro entrepreneurs ▪ Women	▪ Cyclone ▪ Flood ▪ Storm surge ▪ Excessive rainfall ▪ Sea Level Rise	▪ Diversification of livelihood sources which could be developed by conducting further study on community livelihood patterns (seasonality, typology, etc) ▪ Introduction of social protection schemes on livelihoods ▪ Improving access to productivity resources (e.g. micro-finance/micro-

Prioritised Vulnerabilities and Potential Impacts	Who/What is vulnerable?	Triggers/Agents	Options for Adaptation
			insurance; business advisory; technology on product development; access to market) ▪ Skills upgrading and re-tooling for employment and self-wage livelihood activities ▪ Engage women livelihood activities

3.1.6 Barangay Sampaloc

Barangay Sampaloc is an urban coastal Barangay with 911 households composed of 4,566 population living within its 12.58 hectares of land.

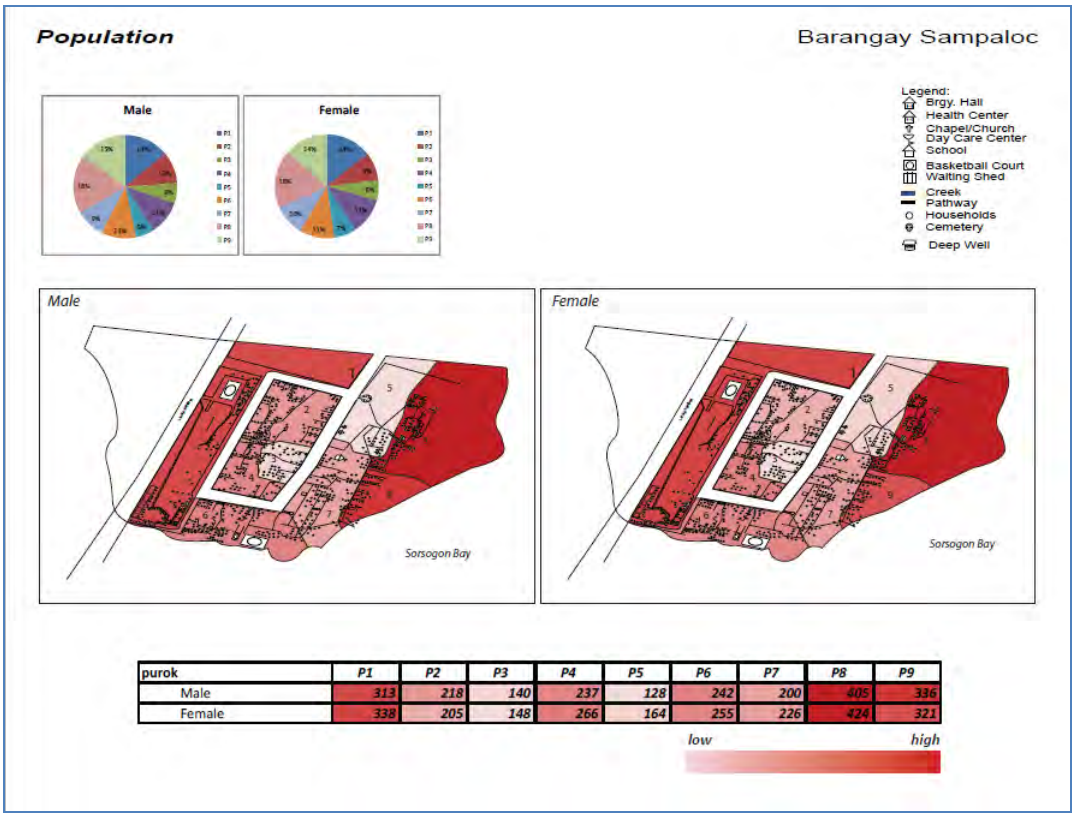
Survey revealed that there are 180 female headed households in the Barangay the rest (731) are headed by males.

There are 130 fisherfolks registered in the Barangay who depends on the aquatic resources they get from Sorsogon Bay. Other income generating activities of the people in Sampaloc include vending, short term employment, labor work and trade/services. There are various commercial buildings (hosting banks, food chains, etc) in the area as well as schools, health center, religious structure, and super market.

Barangay Sampaloc, Sorsogon City
© Sorsogon City/Joselito Derit

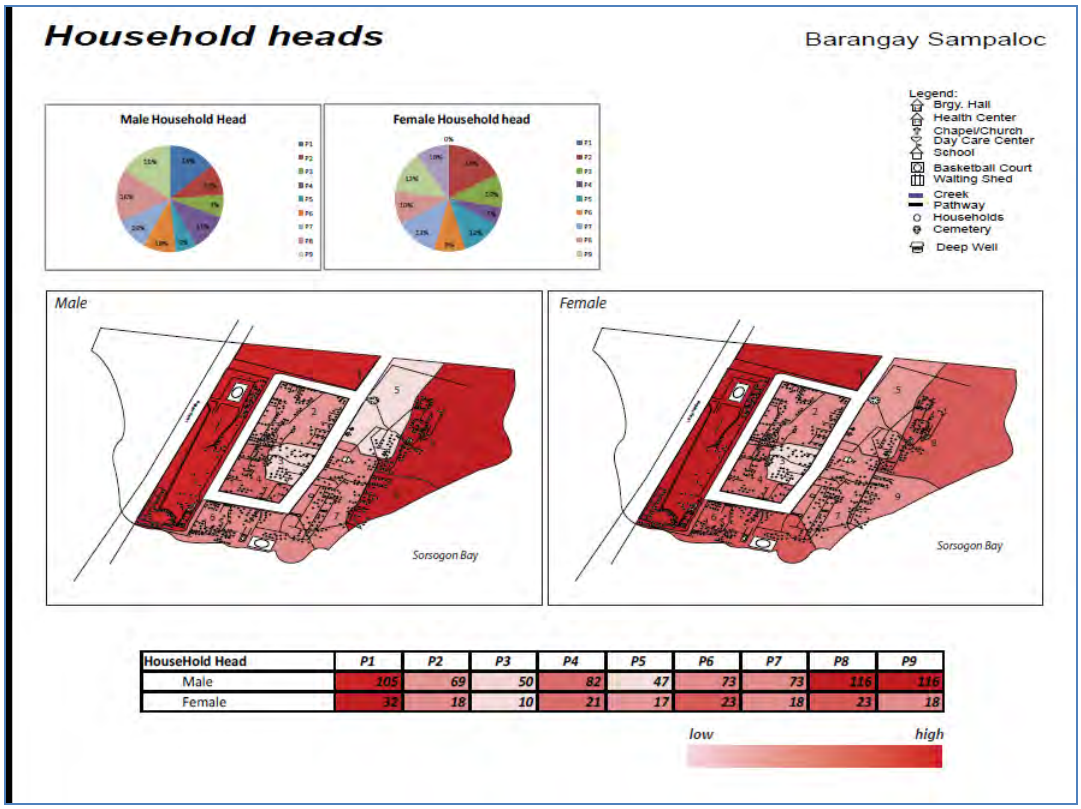
Poverty in the Barangay is alarming given the 61% of the total households are living below the poverty line. Further disaggregated data showed that 54% of the female headed households are part of the families below the poverty line. Figure 33 shows that secure tenure is a major issue in the area considering that 42% does not have access to it.

Figure 30, , Source: Project Team



purok	P1	P2	P3	P4	P5	P6	P7	P8	P9
Male	313	218	140	237	128	242	200	405	336
Female	338	205	148	266	164	255	226	424	321

Figure 31, Source: Project Team



HouseHold Head	P1	P2	P3	P4	P5	P6	P7	P8	P9
Male	105	69	50	82	47	73	73	116	116
Female	32	18	10	21	17	23	18	23	18

Figure 32, Source: Project Team

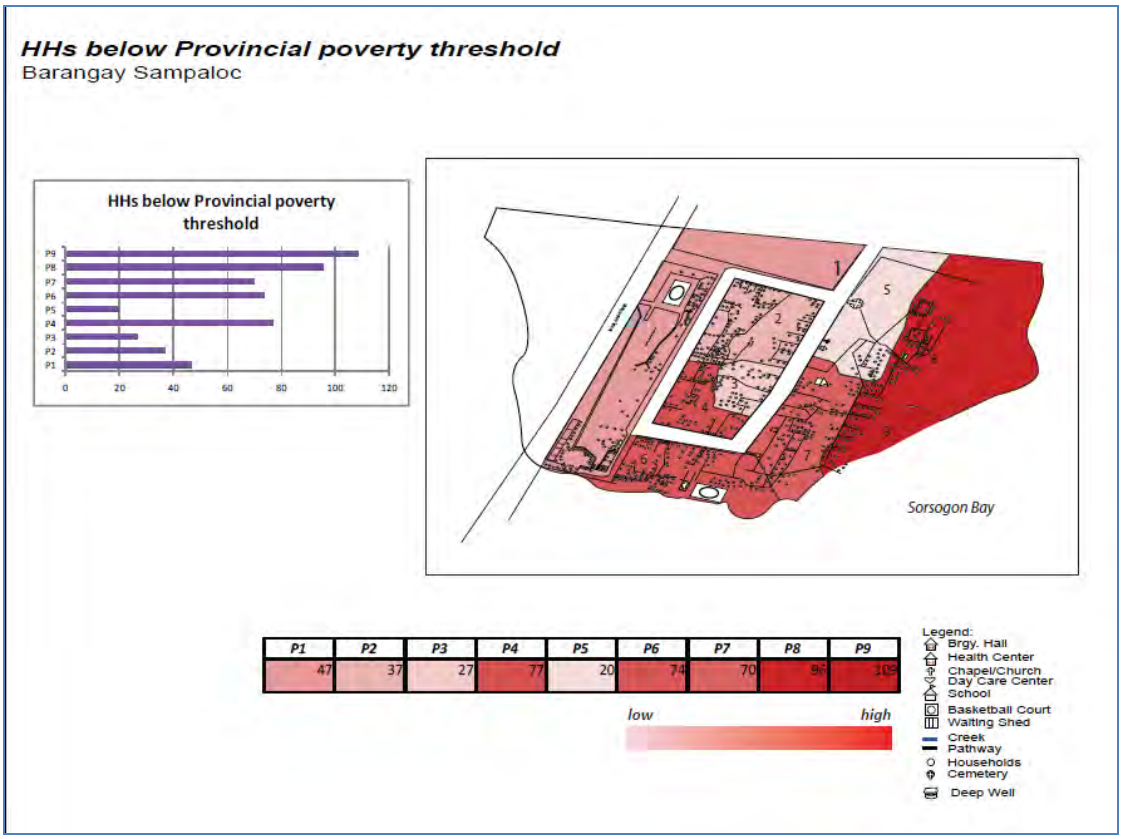


Figure 33, , Source: Project Team

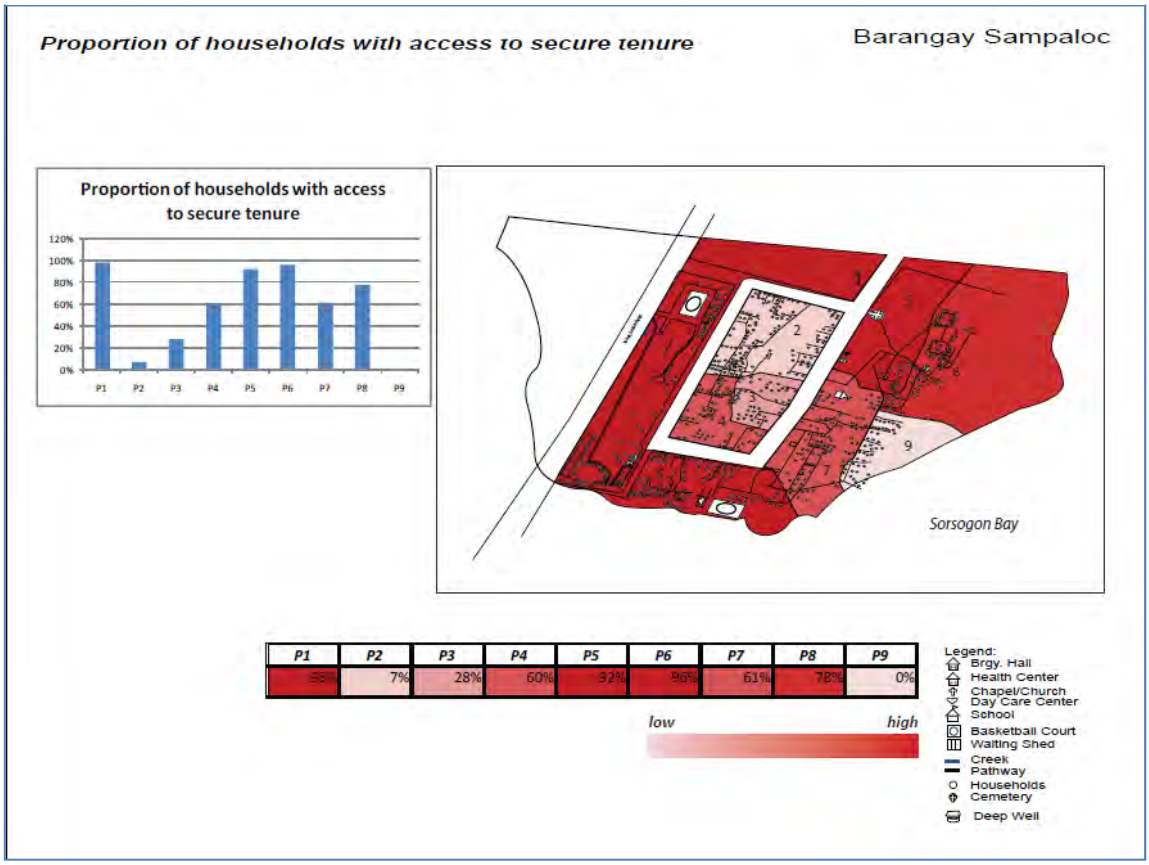
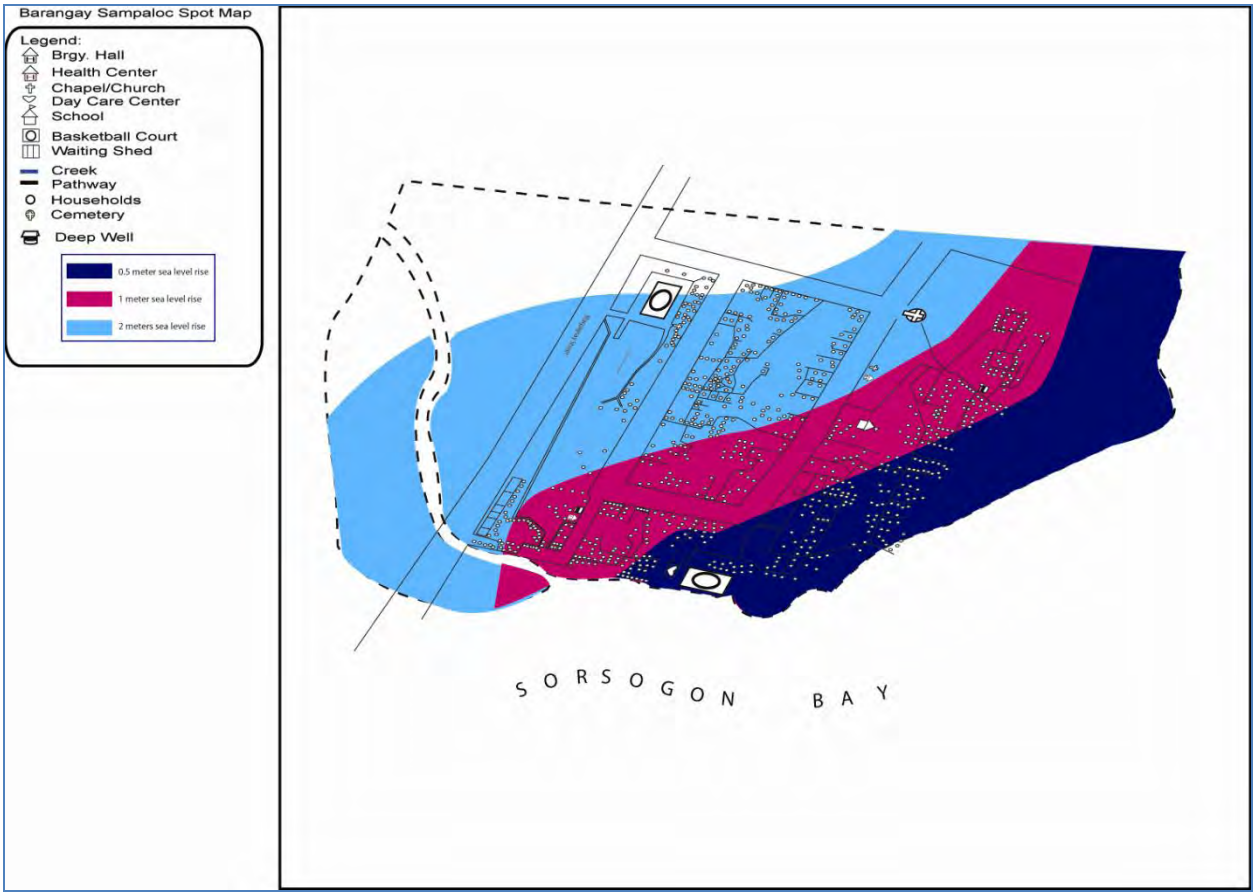


Figure 34: SLR simulation relative to area elevation and projected against Barangay Sampaloc base map, , Source: Project Team



Given the low elevation of the Barangay, settlements and business establishments face the threat of sea level rise due to the global change in climate. Gleaning from the SLR visualization (Figure 34), households face the risk of sea level rise. Puroks 7, 8 and 9 are estimated to be threatened by 0.5 meter SLR, Puroks 5 and 6 will be at risk to 1 meter SLR, while 1 to 4 will likely be threatened 2 meter accelerated sea level rise.

Of the total housing structure in the Barangay Sampaloc, 316 are either made of light materials or makeshift and the families believe they are not safe from climate-induced hazards (Figure 35). Families are vulnerable to strong winds that maybe brought by typhoons just as what they experienced in 2006 when Super Typhoons Reming and Milenyo hit Sorsogon. Of the families who live in unsafe housing, 119 expressed that they cannot afford to repair/improve their housing structures in the next 6 months (Figure 36).

