CLIMATE CHANGE ASSESSMENT FOR SORSOGON, PHILIPPINES: A SUMMARY





CITIES AND CLIMATE CHANGE INITIATIVE

UN HABITAT
FOR A BETTER URBAN FUTURE

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UN HABITAT

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1.0

INTRODUCTION

1.1 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.

1.2 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.

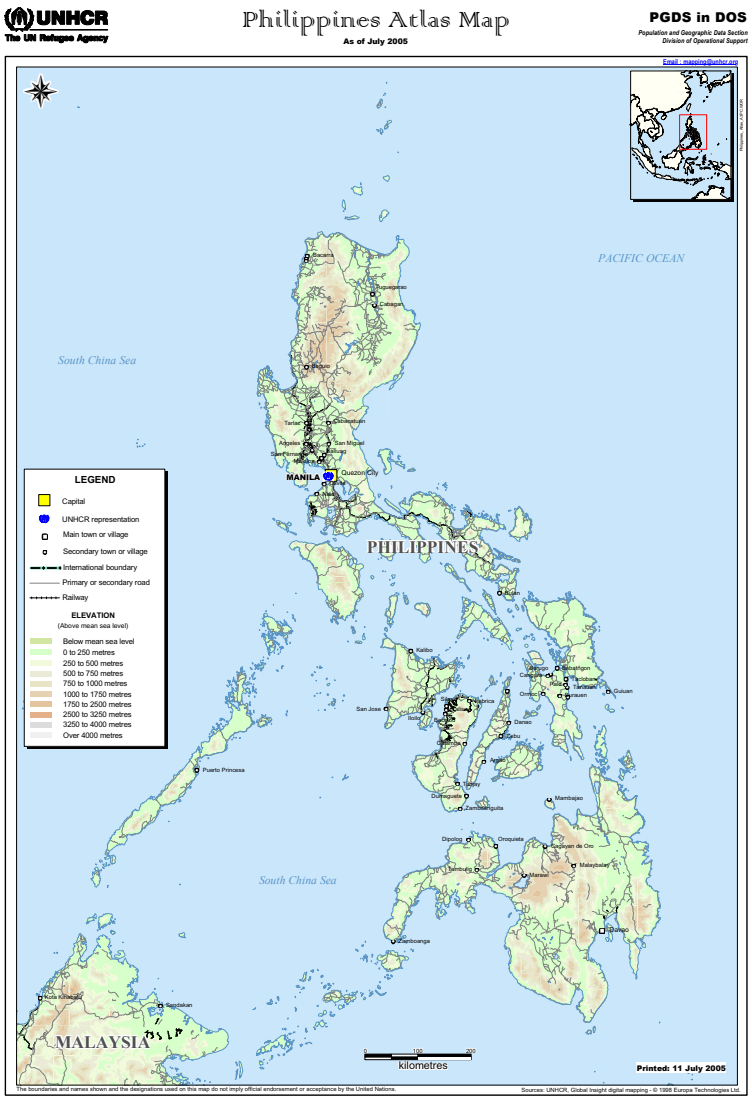
1.3 ASSESSMENT METHODOLOGY

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-a-vis projected climate scenario, previous climate related disaster events and more importantly people's account of the past events and observations.

FIGURE.1 Map of Philippine



2.0

BACKGROUND

2.1 GEOGRAPHIC BACKGROUND

The Philippines in Southeast Asia, is geographically located approximately between latitude 4°23'N and 21°25'N and longitude 12oE and 127°E. It is composed of 7,107 islands, with a land area of 299,764 square kilometres. Its length measures 1,850 kilometres, starting from the point near the southern tip of Taiwan, China and ending close to northern Borneo.

The Philippine coastline is 36,289 km long. Three prominent bodies of water surround the archipelago: the Pacific Ocean on the east, the South China Sea on the west and north, and the Celebes Sea on the south. This position accounts for much of the variations in geographic, climatic and vegetational conditions in the country.

Except for the Cordilleras in Luzon and the mountainous regions of Mindanao, traditionally preferred sites for settlements in the country are the coastal plains, with the result that 80% of the settlements are located along the discontinuous 36,289 km coastline. These sites are the fastest growing in terms of population, commerce, infrastructure and other services; many of them are sprawling urban centers. The mega metropolitan areas, namely Metro Manila, Cebu, Iloilo, Cagayan De Oro and Davao are in the coastal zone.

2.2 URBANIZATION IN THE PHILIPPINES

The Philippines is the 9th most populous country in Asia and the 14th largest country in the world. The latest national census[1] indicates that the total population in the country is 88,574,614 persons.

The most recent definition of urban areas[2] in the Philippines uses population, presence of establishments and presence of facilities within a two-kilometer radius as determining factors. Urban areas therefore are classified as follows: (1) If a barangay[3] has a population size of 5,000 or more, then it is considered urban, or (2) If a barangay has at least one establishment with a minimum of 100 employees, it is considered urban, or (3) If a barangay has five or more establishments with a minimum of 10 employees, and five or more facilities within the two-kilometer radius from the barangay hall, then it is considered urban. From this definition, urbanization in the Philippines is largely fuelled by population growth. An increase in the urban population proportion is evident - with 37.44 percent in 1980 increasing to about 55 percent of the total national population in 1996, and at about 64% in 2007. Further into the future, it is projected that 84% of Filipinos will be living in urban areas by 2050. Migration to urban centres from rural areas is driven by relatively higher wages, more educational opportunities and readily available basic services. About 75% of the country's economic outputs are attributed to urban areas and incomes have been estimated to be 2.3 times that of rural areas (Webster, Corpuz and Pablo 2003).

According to the study conducted for the preparation of the National Urban Development and Housing Framework (2008-2016), the "Philippine economy transformed from a predominantly agricultural to an urban economy. This is evident in the increasing GDP shares of the service and industry sectors, which are primarily urban-based, expanding from 28 percent in the 1980s to 77 percent in the 1990s, and to well over 80 percent in 2000. By 2007, these sectors already accounted for 85.9% of GDP. Further, the contribution of the service sector significantly exceeded that of the industry sector, accounting for about 55% in the same year".

1 *National Statistics Office, Census of Population: August 1, 2007*
2 *National Statistical Coordination Board (NSCB) Resolution No.9, Series of 2003*
3 **Barangay** *is the smallest political unit into which cities and municipalities in the Philippines are divided. It is the basic unit of the Philippine political system.*

As seen, cities/urban areas are predominantly the engines of the country's growth thus their adaptation to climate change would be crucial for the country's economy. The Philippines needs to enhance its urban development strategies noting that adaptive capacity of urban centers varies and greater population densities in all cities spell more vulnerability to climate change. For instance, highly urbanized cities have better means in terms of technology and financial resources for climate change adaptation than the small cities outside the metropolis like Sorsogon City in the Bicol Region.

In general, the Philippine urban sector stakeholders affirm that climate change poses an urgent challenge for sustainable development the Philippines. This is especially evidenced by the impacts of the recent extreme events (typhoons) that caused loss of lives, damage to properties and urban infrastructure, disruption of livelihoods and economic activities, as well as weakening of institutions due to the significant financial implications of the emergency response, recovery and rehabilitation and future disaster mitigation.



