



FOREST LAND USE PLAN (2014-2023)

CHAPTER 1 GENERAL INTRODUCTION

1.1 Introduction

San Carlos City is a second class component City of Negros Occidental. Adjudged as one of the most livable cities in the world by the United Nation, it is also recognized as the renewable energy hub of the Philippines and South East Asia with its Bio-fuel plant and lately, solar power energy to contribute to clean energy demand of the country.

The City has been into various environment and natural resources management (ENR) program for the past years. It obtained various awards and recognition on effective solid waste management, watershed rehabilitation and development, Protected Area (PA) enhancement, and various greening and urban forestry initiatives, mangrove rehabilitation, payment for environmental services thru its water levy program for watershed rehabilitation, among others.

Encapsulated in the City's vision is to become *a green city that demonstrates the proper balance between sustainable development, human habitat, and ecologically sound environment*. As one of the growing model City of the North Negros, it puts the environment and natural resource management on top of the development agenda, especially with the growing clamour to respond to climate change as well as disaster risk impacts. Towards this end, it has formally created the City's Environment Management Office (CEMO) with personnel and funding allocation for various environmental projects. Along this line, the formulation of this Forest Land Use Plan (FLUP) is a fitting contribution to this wide-ranging environmental initiatives, taking into account the holistic and integrated management and development of its entire territory.

1.2 Importance of San Carlos City's Forest Land Use Plan

Not only is the City strategic in terms of its economic importance, but also for its needed contribution in sustaining the ecological balance in this part of the Negros Island as it covers portion of three key National Protected Areas; *the Mt. Kanla-on Natural Park or MKNP, the North Negros Natural Park (NNNP), and Bago River Watershed Forest Reserve (BRWFR)*.

Mt. Kanla-on and the North Negros Natural Parks

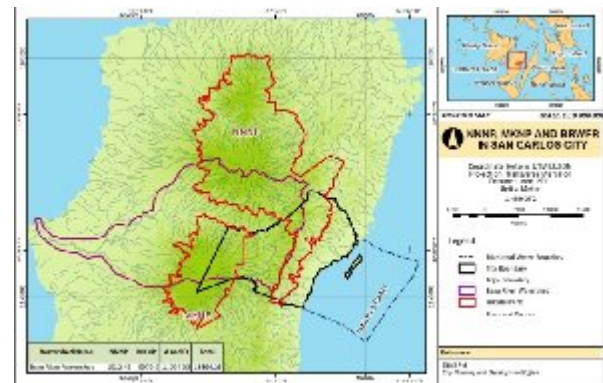


Figure 1. Map showing NNNP, MKNP, and Bago River Watershed Covered by San Carlos City, 2013.

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are public set-aside and considered environmentally critical area (ECA) for its strategic biological and ecological importance. Only in the two Protected Areas are the last frontier of natural forest in Negros Occidental, left in the highest part of the mountain ranges serving as the remaining habitat for important species of flora and fauna.

BRWFR also takes high importance as national public set-aside, much magnified by the inclusion of the two Protected Areas. Considered among the important life-support system in Negros island situated within its 940 square kilometers confine. The river and drainage system supports approximately 400 square kilometers of croplands, provides domestic water to an estimated 40,000+ household, support high water demand for varied scale of industries and commercial establishments, and drains and nourishes 1,944 hectares of coastal areas.

Likewise, the ecological, hydrological, economic, and social functions of the watershed have significant value in both global and local terms. Global significance is provided with the inclusion of NNNP and MKNP in biodiversity conservation. Both are within the Western Visayas Bio-geographic Zone (WVBZ) which supports the three terrestrial rainforest habitat types, namely lowland forests, mid-montane forests and mossy forests. The natural parks still harbor pristine and natural habitats with a unique assemblage of flora and fauna, many of which are endemic to Panay and Negros Islands. The sites are host to plant and animal species that are considered vital to the conservation of the global pool of biological diversity. While many of these species still remain to be identified, many are already facing the risk of local extinction. A good number are now counted among the threatened, critically threatened and endangered species on the IUCN and CITES II Red Lists. The life-sustaining functions of the watershed hinge on the health and wealth of these biological resources as these support not only to biodiversity conservation but also to nutrient cycling, soil fertility and the food web (*IEM Framework Plan for Bago Watershed-2011-2023*).