Figure 35, Source: Project Team

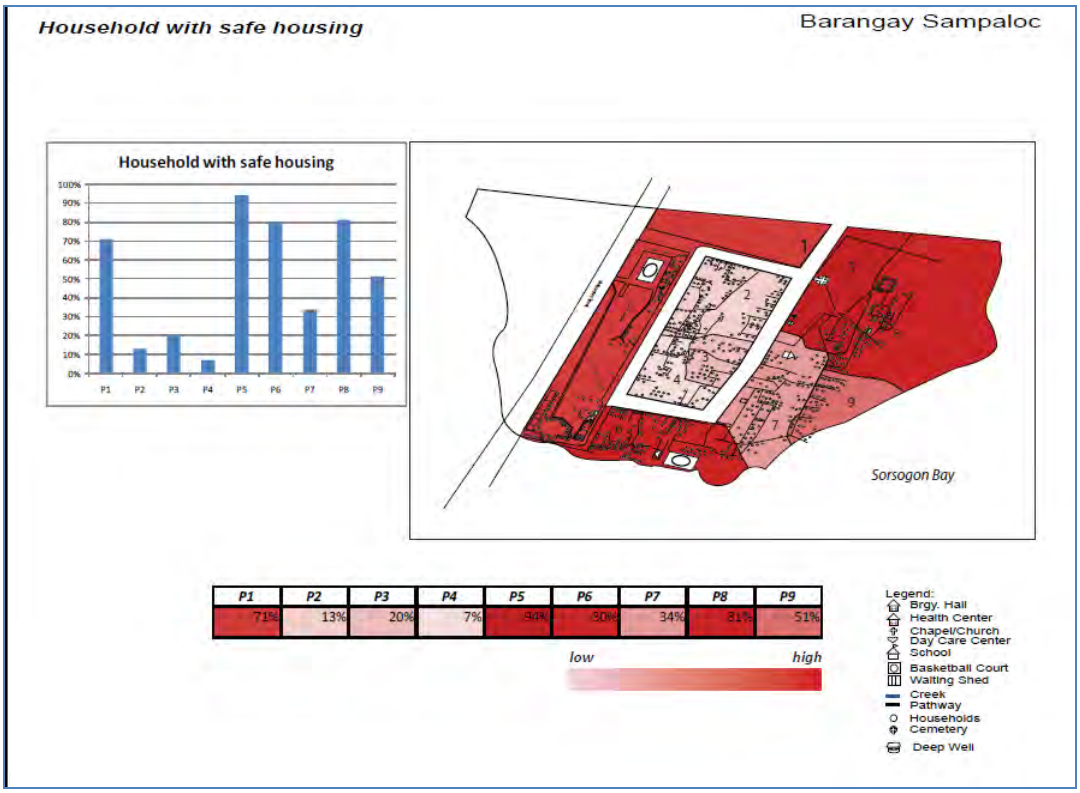
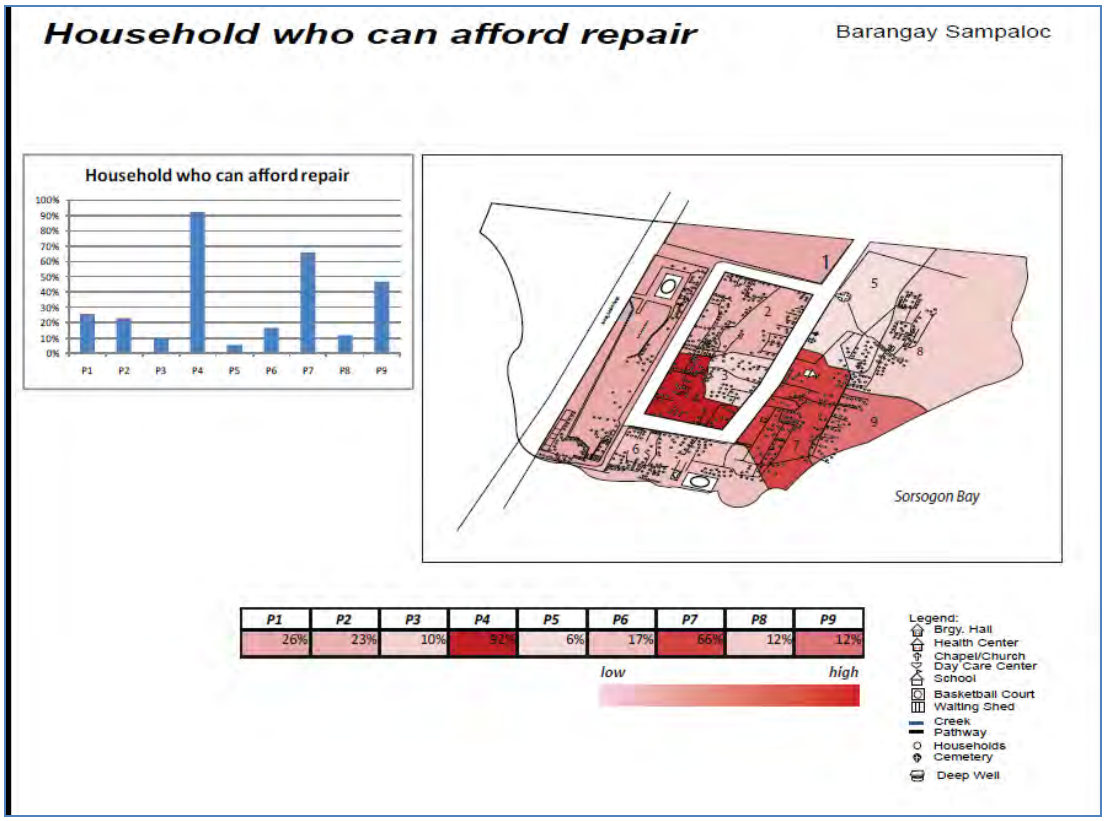


Figure 36, Source: Project Team



The limited access of households to safe water and sanitation poses a great health risks to the people especially that climate change is projected to bring about vector and water borne diseases. As what

could be gleaned in Figures 37 and 38, only 282 households or 31% have access to safe water while there are 306 households (33.5%) without sanitary toilet. Notably, only 56% of the female headed households have access to safe water while 73% of male headed households have access to safe water.

Figure 37, Source: Project Team

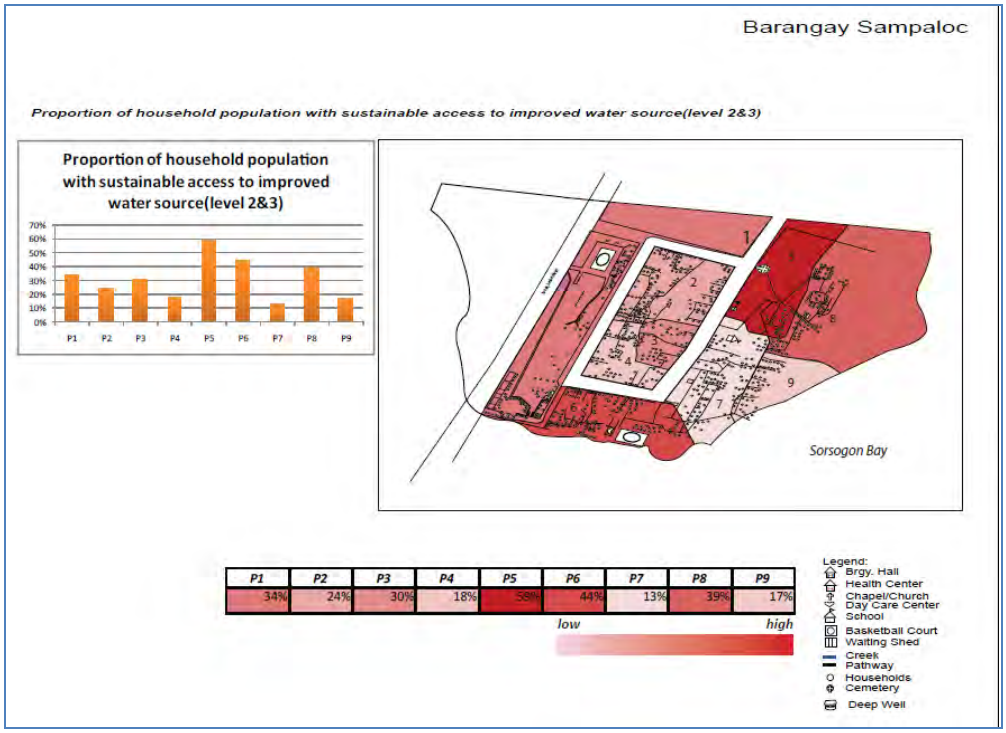
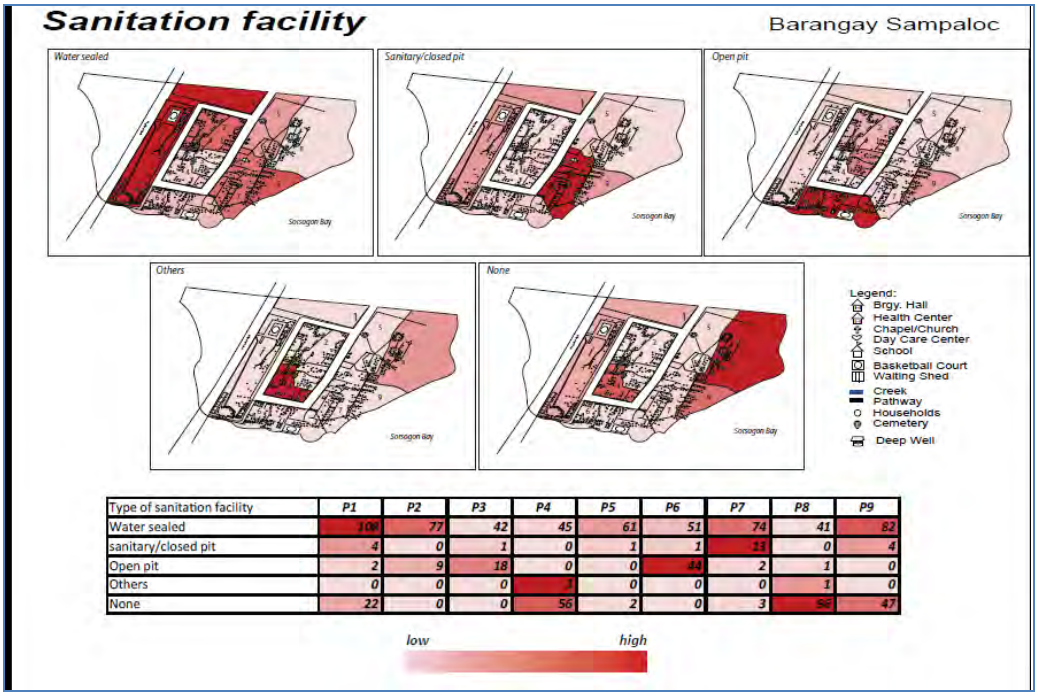


Figure 38, Source: Project Team



Type of sanitation facility	P1	P2	P3	P4	P5	P6	P7	P8	P9
Water sealed	106	77	42	45	61	51	74	41	82
sanitary/closed pit	4	0	1	0	1	1	13	0	4
Open pit	2	9	18	0	0	44	2	1	0
Others	0	0	0	1	0	0	0	1	0
None	22	0	0	56	2	0	3	56	47

Based on discussions with community leaders and members during FGD sessions, they fear that they have limited knowledge on what climate change may bring to their community especially their

livelihoods. In fact they say that during strong typhoons people already evacuate to schools and other areas for safety and they just recover by incrementally re-building their houses. The sea-wall, which is meant to protect them from storm surge, based on experience lacks the height to minimize the destruction that they experience during such events. The community believes that it is very crucial considering that all of them live within 300 meters away from the shore.

Table 22: Summary of Barangay Sampaloc Vulnerability to Climate Change and Options for Adaptation based on FGD

Prioritised Vulnerabilities and Potential Impacts	Who/What is vulnerable?	Triggers/Agents	Options for Adaptation
Damage to houses and village infrastructures: f. Endangered lives g. Water contamination h. Loss or damaged physical assets i. Disruption of livelihoods	▪ housing units ▪ Micro and small entrepreneurs ▪ Water facilities ▪ Power lines ▪ 130 fisher folks	▪ Cyclone ▪ Flood ▪ Storm surge ▪ Excessive rainfall	▪ Sea wall upgrading and expansion ▪ Improvement of power lines and water system ▪ access to productive resources: micro finance; social protection; trainings and savings mobilization ▪ Relocation of affected households and house upgrading (tenement type)
Inundation of land	▪ Estimated 40% of settlement areas ▪ Estimated 35% of land area ▪ Village infrastructures like 2 playgrounds 1 primary school and 1 chapel ▪ Portion of business district	▪ Sea level rise	▪ Upgrading of sea wall ▪ Relocation of affected HHs ▪ Infrastructure improvement ▪ New site development for business
Disruption to livelihoods and employment	▪ Informal workers ▪ Fisherfolks ▪ Small/micro entrepreneurs ▪ Women	▪ Cyclone ▪ Flood ▪ Storm surge ▪ Excessive rainfall ▪ Sea Level Rise	▪ Diversification of livelihood sources which could be developed by conducting further study on community livelihood patterns (seasonality, typology, etc) ▪ Introduction of social protection schemes on

Prioritised Vulnerabilities and Potential Impacts	Who/What is vulnerable?	Triggers/Agents	Options for Adaptation
			livelihoods ▪ Improving access to productivity resources (e.g. micro-finance/micro-insurance; business advisory; technology on product development; access to market) ▪ Skills upgrading and re-tooling for employment and self-wage livelihood activities ▪ Engage women on home-based livelihood activities

3.1.7 Barangay Sirangan

Barangay Sirangan, East District, Sorsogon City
© Sorsogon City/Joselito Derit

Barangay Sirangan is a small Barangay occupying only 4.96 hectares of land in the city but is densely populated having 2,711 individuals. There are 1381 males and 1330 females permanently residing in the area. This village is highly urbanized as it serves as location to many business establishments, settlements, and transportation activities. 492 households are permanent residents of the Barangay but there are also temporary renters from other areas. Female headed household based on the survey is only 23.5% of the total households (Figure 39). Commercial establishments such as food chains, banks, drugstores, supermarkets, and other businesses engaged in trading are found in the village. Source of income of families in Sirangan therefore are concentrated in vending, stevedoring, labor work, casual employment from business establishments, while only 10% are involved in fishing. In Figure 40, the households living below the poverty threshold is shown. It could be gleaned from there that 243 households or 49.4% of the total live below the poverty line while and of 60 households (25% of the poor) are female headed.

Based on ocular inspection of house location, 80% is estimated to be situated within 100 meters from the shoreline while the rest are located within 200 meters. Majority of the people in the Barangay does not have access to secure tenure as 84% of the total households are informal settlers (Figure 41). Considering this perhaps, 396 or 80% of the housing are believed to be unsafe from projected climate disasters as they are makeshift, made of light materials, or has not considered strong typhoons in their

roofing designs (Figure 42). In Figure 43, it is presented that 93% of the households in Purok 3 claim not to have the capacity to repair their structures in the next 6 months due to poverty.