Permanent and semi-permanent housing exist side by side in Sorsogon ©UN-HABITAT/Bernhard Barth

Figure 2: Map of Sorsogon



3.0

OVERVIEW OF CLIMATE CHANGE IMPACTS AND VULNERABILITY

3.1 CLIMATE PROJECTIONS

According to the Fourth Intergovernmental Panel on Climate Change Assessment Report the global climate change models project an increase in average temperatures of 1.4 °C to 5.8 °C in the 21st century leading to further increase in sea level. Also, the Fourth Intergovernmental Panel on Climate Change Assessment Report emphasized that in Asia, climate change is projected to compound the pressures on natural resources and the environment associated with rapid urbanization, industrialization and economic development. The same report specifically stressed that coastal areas, especially heavily populated megadelta regions in South, East and South-East Asia, will be at greatest risk due to increased flooding from the sea and, in some megadeltas, flooding from the rivers.

Based on recent studies[4] in the country, the observed anomalies in climate in the Philippines from 1951-2006 are as follows:

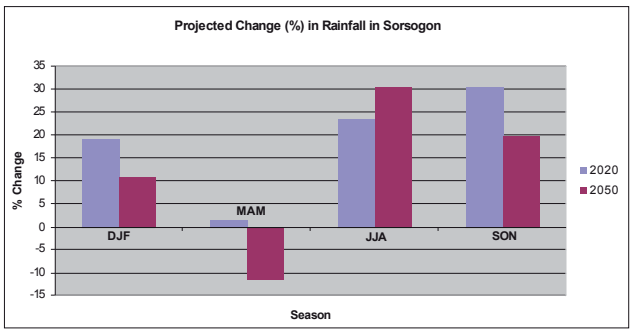
- increase of 0.6104 ^{0}C in observed annual mean temperature;
- increase of 0.3742 ^{0}C in observed annual maximum temp;
- increase of 0.8940 ^{0}C in observed annual minimum temp;
- increased number of hot days and warm nights;
- decreased number of cold days and cool nights;
- increase of annual mean rainfall and rainy days
- increase in inter-annual variability of onset rainfall;
- an average of 20 cyclones cross the Philippine Area of Responsibility with 8-9 reaching land 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 issued the following climate change projections for the Philippines for 2020 and 2050:

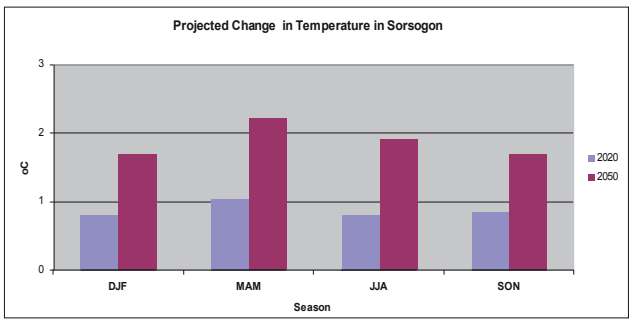
- The mean seasonal temperatures are expected to rise by about 0.9°C to 1.4°C by 2020 and 1.7 °C to 2.4 °C by 2050.
- Projection of seasonal temporal rainfall variation is largest (-35 % to +45%) during the six month period from March to August.
- Projection of seasonal temporal rainfall variation is less (-0.5 % to +25%) during six 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 as evident in future increases in rainfall which is more pronounced in June to August and becoming greater with time.
- The drier seasons of March-April-May will become drier still, while the wetter seasons of June-August and September-November become wetter.

The Boxes below present the Philippine Atmospheric, Geophysical and Astronomical Services Administration PRECIS projected climate change scenarios for the Province of Sorsogon relative to temperature and rainfall for 2020 and 2050.

4 *UN-GoP MDG-F 1656: Tibig et al.*



Box 1: Projected change(%)in Rainfall in Sorsogon



Box 2: Projected change in Temperature in Sorsogon

3.2 THE IMPACTS OF CLIMATE CHANGE IN THE PHILIPPINES

The physiographic and geophysical characteristics of the Philippines make the country highly vulnerable to climate change. With a total coastline of 36,289 kilometers, 70% of the cities/municipalities depend on coastline and marine ecosystems as a source of livelihood. National estimates show that 82.5% of the entire population of the Philippines are at risk to tropical cyclones, flooding and storm surge. Using information from the 2003 official statistics, about 14.9 million homes are vulnerable to the impacts of climate change as they have structures with roofs and/or walls that are either make-shift or made of sub-standard materials, and are also non-engineered. These homes are unlikely to withstand the impacts of stronger typhoons or storm surges.

In 1992 the National Mapping and Resource Information Authority of the Philippines estimated that a sea level rise (SLR) of 100 cm will inundate a total area of 129,114 ha affecting approximately two million people. This was projected using topography as the sole basis for evaluation. Given that sea level rise would also increase the level of storm surges, it is predicted to increase risk of many more people to flooding. Changes in tides as well as salt water intrusion into surface and ground water may affect the amount and quality of water supply. In urban centres, the impacts of sea level rise are compounded by ground subsidence due to over-extraction of ground-water for domestic and industrial use (Rodolfo and Siringan, 2006).

The agriculture sector of the Philippines is projected to be greatly vulnerable to climate change especially due to the increased occurrences of El Nino Southern Oscillation (ENSO) and La Nina events, bringing drought and extreme rainfalls respectively. The 1997-1998 El Nino caused a drop in GDP by 6.6% in agricultural production and in construction and construction-related manufacturing by 9.5%. The 2008 Labour Force Survey estimated 11.8 million workers along with their families and dependents, in agriculture, forestry and fisheries were affected by extreme weather events. Twenty percent (20.6%) of fishponds dried out in the 1998 El Nino. These impacts on agriculture create more pressure to the urban areas not only in food security but also in accommodating alterations in livelihood/income source and settlement patterns. The rural to urban migration pattern is predicted to increase considering the latter. Higher population densities spell higher vulnerability to climate change. As it is now, 60% of the Philippine population is concentrated in cities and the national urbanization rate is 3.4%. Climate change impacts are expected to bring added pressure for the urban environment with respect to sustainable land use, infrastructure, access to potable water and health services, and waste management, among others.

3.3. SORSOGON'S SENSITIVITY TO CLIMATE CHANGE

Sorsogon City is situated 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 trans-shipment 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 the China Sea through the Sorsogon Bay. It is the largest city in Bicol Region in terms of land area and one of the region's leading cities in terms of urbanization. It is also one of the most populous cities in Bicol region.

Sorsogon City's exposure and sensitivity to climate change are evidenced by the following:

Stronger Tropical Cyclones: The impacts of tropical cyclones cause massive destruction to the city and its population as evidenced by previous events especially the most recent which took place in the last quarter of 2006 when Super Typhoons Milenyo (September 2006) and Reming (November 2006) struck. Both Typhoons were measured to have sustained maximum winds of more than 200 kilometers per hour. Due to "Milenyo" more than 10,000 houses (33%) were destroyed and an estimated PHP208 million damage to infrastructure was recorded. While still in the state of calamity and while reconstruction/rehabilitation had just started, Typhoon Reming again caused destruction and further affected the already damaged structures and disrupted the urban system thus prolonging city recovery. Vital lifelines such as power and water services were impaired and the former was only fully restored after three months. The impacts gravely affected the poor households in the city because their structures sustained severe damage as they are built with materials and technologies that could not sustain stronger typhoon winds, their livelihood implements were destroyed, and their sources of income (i.e. tourism) were halted.



Informal settlements are regularly rebuilt after storm surges that breach the seawalls
©UN-HABITAT/Bernhard Barth

Increase in Rainfall (mean and extreme): Some structures occupy hazardous areas (prone to flooding and landslides) – indicating the sensitivity of the city to impacts of increasing rainfall. Given the projected increase in rainfall, the city is continuously exposed to flooding events. In 2009, during the tail end of the summer season, Typhoon Dante which by the Philippine Atmospheric, Geophysical and Astronomical Services Administration storm warning was only signal number 1, brought extremely heavy rains to the city. Based on local records "Dante" poured more than 300 millimeters of rain within a short period of time and caused major destruction to the city. PHP200 million worth of infrastructure and agricultural land were damaged.