In higher order of importance, the watershed is significant in regulating water regime such as in replenishing the atmospheric, underground and surface water flows. At the same time, its vegetation cover acts as a carbon sink, which is important for carbon sequestration from the atmosphere. Through these processes, the watershed plays a vital role in global and local climate regulation.

The unique functions of these set-asides demands a holistic and concrete action to ensure the environmental services expected of these natural assets will be realized and sustained, not only to support national interest but also to complement local economic and environmental advancement. This FLUP draws out the optimum land use scenario that supports this end.





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1.3 The Environmental Governance Fostered in FLUP

San Carlos City's advance governance system can be extended to contribute in improving the value of three set asides, though only operationally confined within its territory. The reformed legal framework on devolution (LGC 1991, DILG-DENR Joint Memorandum Circular 98-01 and 2003-01, Executive Order 2003-308), provides the operating environment for the formulation of this FLUP. It cannot be overemphasized that shifting the focus of responsibility and accountability to LGU stakeholders provides the best means that these public set-asides can be adequately protected, developed, and managed.

The legal and developmental context of the FLUP gives the opportunity for the Local Government Unit of San Carlos City, and the DENR as the nationally-mandated agency, to set aside jurisdictional border in favor of partnership and collaboration to co-decide on the allocation and management of PAs covered by the City. The FLUP provides the appropriate representation of the Protected Area/Forestry Sector in the Comprehensive Land Use Plan (CLUP) with an advantage to have this FLUP integrated in the CLUP and its recommended regulation in the zoning ordinance for proper mainstreaming. To work under the ambit of decentralized governance, the implementation of FLUP presupposes a commitment to provide the governance structures, that will guarantee that not only rights and authorities are shared with City, but regulations are also institutionalized and mainstreamed in the overall ENRM operation and enforcement mechanism. Managing and directing land use change in the Protected Area, in coordination with the DENR and the Protected Area Management Boards (of NNNP and MKNP) and the Watershed Management Council of Bago Watershed, sits within the public good mandate of the LGU where land administration of these PAs become integral part of overall local governance schemes.

Related to the high order importance of PA management, the implementation of FLUP (and integration to the Comprehensive Land Use Plan) is envisaged to help;

- Contribute as an adaptation and mitigation mechanism to the impacts of climate change. Specifically the implementation can provide the best mechanism for the protection, development, and management of the watershed through the conservation of soil and water, and avoid or minimize the catastrophic impacts of flooding downstream;
- Improving overall watershed integrity, e.g., improved water regime in the watershed, including the underground water recharge and stabilize supply, and improve the biological diversity, among others;





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Overall, to improve the conservation value of the public set-asides-- Bago River Watershed Forest Reserve, and Mt. Kanla-on and North Negros Natural Parks.

Locally, the improvement of the forest and watershed ecosystems is also envisaged to complement economic development of the City;

- The economic development and advancement of the City is directed towards agriculture and agro-industrialization which demand large supply of water. The protection and development of headwaters (which mostly are located inside the Protected Area) and the watersheds in general complements or supports demand for envisaged economic advancement.
- Protection of river systems also protects marine ecosystems from constant siltation or contamination from the upland or agricultural and urban areas and help protect the marine ecosystems for sustainable marine resources harvest;
- Greening improve aesthetics and natural heritage value of the City which is important for tourism. Some of the natural landscape and scenic value of the Protected Area, especially Mt. Kanla-on which has been known for its majestic peaks, slopes, and river systems can be the best for low-impact tourism. Likewise, the potential of mangroves for ecotourism use can also be explored;
- Large land resources in the forestlands that presently are either unproductive or underproductive offers opportunities for various economic forest and non-forest based ventures, such as tree plantation, agroforestry, high value crops production, that can help generate income for the local people. These ventures while contributing to local economy can also contribute to watershed protection and improved integrity.
- Set the workable governance mechanism for the sustainable management of the PA through multi-stakeholders participation;

1.4 General Information

Brief History and Strategic Importance

A second class City and one among the 13 cities in Negros Occidental, it was enacted as a component city by virtue of Republic Act No. 2643 on July 1 1960. It was said that various experiences has made San Carlos City put forward innovative changes towards social reform. A former first district congressman, Don Carlos Ledesma, contributed to this resilient and innovative character of San Carlos when he led significant socio-economic changes in the 1973

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Philippine Constitutional Convention and in the agricultural system and industrial development of the City itself from the 1960s to the 1980s. Another historical milestone occurred on August 27, 1996 when then President Fidel V. Ramos held a cabinet meeting in San Carlos making it the first component city to host such an event.