Figure 39, Source: Project Team

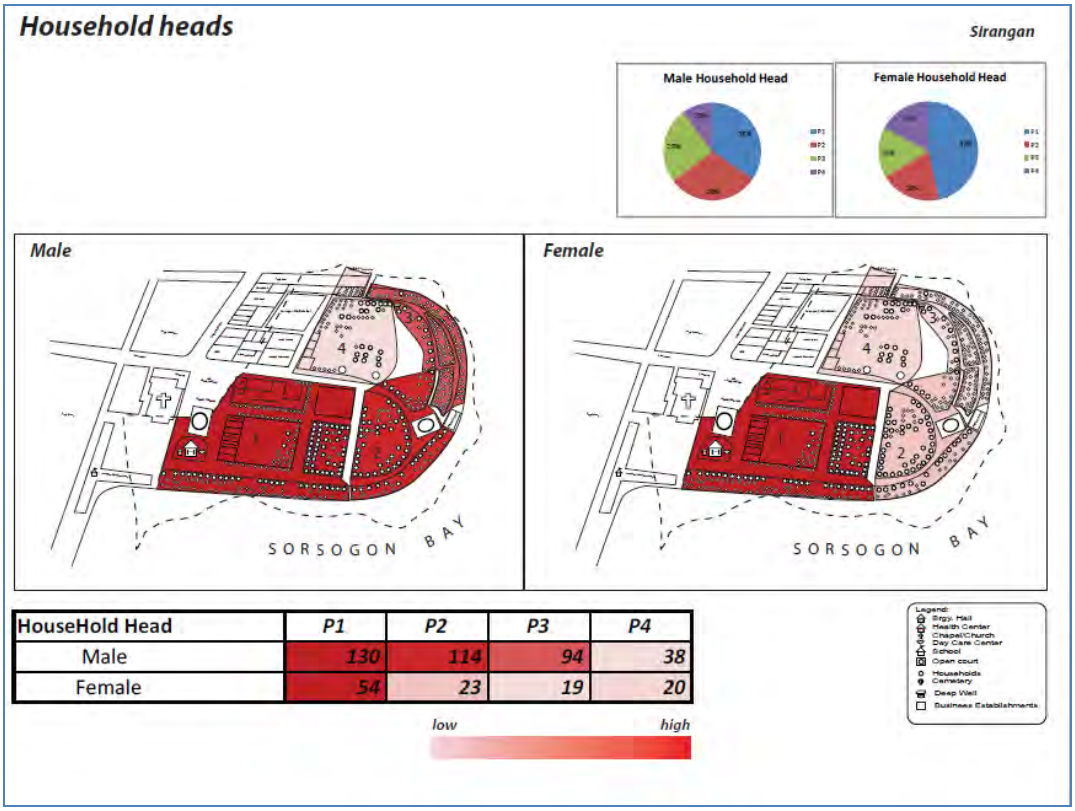


Figure 40, Source: Project Team

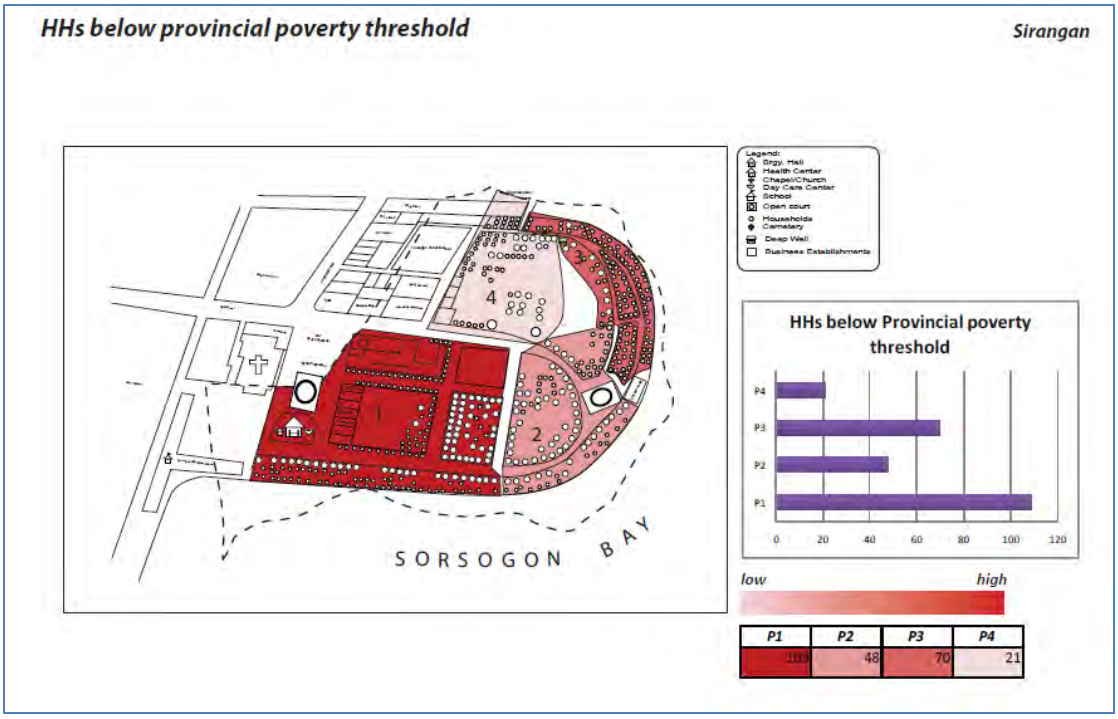
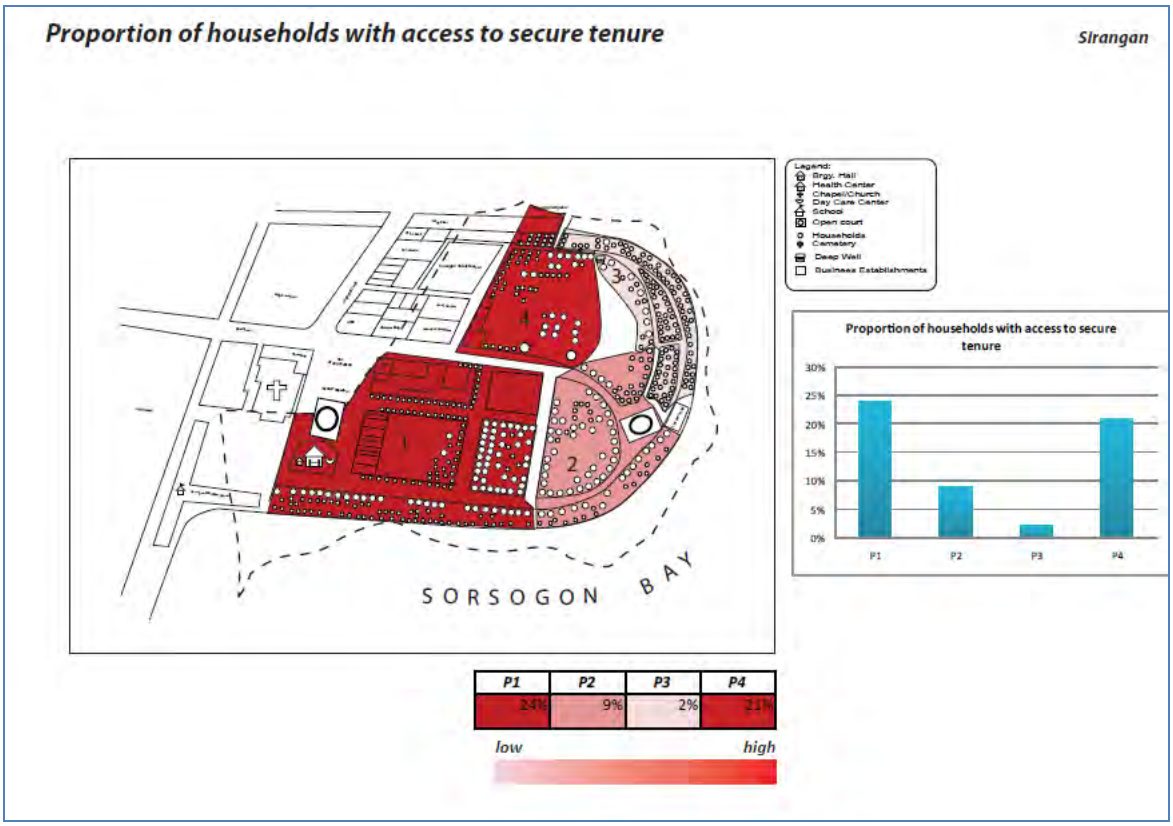


Figure 41, Source: Project Team

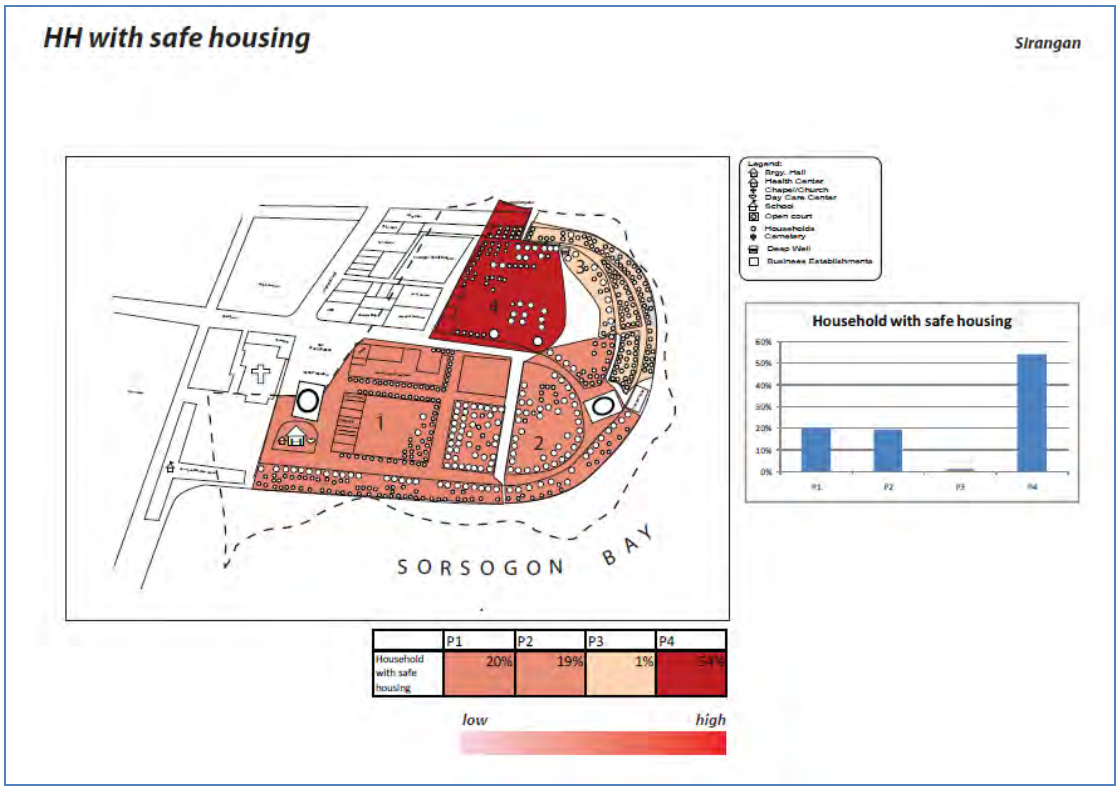


People recount that strong typhoons such as Sisang and Milenyo, big waves (storm surge) damaged their houses. As they recall during the FGD, Typhoon Sisang (1987) brought waves which is 3 storey's high and it wiped their Barangay. This experience was the reason why the Sea Wall was constructed for the coastal Barangays in the City. Despite the sea wall construction however, during Typhoon Milenyo in 2006, 95% of the houses were still damaged and that up to now some are still repairing and saving up to re-build their housing structures. The sea wall height, according to the community leaders during FGD, "needs 300 meters more because the waves are still reaching their houses". Figure 41 presents the current situation of housing structures in the Barangay.

According to the Barangay Captain after the devastation of Typhoon Milenyo, *"we (Sirangan residents) recover from disaster by helping each other out (Bayanihan). We get external donation for light materials but we do the labor counterpart. To hasten the process of rebuilding houses, men contribute 1 hour labor work for each house. That way we were able to re-build 7 houses in a day. If we do not do such scheme people would stay up to 43 days in the evacuation center; which is more costly for the Barangay and increase probability of getting health problems".*

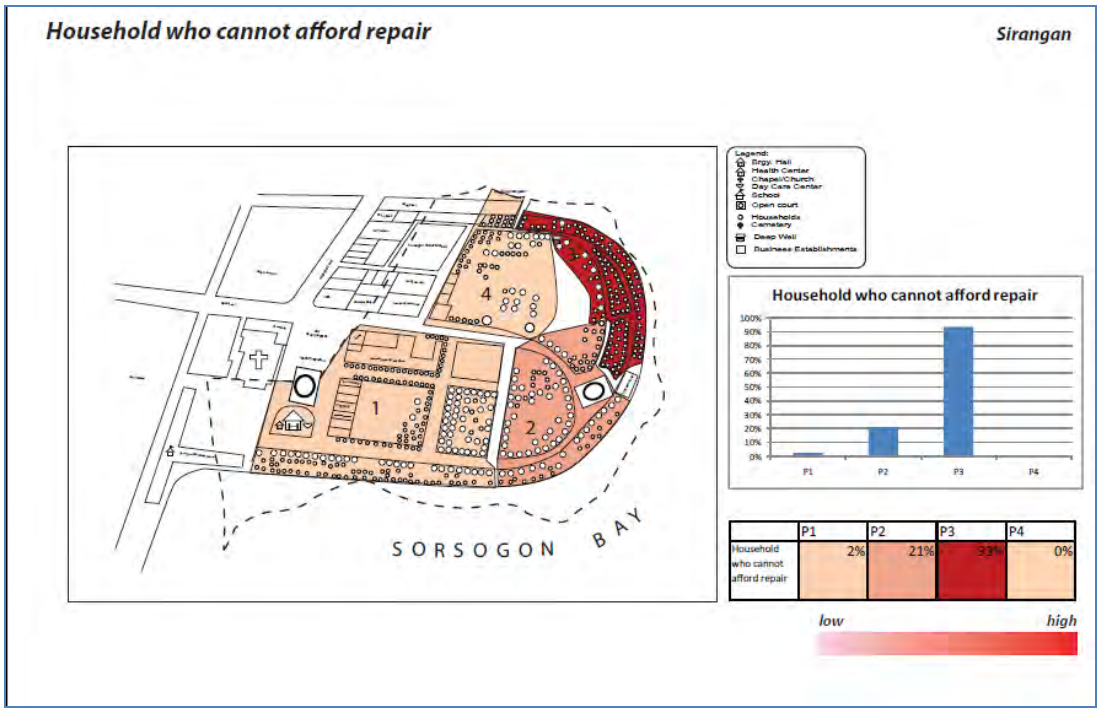
As a coping strategy for poverty and in recovering from disasters, the urban poor families of Sirangan work/partner with NGOs such as COPE Foundation (for their land and housing) and PALFSI and for livelihood loans. Assistance from these groups is made available through the various community organizations they have such as the Sirangan Women's Association, Mercado (Market) Sirangan Organization, and Sirangan Urban Poor Organization.

Figure 42, Source: Project Team



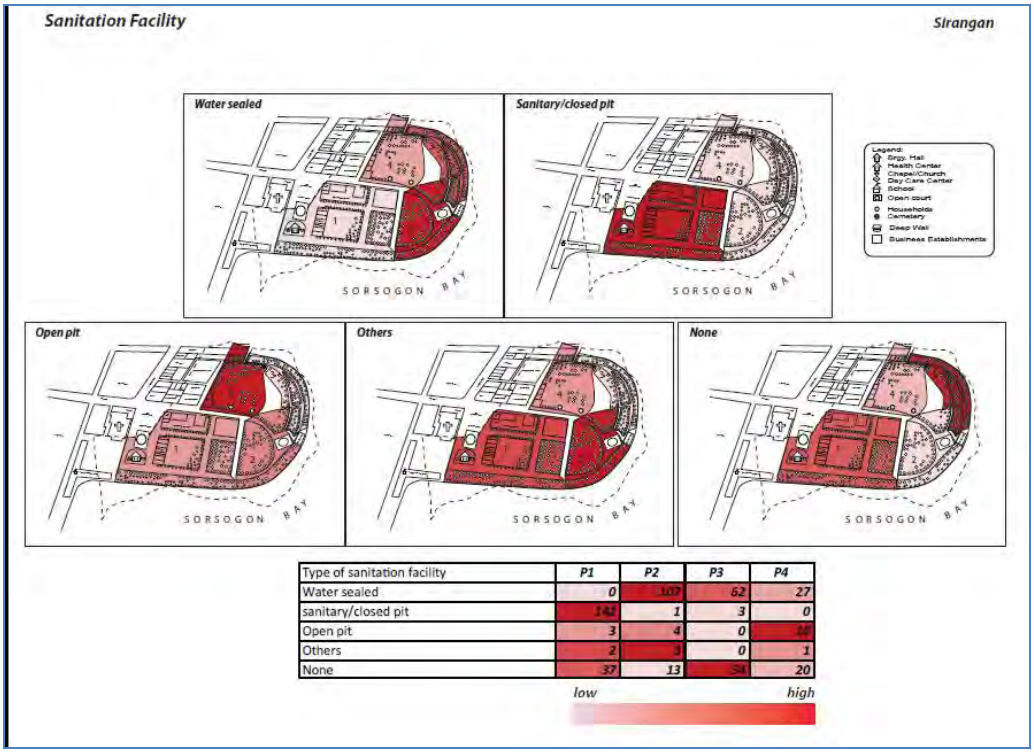
During the FGD with the community, leaders expressed their willingness to improve their settlement and in fact raised community's openness to tenement type of housing as they recognize that there is no more available space in their area. This they believe would improve their resilience to disaster events brought by strong winds from typhoons and flooding due to heavy rains.

Figure 43, Source: Project Team



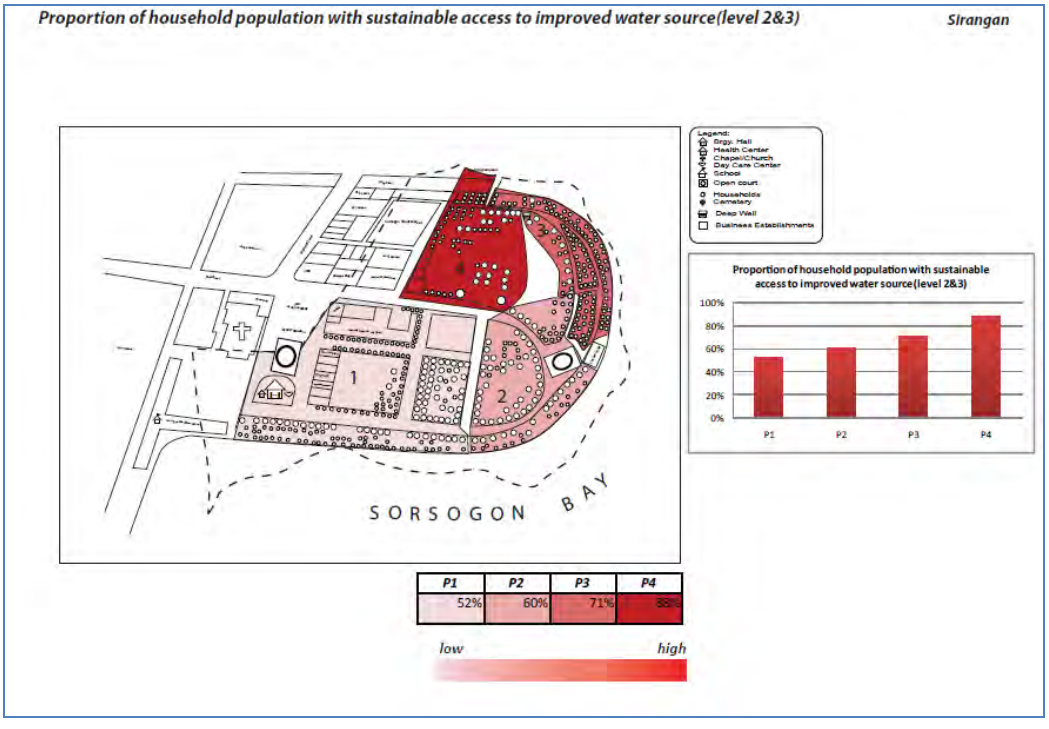
Water and sanitation is a concern in the barangay as there are 149 households who does not have access to sanitary toilet and 37.3% or 184 households does not have access to safe water. This very much presents sensitivity to water and vector borne diseases due to climate change. According to a Barangay health officer, though they do not have cases of dengue in the area, diarrhea is a major problem because not all families have access to clean water.

Figure 44, Source: Project Team



Type of sanitation facility	P1	P2	P3	P4
Water sealed	0	107	62	27
sanitary/closed pit	142	1	3	0
Open pit	3	4	0	14
Others	2	3	0	1
None	37	13	54	20

Figure 45, Source: Project Team



P1	P2	P3	P4
52%	60%	71%	88%

Figure above presents a simulation of sea level rise in Barangay Sirangan. It projects that 80% of the settlement area in Sirangan would already be affected given a 0.5 meter increase in sea level as projected against the area elevation and Barangay spot map. This SLR could further stress the water and sanitation condition in the area and further affect the poverty situation of the people.