The reinforced river banks, here in central Sorsogon, do not prevent flooding during extreme rainfall
©UN-HABITAT/ Bernhard Barth

station in Legaspi revealed that an increasing trend in annual mean sea level occurred since 1970s. Legaspi and Sorsogon City face the same pacific waters through the Albay Gulf. 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 eight urban and one urbanizing barangay (Cambulaga) face the risks from sea level rise.

TABLE 1: Sorsogon City's Adaptive Capacity to Climate Change

DIMENSIONS, INDICATORS AND WEIGHTS USED				CITY ADAPTIVE CAPACITY ASSESSMENT				
						Score	Wtd Score	Total Score
Socio-economic			0.50					0.25
Poverty Incidence		0.40				0.57	0.23	
Informality (Tenure)		0.20				0.46	0.09	
Literacy Rate		0.20				0.17	0.03	
PO/CBO/MFI membership		0.20				0.7	0.14	
							0.49	
Technology			0.25					0.06
Access to telecommunications		0.30				0.1	0.03	
Access to electricity		0.30				0.06	0.02	
Functional DRR Plan		0.40				0.5	0.20	
							0.25	
Infrastructure			0.25					0.07
Households with safe water access		0.25				0.28	0.07	
Paved Road		0.25				0.4	0.10	
Protective Infrastructure		0.50				0.22	0.11	
-Sea Wall	0.5			0.7	0.35		0.28	
-Unsafe Housing Unit	0.5			0.16	0.08			
					0.43			
			1.00					0.38

3.4 SORSOGON CITY'S ADAPTIVE CAPACITY TO CLIMATE CHANGE

Adaptive capacity is the ability of a system to adjust to actual or expected climate stresses, or to cope with the consequences. Mainly it is characterized as a function of various factors like wealth, technology, institutions, information, infrastructure, and social capital5. Such factors are used or could be used by a system to adjust and expand its coping range under existing climate variability, or future climate conditions6. Higher adaptive capacity lowers climate risks and offsets the negative effects of climate change to sensitive socio-economic factors of a given system or area.

To measure Sorsogon City's Adaptive capacity, socio-economic, technology and wealth factors of the city were rated using weighted scores of crucial indicators. The indicators used (Table 1) relate to people's capacity to withstand negative effects as well as facilitating factors that allow recovery from the disaster impacts of climate stresses. In the analysis, each indicator was provided weighted score based on expert judgment of the local government unit technical staff with reference to the relevance of each indicator to reconstruction/ rehabilitation planning/programming. The nearer the score is to 1 the higher the adaptive capacity.

Table 1 shows that Sorsogon City's adaptive capacity is rated at lower than the mid-score of 0.5 thus signifying low capacity to off-set the negative impacts of climate change in view of their exposure and sensitivity.

3.5 VULNERABILITY TO CLIMATE CHANGE

Climate Change Vulnerability is the degree to which a system is susceptible to, or unable to cope with, the adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity[7].

5 *IPCC Third Assessment Report.*
6 *UNDP Adaptation Policy Framework Technical Paper 1- Scoping and Designing Adaptation Project*

7 *www.ipcc.ch/pub/syrgloss.pdf*

3.5.1 VULNERABLE AREAS IN SORSOGON CITY

City climate change vulnerable areas or hotspots were identified based on exposure and sensitivity and the communities' adaptive capacity.

There are 12 villages which were identified as the city climate change hotspots considering their exposure to multiple climate risks and hazards (i.e. tropical cyclone/ storm surge, sea level rise, flooding, landslide). Of the hotspots identified, eight are urban villages, one is urbanizing, and the last three villages are rural in classification.

The urban hotspots on the average are growing annually at the rate of 1.7%. The barangay of 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: Bitan-O Dalipay (2.12%); Sirangan (2.02%); Cambulaga (2%); and Sampaloc (1.74%). Projecting that the growth rate remains the

FIGURE. 3: SIRANGAN HOTSPOT MAP

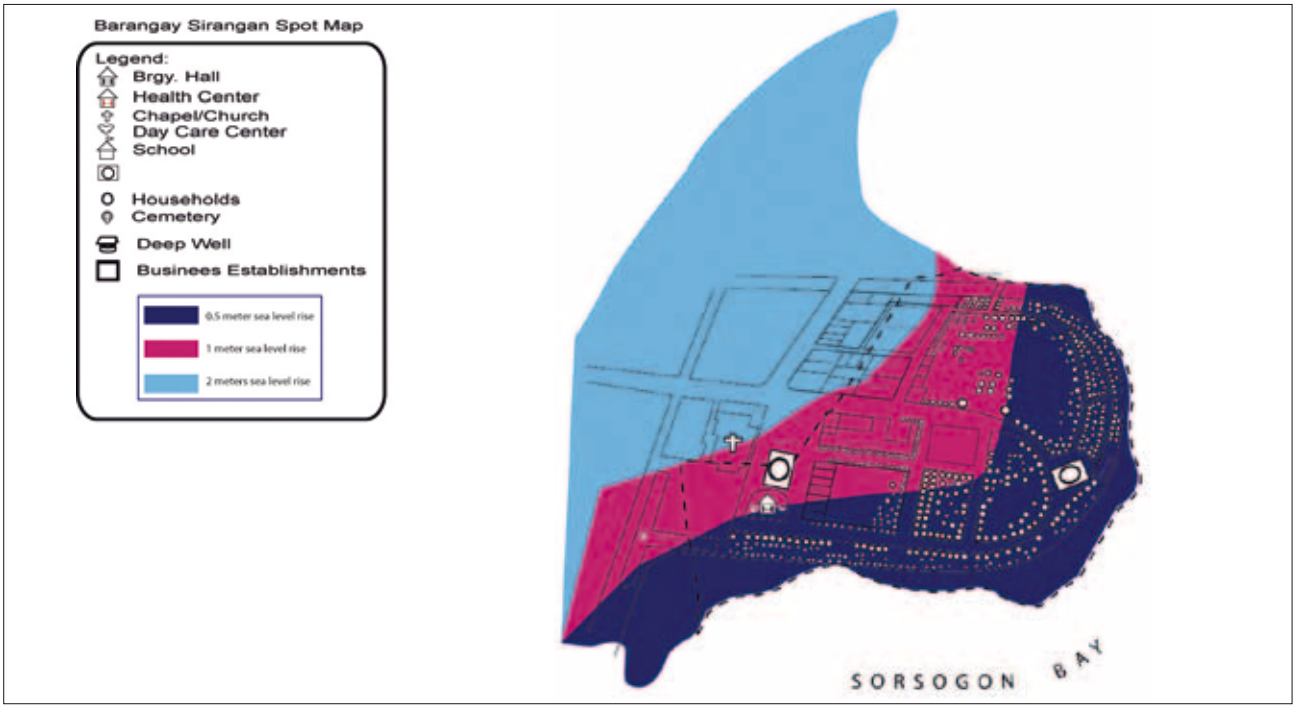


TABLE 2: City Climate Change Hotspots

Barangay	Classification	Land Area (Ha)	2007 Population	% Growth (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

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 (should climate-induced disaster happen) would also be considerably higher if anticipatory plans for climate adaptive social and physical infrastructures are not put in place.