The City's ideal geographical location and financial stability has made it the center of the Panay-Negros-Cebu economic zone. Its agro-industrial economy is centered on trade and industry that takes advantage of its vast and fertile agricultural land which is about 66% of the City's land area. Large tracts of agricultural land are easily accessible through well-developed mountain roads are planted to staple crops like rice and corn, and high-valued crops like cabbage, carrots, soy beans, mango, cashew and coffee. Sugar manufacturing is still one of the major industries in the City although vast sugar plantations have given way to real estate development for residential, commercial and industrial enterprises. An ethanol plant using biomass for renewable energy provides 6% of the City's energy supply. The ethanol plant supports San Carlos City's vision of a robust and vibrant economy pioneering as an agro-industrial energy renewal center in the Visayas and the Philippines (CLUP 2014-2033).

San Carlos is a port city with a fine natural harbor protected by Refugio Island (Sipaway). Its long coastline extends to 36 kilometers and its thriving island barangays on Refugio Island, replete with white sand beaches and rich marine resources, attribute to the growing fish and tourism industries of the City.

Location and Accessibility

The City lies at the northeastern part of Negros Island. It is bounded at the north by the town of Calatrava, at the west by the town of Don Salvador Benedicto and the City of Bago, at the south by the town of Vallehermoso and the City of Canlaon both of Negros Oriental, and at the east by Tanon Strait. It is 82 kilometers from Bacolod City through the new Negros Translink Eco-Tourism Highway and 146 kilometers through the old coastal road, 167 kilometers from Dumaguete City and 14 nautical miles from Toledo City, Cebu. The City's strategic location in relation to the other cities of Bacolod and Iloilo at the west as well as the cities of Toledo, Dumaguete and Cebu at the east, makes San Carlos an ideal hub for educational, residential, retirement and agro-industrial investments. Reliable and appropriate transportation systems by air (various airlines), water (Aboitiz, Negros Navigation hydrofoil, boat/shipping lines) and land (bus system) is available for daily travel to Bacolod, Iloilo, Dumaguete, Cebu and outlying provinces and cities in Regions VI and VII.





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The City has an annual grand cultural celebration known as the Pintaflares festival. Held every November 3 to 5, the festival includes a colorful street dancing ritual performed by dancers with painted bodies originating from an old Visayan tradition of welcoming visitors through dances performed by natives with tattoo-painted bodies. San Carlos City's flower is the Sunflower depicting its warm, friendly, hospitable and welcoming people.

Slope and Elevation

The topography of the City of San Carlos is predominantly level to undulating along the coastline and rolling to very steep along its north-western and south-western portions. Parts of Mount Kanlaon Volcano and the Balabag Mountain Ranges are within the jurisdiction of San Carlos. The Mount Kanlaon National Park, which has a geographical spread across Negros, reaches into the southwestern portion of the City. Mount Kanlaon National Park in Barangay Codcod has an elevation of 2,455 meters from the peak down, and is 1,800 meters above sea level. **See Slope and Elevation Map in Annex 4.**

Slopes of 0-8% are flatlands, considered irrigable and highly suitable for agriculture, urban, industrial, and other related uses. Slopes of 8-18% have higher variety of uses with potential for seasonal or permanent agricultural activities. Steeper slopes of 18-30% are considered marginal lands that may also be used for planting agricultural crops but may require more tillage. Slopes of 30-50% are suitable for forest trees, while those with greater than 50% slopes should be maintained for forest use.

Based on this slope profile, the City's flatlands are found along the coastline, from barangay Buluangan up north to barangay Punao and on Refugio Island. Slope gradually becomes steeper to the west of the National Highway that reaches the 18 – 30% range in barangays Quezon, Nataban, Prosperidad, Palampas and Bagonbon. Slope becomes gradual up to the valley portion of barangays Prosperidad, Nataban and Quezon that becomes almost flat again in many parts of barangay Codcod. Notable increases in slope may thereafter be observed going to the upper regions of Mount Kanlaon and along the City's boundaries with the Municipality of Murcia and City of Bago. The area distribution of the City's slope categories are presented in the table below while its Slope Map is presented in **Annex 4.**

Table 1. Slope Distribution by Land Classification (in Hectares), SCC 2013.