Figure 46: SLR simulation relative to area elevation and projected against Barangay Sirangan base map, Source: Project Team

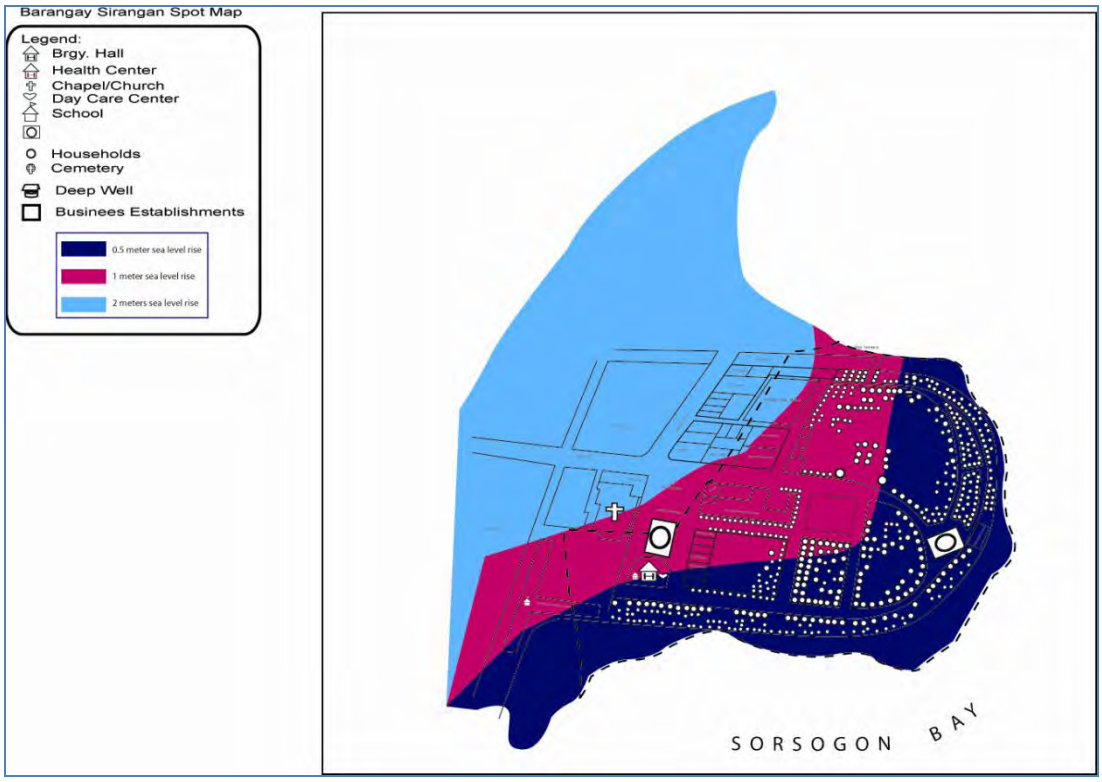


Table 23: Summary of Barangay Sirangan Vulnerability to Climate Change and Options for Adaptation based on FGD

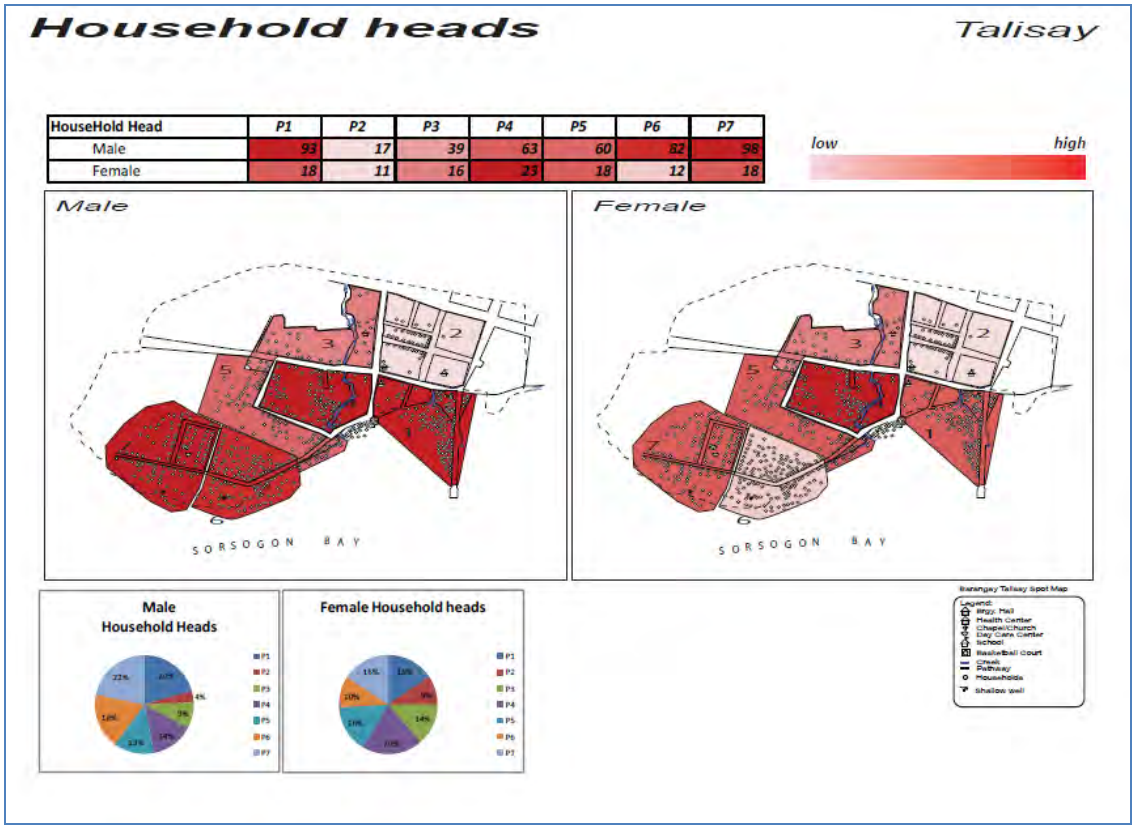
Prioritised Vulnerabilities and Potential Impacts	Who/What is vulnerable?	Triggers/Agents	Options for Adaptation
Damage/destruction of houses and village infrastructures including losses of livelihood assets and employment	▪ housing units are make shift and another 102 houses made up of light materials, 80% of houses are located in shoreline areas ▪ Micro and small entrepreneurs and employed workers (in service trades) ▪ Water facilities ▪ Fisher folks (only 10% of households)	▪ Cyclone ▪ Flood ▪ Storm surge ▪ Excessive rainfall	▪ Housing design improvement ▪ Sea wall upgrading and expansion of 44 meters in length and 2.1m in height ▪ Repair of drainage and canals ▪ Diversification of livelihoods; access to social protection and savings mobilization ▪ Strengthening of existing water systems ▪ Evacuation plan and community-based early warning systems

Prioritised Vulnerabilities and Potential Impacts	Who/What is vulnerable?	Triggers/Agents	Options for Adaptation
Inundation of land and alteration of coastline Schools and homes and other village infrastructure are threatened by visible erosion or inundation	▪ Estimated 100% of settlement areas ▪ Estimated 100% of land area ▪ Including the Barangay Hall, Health Center and Day Care, and 2 basketball courts and 1 cemetery	▪ Sea level rise	▪ Long term planning- land use reclassification ▪ Application of GIS in planning and decision making ▪ Relocation of affected HHs and opening of alternative business areas ▪ Infrastructure improvement
Disruption to livelihoods and employment	▪ Informal workers ▪ Fisherfolks ▪ Small/micro entrepreneurs ▪ Women	▪ Cyclone ▪ Flood ▪ Storm surge ▪ Excessive rainfall ▪ Sea Level Rise	▪ Diversification of livelihood sources which could be developed by conducting further study on community livelihood patterns (seasonality, typology, etc) ▪ Introduction of social protection schemes on livelihoods ▪ Improving access to productivity resources (e.g. micro-finance/micro-insurance; business advisory; technology on product development; access to market) ▪ Skills upgrading and re-tooling for employment and self-wage livelihood activities ▪ Engage women on home-based livelihood activities ▪

3.1.8 Barangay Talisay

Talisay is another low lying urban coastal Barangay in Sorsogon City and it is where the city government established its mangrove rehabilitation initiatives. It occupies 12.4 hectares of land area and has total of 568 households with a total population of 2,697. Of the total population 49.2% are women and the same gender heads 116 households.

Figure 47, Source: Project Team



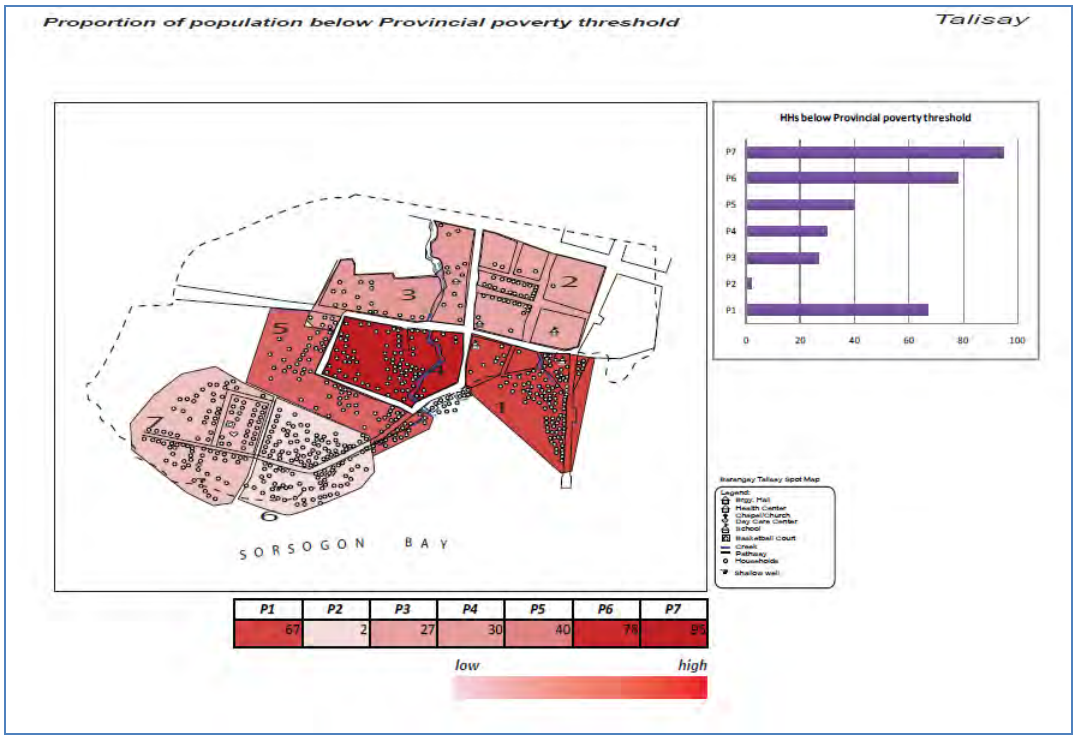
Barangay Talisay is host location to public and private schools, sea port/baywalk, department stores, communication relay station (sell site), fire station, catholic churches including the Cathedral, Lee Homes subdivision, bowling and recreation center, food chains and other restaurants. With these, Talisay people mostly are engaged in trading/vending, fishing and allied activities, and formal and informal work for their income. Poverty incidence (Figure 48) in the Barangay is at 60% where 52 female headed households are part of this total number of poor families.

Sorsogon Pilot Elemenatry School, Barangay Talisay, West District, Sorsogon City © Sorsogon City/Joselito Derit

Barangay Talisay is divided into 7 Purok/areas. Five out of these seven areas are flood prone according to community leaders and residents. These areas are often flooded during heavy rains because they do not have river control. There are also houses that are often relocated because they have built their structure on stilts along the baywalk. Though there is seawall to protect the Barangay people expressed that it is already damaged and the height is not enough and there are gaps/spaces in the wall. People in Talisay evacuate to Saint Louise de Marillac College

during typhoons and flooding.

Figure 48, Source: Project Team



Barangays leaders during the FGD said that their area needs assistance in shelter upgrading since there is no available area that they could relocate to. Quoting the Barangay captain during the FGD, "we do not need evacuation centers if only our housing design is good and up to the standards". Qualifying this need, the baseline data of the Barangay shows that 237 housing structures are not safe (41%) from climate induced disasters. Figure 49 presents that it is in Purok 1 that majority of housing units are deemed unsafe and 78% of the households occupying these units expressed that they cannot afford the repair their structures (Figure 50).

Figure 49, Source: Project Team

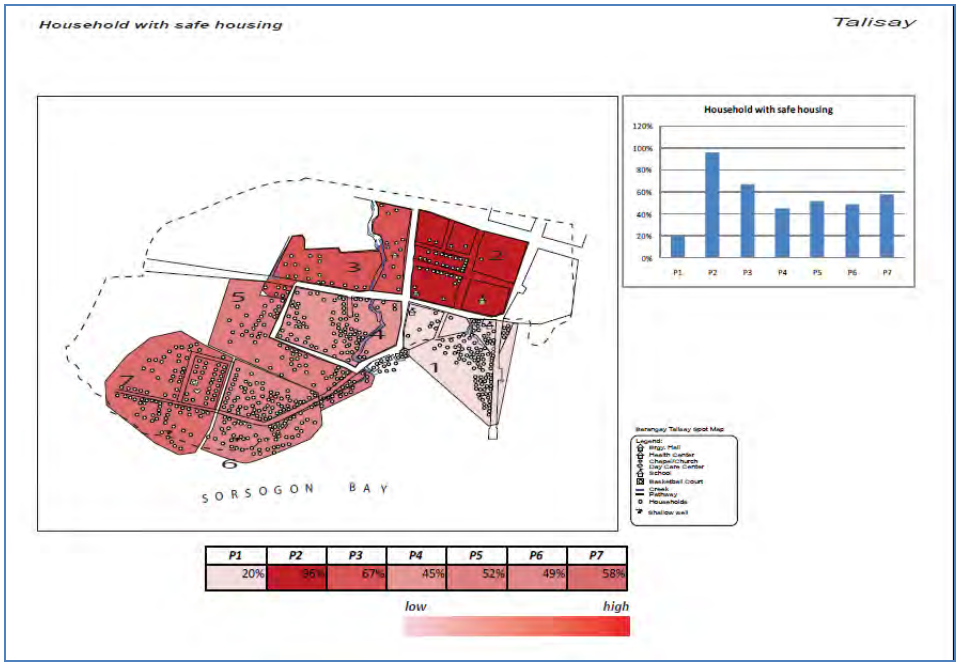
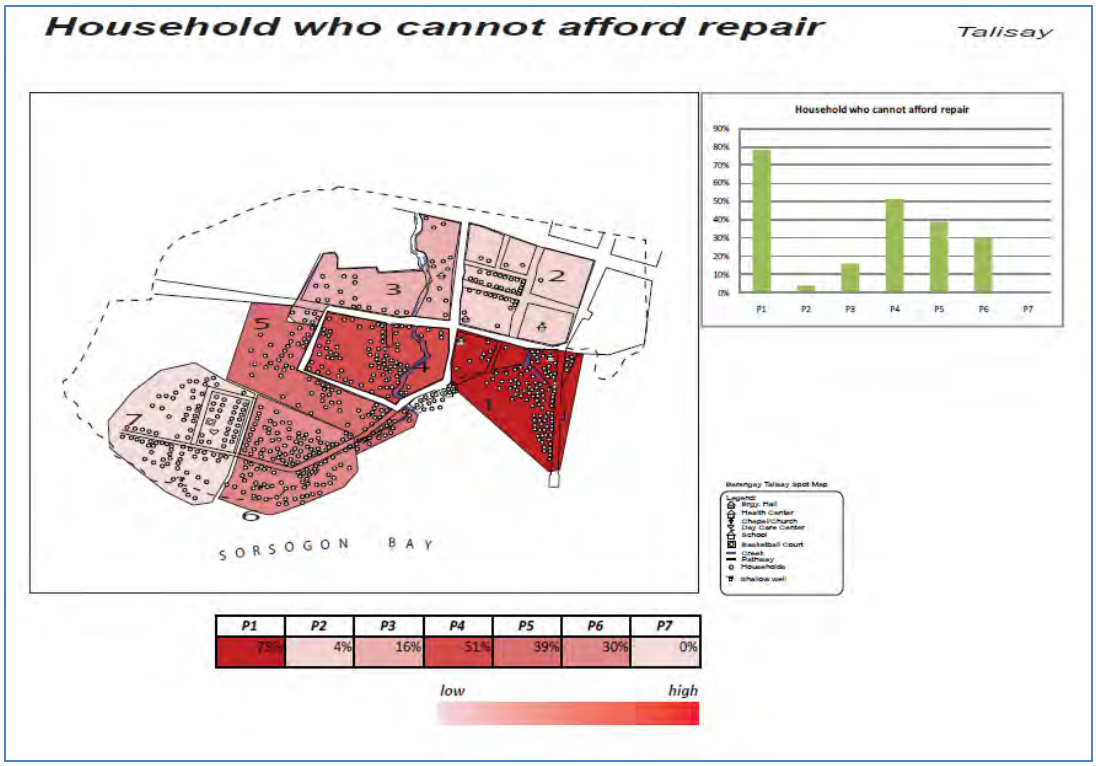


Figure 50, Source: Project Team



The figure below presents a simulation of sea level rise in Talisay using the area elevation profile and projected against the Barangay spot map. It should be noted that majority of the settlements in the Barangay is highly vulnerable to 0.5 meter increase in sea level while the entire area will be affected in the event of 2 meter increase in sea level. Flooding and SLR is a great risk to the water and sanitation in the area (Figure 51-52). A total 62 households are noted not to have sanitary toilet and 14 of them are female headed households. Also noted is that 60 of the 116 female headed households does not have access to safe water.