The climate change vulnerabilities of the urban hotspots are mainly accounted to the fact that these villages are home to poor households with limited capacities to cope with projected impacts of climate change; their structures (houses and community facilities like health centres) are exposed or at risk to tidal flooding; seawalls are already damaged; there is inundation/erosion of coastlines; settlements are not planned in view of climate hazards especially their flood drains; livelihoods are sourced from weather sensitive activities such as fishing/vending and tourism services; commercial establishments where wage earners source their income are at risk to flooding and Sea Level Rise; public infrastructures (schools, bridges & roads) are not engineered to withstand extreme events as evidenced by previous disaster reports; and people in general have limited knowledge on climate change thus have insufficient information on possible adaptation options. These vulnerabilities were all substantiated by city data and community accounts as gathered in site validation and focus group discussions.

At the governance level, the City Government of Sorsogon attributes its general vulnerability to the fact that the current City Comprehensive Land Use Plan has not taken into account the projected impacts of climate change. The built-up area as planned in the City Comprehensive Land Use Plan is exposed to seaward risks that climate change brings (e.g. sea level rise and storm surges). The spatial planning capacity of the city is limited by its lack of a Geographic Information System that could support the local government unit in sustainable development planning. Further, the city's vulnerability tends to be higher as its disaster risk management framework is more aligned to reactive or response actions (relief and rescue) rather than to preparedness to mitigate disasters and anticipatory planning for climate related risks.

3.6 PRIORITY CLIMATE CHANGE ISSUES IN SORSOGON

The assessment identified key urban activity sectors which are deemed crucial to support the city's resilience to projected climate change impacts while also looking into the valuation of possible damages. A multi-sector city consultation was conducted to further support the initial participatory analysis activities carried out with various sectors which facilitated identification of vulnerability issues. As a result of these activities, Issue Working Groups were formed to incorporate the assessment findings in planning adaptation response and mainstreaming appropriate strategies into the city developments plans and programs. Below are the key climate change vulnerability issues which are considered top priority:

3.6.1 HOUSING AND BASIC INFRASTRUCTURE

The climate change vulnerability of settlements and basic infrastructure in the urban hotspots of Sorsogon City could be generally attributed to existing social issues, current structural designs and available technology, and on existing governance policies and processes.

a. *Informal Settlements In Hazardous Areas.*

   Forty five percent of the households in the city have no rights to the land their houses are built on. Informal settlements are usually situated in coastal areas, riverbanks, road-right-of-ways/roadway, and unlawfully dwell on private and government land.



Community members actively engage in the City Consultation
©UN-HABITAT/Cris Rollo



Damaged seawall, Bacon District ©UN-HABITAT/Bernhard Barth

b. *Makeshift Houses And Limited Knowledge Of Typhoon Resilient Housing Technology*

The houses in poor urban communities are either made of makeshift materials or light materials which are susceptible to damage that could be brought about by strong tropical winds and heavy rains. House structure reinforcement and new technology to adapt to stronger winds, heavier rainfall, and the increasing sea level are not yet popular among the general public. The vulnerable urban communities, because of insecure tenure, are hesitant to build stronger structures, but use indigenous means to cope with cyclones, like tying their makeshift houses to strong poles, and adding weights (e.g. old tires and stones/rocks) on the rooftops. However such rudimentary ways have proven to be insufficient protection from damage. With about 5,000 housing structures in the city being damaged yearly by typhoons, about PHP150 million is spent for housing reconstruction each year (assuming PHP30,000 cost of reconstruction per house).

c. *Aging And Damaged Bridges.*

Based on Department of Public Works and Highways reports, the strong cyclones in 2006 (Milenyo and Reming) caused critical damage to Buhatan, Alice, Cawayan, and Abuyog Bridges. The flow of goods and trade as well as the mobility of people are at risk should an extreme event occur.

d. *Insufficient Water Drains And Absence Of River Dikes.*

According to the city disaster profile, a total of 20 barangays are identified as flood prone areas. Previous flooding in those areas was attributed to insufficient drains and absence of river dikes. Assuming the 50% increase in annual rainfall holds true, and with extreme events like continuous downpour over three straight days, the existing drainage system in the urban areas as well as the present natural drain from the rivers will not be able to contain and hold the water and could lead to damaging flash floods and run-offs. Flooding could halt economic/livelihood activities and cause damage to property making disaster recovery more costly and difficult.

e. *Damaged Seawall*

The seawall that protects most of the coastal communities from storm surge was heavily damaged by the two super typhoons in 2006. Though repair activities began, only minor sections have been repaired due to limited budget from both local and national government. As revealed during focus group discussions in the hotspot areas, the present condition of the sea wall in these areas

is 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 sea wall infrastructure is managed and maintained by the national government through the Department of Public Works and Highways.

f. *Land Use Plans Are Not Yet Responsive To Climate Change Impact Scenarios*

Development of the city is guided by the approved city land use plan which is intended to guide city development in the most appropriate and suitable areas. The existing land use plan has not considered climate change impact scenarios and the underlying development constraints that it would bring to most areas. The built-up environment as planned is highly concentrated in areas near the coast that could be threatened by storm surge and rising sea levels.

g. *Built-Up Areas Are Threatened By Sea-Level Rise*

During Focus Group Discussions, residents from coastal barangays shared their observations on inundation in beach areas and coastal shores especially in the Bacon District. Older citizens estimated 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. Residents of Bacon Poblacion recounted that during the 1950s the current shore line had access roads and was their play area then.

h. *Absence Of City Shelter Plan*

The city is yet to define its shelter plan with strategies and options on how to address its housing backlog and future needs. Existing government reports indicate that 43% of the households do not have security of tenure and informal settlements lack basic services. With the population growing at 1.7% annually and with the migration of families from nearby municipalities - given the city's role as education, administrative and trade center of the province - there are no appropriate strategies defined that address the shelter concerns that match the existing resources of the local government, the families needing housing, and other actors such as NGOs which provide shelter assistance. The coordination amongst national government, local authorities and civil society needs strengthening to ensure complementarity of actions especially since climate change impact scenarios could result in the displacement of a large number of people in the city.

i. *Weak Local Policy On Construction Of Safe Housing*

Building and construction of settlements in Sorsogon city is guided by the National Building Code and the standards in building socialized[8] and economic housing as contained in Batas Pambansa 220 (BP 220). Both national policies, were formulated decades back, and do not provide for guidance on technology that must be applied considering the risks of climate change and variability. There is no parallel local policy in Sorsogon City that could help enforce these national laws while also considering the local context and disaster risks that the city faces.

j. *Secondary/Underlying Risks*

Solid waste. Since the informal settlements are located in high risk areas, some are inaccessible for solid waste collection resulting in dumping of waste in the waterways and vacant land. This results in clogging of waterways leading to flooding and contamination of the water bodies.

Sanitation. 25% of total city households do not have sanitary toilets. The figure is higher in areas where informal settlements are located. Where the households along the shorelines have septic tanks, these are encroached by the bay during high tide. Further, the source of potable water is also insufficient in these areas as only 72% of the population have access.