Slope	A and D	NNNP	MKNP		Forestland (Mangrove)	Total	%
			MUZ	SPZ			
0-18%	6,845.15	13.23	398.30		194.78	7,451.46	17.77
18%-30%	7,582.67	1,522.29	2,417.83	497.65		12,020.43	28.66

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80%-50%	8,086.05	1,979.90	1,661.70	1,163.56		12,891.21	30.74
50%-Up	1,554.08	7,268.71	321.82	428.35		9,572.96	22.83
Total	24,067.95	10,784.13	4,799.65	2,089.55	194.78	41,936.06	100.00

Source: Slope Map of SCC, 2013; NAMRIA Topo Map.

Elevation is highest in the part o the Mt. Kanlaon which reaches up to more than 2000 meters above sea level. Elevation with more than 1000 meters above sea level which by law is considered for protection purposes, is about 2600 hectares or 6% of the total land area, all are located in Mt. Kanlaon. On the other hand, elevation in the North Negros Natural Park (NNNP) ranges from more than 100 masl to 1000 masl. The area covered by elevation ranges is fairly distributed (more than 3000 hectares each) in three main elevation ranges, 100-300 masl, 300-500 masl, and 500-800 masl, respectively.

Table 2. Elevation Distribution by Land Classification (in Hectares), SCC 2013.

Elevation	A and D	NNNP	MKNP		Forestland (Mangroves)	Total	%
			MUZ	SPZ			
0-100	7,535.63	89.16			194.78	7,819.57	18.65
100-300	4,312.91	3,592.78	65.74			7,971.44	19.01
300-500	2,293.20	3,381.60	666.17			6,340.98	15.12
500-800	9,647.88	3,390.75	2,431.51	0.10		15,470.25	36.89
800-1000	278.31	329.83	993.75	49.40		1,651.29	3.94
1000-1300			629.88	437.57		1,067.45	2.55
1300-1500			12.60	472.85		485.45	1.16
1500-1800				641.03		641.03	1.53
1800-2000				276.44		276.44	0.66
2000-Up				212.17		212.17	0.51
Total	24,067.94	10,784.13	4,799.66	2,089.56	194.78	41,936.06	100.00

Source: NAMRIA Topo Map; SCC Elevation Map.

Climate Change Scenario

Based on the PAG-ASA Climate Change Projection for 2020 and 2050, all areas of the Philippines will get warmer, more so in the relatively warmer summer months. Mean temperatures in all areas in the Philippines are expected to rise by 0.9 °C to 1.1 °C in 2020 and by 1.8 °C to 2.2 °C in 2050. Likewise, all seasonal mean temperatures will also have increases in these time slices, and these increases during the four seasons are quite consistent in all parts of the country. Largest temperature increase is projected during the summer (MAM) season. Hot temperatures





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will continue to become more frequent in the future with increase in number of days with maximum temperature exceeding 35 °C.

Specifically, for Negros Island, the increase in temperature ranges from .9 to 1.2 °C for the 2006-2035 period and about 1.9 to 2.3 °C for 2036 to 2065 period. It means that overall temperature increases from its baseline of 28 °C to 30 to 31 °C in the projected period. However, the same erratic hot temperature at its extreme may also be experienced during summer months.

Rainfall, on the other hand, increases the southwest monsoon (June, July, and August) season until the transition (September, October, November) season in most areas of Luzon and Visayas. The Region covering Negros island has the projected increase of 20 to 30% rainfall from its baseline, which means more intense rainy days can be experienced.

The scenario speaks largely on the vulnerability of City to the impact of monsoon. Storm surges are also expected to increase, as well as flooding due to increase in precipitation. Such situation is much alarming to the population that are in the path of flooding and close enough to seashore. In line with MGB geo-hazard analysis, the FLUP Team established that about more than 2000 household (based on 2010 Google Earth) may potentially be affected by flooding hazard, mostly those that are near riverbanks and estuaries along the coastal area covering the City Proper, and Barangay Guadalupe and Buluangan.