Figure 51: SLR simulation relative to area elevation and projected against Barangay Talisay base map, Source: Project Team

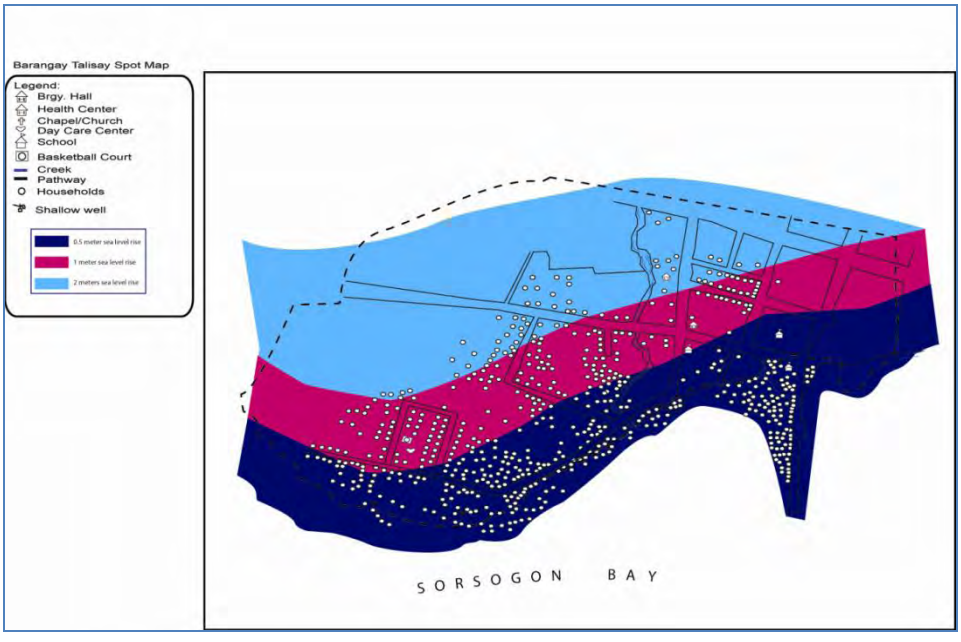


Figure 52, Source: Project Team

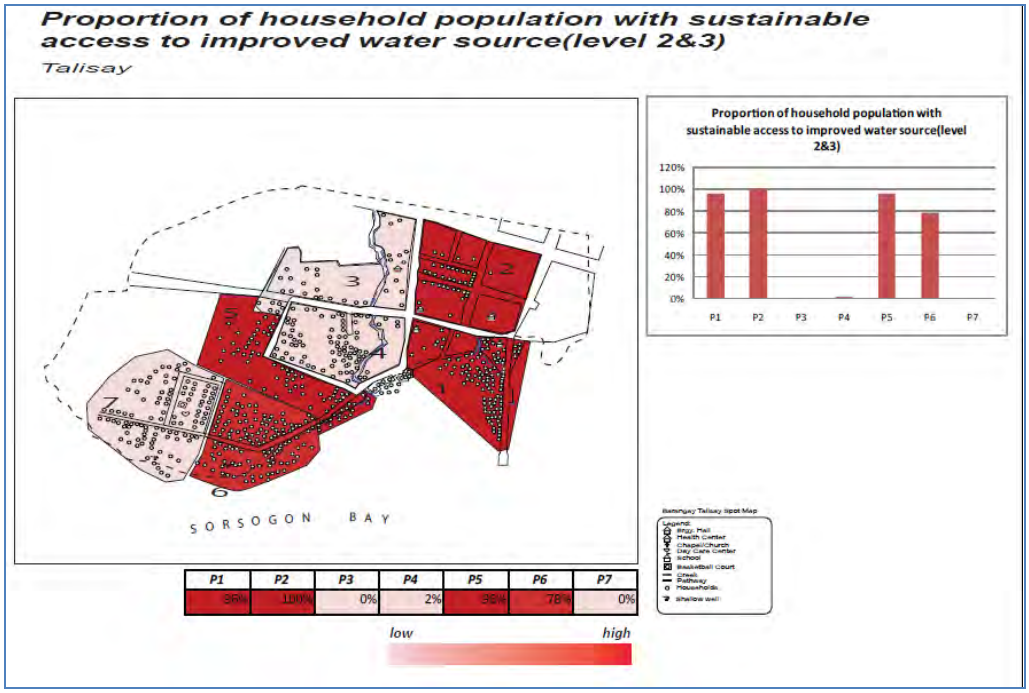
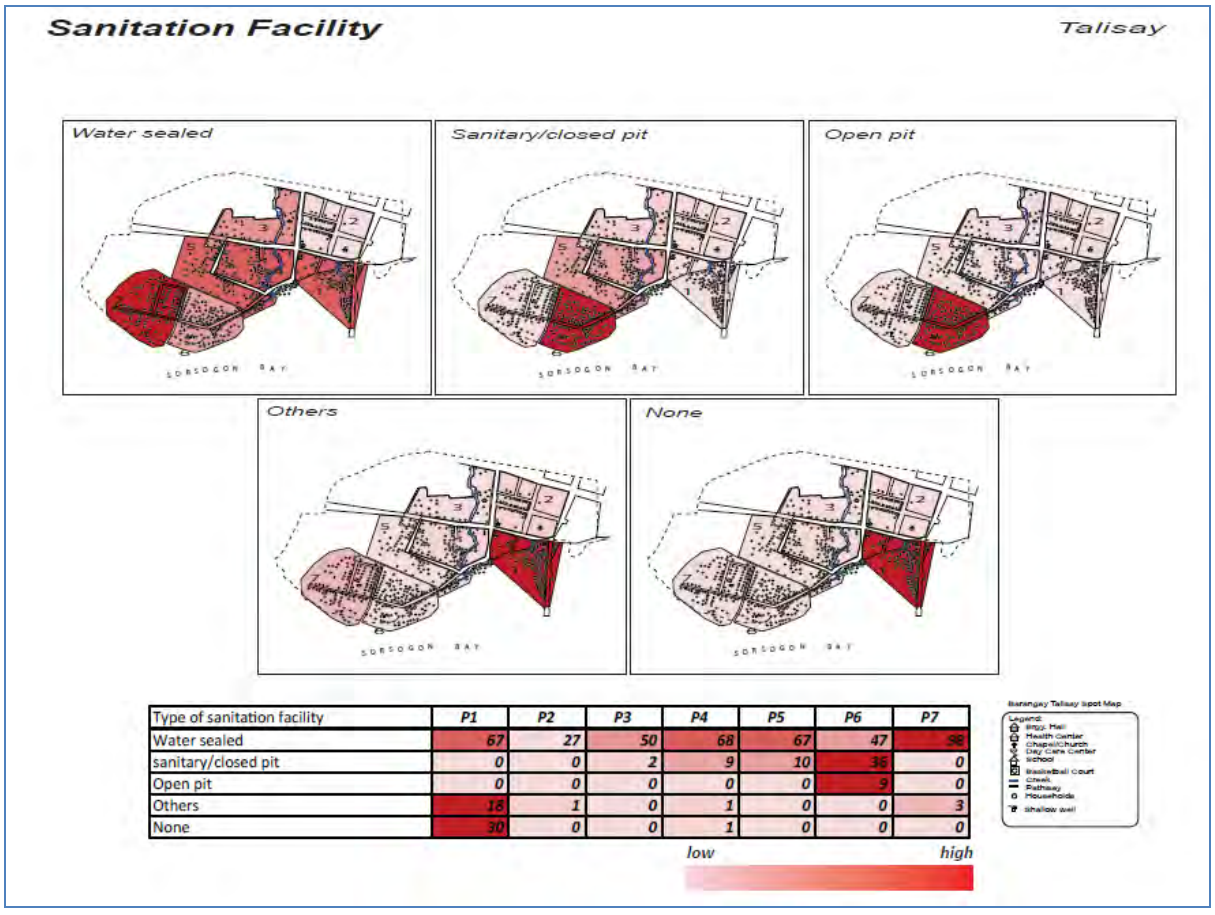


Figure 53, Source: Project Team



The table below further provides details of FGDs and KIIs with communities. It presents who and what in Barangay Talisay are sensitive to climate change impacts as narrated/shared by the people.

Table 24: Summary of Barangay Talisay Vulnerability to Climate Change and Options for Adaptation

Prioritised Vulnerabilities and Potential Impacts	Who/What is vulnerable?	Triggers/Agents	Options for Adaptation
Loss of land due to inundation	• Estimated 100% of village land area • Estimated 100% of settlements	Increase temperature	• Long-term planning and land use reclassification • GIS-based development planning • Relocation • Identification and development of alternative sites for business locators
Damage/destruction of houses and village infrastructures including losses of livelihood assets and employment	• houses made up of very light materials • Commercial district mostly service related trades • 5 schools • Barangay Hall, Health and Day Care Center • Cathedral • 1 basketball court • Workers and employees in the commercial area • Fisher folks	▪ Cyclone ▪ Flood ▪ Storm surge ▪ Excessive rainfall	• Strengthen existing sea walls • Mangrove reforestation and banning of clearing of trees on the hill side and river banks to prevent flooding • Establishment of nursery for trees and plants to protect the coast • Continuous awareness programmes • Provision of adequate drainage system • Development of alternative livelihoods and expansion of asset base • Social protection
Disruption to livelihoods and employment	▪ Informal workers ▪ Fisherfolks ▪ Small/micro entrepreneurs ▪ Women	▪ Cyclone ▪ Flood ▪ Storm surge ▪ Excessive rainfall ▪ Sea Level Rise	▪ Diversification of livelihood sources which could be developed by conducting further study on community livelihood patterns (seasonality, typology, etc) ▪ Introduction of social protection schemes on livelihoods ▪ Improving access to productivity resources (e.g. micro-finance/micro-insurance; business

Prioritised Vulnerabilities and Potential Impacts	Who/What is vulnerable?	Triggers/Agents	Options for Adaptation
			advisory; technology on product development; access to market) ▪ Skills upgrading and re-tooling for employment and self-wage livelihood activities ▪ Engage women on home-based livelihood activities ▪

IV. Impact Projections: "the cost of business-as-usual"

Tropical Cyclone
Sorsogon City
Valuation relative to Risks in case of direct impact

Sector	Sub	Estimating Indicator	Estimated vulnerable to typhoon	unit cost estimate	Possible damage %	Estimated value exposed to risk	Estimated Value of Damage (exposeXpercent)	Return Period of Impact (2 in 3 years = 4 for the planning period)	**Estimated Value of Damage for the planning period**
Social									
	Housing								
		number of housing units (permanent)	15,000	300,000.00	0.25	4,500,000,000.00	1,125,000,000.00	4	4,500,000,000.00
		semi permanent and indigenous(assumed)	15,000	132,000.00	0.64	1,980,000,000.00	1,267,200,000.00	4	5,068,800,000.00
		household furnitures and equipment	30,000	10,000.00	0.75	300,000,000.00	225,000,000.00	4	900,000,000.00
								4	-
	Education	number of classrooms in the affected area	936	384,000.00	0.25	359,424,000.00	89,856,000.00	4	359,424,000.00
		number of libraries, sports area,	80	480,000.00	0.50	38,400,000.00	19,200,000.00	4	76,800,000.00
		number of desks, armchairs, tables, chairs	28,080	300.00	0.25	8,424,000.00	2,106,000.00	4	8,424,000.00
		educational equipment and supplies	4	500,000.00	0.75	2,000,000.00	1,500,000.00	4	6,000,000.00
		education sector offices	3	480,000.00	0.25	1,440,000.00	360,000.00	4	1,440,000.00
								4	-
	Health	number of hospitals	4	5,000,000.00	0.10	20,000,000.00	2,000,000.00	4	8,000,000.00
		number of health centers	69	384,000.00	0.25	26,496,000.00	6,624,000.00	4	26,496,000.00
		medical equipment and supplies	4	2,000,000.00	0.25	8,000,000.00	2,000,000.00	4	8,000,000.00
		furnitures and beds	345	10,000.00	0.50	3,450,000.00	1,725,000.00	4	6,900,000.00
		health offices	4	1,000,000.00	0.25	4,000,000.00	1,000,000.00	4	4,000,000.00
Economic								4	-
	Agriculture							4	-
		area of riceland	2,100	300,000.00	0.02	630,000,000.00	9,450,000.00	4	37,800,000.00
		area of coconut land	9,900	200,000.00	0.10	1,980,000,000.00	198,000,000.00	4	792,000,000.00
		area of abaca	2,000	100,000.00	0.10	200,000,000.00	20,000,000.00	4	80,000,000.00
		area of fruits and vegetable plantation	570	150,000.00	0.10	85,500,000.00	8,550,000.00	4	34,200,000.00
		buildings and warehouses	32	500,000.00	0.25	16,000,000.00	4,000,000.00	4	16,000,000.00
		irrigation	50	1,000,000.00	0.25	50,000,000.00	12,500,000.00	4	50,000,000.00
		machineries and equipments	64	5,000.00	0.25	320,000.00	80,000.00	4	320,000.00
		agri and livestocks	10,000	1,500.00	1.00	15,000,000.00	15,000,000.00	4	60,000,000.00
	Fisheries			-				4	-
		Banca (motorized and non-motorized)	100	15,000.00	0.50	1,500,000.00	750,000.00	4	3,000,000.00
		Fishing gears	100	10,000.00	0.50	1,000,000.00	500,000.00	4	2,000,000.00
		Shrimps/Mudcrab/Milkfish/seaweeds	300	150,000.00	0.50	45,000,000.00	22,500,000.00	4	90,000,000.00
		Fishponds	300	1,000,000.00	0.25	300,000,000.00	75,000,000.00	4	300,000,000.00
	Commerce			-				4	-
		buildings and warehouses	200	500,000.00	0.25	100,000,000.00	25,000,000.00	4	100,000,000.00
		machinery and equipment	10	1,000,000.00	0.25	10,000,000.00	2,500,000.00	4	10,000,000.00
		stocks	10,000	1,500.00	0.50	15,000,000.00	7,500,000.00	4	30,000,000.00
								4	-
	Tourism							4	-
		hotels, restaurants, resorts	65	500,000.00	0.25	32,500,000.00	8,125,000.00	4	32,500,000.00
		cultural and historical sites and attractions	10	5,000,000.00	0.25	50,000,000.00	12,500,000.00	4	50,000,000.00
		machineries and equipments	65	20,000.00	0.25	1,300,000.00	325,000.00	4	1,300,000.00

Tropical Cyclone
Sorsogon City
Valuation relative to Risks in case of direct impact

Sector	Sub	Estimating Indicator	Estimated vulnerable to typhoon	unit cost estimate	Possible damage %	Estimated value exposed to risk	Estimated Value of Damage (exposeXpercent)	Return Period of Impact (2 in 3 years = 4 for the planning period)	**Estimated Value of Damage for the planning period**
Infrastructure								4	-
	Transportation							4	-
		roads	160	5,000,000.00	0.10	800,000,000.00	80,000,000.00	4	320,000,000.00
		bridges	600	350,000.00	0.10	210,000,000.00	21,000,000.00	4	84,000,000.00
		drainage system	300	50,000.00	0.10	15,000,000.00	1,500,000.00	4	6,000,000.00
		ports	3	100,000,000.00	0.10	300,000,000.00	30,000,000.00	4	120,000,000.00
		airport	1	50,000,000.00	0.05	50,000,000.00	2,500,000.00	4	10,000,000.00
		terminal buildings	1	500,000.00	0.25	500,000.00	125,000.00	4	500,000.00
								4	-
	Water	water sources and facilities	20	2,000,000.00	0.10	40,000,000.00	4,000,000.00	4	16,000,000.00
		transmission lines	15	2,000,000.00	0.05	30,000,000.00	1,500,000.00	4	6,000,000.00
		distribution lines	50	1,500,000.00	0.10	75,000,000.00	7,500,000.00	4	30,000,000.00
		water dist machineries and equipments	4	500,000.00	0.10	2,000,000.00	200,000.00	4	800,000.00
	Energy			-				4	-
		hydro energy sources	1	20,000,000.00	0.05	20,000,000.00	1,000,000.00	4	4,000,000.00
		geothermal energy sources/wells	10	3,500,000.00	0.05	35,000,000.00	1,750,000.00	4	7,000,000.00
		buildings and offices	5	10,000,000.00	0.25	50,000,000.00	12,500,000.00	4	50,000,000.00
		energy machineries and equipments	1	500,000,000.00	0.10	500,000,000.00	50,000,000.00	4	200,000,000.00
		sub stations	1	50,000,000.00	0.05	50,000,000.00	2,500,000.00	4	10,000,000.00
		power transmission lines	50	10,000,000.00	0.10	500,000,000.00	50,000,000.00	4	200,000,000.00
		power distribution lines	50	1,500,000.00	0.25	75,000,000.00	18,750,000.00	4	75,000,000.00
	Communications							4	-
		cell site towers	10	3,500,000.00	0.10	35,000,000.00	3,500,000.00	4	14,000,000.00
		machineries and equipment	10	10,000,000.00	0.10	100,000,000.00	10,000,000.00	4	40,000,000.00
		offices	10	500,000.00	0.25	5,000,000.00	1,250,000.00	4	5,000,000.00
		radio and tv stations	8	5,000,000.00	0.25	40,000,000.00	10,000,000.00	4	40,000,000.00
Environmental				-				4	-
	Forest			-				4	-
		area of forestland	7,000	100,000.00	0.25	700,000,000.00	175,000,000.00	4	700,000,000.00
		area of mangove forest							-
		wildlife (bacman)							-
	Others								-
		damage in corral reefs							-
		loss of beaches/shoreland							-

Landslide
Sorsogon City
Risks for direct impact valuation

Sector	Sub	Estimating Indicator	Estimated vulnerable to landslide		unit cost estimate	Percent of possibledamage	Estimated value exposed to landslide risk	Estimated value of possible damage	Return Period of Impact (withing the planning period)	**Estimated Value of Damage for the planning period**
Social										
	Housing									
		number of housing units (permanent)	2,023	units	300,000.00	0.50	607,021,276.60	303,510,638.30	2	607,021,276.60
		semi permanent and indigenous(assumed)	2,023	units	132,000.00	0.80	267,089,361.70	213,671,489.36	2	427,342,978.72
		household furnitures and equipment	4,047	units	10,000.00	0.65	40,468,085.11	26,304,255.32	2	52,608,510.64
					-		-	-	2	-
	Education	number of classrooms in the affected area	195	clrooms	384,000.00	0.15	74,880,000.00	11,232,000.00	2	22,464,000.00
		number of libraries, sports area,	13	units	480,000.00	0.15	6,240,000.00	936,000.00	2	1,872,000.00
		number of desks, armchairs, tables, chairs	5,850	units	300.00	0.15	1,755,000.00	263,250.00	2	526,500.00
		educational equipment and supplies	1	units	500,000.00	0.15	500,000.00	75,000.00	2	150,000.00
		education sector offices	1	units	480,000.00	0.15	480,000.00	72,000.00	2	144,000.00
					-		-	-	2	-
	Health	number of hospitals	-	hosp	5,000,000.00	0.25	-	-	2	-
		number of health centers	13	units	384,000.00	0.25	4,992,000.00	1,248,000.00	2	2,496,000.00
		medical equipment and supplies	1	lots	2,000,000.00	0.10	2,000,000.00	200,000.00	2	400,000.00
		furnitures and beds	65	units	10,000.00	0.25	650,000.00	162,500.00	2	325,000.00
		health offices	-	units	1,000,000.00	-	-	-	2	-
Economic									2	-
	Agriculture								2	-
		area of riceland	50	hectares	300,000.00	0.10	15,000,000.00	1,500,000.00	2	3,000,000.00
		area of coconut land	7,425	hectares	200,000.00	0.25	1,485,000,000.00	371,250,000.00	2	742,500,000.00
		area of abaca	500	hectares	100,000.00	0.05	50,000,000.00	2,500,000.00	2	5,000,000.00
		area of fruits and vegetable plantation	50	hectares	150,000.00	0.10	7,500,000.00	750,000.00	2	1,500,000.00
		buildings and warehouses	3	units	500,000.00	0.10	1,500,000.00	150,000.00	2	300,000.00
		irrigation	2	kms	1,000,000.00	0.10	2,000,000.00	200,000.00	2	400,000.00
		machineries and equipments	13	units	5,000.00	0.50	65,000.00	32,500.00	2	65,000.00
		agri and livestocks	1,000	stocks	1,500.00	1.00	1,500,000.00	1,500,000.00	2	3,000,000.00
	Fisheries			-	-		-	-	2	-
		Banca (motorized and non-motorized)	-	units	15,000.00		-	-	2	-
		Fishing gears	-	units	10,000.00		-	-	2	-
		Shrimps/Mudcrab/Milkfish/seaweeds	-	has	150,000.00		-	-	2	-
		Fishponds	-	has	1,000,000.00		-	-	2	-
	Commerce				-		-	-	2	-
		buildings and warehouses	-	units	500,000.00		-	-	2	-
		machinery and equipment	-	lots	1,000,000.00		-	-	2	-
		stocks	-	stocks	1,500.00		-	-	2	-
					-		-	-	2	-
	Tourism				-		-	-	2	-
		hotels, restaurants, resorts	1	units	500,000.00	1.00	500,000.00	500,000.00	2	1,000,000.00
		cultural and historical sites and attractions	1	sites	5,000,000.00	0.50	5,000,000.00	2,500,000.00	2	5,000,000.00
		machineries and equipments	-	lots	20,000.00	-	-	-	2	-