3.6.2 LIVELIHOODS AND CLIMATE CHANGE

The poor populace is projected to be further challenged by impacts of climate change which could alter their livelihoods sources and patterns of productivity. Given that the poor in Sorsogon City source their income directly and indirectly from trade, agriculture, and fisheries related activities (the last two being generally climate dependent), poor families would have difficulty in meeting their basic needs such as health, water,

8 *Socialized housing in the Philippines is the housing program for the lowest 30% income group; largely the population active in the informal economy without secure tenure. Socialized housing is categorized to be up to PHP400,000 (land and housing cost).*

sanitation, and food security. Without adaptation, poor families in Sorsogon relying on climate related/ dependent activities will have limited ability to cope with a changed global climate.

a. *Inundation Of The City Center*

As the urban center of the province of Sorsogon and the trade and commerce hub, the threat of climate-induced risks to Sorsogon City has far-reaching implications. Following the Intergovernmental Panel on Climate Change sea level-rise scenarios of 0.5 m, 1.0 m or 2.0 m worst case scenarios, the downtown area where major commercial establishments are located would be inundated.

b. *Threatened Tourism Sector*

Given the multiple climate change risks exposure of the city, the tourism sector which is highly weather/ climate dependent is facing risks. Climate change would impact on the revenue of beach resorts and the parks located in the coastal areas as well as the income of small traders and micro-entrepreneurs linked with tourism establishments.

c. *Decrease In Farming And Fishing Productivity*

Increased precipitation and warmer temperatures could alter the productivity of farmers in the city. Rice and coconut farmers, who are about 6,000, would have to face the risks of climate change. In 2006 the damage of Typhoon Milenyo to agriculture and fisheries sector was estimated to be at PHP234 million. Coconut farms were damaged, with prolonged impacts on families (it takes two to four years to fully recover from such calamities), thus limiting income sources over the same period. The fisheries sector and the economy of the city is highly disturbed and challenged by impacts of warming waters and excessive rains which are reasons perceived to be contributing to the lingering case of red tide in Sorsogon Bay. The red tide is disrupting 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). Farming tools and fishing gear are also lost or damaged during heavy typhoons and flooding, thus affecting people's capacity to go back to their productive activities right away.

d. *Job Losses And Limited Skills*

Workers and service providers to businesses whether micro, small or medium often end up losing their jobs and income sources when climate related disasters happen as shops close down or reduce overhead spending. There are people in the city who attribute the loss of their jobs to the two strong cyclones in 2006.

e. *Limited Skills And Knowledge And Alternative Livelihood Sources*

Considering their limited skills and knowledge, famers and fisher folk in Sorsogon City perceive themselves as having limited income earning options when disaster strikes. Likewise, those engaged in vending and peddling products in the informal market experience limited opportunities to go into other activities once supply becomes limited.

3.6.3 ENVIRONMENTAL MANAGEMENT

Environmental management plays a crucial role in achieving sustainable development. Likewise, it is very important in reducing the risks and vulnerabilities of people to climate change disasters. With environmental degradation, the natural and dynamic barriers to hazards are weakened thus resulting in disasters that affect social equity and the economic efficiency of cities. Sorsogon City boasts of diverse natural endowments (forest and coastal/marine resources) that support its development and ecological balance. These resources however are threatened because of human activities and impacts of climate change.

a. *Degradation Of Coastal And Marine Resources*

Sorsogon Bay and Albay Gulf are the main fish sources for the City. However, Sorsogon Bay is at present experiencing a major setback because of intense economic activity and waste discharges from informal settlements around it resulting in red tide and other pollutants which affect the mortality of marine and coastal species in the area. The rampant use of illegal fishing methods, over-fishing, inadequate coastal zone management, poor

water quality and loss of commercially important species exacerbates the degradation of Sorsogon Bay. Furthermore the degradation of the bay is worsened by indiscriminate dumping of domestic and industrial wastes and the massive conversion of mangrove forest into fishponds as well as the unregulated utilization of these mangrove resources for personal and commercial purposes. With the degradation of the coastal and marine resources in the city, fishing communities' adaptation to climate change impacts could be strained and be more challenging as their income sources become limited.

b. *Inadequate Forest Cover*

Forestland, which is 7,612.76 hectares, is 24% of the total land area of the city. This was once an economic resource when timber, mangrove firewood, and rattan poles were extracted. Secondary growth forest, which is accounted for by open and close canopy mature trees, now covers the logged-over timberland. However, the city's forest cover should be improved as run-off still causes floods and with heavier rainfalls and stronger typhoons due to climate change, the built environment will face greater risks from flash floods and erosion. The reduced forest cover also limits the city's carbon sequestration capabilities that could contribute to the global campaign to lower CO2 levels in the atmosphere.

c. *Pollution And Lack Of Waste Management Systems And Facilities*

The city has no sanitary sewerage system. In the city proper, septic tank effluent and wastewater flow through the existing drainage system. In areas without drainage facilities, wastewater and effluent are disposed through seepage pits and ground surface. These flow through natural waterways and eventually to Sorsogon Bay.

The solid waste disposal needs of the city are served by nine operational garbage trucks and 256 environmental aides (100 garbage collectors 156 street cleaners) under the supervision of the City Environment & Natural Resources Office. Though the city has established material recovery facilities in each barangay, it is yet to establish a controlled dumpsite to comply with the Solid Waste Management Act of the Philippines.



Children playing at low tide, Sorsogon Bay
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d. *Residential Electricity Users Contribute The Highest In The City Carbon Emission Profile (Electricity And Gas Consumption).*

Though Sorsogon city produces renewable (geothermal) energy, the power generated is not utilized in the city but is fed back into the Luzon Grid for distribution; thus the local geothermal source is not maximized by the city. Also, energy saving lighting and other means of minimizing consumption of electricity are not yet as popular in Sorsogon City as in Metro Manila. Based on the city green house gas profiling, residential electricity users contribute the most carbon emission.

e. *A Significant Number Of The Dominant Transport Vehicles (Tri-Cycles) Still Use Two Stoke Engine.*

About 40% of the total 3,114 registered tricycles, in the city still uses two stroke engines with high pollutant emissions.

3.6.4 CLIMATE CHANGE AND HEALTH

Preliminary results at the national level link health and climate change as indicated by increase in disease incidence. No study, however, has been done at the city

level although the city is vulnerable to and anticipates increase in vector-borne disease especially Dengue Fever. Given increased precipitation and flooding of areas, urban slums are highly at risk to climate related diseases and illnesses.

Looking at health service infrastructures, the assessment revealed that out of the 69 health centers in Sorsogon City, 32 centers were identified to be at risk to flooding while 13 are located in areas prone to landslides.

3.6.5 CLIMATE CHANGE AND GENDER

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

Focused Group Discussions with communities revealed that in previous disasters women experienced heavy burdens especially because 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 sought access to financial resources support and small business information and training programs from local micro-finance organizations in the City like PALFSI. The Self-Employment Assistance Kabuhayan (SEA-K) program of the Department of Social Welfare and Development through the local government unit of Sorsogon City was also among the available livelihood programmes accessed by affected women. 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 in a low-income neighbourhood in Sorsogon carry out their daily chores @UN-HABITAT/Bernhard Barth

4.0

EXISTING INSTITUTIONAL FRAMEWORK

4.1 NATIONAL POLICIES AND STRATEGIES

The creation of the Inter-Agency Committee on Climate Change via Presidential Administrative Order (EO) 220 in 1991 was among the first climate change actions that the government undertook parallel to the formulation of the Philippine Strategy for Sustainable Development. The Inter-Agency Committee on Climate Change is chaired by the Department of Environment and Natural Resources and is made up of 13 government agencies and one NGO network, the Philippine Network on Climate Change.

The Inter-Agency Committee on Climate Change facilitated the development of the 1999 Philippines' Initial National Communication on Climate Change which was submitted to the United Nations Framework Convention on Climate Change (UNFCCC). The Philippines' Initial National Communication on Climate Change established the baseline understanding on the Philippines' vulnerability to climatic change and its potential for adaptation measures. The sectors assessed were energy, agriculture, industry, land use change/forestry and wastes. The Inter-Agency Committee on Climate Change is currently undertaking an improved national green house gas inventory and planning for adaptation actions. It will serve as a basis for the preparation of the country's Second National Communication to be submitted to the Conference of Parties of the UNFCCC by 2010.