2.1 The FLUP Protocol

The overarching goal of the forest land use planning exercise is to formulate stakeholder-sensitive, LGU-responsive, strategic and enforceable forest land use plan as integral component of the Comprehensive Land Use Plan. It represents an innovative process of integrating the FLUP within the CLUP along a common, ridge-to-reef, watershed landscape framework. The stages of FLUP development are envisaged to respond to the following objectives.

- Delineate and generate sub-watershed representation of the City's jurisdiction, following the “ridge to reef” physical framework;
- Undertake situational analysis and generate baseline Protected Area and watershed indices as basis for subsequent and deeper characterization;
- Elicit gender responsive stakeholder participation, and multi-sectoral support for the formulation, affirmation, and subsequent implementation of the forest land use plan; and,
- Facilitate the review and legitimization of the plan and create advocacy for governance of the Protected Areas covered by the City through the FLUP.

The FLUP provides for the process of knowing and understanding the biophysical resource and some social, institutional, and cultural influences affecting forest land use change.

- **Understanding the role of forest goods and services in supporting people's livelihoods** – this includes considering the perspectives of women, indigenous groups and other marginalized sections of society, and also considering the role of forest in lives of people.
- **Recognizing present and competing claims and use of the Protected Areas**— understanding how forestry practices are affected by past and current, formal and informal tenure contexts and conflicts.
- **Mapping the political and institutional context** – identifying key stakeholders, institutions and policies that influence land use changes as well as the effectiveness of PA management interventions.
- **Defining opportunities for change** in institutional arrangements on PA governance, including tenurial arrangement on how lands should be utilized and managed within the PA.





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2.2 Technical Framework

The overall spatial framework for analysis follows the integrated landscape (ridge-to-reef) approach in a watershed spectrum. It demonstrates the cross-ecosystems importance of forest and forestlands and/or the Protected area in relation to food security, water resources management, biodiversity conservation, disaster and risk mitigation, and climate change adaptation. The holistic and integrated nature of the process demands that FLUP be integrated to the Comprehensive Land Use Plan (CLUP) for a more meaningful application of spatial analysis and to applicably determine complementation and/or link between the Protected Areas as the natural assets and the demand of population and sectors for ecological goods and services.



Figure 2. Illustration of watershed/ridge-to-reef framework used in FLUP and CLUP. (ACabrera)

2.3 FLUP Processes and Methods

The formulation of this FLUP of San Carlos City started as a joint undertaking by the DENR, the City, and the DENR-Forest Management Bureau US Forest Service (USFS) in pilot testing Situational Analysis and use of GIS in land use and allocation and analysis. It was then

followed through with actual mobilization of the technical working group for the socio-economic profiling, and validation of thematic maps with key stakeholders, including the Barangay Council. The subsequent activities after the completion of the US Forest Service Technical Assistance was continued with the support of Bio-Power Company who also provided the Technical Assistance to complete the process.

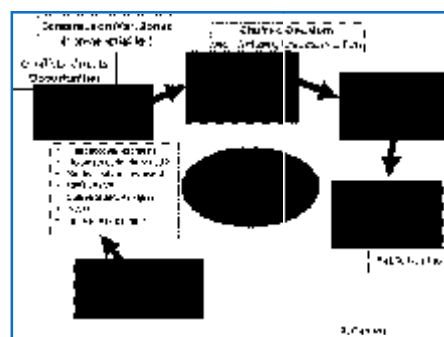


Figure 3. Illustrative steps in formulating the Forest Land Use Plan as applied in San Carlos (Source: APCabrera)

Practically, the FLUP formulation made use of the 5-step processes, which is an adaptation to the process used by EcoGov Project as supported and expounded in the Technical Bulletin issued by the DENR-Forest Management Bureau.

Overall, the approach applied is participatory and transparent. Some of the key methods used applied in planning also include:

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Pre-planning Requisites

- ✚ **Formation of FLUP Technical Working Group (the Vamos Team).** A multi-sectoral and inter-departmental membership organized by LGU through the Executive Order and tasked primarily to facilitate the formulation of FLUP, and its eventual integration to the Comprehensive Land Use Plan.
- ✚ **FLUP Orientation and Cliniquing** - A continuous process of information and knowledge exchange between the facilitator and TWG as part of the enabling means of FLUP formulation.