Landslide
Sorsogon City
Risks for direct impact valuation

Sector	Sub	Estimating Indicator	Estimated vulnerable to landslide		unit cost estimate	Percent of possibledamage	Estimated value exposed to landslide risk	Estimated value of possible damage	Return Period of Impact (withing the planning period)	**Estimated Value of Damage for the planning period**
Infrastructure					-		-	-	2	-
	Transportation				-		-	-	2	-
		roads	50	kms	5,000,000.00	0.25	250,000,000.00	62,500,000.00	2	125,000,000.00
		bridges	80	m	350,000.00	0.25	28,000,000.00	7,000,000.00	2	14,000,000.00
		drainage system	50	kms	50,000.00	0.25	2,500,000.00	625,000.00	2	1,250,000.00
		ports	-	units	100,000,000.00	-	-	-	2	-
		airport	-	units	50,000,000.00	-	-	-	2	-
		terminal buildings	-	units	500,000.00	-	-	-	2	-
					-		-	-	2	-
	Water	water sources and facilities	2	units	2,000,000.00	0.25	4,000,000.00	1,000,000.00	2	2,000,000.00
		transmission lines	5	kms	2,000,000.00	0.50	10,000,000.00	5,000,000.00	2	10,000,000.00
		distribution lines	1	kms	1,500,000.00	0.10	1,500,000.00	150,000.00	2	300,000.00
		water dist machineries and equipments	1	units	500,000.00	0.10	500,000.00	50,000.00	2	100,000.00
	Energy				-		-	-	2	-
		hydro energy sources	1	units	20,000,000.00	0.10	20,000,000.00	2,000,000.00	2	4,000,000.00
		geothermal energy sources/wells	10	units	3,500,000.00	0.10	35,000,000.00	3,500,000.00	2	7,000,000.00
		buildings and offices	1	units	10,000,000.00	0.10	10,000,000.00	1,000,000.00	2	2,000,000.00
		energy machineries and equipments	-	lots	500,000,000.00	-	-	-	2	-
		sub stations	-	units	50,000,000.00	-	-	-	2	-
		power transmission lines	2	kms	10,000,000.00	0.10	20,000,000.00	2,000,000.00	2	4,000,000.00
		power distribution lines	1	kms	1,500,000.00	0.10	1,500,000.00	150,000.00	2	300,000.00
	Communications				-		-	-	2	-
		cell site towers	2	units	3,500,000.00	0.10	7,000,000.00	700,000.00	2	1,400,000.00
		machineries and equipment	1	units	10,000,000.00	0.10	10,000,000.00	1,000,000.00	2	2,000,000.00
		offices	1	units	500,000.00	0.10	500,000.00	50,000.00	2	100,000.00
		radio and tv stations	-	units	5,000,000.00	-	-	-	2	-
Environmental									2	-
	Forest								2	-
		area of forestlanf	5,000	hectares	100,000.00		500,000,000.00	-	2	-
		area of mangove forest	)	hectares					2	-
		wildlife (bacman)	)	hectares					2	-
	Others								2	-
		damage in corral reefs	)	lump					2	-
		loss of beaches/shoreland	)	lump					2	-

Sea Level Rise
Sorsogon City
Risks for direct impact valuation

Sector	Sub	Estimating Indicator	Estimated vulnerable to flooding (units)	Unit (average estimae guide)	Percent exposed	unit cost estimate	possible & of damage	Estimated value exposed	Estimated Value of Damage (exposeXpercent) 100% for perm flooding by 2020	Assumptions
Social										
	Housing									
		number of housing units (permanent)	6,426	units	42.8%	300,000.00	100%	1,927,667,872.34	1,927,667,872.34	
		semi permanent and indigenous(assumed)	6,426	units	42.8%	132,000.00	100%	848,173,863.83	848,173,863.83	
	Education	number of classrooms in the affected area	480	clrooms	51.3%	384,000.00	25%	184,320,000.00	46,080,000.00	average 15 classrm per bgy. (32 bgys exposed)
		number of libraries, sports area,	32	units	40.0%	480,000.00	50%	15,360,000.00	7,680,000.00	average 1 library or sports area per bgy
		education sector offices	1	units	33.3%	480,000.00	25%	480,000.00	120,000.00	assumed
	Health	number of hospitals	-	hosp	0.0%	5,000,000.00	0%	-	-	no hospital exposed to flooding
		number of health centers	32	units	46.4%	384,000.00	50%	12,288,000.00	6,144,000.00	assumed at 1 unit per exposed bgy
		health offices	2	units	50.0%	1,000,000.00	25%	2,000,000.00	500,000.00	Poblacion and 1 rural
Economic										
	Agriculture									
		area of riceland	1,680	hectares	80.0%	300,000.00	2%	504,000,000.00	7,560,000.00	includes damage to riceland if covered with silt
		area of coconut land	-	hectares	0.0%	200,000.00	0%	-	-	
		area of abaca	-	hectares	0.0%	100,000.00	0%	-	-	
		area of fruits and vegetable plantation	285	hectares	50.0%	150,000.00	10%	42,750,000.00	4,275,000.00	50% assumed prone to flooding
		buildings and warehouses	2	units		500,000.00	25%	1,000,000.00	250,000.00	nfa and capuy warehses
		irrigation	50	kms	100.0%	1,000,000.00	50%	50,000,000.00	25,000,000.00	
		machineries and equipments	32	units		5,000.00	50%	160,000.00	80,000.00	
		agri and livestocks	3,000	stocks	30.0%	1,500.00	75%	4,500,000.00	3,375,000.00	sack of palay,fertilizer,10_chicken,half-hog,q-cow
		Shrimps/Mudcrab/Milkfish/seaweeds	300	has	100.0%	150,000.00	100%	45,000,000.00	45,000,000.00	assumed 100% contents/produce lost if submerged
		Fishponds	300	has	100.0%	1,000,000.00	25%	300,000,000.00	75,000,000.00	damage to structures
	Commerce								-	
		buildings and warehouses	50	units	25.0%	500,000.00	25%	25,000,000.00	6,250,000.00	
									-	
	Tourism								-	
		hotels, restaurants, resorts	7	units	10.8%	125,000.00	25%	875,000.00	218,750.00	beaches and resorts
		cultural and historical sites and attractions	2	sites	20.0%	5,000,000.00	25%	10,000,000.00	2,500,000.00	includes trekking sites/loss of tourists
Infrastructure									-	
	Transportation								-	
		roads	40	kms	25.0%	5,000,000.00	10%	200,000,000.00	20,000,000.00	mostly on earth, gravel, and asphalt, erosion
		bridges	600	m	100.0%	350,000.00	10%	210,000,000.00	21,000,000.00	eroding of approaches
		drainage system	100	kms	33.3%	50,000.00	25%	5,000,000.00	1,250,000.00	damages due to erosion and siltation
		ports	3	units	100.0%	100,000,000.00	10%	300,000,000.00	30,000,000.00	riprap and other damages
		airport	1	units	100.0%	50,000,000.00	10%	50,000,000.00	5,000,000.00	earthport??
		terminal buildings	1	units	100.0%	500,000.00	25%	500,000.00	125,000.00	private
									-	
	Water	water sources and facilities	10	units	50.0%	2,000,000.00	10%	20,000,000.00	2,000,000.00	springs etc
		transmission lines	1	kms	6.7%	100,000.00	10%	100,000.00	10,000.00	
		distribution lines	5	kms	10.0%	100,000.00	25%	500,000.00	125,000.00	along coastal areas and river crossings
		offices/stations	1	units	25.0%	500,000.00	10%	500,000.00	50,000.00	includes pumphouse
Environmental									-	
	Forest								-	
		area of forestland	500	hectares	7.1%	100,000.00	5%	50,000,000.00	2,500,000.00	mangroves/forest eroded after flooding

V. Conclusions and Challenges for City Resilience

- Sorsogon City is highly vulnerable to impacts of climate change and variability based on projections and recorded evidences. The city's climate change exposures are associated to changes in mean temperature, precipitation and sea level as well as likely occurrences of climate extremes such as droughts and stronger tropical cyclones. This is corroborated by both local people's account and climate models (PRECIS) developed by PAGASA, the official government agency responsible for climate monitoring and projections. The city sensitivities to climate change impacts are highly related to the socio-economic factors and physical conditions at the community level. The 43% poor families, especially those living in high risk and disaster prone areas, would be facing higher risk given their limited resources and assets.

  Based on assessments conducted at the community (village) level, the people are aware of the hazards they face relative to extreme events as they have experienced extreme typhoons and storm surges over the last decades. However, the communities need to be provided with the right information and be encouraged to increase their involvement in planning and decision making processes vis-à-vis the possible changes (positive and negative) in their natural and social landscape especially due to changes in mean temperature and precipitation.

  Recommendations:

  - It was affirmed in the V&A assessment that the communities are the best information source on applicable adaptation measures as they are the ones who immediately experience effects of climate variability and they are the front-liners as well in seeking community coping actions even with limited support from city government and civil society groups. Pursuing DRR as an entry point to promote climate change risk management will complement and enhance existing community knowledge and in fact gain their interest on working with other stakeholders on climate change issues as DRR ultimately zero in and aim for community safety and long term security.

  - Develop social/community mobilization plan and engage Barangays especially the hotspots in city consultations and action planning. This would prove to be an efficient way to get them involved in actions and in increasing their ownership of the issues brought by climatic change and variability while also bringing into their consciousness the secondary risks that may be caused by the specific impacts of climate change.

  - Develop Community Actions Plans and identify possible demonstration projects that present great feasibility and would generate high impact towards developing climate change resilient communities. Innovative technologies that would be used and generated from demonstration projects could feed into the national Housing and Urban Development Coordinating Council (HUDCC) initiatives on building climate-resilient human settlements especially in low-lying urban coastal areas

- The city needs to enhance its adaptation mechanisms and processes to increase their resilience to impacts of climatic risks and threats. As the assessment revealed, the City still does not have a framework that would guide and harmonize the city's initiatives on climate change. This is mainly due to the following facts: at the city level knowledge and information on climate change impacts is still very limited; the city government still lacks climate change responsive tools (software) and equipments (hardware) for assessment and planning activities; and capacities of

city government technical staff is still weak relative to anticipatory planning vis-à-vis climate change impacts.

Recommendations:

- Promote and advocate awareness on climate change among the general public and stakeholders through various media and community activities in partnership with the academic institutions

- Develop knowledge products, tools and document good practices for sharing and harmonization of climate change initiatives (adaptation and mitigation) that could be used at the city level which could also be eventually shared to the provincial and national levels.

- Maximize the opportunity technical assistance available for cities (e.g. CCCI and MDG-F projects) particularly in areas of technology and tools development; institutional coordination and strengthening; and policy advocacy

- There is an increasing need for the city to consider its vulnerability to climate change impacts in its land use planning. The City's built-up area is at risk and would need strategic planning in order to prevent or perhaps moderate negative impacts of climate change to the socio-economic condition of the people. In Part IV of the Assessment, the "cost of business as usual" (without adaptation/mitigation) is projected to be so much that the city and the local people could not afford. For the socialized housing sector alone, a direct tropical cyclone impact that would cost 25% damage to structures would already cost losses of more than a Billion Pesos. This same amount or more would be required for reconstruction and rehabilitation.

  Recommendations:

  - The city must identify where to lead investments and situate development infrastructures to support its competitiveness despite climate change impacts. There must also be an effort to identify safe and unsafe areas to better manage people's access to public service (health, education, recreation, etc.)

  - Strengthen institutional capacities of the city government particularly in developing a Shelter Plan and Comprehensive Land Use Plan responsive to climatic-induced hazards including the use of Geographic Information System (GIS)

- The trade, agriculture, and fisheries sector is highly vulnerable to impacts of climate change in the city. Given that the poor in Sorsogon City source their income directly and indirectly from these activities, their livelihoods lifeline and other basic needs such as health, water, sanitation, and food security will be greatly challenged. These effects are foreseen to put more pressure on the cycle of poverty in the city and therefore hamper the achievement of the city MDG targets.

  Recommendations:

  - Develop a livelihoods baseline for the City that considers climate change and disaster risk typologies per livelihood activity

  - Align poverty alleviation program of the city with its vulnerability to climate change

- Develop alternative livelihood programs that takes into account the vulnerability of the communities in the identified hotspots to increase peoples resilience to impacts of climate change

- Though capacities and knowledge on climate change is still weak, there is a great potential for improvement given that there is already recognition from the local elected officials, LGU technical staff and other stakeholders that the City is facing great risks and threats due to climate change related phenomenon. There is openness from city leaders, especially the Local Chief Executive, that actions must be undertaken to improve the peoples coping mechanisms to disasters as well to strengthen and develop the city's adaptation and mitigation initiatives to climate variability.

  Recommendations:

  - Develop a capacity building plan and initiate actions to address skills and knowledge gap of various stakeholders especially the city government.

Institution/Organization	Knowledge & Skills Gap	Training Intervention
City Local Government Unit of Sorsogon	▪ Climate change concepts, issues and challenges, institutional actions at the international and local levels, conventions and agreements ▪ Disaster Risk Reduction ▪ Vulnerability assessment ▪ CDM and VER projects and processes ▪ GIS ▪ Climate change adaptation technologies particularly on building designs and livelihoods ▪ Monitoring and evaluation ▪ City Shelter Planning ▪ Computation and monitoring of GHG emission	▪ Orientation training on climate change ▪ Training workshop on DRR and vulnerability assessment ▪ Best practices on CDM and VER including processes and guidelines in developing related projects ▪ Training on GIS application and maintenance ▪ Training and exposure trip on adaptation projects ▪ Training on project documentation, monitoring & evaluation ▪ Workshop on city shelter planning with focus on climate change risk adaptation and management
Academe	▪ Adaptation and mitigation	▪ Training on climate change (generic)

Institution/Organization	Knowledge & Skills Gap	Training Intervention
	practices/technologies ▪ CDM and VER ▪ IEC development and management ▪ Research and development ▪ Climate change course in general	▪ CDM and VER guidelines and processes ▪ IEC project administration and communications development ▪ Research techniques upgrading
Business Sector	▪ Climate change (generic) ▪ CDM and VER projects ▪ Update on environmental laws ▪ Role of business in addressing climate change impacts	▪ Basic climate change facts and information sharing ▪ Training and workshop on CDM and VER project guidelines and processes ▪ Enhancement training on environmental laws relative to climate change ▪ Forum/sharing on business and LGU roles and accountabilities in addressing climate change
Community-based Organizations	▪ Climate change (generic) ▪ Adaptation and mitigation practices/technologies ▪ Community-based Disaster Risk Reduction ▪ Climate change interrelated with livelihoods adaptation and social protection schemes ▪ Estate Management and Organizational management vis-à-vis green building technologies	▪ Basic course on climate change ▪ Estate management course for CBOs and Homeowners Association ▪ DRR course and establishment of community-based early warning system ▪ Organizational management ▪ Promotion and training on social protection and savings schemes ▪ Livelihoods adaptation training

- Numerous non-public institutions could be tapped by the City Government for climate change risks management. For instance, the Bicol University and the Sorsogon State University could extend technical expertise on IEC, livelihood adaptation development (fishing & agriculture), research and development on building materials and design, and technical assistance for GIS operation and maintenance. Likewise, the NGOs are also committed to be involved in community organizing and mobilization, IEC and livelihood support.

  Recommendations:

  - Involve non-public institutions in continuing dialogue on climate change especially during city consultations that would lead to the development of the City Climate Change Action Plan

  - Broaden/establish partnerships among the private, public, academe, civil society, and neighbourhood associations to converge efforts in climate change mitigation and adaptation.

  - Business sector participation could be elevated from the conventional disaster relief and emergency assistance and community CSR projects to a more strategic and focused programs contributing to climate change. In particular, the business sector could play a vital role in providing technology development in green building and in promoting risk resilient communities through the use of appropriate and innovative technologies in housing and infrastructure development.