The Philippines has conducted the necessary policy initiatives needed for the implementation of Clean Development Mechanism. It ratified the Kyoto Protocol in November 2003 and named the Department of Environment and Natural Resources in 2005 as the Designated National Authority for the Clean Development Mechanism with the key role of facilitating and promoting its projects.

Administrative Order 171 was issued in February 2007 to create a Presidential Task Force on Climate Change. The Task Force is headed by the Department of Environment and Natural Resources Secretary, with members from heads of various government agencies and two representatives from the private sector and the civil society. Its functions include: conducting rapid assessments on the impact of climate change, particularly on vulnerable sectors; ensuring compliance to air emission standards and combating deforestation and environmental degradation; undertaking and initiating strategic approaches and measures to prevent or reduce green house gas emissions; conducting nationwide massive and comprehensive public information and awareness campaigns; designing concrete risk reduction and mitigation measures and adaptation responses, collaborating with international partners to stabilize green house gas emissions; and integrating and mainstreaming climate risk management into government development policies, plans and programs.

Republic Act 9729 otherwise known as The Philippine Climate Change Act of 2009 was signed in 24 October 2009, by the President of the Philippines. This new law directs the mainstreaming of climate change into government policy formulations, development of the framework strategy and program on climate change, and creation of the climate change commission. The Act requires the creation of the Climate Change Commission, within 60 days from the effective date of the law, as the sole policy-making body of the government tasked to coordinate, monitor and evaluate the programs and action plans of the government relating to climate change. Consequently, the Inter-Agency Committee on Climate Change and Presidential Task Force on Climate Change shall be abolished upon the organization of the Commission.

The Climate Change Commission will be an independent and autonomous body with the same

status as that of a national government agency. It will be attached to the Office of the President, with the President as Chairperson of the Commission. Three more Commissioners will be appointed, and to support the Commission will be an Advisory Board composed of Secretaries of National Government Agencies[9], Director General of National Economic and Development Authority (in his capacity as Chair of the Philippine Council for Sustainable Development), Director General of the National Security Council, Chairperson of the National Commission on the Role of Filipino Women, Presidents of the Leagues of Provinces, Cities, Municipalities, and Barangays, and Representatives from the Academe, Business Sector, and Non-governmental Organizations. Further, a Panel of Technical Experts who shall provide technical advice to the Commission in climate science, technology, and best practices for risk assessment and enhancement of adaptive capacity of vulnerable human settlements to potential impacts of climate change.

Based on the new law, the Climate Change Commission shall develop the National Framework Strategy on Climate Change and subsequently formulate the National Climate Change Action Plan within one year after formulation of the Framework. The Commission will have the following powers and functions: Mainstreaming and coordinating climate change in national, sectoral and local development plans and programs; Formulating a Framework Strategy on Climate Change and ensuring policy coordination under the framework; Recommending legislation, policies, strategies, and programs for climate change adaptation and mitigation; Recommending development investments in climate-sensitive sectors such as water; Creating an enabling environment for the design of risk-sharing and risk-transfer instruments and to promote broader multi-stakeholder participation; Coordinating and ensuring partnerships with key national and local government agencies and other stakeholder groups; Facilitating and promoting capacity building and technical support for local planning and research in vulnerable areas; and Overseeing dissemination of information on climate change.

9 *Departments of Agriculture, Energy, Environment and Natural Resources, Education, Foreign Affairs, Interior and Local Government, Public Works and Highways, Science and Technology, Social Welfare and Development, Trade and Industry, Transportation and Communications*



Tricycles are the most common form of motorized transport in Sorsogon City @UN-HABITAT/Bernhard Barth

Notably, the Climate Change Act recognises the role of local government units as the frontline agencies in the formulation, planning and implementation of climate change action plans in their respective areas, which must be carried out consistent with the provisions of the Local Government Code, the Framework, and the National Climate Change Action Plan. While the law elaborates that it is the national government's responsibility to extend technical and financial assistance to local government units for the accomplishment of their Local Climate Change Action Plans, local governmentunits are tasked and directed amongst other things to:

- Formulate local climate change plans and regularly update their respective action plans;
- Mobilize and allocate necessary personnel, resources and logistics to effectively implement their respective action plans;
- Allocate from their annual appropriations adequate funds for the formulation, development and implementation, including training, capacity building and direct intervention, of their respective climate change programs and plans, including public awareness campaigns;
- Appropriate and use the amount from their Internal Revenue Allotment necessary to implement said local plans effectively;
- Submit annual progress reports on the implementation of their respective local action plans to the Commission within the first quarter of the following year

4.2 SORSOGON CITY POLICIES AND STRATEGIES

A comprehensive city climate change action plan or other overarching strategies for adaptation are yet to be developed. There are however recent efforts leading to the development of local climate change policies.

The assessment of city government offices/departments revealed that local government unit capacities and knowledge on climate change was weak but that there was great potential to develop these capacities, given that there was recognition from the local elected officials, local government unit technical staff



Low-income settlement, perched on top of the seawall, business district of Sorsogon in the background
@UN-HABITAT/Bernhard Barth.

and other stakeholders that the City was extremely vulnerable to climate change. City leaders, especially the Local Chief Executive, were willing to take action towards improving community responses to disasters and to strengthen the city's climate change adaptation initiatives. Furthermore the city was committed to contribute its share to reduce greenhouse gas emissions. To facilitate this, the local government unit believes that capacities of city stakeholders need to be developed in support of climate change action and to ensure sustainability.

The creation of the city Technical Working Group on Climate Change and the ad-hoc multi-stakeholder committees that were constituted to propose specific options provide the mechanisms for coordination, consultation and prioritization of climate change action.

The findings of the vulnerability assessment and the adaptation strategies for housing and basic services, livelihoods, Climate /Disaster Risk Reduction, and Environmental Management are being worked out by the Issue Working Groups. They are now used as reference for climate change sensitive local policy formulation and in the development programming of the city, especially in revising the Comprehensive Land Use Plan, the City Development Plan and the Disaster Risk Reduction Framework.

Local environmental policies like those relating to coastal resource management and solid waste management are being used as entry points for mainstreaming climate change in the environmental management programs of the city.

5.0

CLIMATE CHANGE ADAPTATION AND MITIGATION MEASURES

5.1 NATIONAL ADAPTATION AND MITIGATION MEASURES

The following are considered as the major national sectors in climate change, include, (1) housing and urban development, (2) energy, (3) air, (4) waste, (5) environment and natural resources, and (6) agriculture and marine. The national assessment for Cities and Climate Change Initiative revealed the fact that some overarching national policies on climate change are anchored in sectoral agencies. Thus far, the most active in developing policies on adaptation and mitigation approaches is the Environment and Natural Resources sector. At the Department of Education, climate change advocacy is gaining ground with integration of climate change matters in school curriculums. On the other hand, the Department of the Interior and Local Government has designated a bureau to lead on the climate change issue. Thus agencies that are not "traditionally" identified as climate change champions have integrated adaptation actions.

HOUSING AND URBAN DEVELOPMENT

The formulation of the national policy on housing and urban development is with the Housing and Urban Development Coordinating Council. As the title suggests, the Council is expected to lead the government in addressing the housing and urban development functions, but for undefined reasons, the urban development function receives less attention than housing in the Council while urban policy development relating to climate change impacts has also been weak. The urban data situation as observed reflects the absence of persistent advocacy or championing of the urban cause in national agencies, institutions and organizations.