Technical Requisites

- ✚ **Forest and Watershed Resource Appraisal.** The situation of the forestlands and watershed are determined and analyzed through combination of methods; field observation, map overlaying and analysis, and focus group discussion. In the absence of forest and biodiversity data, basic descriptive methods of analysis is made to know current situation of the forest and forestlands and watersheds where issues and threats are correlated in existing land uses practices, forest stressors, and other threats triggers.
- ✚ **Hazard/Climate Change Vulnerability Assessment.** Use of hazard map from MGB and site validation. The result provides a scenario of impacts of climate change and geologic hazards to population, and to the existing and proposed investments in relation to existing and proposed land uses.
- ✚ **Map Overlaying Analysis.** It was used for the general spatial analysis using maps, making use of all thematic maps for deeper understanding the condition and/or situation of the Protected Areas in relation to other ecosystem in line with integrated spatial analysis.

Socio-economic Parameters

- a. **Organizational Analysis.** Using SWOT techniques, it assesses DENR and LGU organizational strength, weaknesses, external and internal threats, and opportunities to pursue effective management and governance of the natural assets.
- b. **Stakeholders Analysis** through focus-group-discussion determines the roles, interests, and influences of various stakeholders and how these affects the change in land use.





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Scope or Coverage

The FLUP have both horizontal and vertical cross-ecosystem influence over the entire watershed landscape. Horizontal influence includes the potential impact it may have across ecosystems or to adjacent areas of the impact zones (connectivity with other parts of the Protected area in adjacent towns or Cities). Vertical influence is for the upstream-downstream impact within sub-watersheds or watershed continuum. The onsite impact area of the FLUP covered the portion of the Protected Areas of the North Negros Natural Park and Mount Kanlaon within the City's administrative jurisdiction covering a combined total 17, 763 hectares.

2.5 Data Used in Planning

Socio-Profile. Utilized secondary data from CLUP and various sources and augmented by the primary data taken thru Participatory Rapid Appraisal (PRA) done by the Vamos Team (TWG).

Vegetative Cover and Land Use Mapping. Google earth image 2013 and the 2010 NAMRIA Vegetative Cover Maps were used. Random validation through walkthroughs and focus-group-discussions with key informants were done for updating.

Other Geo-spatial Data. At least 14 thematic maps were prepared as input to map overlaying and analysis. Maps from secondary sources such as DENR-LEP, MGB, City Planning and Development Office, and other City Departments were used and updated as necessary. These maps serves as the baseline for which succeeding updates can be done.

2.6 Resources Used in Planning

Facilitator. The Bio-Power Company engaged a facilitator who provided the means for continual discussion and learning to complete the FLUP following the modular process. This was preceded by the support of the DENR-FMB US Forest Service who provided training on Situational Analysis.

Mapping. A Mapping Specialist from the facilitators team (Technical Assistance Team) supported the mapping Team of FLUP Vamos Team to enhance their knowledge of various GIS platforms as it is applied to mapping and analysis required in FLUP.





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Integration into the Comprehensive Land Use Plan

The FLUP is an elaboration of the forestry/Protected Area sector's component of the Comprehensive Land Use Plan (CLUP) based on enhanced HLURB CLUP guidelines. Following the integrated and ecosystem approach, the plan shall also complement urban, agricultural, and freshwater environment management plan.

Integration of FLUP to the comprehensive land use plan (CLUP) ensures its mainstreaming to the LGU development program. Population demand for ecosystems services is intertwined to the needs of each and every person and sector. The City has developed its Vision in the CLUP where ENR is on top of the development agenda.

2.8 Collaborative Implementation and Resources Required by the Plan

The implementation of FLUP should foster partnership and collaboration between the City, the DENR, and other stakeholders. Mainstreaming or institutionalization of the implementation can be facilitated through defining and setting the local mechanism for effective implementation of the Plan. The implementation shall consider how it can best serve the interest of both the DENR as the nationally mandated institution, and the City, that by virtue of power under the Local Government Code, can share its function and resources to ensure the sustainable management of the public set-aside (Protected Area).

2.9 Duration of the Plan

This FLUP component of the CLUP will have the duration of ten-years. Subsequent revisions or updating, however, may be done after 3 or 5 years to ensure the up-to-datedness of the objectives and targets.