VI. Annexes

Annex A : List of Barangays in Sorsogon City

Barangay	Urban/ Rural	Coastal/ Inland	Land Area (Hectare)	Percent Share	2000 Population	Census 2007
Abuyog	Rural	C	1,083.14	2.35%	3,165	**3,880**
Almendras/Cogon	Urban	I	16.06	0.85%	1,141	**1,181**
Balete	Rural	I	341.83	1.85%	2,497	**2,537**
Balogo (B)	Rural	C	187.88	0.31%	420	**449**
Balogo (Se)	Urban	C	152.85	3.45%	4,649	**5,251**
Barayong	Rural	I	92.64	0.65%	880	**851**
Basud	Rural	I	697.52	1.52%	2,041	**2,430**
Bato	Rural	C	279.14	1.15%	1,548	**1,616**
Bibincahan	Urban	I	513.49	9.34%	12,575	**15,186**
Bitan-O/Dalipay	Urban	C	19.20	1.91%	2,578	**3,028**
Bogña	Rural	C	244.00	0.85%	1,151	**1,321**
Bon-Ot	Rural	C	198.69	0.39%	528	**576**
Bucalbucalan	Rural	C	1,348.40	1.47%	1,982	**2,312**
Buenavista (B)	Rural	C	345.46	0.94%	1,266	**1,279**
Buenavista (Sw)	Rural	C	148.73	0.92%	1,237	**1,455**
Buhatan	Rural	C	629.19	1.78%	2,395	**2,858**
Bulabog	Rural	C	816.70	1.68%	2,268	**2,164**
Burabod	Urban	I	20.16	1.80%	2,421	**2,197**
Cabarbuhan	Rural	I	417.37	0.52%	697	**758**
Cabid-An	Urban	C	223.56	3.12%	4,199	**5,426**
Cambulaga	Rural	C	37.10	2.62%	3,522	**4,097**
Capuy	Rural	C	768.24	1.62%	2,182	**2,479**
Caricaran	Rural	C	167.53	1.06%	1,425	**1,580**
Del Rosario	Rural	C	73.67	0.63%	853	**903**

Barangay	Urban/ Rural	Coastal/ Inland	Land Area (Hectare)	Percent Share	2000 Population	Census 2007
Gatbo	Rural	C	857.07	1.63%	2,201	**2,378**
Gimaloto	Rural	C	143.00	0.63%	842	**907**
Guinlajon	Rural	I	1,455.46	2.59%	3,483	**4,173**
Jamislagan	Rural	I	99.83	0.35%	465	**529**
Macabog	Urban	I	536.06	1.73%	2,328	**3,048**
Marinas	Rural	I	172.20	0.35%	474	**586**
Osiao	Rural	C	1,015.66	1.93%	2,598	**2,721**
Pamurayan	Rural	C	120.45	1.19%	1,596	**1,879**
Pangpang	Urban	I	984.70	5.20%	7,002	**7,818**
Panlayaan	Rural	C	730.71	0.96%	1,289	**1,398**
Peñafrancia	Rural	C	84.80	1.02%	1,369	**1,506**
Piot	Urban	C	65.96	1.77%	2,379	**2,572**
Poblacion	Urban	C	174.51	3.49%	4,695	**4,882**
Polvorista	Urban	I	5.08	0.44%	594	**678**
Rawis	Rural	C	158.39	0.80%	1,074	**1,192**
Rizal	Rural	C	1,117.53	2.12%	2,851	**3,098**
Salog	Urban	I	15.12	1.51%	2,029	**2,586**
Salvacion (B)	Rural	C	315.62	0.78%	1,044	**1,089**
Salvacion (Sw)	Rural	I	689.09	0.51%	688	**716**
Sampaloc	Urban	C	12.58	3.40%	4,578	**5,214**
San Isidro(Sw)	Rural	I	607.03	0.93%	1,254	**1,306**
San Isidro (B)	Rural	I	506.68	1.96%	2,646	**2,748**
San Jose	Rural	I	169.76	0.78%	1,055	**1,265**
San Juan (B)	Rural	C	759.65	1.37%	1,840	**1,823**
San Juan (Se)	Urban	I	470.87	2.72%	3,663	**4,284**
San Pascual	Rural	I	287.90	1.11%	1,501	**1,478**
San Ramon	Rural	I	182.48	0.67%	908	**963**
San Roque	Rural	I	361.39	2.16%	2,905	**3,023**
San Vicente	Rural	I	295.29	0.71%	951	**1,265**

Barangay	Urban/ Rural	Coastal/ Inland	Land Area (Hectare)	Percent Share	2000 Population	Census 2007
Sawanga	Rural	C	366.23	1.08%	1,454	**1,495**
Sirangan	Urban	C	4.96	1.59%	2,139	**2,491**
Sta. Cruz	Rural	I	444.41	0.76%	1,025	**1,132**
Sta. Lucia	Rural	C	205.63	0.30%	399	**413**
Sto. Domingo	Rural	C	123.64	0.86%	1,159	**1,333**
Sto. Niño	Rural	C	385.13	1.42%	1,912	**2,008**
Sugod	Rural	C	581.77	1.45%	1,949	**1,919**
Sulucan	Urban	I	2.68	0.44%	587	**586**
Talisay	Urban	C	12.40	1.85%	2,485	**2,660**
Ticol	Rural	I	768.91	1.15%	1,550	**1,926**
Tugos	Urban	I	53.19	1.56%	2,097	**2,552**
Sorsogon City			**24,166.39**	**100.00%**	**134,678**	**151,454**

Annex B: Profile of Local Institutions and Possible partners

Private Sector

While the city is host to approximately 647 business establishments and 159 small scale industries, only two business groups could be potentially involved in climate change and DRR initiatives. They are the Sorsogon Chamber of Commerce and the Energy Development Corporation. These two business groups/network offer various resources and programs that could enhance the city's CC and DRR actions. For example, they could participate on IEC; technology transfer (livelihoods and environmental management); and. disaster preparedness-relief-and-recovery.

Sorsogon Chamber of Commerce

Basic Profile

The Chamber was established in 1970 but it has hibernated through the years because businessmen in Sorsogon still have an inward mentality that co-businessmen are competitors. They should be more united to uplift business in Sorsogon. Currently, majority of business owners are not from Sorsogon. Leadership is provided by a long-standing President but change in leadership is forthcoming in November. The Chamber has 60 active members.

The Chamber's operations is funded from the membership fee/annual due of P1500.

The Chamber accepts funds for CC and DRR programs. During the active years, they helped out in Pagtulong sa Tao Program. They had constructed school buildings in rural areas under the Sorsogon Project Development Assistance Center.

Thrust, Mandate and Programs

Since the Chamber was revived only in August 2008, it does not have CC projects yet but the organization is willing to integrate it in their regular programs as it grows. At present, any assistance extended by the Chamber comes from individual members (based on the prodding of the leader) but not as a collective effort of the organization. Thus, when calamities occur, it is more of a personal advocacy of the members to help out. They have been doing this individually for more than 10 years. They are now willing to put up a committee on Disaster Risk Management. Members are slated to attend a series of conferences to be conducted by the Philippine Chamber, where most topics are on Disaster Risk Management and Global Warming.

Institutional Gaps

Baseline data on target groups/clients, policies on CC and DRR, CC AND DRR response plans and procedures or tools, HRV assessment, information and financial management systems and program monitoring system, CC and DRR skills of its staff and members, and tools or system for gathering baseline information for CC and DRR are all absent. Development of a system for design of CC and DRR programs and projects still underway. Trainings and capacity building activities are definitely needed.

Potential Areas for Project Partnership

Aside from the provision of financial and material assistance on CC and DRR, there are no other areas specified. However, given its command in the entire business community both locally and nationally, the Chamber could be tapped as an important partner in capacity building and resource generation.

Energy Development Corporation

Basic Profile

The EDC caters to 9 Barangays (1 Barangay in Manito, Albay and 8 Barangays in Sorsogon City) with 25,000 hectares reserved and protected areas.

The organization is composed of only 11 fulltime on CSR, but employs 2,600 nationwide (Head Office and 6 Power Plants including the Macban Power Plant in Bicol). It has four casual/contractual employees.

Staffs are not directly working on CC and DRR but some of them are technically competent on environmental management programs and disaster risk management.

It has a corporate structure/leadership with 11 members comprising the Board of Directors. . Head office is in Taguig City, Metro Manila

Services include environmental management, reforestation, trainings on disaster relief and emergencies, livelihood technology adaptation particularly on rice production (e.g. adapted to local climate variability).

Funds are internally generated from business operations. Its annual budget is approximately P50 million for CSR only. Net income for 2007 was P8.65 billion with gross revenue of P18.78 billion. Budget for CC/and DRM is not clear-cut. The EDC accepts funds for CC but it prefers to enter into partnerships rather than simply accepting grants for projects.

Thrust, Mandate and Programs

The EDC's mandate is centered on geothermal energy development and other renewable energy sources through: exploration; drilling; reservoir management; fluid collection and recycling system; power plant operation; and environmental management. Created in March 1976, the company has been exploring and developing sustainable , indigenous energy resources to reduce the country's dependency on imported fuel.

Its specific mandate on CC is derived from its corporate vision and corporate social responsibility (CSR) programs. This is translated into sound environmental management practices of the company and community outreach programs. Concrete examples of these initiatives include mangrove and timber reforestation and disaster preparedness and emergency response programs

Current CC practices are in the form of environmental management, renewable energy, and community-based disaster response and disaster risk management programs.

The Carbon sink programs like mangrove reforestation for a total of 79 hectares in Sorsogon City had been in place since mid 1980.

As far as tools are concerned, the EDC has GIS and area profiling (bio-physical, demographic, socio-economic, environmental, etc.) that churns out baseline data on its target clients.

CC and DRR plans and procedures are also embedded in its corporate environmental programs (under the Environmental Management Department) and in disaster response teams.

HRV assessment is available though limited on the territories of the company and adjacent communities. The company also utilizes socio-economic profiling for its host or adopted communities (8 villages).

They design their CC programs based on results of researches/studies on environment and community relations, and baseline studies as well.

Institutional Gaps

Although the EDC has comparative edge over other local institutions where CC and DRRM are concerned, the organization is also beset with concerns like limited funds. In particular, its capacity building funds are not directly aligned with the Phil. CC initiative and the thrust of the Philippine Disaster Management System although it supports the overall thrust of the government in terms of developing renewable energy and environmental programs.

It also needs more technical know-how and skills on climate change, clean development Mechanism (CDM) practices, and community development.

In summary, the gaps revolve around inadequate training support and program resources, partnership with other local stakeholders, and development of CDM projects. These gaps should first be addressed by the company itself.

Potential Areas for Project Partnership

Technical support on GIS and GPS training for LGU personnel
Community support livelihoods and other social development projects
Clean Development Mechanism project could be explored
Reforestation (Carbon sink initiatives)

The EDC pronounced its willingness to join local networks such as the City Disaster Coordinating Council.

Academic Institutions

Likewise, the academic institutions are also critical players in the city as they can provide enormous extension programs and other resources. These two academic institutions are the Bicol University (BU) and the Sorsogon State College (SSC).

Bicol University (BU)

Basic Profile

The BU's operations cover the entire province and the region. It has around 886 permanent personnel, 568 teaching and 318 non-teaching, and 28 casual personnel. It has 171 contractual

employees. No volunteers. The school is governed by a 10-member Board of Regents and a University President.

Its colleges significant to climate change programs are: Science, Engineering, Agriculture and Forestry, Business, Economics and Management, and the Research and Development Center.

Its main source of funds is the national government and internal revenues. It has an average annual income/budget of approximately P310 million. Out of this, there is no specific percentage allocated for climate change and disaster risk reduction programs though such expenses are charged to specific college departments, where appropriate such as Agriculture and Forestry, Engineering, among others.

Thrust, Mandate and Programs, Projects and Activities

The BU's overall thrust and mandate is to give professional and technical training, provide advanced and specialized instruction in literature, philosophy, the sciences and arts, and promote scientific and technological researches. The BU also aims to generate and transfer knowledge and technology that will help address poverty in the region.

Specifically on climate change and disaster management, the school is mandated to incorporate climate change in the primary and secondary levels of teaching, conduct CC and DRRM-related research and extension.

Existing researches are on typhoon-resilient dwelling designs and materials, specifically Redefining Building Design for the Changing Climate in Albay, BU Infra Planning, and livelihood adaptation technology (agriculture and fishing).

It also provides technical support on GIS training, conducts IEC on climate change and DRRM and CCCI and MDG-F project documentation and impact evaluation.

Other projects and activities included the hosting of the Training of Trainors (TOT) for the mainstreaming of Climate Change into the curriculum of Primary, Secondary and Tertiary Schools and Learning Institutions of Albay (July 2008) and the 2nd International Earth Science Olympiad (Sept. 2008), the Coastal Clean-up and Green Roof Project (a training on urban agri and gardening) and Berdeng Pilipinas.

The school also provides facilities for conferences.

The school's CC and DRR response plans and procedures are in the form of IEC materials, research and extension projects and participation in various CC and DRR conferences/fora.

The BU has an HRV Assessment available for its own use, however, it is highly designed to suit the needs of specific research projects such as development of farm plan modules for climate adaptation livelihoods.

The development of CC-related programs and projects follows a system of review and approval by an existing Review Committee, with the final approval of the University President.

While there is no information and financial management systems and programs specific to CC, the school follows the usual government accounting rules and procedures being enforced by the Commission on Audit. Transparency is attained through its various school publications.

Likewise, the school does not have a tool or system for gathering baseline information for CC or DRR management but it has developed alternative and complementary livelihoods on agri and fishing, as well as building designs that could be used for CC adaptation. The school has a pool of staff/personnel that could be tapped to train GIS application and maintenance. In particular, the BU has an expertise on GIS though its own GIS has yet to be installed.

These interventions, targeting coastal communities, farmers, women, children and youth, LGU personnel, and the general public, had been going on for about five years already.

Institutional Gaps

In terms of structure, the BU lacks a specific unit or office within the University that will tackle climate change issues and corresponding programs.

Along policy, an advisory or national issuance/guidelines on curriculum development to ensure integration of climate change modules in the school's curriculum is also absent.

Training needs are along research and extension work for CC adaptation and mitigation, improvement of IEC materials, enhancement of environmental conservation and protection programs, improvement of livelihood adaptation modules and technologies, CDM projects and schemes (energy sector in general), DRR (human and physical vulnerabilities).

Limited funds is also an identified weakness.

These gaps should be filled in through the support of external institutions like the LGUs, UN agencies, NGOs and government agencies mandated to address the effects of climate change.

Potential Areas for Project Partnership

> The university could be a partner in the following areas: IEC development and dissemination; GIS technical assistance through training, application and maintenance, adaptation technologies, particularly on livelihood programs and building materials.

Sorsogon State College (SSC)

Basic Profile

The SSC is another government school in Sorsogon City. It has 20 management staff, from the President down to Chief Administrative Officer, and a faculty of 184. It is governed by a 10-member Board of Trustees.

Of this staffing, no specific personnel/faculty is working on climate change and DRR programs but the school has a number of people/faculty that could be tapped for CC and DRR programs particularly in the engineering and sciences departments.

Its financial resources come from the national government and local revenues through its income-generating projects. For FY 2007, it had a budget of P154M, the amount of P74.299M or 49.55% came from the national government subsidy, 32% from locally generated income, and the remaining 18.41% are grants from other agencies and institutions. There is no defined budget for CC/DRRM.

The school accepts all students from all areas, but most of the enrollees are locals of Sorsogon and neighbouring provinces like Albay and Camarines Sur. Its services are limited only to elective science and environmental courses/modules.

Thrust, Mandate and Programs

As an academic institution, the SSC seeks to provide quality and relevant instruction which is accessible to all; conduct and promote scientific and technological studies; extend appropriate knowledge, skills and technologies of practical application and undertake income-generating projects to meet the needs and demands of various sectors to improve and sustain the quality of life of every Filipinos.

It has no specific mandate on CC/DRRM but some course modules could be utilized or could be considered contributory to climate change and disaster risk reduction programs, particularly those in the fields of engineering, information technology, agricultural technology and development, and science in fisheries management and conservation

The school's clear contribution to CC and DRRM is limited to information and education campaign amongst the students and youth on climate change and environmental resource management. Science courses offer environmental management as an elective to complete the course module. In times of crisis (like typhoon Milenyo), the school also initiates emergency relief assistance in highly affected communities in Sorsogon.

Although there is no specific program for CC and DRRM, the school, under its research and extension program, had been implementing projects for poor coastal communities in enhancing livelihood productivity (fisheries) and maintenance/conservation of natural resources for more than 15 years.

Examples of these extension programs are:

Socio-economic Development through Clean & Green
Advocacy for Livelihood Intervention & Values Enhancement (ALIVE)
Animal Farmers Assistance Center (AFAC)
Orientation on Mitigating Measures on Red Tide
Coral Localization Enlargement Project
Seminar in Participatory Road Appraisal & Planning

It has an existing enrolment database and is governed by COA rules and regulations.

What could be considered as a tool on CC and DRRM are the teaching modules also used for extension such as socio-economic development program through clean and green and the ALIVE project.

The school consciously promotes environmental conservation and the development of community livelihood programs that are resilient or adaptive to climate variability, particularly in fisheries and agriculture.

Institutional Gaps

The school's deficiencies are manifested in the following:

No CC and DRM response plans, procedures or tools
HRV assessment limited to livelihood and natural resources (fisheries and agriculture)
No defined systems for CC/DRRM program design on CC
More advocacy though few initiatives had been started in the form of IEC campaigns in partnership with SC, LGU and selected communities
No institutional capacity building funds
Most training focused on sciences and engineering and agricultural

The SSC needs trainings on knowledge enhancement and development, institutionalization of course modules directly related or contributing to climate change mitigation and adaptation measures. The school believes that these courses/modules are highly important and relevant not only in Sorsogon but in the whole Bicol Region since the area is prone to numerous climate change variability such as flooding, sea level rise and occurrence of extreme events (strong cyclones).

These gaps should be addressed internally with help from UN and the DepEd.

Potential Areas for Project Partnership

The school could be tapped as a partner in advocacy in areas of environmental management and development, and along information and technology sharing.

In the short-term, the SSC could help in the conduct of IEC activities and in technology development, particularly on livelihood adaptation.

On a long-term and sustainable level, the SSC could focus on the development of curriculum for climate change course modules

Aemilianum College (AC)

Basic Profile

The AC is an institution providing Catholic education mostly to less privileged students within the Province of Sorsogon though benefactors-sponsored scholarships.

The school is being administered by Somascan Fathers. Its staff complement is provided by 60 professional and 10 non-professional staff and 3-5 volunteers (members of Peace Corps) who take care of the orphans in Pangpang (extension orphanage of the school). The staff provides spiritual teaching and values formation.

The AC has a Board of Trustees, a school director, and 3 assistant directors respectively in-charge of academics, finance and administration.

The bulk of the school's financial resources come from tuition fees of the students and some sponsorships from abroad. Its annual budget is roughly P10-15 million. Right now, it has no certain budget for CC/DRRM but realignment is practiced during calamities. Fund raising is also done for the affected families. Despite the absence of a clear-cut budget for CC, the school is willing to provide scholarships on CC, integrated into their engineering courses.

Thrust, Mandate and Programs

The over-all mandate of the institution is to educate students to live their lives according to their founder, St. Jerome Emiliani. Their main thrust is to help the youths and the orphans. They have a Law school, Masters in Information Technology, college degrees like Electronics and Computer Engineering, and secondary and elementary levels.

As of now, the school has no specific mandate yet on CC/DRRM, save for the free TV and radio broadcast from their own TV station tackling topics on climate change and disaster management programs.

Climate Change is not yet a part of the AC's curriculum but the school plays an importance role as an evacuation center when disaster comes like Milenyo and other typhoons. The whole school including the gymnasium is opened to accommodate evacuees from nearby barangays. Furthermore, the Somascan Fathers conducts supplemental feeding right after typhoons, supported with spiritual activities like bible readings.

The school's radio and TV stations are two of the most reliable media outlets in Sorsogon, especially during calamities. It also has a communication system made possible through a software provided by Globe that sends text to all students and teachers.

The Science Club is very active in information dissemination on topics related to CC, especially during Science Week. CC has been featured twice already in the TV Campus Talk, simulcast in the school's radio program. Given the extent of these information dissemination activities, most of the students are aware of the CC issue.

As a matter of policy, the school enforces the city ordinance on waste segregation and use the prescribed fire extinguisher (the yellow one).

The school is equipped with emergency lights, flash lights and generators.