The Housing and Urban Development Coordinating Council works directly with communities and the Local Government Unit in the implementation and monitoring of the Urban Development and Housing Act. Recently the 2009-2016 National Urban Development and Housing Framework was formulated and launched by the Housing and Urban Development Coordinating Council. Operationally, under this planning function, the Housing and Land Use Regulatory Board is mandated to oversee the formulation of Comprehensive Land Use Plan, City Development Plan and other city plans. The key themes of the new National Urban Development and Housing Framework structure are: (a) Urban Competitiveness, (b) Poverty Reduction (c) Housing affordability and delivery (d) Sustainable Communities, and (e) Performance-oriented governance. Of these five themes, the framework document only discusses climate change in the sustainable communities' theme.

PRESIDENTIAL EXECUTIVE ORDER 841

After severe losses and destruction brought by extreme weather events (Typhoon Ondoy and Pepeng) affecting Mega-Manila and other highly urbanized areas, the Philippine President issued Executive Order 841 in October 26, 2009 "ordering all local governments to revisit, reformulate, update and assess the implementation and manner of execution of their existing comprehensive land-use plans, particularly identifying government lands suitable for socialized housing resettlement and relocation."

The Executive Order requires all local governments to create a task force chaired by the local chief executive and composed of all members of local development councils. The task force will update, formulate or reformulate the City Land Use Plan to ensure its completion within six months, or by April 2010. Further, the taskforce will facilitate the identification and inventory of public lands that have been idle for 10 years from the effective date of RA 7279, and initiate their transfer to the National Housing Authority for socialized housing and resettlement or relocation areas. The task force will also draw the mechanics for the relocation and resettlement of persons living in so-called danger

areas and other public places, and institute programs for the provision of basic services, facilities, and access to employment and livelihood opportunities of relocated families.

5.2 CITY LEVEL ADAPTATION AND MITIGATION MEASURES

With championing from the current Local Chief Executive, the City has created a technical working group which spearheads and coordinates with other partners the conducting of assessments, planning, and community mobilization towards the development of the city climate change adaptation plan. Although the city does not have a concrete or structured adaptation strategy, the Focus Group Discussions with communities revealed that families are employing sporadic adaptation techniques in response to the changing climate as its impacts are experienced. Among the local adaptations noted are: the existing constructed sea wall[10] around areas often damaged by storm surge and tidal flooding; the people's instituted "bayanihan way" (families helping one another without fee) of reconstructing damaged housing without external help; and the reforestation of mangroves areas that serve as break water for waves and surges.

Though not clearly advocated locally as the city climate change adaptation strategy, disaster preparedness is at the core of the city's development agenda. The task on disaster preparedness and mitigation lies in the hands of the City Disaster Coordinating Council. In times of natural catastrophe and other man-made hazards, the city carries out its disaster preparedness plans and contingencies through the City Disaster Coordinating Council headed by the Mayor. The City Disaster Coordinating Council is mirrored at the barangay/village level by the existence of the Barangay Disaster Coordinating Councils 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 City Planning and Development Office provides data and information to the City Disaster Coordinating Council 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 the City Disaster Coordinating Council, the city has prepared its City Disaster Profile (Office of the Mayor, 2008). The document presents basic profile information 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 focuses on two major components namely (1) Disaster Preparedness and Risk Reduction and (2) Mitigation Measures.



Seawall facing Sorsogon Bay @UN-HABITAT/Bernhard Barth

5.2.1 MAINSTREAMING CLIMATE CHANGE IN SORSOGON

As earlier discussed, the mandated development documents from local government units are the Comprehensive Land Use Plan and City/Municipality Development Plan. The city now recognizes that sensitizing these two documents with climate change planning considerations would be good entry-points to mainstream climate change in local policies/processes/strategies. A climate change responsive shelter plan is being developed to be used as inputs to the Comprehensive Land Use Plan development and in developing housing construction strategies that are adaptive to projected climate change impacts. The city government is now using the Vulnerability & Adaptation Assessment results in support of sectoral planning for agriculture and livelihood development, environmental management (coastal protection, solid waste, energy efficiency), and in their City Disaster Risk Reduction plan.

10 Although the sea wall is a national government project in terms of actual constructions and is implemented by the Department of Public Works and Highways, the funds are normally from the "local development fund" of the local district representative of Sorsogon in Congress. The Local Government Unit and community are also involved in the project planning (specifically project request/identification).

6.0

CONCLUSIONS

6.1 CHALLENGES AT THE NATIONAL LEVEL

Given its physiographic and socio-economic conditions, the Philippines is highly vulnerable to the impacts of climate change. The country's vulnerability to climate change is attributed to observed trends in increasing mean annual and maximum temperature, increase in mean rainfall, occurrence of extreme events and observations on sea level rise. The Philippine urban system, hosting 64% of the total population, would be confronted with greater pressures given projected impacts to settlements, livelihood patterns especially in the agriculture sector, food security, health, access to ground water, and land inundation.

National estimates show that 82.5% of the entire population of the Philippines is exposed to tropical cyclones, flooding and storm surge. 14.9 million homes are vulnerable to the impacts of climate change, having structures with roofs and/or walls that are either make- shift or made of sub-standard materials, and are non-engineered. This underscores the fact that poverty and limited knowledge highly contributes to climate change vulnerability and the condition of the poor could be exacerbated by climate change.

The recent developments in advancing national policies and governance frameworks related to climate change through the Philippine Climate Change Act of 2009 signifies the promising and dynamic policy environment in the country. The issue of constraints in coordination and direction is now being addressed by the new law as it mandates the establishment of the Climate Change Commission. The Philippine Climate Change Act not only demonstrates the country's



Street Market, Bacon District @UN-HABITAT/Bernhard Barth

commitment to global agreements on climate change but also its commitment to sustainable development. It promotes synchronization of vertical and horizontal government functions and puts at the heart of the action local government units – who are expected to develop, implement, monitor and actualize adaptation and mitigation actions.

Despite the dynamism at the national front, a big challenge now is on building local government unit capacities to act as the front runner for climate change adaptation and mitigation planning as embodied in the Climate Change Act. Local government units would need great support from national government in terms of their capacity development in the areas of vulnerability assessments, and adaptation & mitigation planning. Knowledge management and information sharing across local government units, sectors, and disciplines are highly crucial to ensure sustainable adaptation and development. Innovations and applicable new technologies that are affordable need to be considered given the limitations of financial resources not only of local government units, but most importantly of the vulnerable poor who would be the end users of the adaptation technologies.

There is a big opportunity to mainstream climate change planning elements in the newly launched National Urban Development and Housing Framework (2009-2016) put forward by the Housing and Urban Development Coordinating Council. Mainstreaming climate change parameters in the National Urban Development and Housing Framework could facilitate local government units' better understanding of the relation between climate change and urban development planning processes. However, it is noted that climate change is only considered as an element of the sustainable communities theme, which is just one of the five themes of the framework. It could be advocated that given the complexities of its impacts, climate change should be an overarching consideration in urban development programming.

6.2 RECOMMENDATIONS

6.2.1 FOR IMMEDIATE ACTION AT THE NATIONAL LEVEL

In consultation with the national urban development stakeholders, the following actions are perceived crucial as embodied in the proposed Urban Sector Action Agenda on Climate Change.

1. **With regard to the implementation of the Philippine Climate Change Act of 2009:**
   a. The Housing and Urban Development Coordinating Council as the agency responsible for urban development and housing services should be represented in the Advisory Board of the Climate Change Commission along with those already mentioned in the signed law. This is in consideration of the significant impacts of climate change on human settlements and the urban system in general and the strategic role of urban centers in responding to climate change.
   b. Strengthened coordination between the national government and local government units to facilitate information sharing, technical support, and better knowledge management. Specifically, inventory of environmental policies and technical guidance notes (especially those relating to climate change) must be made available and accessible to local government units and urban development planners and stakeholders to inform policy development and decision-making;
   c. Capacity development for local government units should be responsive to their needs and translate into the development of Local Climate Change Action Plans. Initiatives on capacity development should be directed not only at the local technical staff but also at the local decision makers and leaders (i.e. Local Chief Executives and other elected officials);
   d. Apart from local funds, linkages to financing facilities for adaptation and mitigation actions should be made available with terms/conditions that are sensitive to local government units' capacities;
   e. Strengthened research and development on Climate Change that would support local government units' climate change directions and actions;
   f. Strong information and education campaign should be done to improve awareness, knowledge, skills, attitudes and practices



Typical low-income houses, Sorsogon ©UN-HABITAT/ Cris Rollo

on climate change issues as they relate to sustainable development thus building wider constituencies in support of local actions;

g. Incentives for green development must be taken into consideration and further explored.

2. **With regard to the dissemination and implementation of the National Urban Development and Housing Framework, (2009-2016) it must be ensured that:**

a. The Housing and Urban Development Coordinating Council and the Philippine Urban Consortium should consider climate change as an encompassing issue across the five specific themes of the Framework. This is in recognition of the complexities of climate change impacts across the urban system. The following overview considerations per theme should be considered:

i. The Urban Competitiveness theme should look into climate change resilient urban infrastructure. Urban systems competitiveness (i.e. tourism) could be altered by climate change impacts thus strategic local economic development plans must be ensured.

ii. The Poverty Alleviation theme should look into climate change impact on the rural-urban linkage especially as there is a big threat on rural producers who are dependent on climate or weather sensitive patterns. Climate related disasters could result in increased informality (settlement), disruption in food security, and higher cost of living in urban areas. Livelihood programs that would be promoted in view of the Framework need to consider climate change socio-economic sensitivities of the poor;

iii. The Housing Affordability and Delivery theme must look into the appropriateness of location and structures relative to projected climate change impacts and considerations. Climate change requires that the needs of families living in identified danger or high risk areas be addressed in a more focused approach. The strategy for innovative financing and development schemes should factor in

locational and financial vulnerability to climate change.

iv. The Sustainable Communities theme is currently the only theme in the Framework that covers climate change concerns. Even so, it is noted that there is a need to be explicit in this theme to ensure a concrete strategy to develop tools that will be made available for local government units in support of their work in mainstreaming climate change in development planning processes, especially in the review/enhancement of their comprehensive land use plans and in crafting their Local Development Strategies. The strong involvement of the poor in the planning process is crucial now given their expanded vulnerabilities in the context of climate change.

v. The performance-oriented Governance theme should consider climate change as an issue given the responsibilities of the local government unit in the implementation of the Philippine Climate Change Act of 2009. The theme should work parallel to the stipulations in the Act notably in relation to the national-local interface, Internal Revenue Allotment (IRA) programming, Financing, Framework Planning, Public-Private Partnerships.

3. In pursuit of the Urban Development Stakeholders' Agenda on Climate Change:
   a. The Housing and Urban Development Coordinating Council with other urban development stakeholders must actively be part of the national discourse and planning for climate change action through the Climate Change Commission;
   b. The Housing and Urban Development Coordinating Council with other urban development stakeholders are encouraged to strengthen partnerships with international development partners in support of the implementation of climate change actions
   a. Dialogue on climate change adaptation and mitigation in the urban setting must continue both at the national and city levels; and
   b. The needs of the vulnerable segments of the urban system especially the poor should be top priority in national and local climate change initiatives, parallel to the pursuit of sustainable urban development.

6.2.2 SORSOGON CITY LEVEL ACTION

1. 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 areas are at risk and would need strategic planning that would prevent or perhaps mitigate the negative impacts of climate change on the socio-economic condition of the people.

   RECOMMENDATIONS:

   a. The city must identify where to direct investments and situate development infrastructures to support its competitiveness. There must also be an effort to identify areas that are strategic for specific land use especially the settlements zones in order to better manage area resources while ensuring people's access to public service (health, education, recreation, etc.).

2. 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. This is foreseen to put more pressure on the cycle of poverty in the city and therefore hamper the achievement of the city MDG targets.

   RECOMMENDATIONS:

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

b. Align the poverty alleviation program of the city with the city's vulnerability to climate change

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

3. 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 information and education campaigns, 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, information and education campaigns and livelihood support.

RECOMMENDATIONS:

a. Involve non-public institutions in continuing dialogue on climate change especially during city consultations

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

c. Business sector participation should be elevated from the conventional disaster relief and emergency assistance and community Corporate Social Responsibility projects to 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.

4. Based on assessments conducted at the community (village) level, the people are aware of the hazards as a result of extreme climate events as they have experienced extreme typhoons and storm surges over the last few 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 due to impacts of climate change. It has been noted that communities' current adaptation practices are still weak in terms of considering secondary risks (e.g. health risks due to flood waters) in their current autonomous adaptation practices

RECOMMENDATIONS:

a. Pursuing Disaster Risk Reduction as an entry point to promote climate change risk management will complement and enhance existing community knowledge and draw their interest to working with other stakeholders.

b. Develop social/community mobilization plans and engage hotspot Barangays 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 actions.

c. Develop Community Actions Plans and identify possible demonstration projects that would generate high impact towards developing climate change resilient communities. The demonstration projects could feed into the national Housing and Urban Development Coordinating Council initiatives on building climate-resilient human settlements especially in low-lying urban coastal areas

5. Sorsogon City's green house gas emission profile reveals that the city has a miniscule contribution relative to the world's green house gas emissions. However, the city could contribute to climate change mitigation by showcasing responsible actions that further decrease their

CO2 emissions by continuing its efforts in improving the local air quality (enhancing local policies) and in carbon sequestration activities (e.g. reforestation and mangrove rehabilitation).

RECOMMENDATIONS:

a. Initiate issuing pro-active policies to ensure that both public and private development efforts adhere to eco-efficiency principles by doing more with less.

b. Improve the city's waste management scheme through capacity building efforts for the local government team involved in implementing their local solid waste management initiatives.

c. Engage private sector in possible partnership with the city, especially in exploring potential Clean Development Mechanism projects that could be applied in Sorsogon City.

UN-HABITAT's Cities and Climate Change Initiative promotes enhanced climate change mitigation and adaptation in developing country cities. Sorsogon is a pilot city of the Initiative, and this document is an initial output of Sorsogon's Cities and Climate Change Initiative activities. This summary is based on the report titled "Sorsogon City Climate Change Vulnerability and Adaptation Assessment".

The Sorsogon City Assessment examines the climate change impacts, vulnerability and adaptation capacity of a small coastal city in the Philippines - Sorsogon City in the Bicol Region. The assessment uses a participatory Vulnerability and Adaptation process that looks into the city's exposure, sensitivity, and adaptive capacity vis-à-vis projected climate scenarios, previous climate related disaster events and people's account of the past events and observations. It examines how the existing institutional framework at national and city level addresses climate change and also identifies gaps in the framework. Measures taken by the city to adapt to and mitigate against climate change are highlighted. In conclusion, the summary recommends actions to be taken to ensure that issues of climate change are adequately addressed and the adverse consequences are minimized.

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