Storing information on CD could be considered as a tool or system for generating baseline information on CC and DRRM. The school's Administration has an existing database that stores all needed information, complemented by a photo gallery.

During calamities, the school coordinates with its partner sisters, the Somascan Missionary System, the LGU, and Barangay officials. It also has sponsors from Italy that give relief goods.

Institutional Gaps

Mainstreaming of CC and DRRM in the school curriculum, planning and budgeting process, and the school's structures

Potential Areas for Project Partnership

Considering the school's physical and financial resources, it can be a potential partner in the areas of: communication and advocacy, immediate relief assistance to disaster victims as an evacuation center and partner in supplemental feeding and psycho-social rehabilitation of disaster victims through spiritual activities, and more sustainable recovery interventions through scholarships for disaster victims.

NGOs

There are several NGOs operating in the City however only Habitat for Humanities and Gawad Kalinga have formal engagements currently being done in partnership with the city. Other local NGOs were also found to be operating in the city however their scope of operations is very limited.

Habitat for Humanities

Basic Profile

Habitat for Humanity (HfH) Philippines is a non-profit, Christian housing ministry that works both to eliminate poverty housing and to make adequate housing a matter of conscience and action.

In the Philippines, the first local affiliates of Habitat for Humanity International were established in 1988. Today, Habitat for Humanity Philippines has built more than 15,000 houses in more than 100 communities, and has a presence in 20 provinces and 29 cities with 25 affiliates and 21 satellites.

Habitat for Humanity Philippines is a partner of Sorsogon City in their recent project to build 75 duplex houses for poor families living in informal settlements/danger areas in the Bacon District.

Thrust, Mandate and Programs

Habitat aims to build decent houses in decent communities where people could grow into all that God intended. This means that Habitat should also ensure the proper development of Habitat communities, especially in the following areas:

- Community organizing & values formation
- Livelihood
- Education
- Health, sanitation, and the environment
- Promoting a culture of savings

Gaps (relative to Climate Risk Management)

Habitat for Humanity in the Philippines has been engaged with several disaster response and rehabilitation projects. However HfH in the Philippine currently does not have any direct engagement/project relating to climate risk management.

Potential Areas for Project Partnership

As HfH Philippines ensures that the houses they build are decent, affordable and durable they have been engaged in the use of their House Construction Innovations such as: Concrete Interlocking Block; Compressed Earth Blocks; light-alloy Steel Frames for row houses; and the Medium Rise Technology.

Given these, Habitat for Humanity in the Philippines is a potential partner in developing/testing innovative housing designs towards building climate resilient human settlement.

Gawad Kalinga Community Development Foundation (GK)

Basic Profile

Gawad Kalinga (GK) translated in English means to "to give care", and it is an alternative solution to the blatant problem of poverty not just in the Philippines but in the world. GK's vision for the Philippines is a slum-free, squatter-free nation through a simple strategy of providing land for the landless, homes for the homeless, food for the hungry and as a result providing dignity and peace for every Filipino.

It started in 1995 as an initiative of the Catholic Group - couples for Christ but has evolved into a movement for nation-building.

GK has partnered with the City of Sorsogon for its previous resettlement projects.

Thrust, Mandate and Programs

GK's vision for the Philippines is a slum-free, squatter-free nation through a simple strategy of providing land for the landless, homes for the homeless, food for the hungry and as a result providing dignity and peace for every Filipino. GK envisions to build 700,000 homes in 7,000 communities in 7 years.

GK Programs include:

- Shelter & Site Development
- Child & Youth Development
- Health
- Productivity
- Values Formation/Community Empowerment
- Environment

Gaps (relative to Climate Risk Management)

The GK programs have not yet mainstreamed climate change issues especially in the area of shelter and site development. It has been noted that GK technical plans however have been improving over the years in incorporating durability standards.

Potential Areas for Project Partnership

Given its strength and track record, GK is a potential partner in terms of values formation and community empowerment should the project involved community social development dimensions.

Lingap Para sa Kalusugan ng Sambayanan (LIKAS) Inc.

Basic Profile

LIKAS is an NGO established in 1977 and in Bicol it is mainly operating in the Municipality of Irosin. Currently LIKAS is developing projects that would be operationalized in the province of Masbate and Sorsogon City.

LIKAS has a strong staff of 22, most of whom are social development practitioners with specialization community and livelihood development and environmental management. Funding of the NGO is sourced through their partnership with various international and national organizations.

Thrust, Mandate and Programs

Vision
To build a healthy Filipino Christian community based on truth, freedom, justice, love and participation in everything that affects themselves, their family, community and country

Mission
Empower the basic sectors through health organization, health education, and mobilization towards building self-reliant communities.

LIKAS Programs are focused on the following:
- Community health development
- Local Governance advocacies
- Gender and Development
- Livelihood and Enterprise Development
- Environmental management

The organization is an active member of the Protected Area Management Board (PAMB) in Irosin and it provides trainings to communities on watershed management as organizational development assistance to its partners. LIKAS is likewise involved in coastal resource management projects like mangrove reforestation and capacity building for coastal communities.
LIKAS Inc. is also involved in DRR initiatives and provides its community partners with trainings on community-based risk management in partnership with the LGU.

Gaps (relative to Climate Risk Management)

The NGO has limited tools and capacities yet on climate risk management. Assessment tools though being used could still be enhanced and updated.

Potential Areas for Project Partnership

LIKAS could be tapped in the areas of watershed and coastal resource management advocacies/IEC as well as community capacity building.

Provincial Alliance of NGOs and POs for Development (PANGOPOD) Inc.

Basic Profile

PANGOPOD is duly registered, non-practical non-sectarian; non-stock and non-profit network of NGOs and POs in Sorsogon Province organized and registered in 2001. It maintains 3 staff which stands the coordinator and secretariat of the network which currently has 49 organizational members composed of POs, NGOs, Faith-based organizations and academe operating in the province.

Members of PANGOPOD across the province are divided into 5 clusters based on location where each cluster has one representative in the networks Board of Directors.

Thrust, Mandate and Programs

The mission of PANGOPOD is "to help transform the people of Sorsogon to become productive, innovative, gender sensitive, God-Loving and active agents of development towards a just and humane society and community, through the protection and advancement of people's rights and welfare, promotion of employment, human resources development, maintenance of ecological balance and the enhancement of the people's participation in local governance.

It seeks to:

- Enhance people's development-oriented value system
- Strengthen people's organizations
- Institutionalize people's participation in local governance
- Enhance women's rights and welfare
- Promote equitable access to development resources and services
- Promote sustainable use and development resources and services
- Develop agri-based industries and increase economic productivity on the basis of a nationalist, equitable development network

Currently, PANGOPOD acts as the provincial action center of the Peace and Equity Foundation for the latter's poverty reduction program.

Gaps (relative to Climate Risk Management)

Though PANGOPOD has a wide-network, no concrete agenda has been defined yet on Climate Change issues that could be mainstreamed through its membership. Tools being used by its members on DRR are not consolidated. In fact, PANGOPOD lacks the information on what tools are being promoted and used by its members relative to CC and DRR.

Potential Areas for Project Partnership

Given its wide network and membership, PANGOPOD is a potential partner on climate change IEC, livelihood adaptation, and capacity building, learning exchange activities.

The matrix below summarizes the potential institutional partners and their role in CC and DRR initiatives/programs in the City of Sorsogon:

Name of Institution	Role and Potential Areas for Collaboration	Target Client/Groups
Business Sector:		
▪ Sorsogon Chamber of Commerce	▪ Support for IEC materials development and reproduction and dissemination ▪ Emission monitoring amongst members ▪ Support resources and logistics related to disaster preparedness and emergency-relief operations ▪ Livelihood adaptation support	Business operators and owners; employees; disaster victims, LGU, vulnerable communities
▪ Energy Development Corporation (EDC)	▪ Carbon sink projects as "CDM" project (mangrove reforestation) ▪ Livelihood adaptation support particularly for rice production technologies ▪ Support for IEC ▪ CSR programs for coastal communities	Vulnerable communities, women, youth
Academic Institutions:		
▪ Bicol University	▪ Research and extension for typhoon resilient dwelling designs and materials ▪ Livelihood adaptation technology (agriculture and fishing)	Coastal communities, farmers, women, children and youth, LGU personnel

Name of Institution	Role and Potential Areas for Collaboration	Target Client/Groups
	▪ Technical support for the LGU-GIS installation and training ▪ CC and DRR IEC ▪ CCCI and MDG-F project documentation and impact evaluation ▪ Environmental resource management and conservation	
▪ Sorsogon State College	▪ IEC on CC and DRR ▪ Livelihood technology support for adaptation (agriculture and alternative livelihoods) ▪ Project documentation and evaluation	Children and youth, farmers and fisherfolks, women, LGU personnel, communities
NGOs:		
▪ PALFSI	▪ Micro-finance support for livelihoods and housing ▪ Community-based savings and other social safety-net programs	Women, youth, informal workers, poor households
▪ Habitat for Humanity Philippines	▪ Innovative house construction responsive to CC challenges ▪ IEC on CC especially on health issues	Households/ communities in high risk sites
▪ PANGOPOD/ Lingap Para sa Kalusugan ng Sambayanan (LIKAS), Inc.	▪ Livelihood support for adaptation ▪ Women and Climate Change ▪ Environment Management advocacies	Women, youth, poor households or communities
Communities/CBOs:		
▪ Urban Poor Federation	▪ Community organizing	Communities and

Name of Institution	Role and Potential Areas for Collaboration	Target Client/Groups
	and mobilization ▪ Community-based hazard mapping and monitoring ▪ IEC	households

Annex C: City Government Self Assessment using the WB Tool

The city exposure and vulnerabilities were discussed and presented through a focused group discussion with the city government head departments. Using the World Bank self-assessment tool for cities, the discussions resulted to the following rating using the high, medium, low characterization. It should be noted however that this result is yet to be further reviewed and incorporated as an official assessment that could be used by the city in line with its priorities for development.

A. City description	
1. City location	
In a coastal area? (Y or N)	Y
On or near mountain area? (Y or N)	Y
On inland plain? (Y or N)	N
On inland plateau? (Y or N)	N
Near to or on a river(s)? (Y or N)	Y
Near earthquake fault lines? (Y or N)	Y
B. Size characteristics of city	
1. Resident population (VH, H, M, or L)	L (151,454)
VH = Greater than 10 million H = 2 million to 10 million M = 0.5 million to 2 million L = up to 0.5 million	
2. Population growth during last 10 years (H, M, or L)	L (1.78%) 2000-2007
H = Greater than 10% M = Between 2% to 10% L = Less than 2%	
3. Floating population (VH, H, M, or L)	
VH = Greater than 30% of resident population H = Between 20%-30% of resident population M = Between 10%-20% of resident population L = Less than 10% of resident population	
4. Area in square kilometres (km^2)	31,292 Has.
5. Maximum population H = Greater than 2,000 persons per km^2 M= Between 1,000 to 2,000 persons per km^2 L = Less than 1,000 persons per km^2	

C. Governance structure as related to disaster risk management	
1. Appointment head of government (Y or N)	N
a. Term of assignment (Years)	
2. Elected head of government (Y or N)	Y
a. Term of elected officials (Years)	3yrs

3. Local government office structure: does it have…	
a. Disaster risk management department? (Y or N)	N (CDCC)
b. Environment, sustainability or climate change department? (Y or N)	Y (CENRO)
c. Are (a) and (b) in the same department? (Y or N)	N
4. Other government office structure (state, national): does it have..	
a. Disaster risk management department? (Y or N)	
b. Environment, sustainability or climate change department? (Y or N)	
c. Are (a) and (b) the same department? (Y or N)	

D. City management on climate change and disaster risk management	
1. Responsibilities clearly specified? (Y or N)	N
2. Responsibility for climate change management established? (Y or N)	N
3. Responsibility for disaster risk management established? (Y or N)	N
4. Authority to contact for service? (Y or N)	N
E. Financial resources	
1. Total budget	P343,383,294.00 (2008 Budget)
2. From local taxes and levies (% of total)	14.57%
3.From state and national government grants & devolutions (%)	85.43%
4. From domestic market - bonds a& loans(%)	
5. From international market (%)	
6. From external or multi-lateral lending agencies (%)	
F. Built environment	
1. Does the city have urban growth Master Plans? (Y or N)	N
2. Does the city have urban development plans and land-use plans? (Y or N)	Y
a. Population in authorized development (% of total)	54.72%
b. Population in informal colonies (% of total)	
c. Population density of informal colonies (H, M, or L)	
H = Population of informal colonies > 20% of total	
M = Population of informal colonies <20% but > 10% of total	
L = Population of informal colonies <10% of total	
d. Population in old tenements and historical development (% of total or H,M, or L using ratings in 2c)	
3. Does the city have building codes? (Y or N)	Y (National)
a. What is the level of compliance? (% complaint buildings)	
4. Observed vulnerability of buildings in past natural disasters (extent of disruption of building functionality)	
a. Informal buildings (H, M, or L)	
H = Greater than 15% of informal buildings highly vulnerable	
M = Between 5% and 15% of informal buildings highly vulnerable	
L = Less than 5% of informal buildings highly vulnerable	
b. Historic buildings (H, M, or L)	
c. New & formal developments (H, M, or L)	
H = Greater than 15% of new & formally developed buildings highly vulnerable	
M = Between 1% and 5% of new & formally developed buildings highly vulnerable	

L = Less than 1% of new & formally developed buildings highly vulnerable	
G. Political impact of disasters	
1. Is the city a national/provincial capital or where a large number of decision-makers live? Y or N)	Y
2. Is impact of disaster in the city likely to influence political activity in areas far away from affected regions? (Y or N)	
H. Economic impact of disasters	
1. Is the city a major center of economic activity in regional or national context? (Y or N)	
2. Do the following sectors have major activity in the city?	
a. Industrial sector? (Y or N)	N
b. Service sector? (Y or N)	Y
c. Financial sector? (Y or N)	Y
d. Tourism and Hospitality sectors? (Y or N)	Y

Attribute Matrix	**Climate Factor**		
	Temperature rise	Precipitation change	Sea-level rise
Rate the level of vulnerability in each of the following areas H = Very important consequence and priority for actions M = Important and should be considered in city development plans L = Unimportant			
Built environment (H, M, or L)	**H**	**H**	**H**
Cultural and religious heritage (H, M, or L)	M	M	M
Local business, industry and economy (H, M, or L)	**H**	**H**	**H**
Energy generation and distribution system (H, M, or L)	**H**	**H**	**H**
Health-care facilities (H, M, or L)	**H**	**H**	**H**
Land use (H, M, or L)	**H**	**H**	**H**
Transportation system (H, M, or L)	**H**	**H**	**H**
Parks and recreation areas (H, M, or L)	M	M	M
Social equity system (H, M, or L)	**H**	**H**	**H**
Water management (H, M, or L)	**H**	**H**	**H**
Tourism (H, M, or L)	M	M	M

Attribute Matrix	**Disaster preparedness and response**			
	Industrial sector	**Service sector**	**Financial sector**	**Tourism and hospitality sector**
Define the level of preparedness for each event for each sector	L	M	L	L
H= high level of preparedness and readiness to respond to disaster and hazard M= somewhat high level and the basic/key informants are present (i.e. a basic disaster management system is in place, but may be comprehensive or consider specific hazards) L= low (i.e. no disaster management system, no warning system, etc.)				
1. Earthquake (H, M, or L)	L	M	M	M

2. Wind storm (H, M, or L)	L	M	M	M
3. River flood (H, M, or L)	L	M	M	M
4. Flash rainwater flood or extreme "precipitation (H, M, or L)	L	M	M	M
5. Tsunami (H, M, or L)	L	M	L	L
6. Drought (H, M, or L)	L	L	L	L
7. Volcano (H, M, or L)	L	M	L	L
8. Landslide (H, M, or L)	L	M	L	L
9. Storm surge (H, M, or L)	L	M	M	M
10. Extreme temperature (H, M, or L)	L	L	L	L

Annex D: Institutional Capacity Assessment Tool

Name of Institution/ Organization: Government NGO PO Others		
Name of Respondent:		
Date of Interview:		
Area for Assessment		**Findings/Remarks**
	Institutional Mandate and Legal Framework:	
1	What is the overall mandate and thrust of the institution/organization?	
2	Does the institution/organization have specific mandate or authority to implement climate change and crisis/disaster management programs?	
3	What specific climate change and disaster management related programs and projects does the organization have?	
4	How long have been the organization implementing its climate change and disaster management programs? (no. of years)	
5	Who are the target groups/clients of the organization?	
6	Does the organization/institution have a baseline data of critical information on its target groups/clients?	
	Basic Profile of the Institution, structure, leadership and staffing	
7	What is the geographical coverage/scope of operations of the institution/organization?	
8	What services, especially in the areas of DRR and climate change adaptation, does the organization provide?	
9	What are the current policies and practices relating to CC and DRR programmes?	

10	How many professional staff do you have?	
11	Non-professional staff?	
12	Number of volunteers and scope of work?	
13	What are their other responsibilities?	
14	Brief profile of key staff working on climate change and DRR (qualifications and work experience)	
15	What is the organizational structure and chain of command?	
	Financing and Resources	
16	Where does the organization receive/source its funding?	
17	What is the annual budget?	
18	What is the annual budget or percentage share of climate change & DRR programs in the total annual budget?	
19	Does the organization accept funds specifically for CC and DRR programmes?	
	Project Development, Monitoring and Evaluation	
20	Does the organization have CC and DRR response plans and procedures or tool?	
21	Is there an HRV Assessment available for use of the institution? Is this being used in programming/project development?	
22	How does the institution/organization develop programs and projects related to CC and DRR?	
23	Are there information and financial management systems and program monitoring systems being used? Please identify.	

24	Does the organization have a tool or system for gathering baseline information for CC and DRR management? Elaborate.	
	Networking and Affiliations	
25	Who are your institutional partners in CC and disaster preparedness/disaster response programmes/projects?	
26	Is the organization a member or an affiliate of a CC or disaster response network or cluster? If yes, reasons for joining the network/cluster?	
27	What type of services does the network provide to its members and clients?	
	Capacity Building	
28	What are the organizational development plans of the organization to CC?	
29	Where do you get your institutional capacity building fund specifically on CC and crisis/disaster management? Do you perceive them enough?	
30	Are the CapB plans aligned with the Philippine Climate Change Initiative and the thrust of Philippine Disaster Management System? Elaborate.	
31	Given your institution/organization's mandate and experiences in CC adaptation and disaster response/management, what do you think are critical staff skills and institutional policies/systems that must be possessed /applied by your organization?	
32	Do you think those are present/installed in your organization now?	
33	If not, what do you think are the gaps?	
34	Who do you think should address the gaps identified and prioritized?	