2.10 Complementation with Other ENR Plan

As a component of Comprehensive Land Use Plan (CLUP), this FLUP was made consistent and envisioned to complement other Environment and Natural Resources Management Plan of the LGU. It shall directly provide the detailed recommendations that complements the General Management Plan for MKNP and NNNP, and the implementation of the Integrated Ecosystem Management Framework Plan (IEMFP) of the Bagor River Watershed.





3.1 Introduction

Three public set asides within its territory provide the most compelling reasons for the City to participate and/or lead in its management. Much more compelling that these public set-asides are now in various state of degradation, and appropriate interventions are necessary to reverse this pattern of continued ecosystem alteration.

The importance of these natural assets are intergenerational with its management put bias to protection and preservation. Part of the Bago River Watershed Forest Reserve (BRWFR) in San Carlos which covers the two Protected Areas (MKNP and NNNP) is inclusive in terms of expected protective services functions that include, biodiversity conservation, sustainability of water yield, and in supporting the mitigation of climate change impacts and disaster and risk. MKNP also puts huge value as the primary natural heritage sites in Negros Island as famously known for its majestic peak.

Locally, the land covered by these PAs, in one way or another, benefits the local population in terms of its usage for farming, settlements, orchard, and for tourism. In accruing these benefits, however, people overlooked the necessity in ensuring the balance between the protective and production function, especially in the case of the Multiple Use Zone (MUZ) of the two Protected Areas. River easements are likewise farmed, and the practices of open cultivation led to massive siltation of streams and destroyed the freshwater as well as the coastal and marine habitat and ecosystems in its path.

An observable increase in encroachment on the two protected areas has led to an increase of open cultivation and massive land conversion. The conversion of land from its PA use to agricultural use also infringe the lower part of the designated Strict Protection Zone of MKNP. Likewise, the unregulated cultivation practices in the MUZ (in MKNP) has left open most of the land, and continuously threatens both the terrestrial and aquatic (freshwater and marine) diversity due to siltation and loss of its habitat.

Although with lesser intensity of open cultivation, NNNP experiences the same pressure from the population. More than 2500 families are now settled, and with the requirement of space and means of land-based livelihood alone will require large areas to be used. In the absence or weak regulation, conversion is expected to continue, unknowingly affecting the overall health of the watershed and undermining the overall integrity of the Protected Area and various ecosystems within it.





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Water is increasingly the most sought-after natural resources of San Carlos City. The CLUP has outlined its development pursuit towards agro-industrialization which perceivably requires huge amount of water in the long term. Based on record by the City Water District Office, underground water (especially from its dug wells) indicates a declining level over the past years, and more so during the peak of the summer months when precipitation and recharge of aquifers is low. Taking into account the importance of vegetation cover, the efficiency of water recharge hinges on the availability of perennial cover (e.g., trees), especially on known recharge points, which usually are in the upper slopes and where headwaters or springs are located. The irrigation is likewise dependent from the abundant supply of fresh water, such is true in the case of large rice land in Barangay Codcod, Quezon, and part of Nataban, and for the large area of sugar cane plantation surrounding the urban area.

On a positive note, mangroves are thriving abundant in some part of Refugio (Sipaway) Island and along the coastline of City Proper and Barangay Guadalupe. The City has dutifully protected and rehabilitated its mangrove areas in complement to the protection of its marine sanctuaries, as well as its coastal areas.

By and large, the issues of degradation and regulation are intertwined. Though the City has various initiative and shown its support in various aspects of environmental enhancement, a more thorough collaboration is yet to realize in the management of the Protected Area at the local level. The DENR, through its PAMB and Protected Area Superintendent (PASu), has merely exercised oversight function but yet to set an effective mechanism for onsite management of the PAs. The challenge is for the City to take the lead role, and enjoin support of stakeholders, in establishing the effective governance regime to ensure the PA are amply protected and managed.

3.2 Land Classification and Brief Information of MKNP and NNNP

Mt. Kanlaon Natural Park (MKNP) was declared as a PA by virtue of Republic Act 9154 of 2001. This was after it had already been proclaimed as a natural park through Presidential Proclamation No. 1005 dated May 8, 1997. The MKNP is centered on the peak of Mount Kanlaon which forms the common boundaries of four cities, namely San Carlos, Bago, La Carlota and Kanlaon. The North Negros Natural Park (NNNP), on the other hand, was proclaimed as a natural park by virtue of Presidential Proclamation No. 895 in August 2005. It falls within the jurisdiction of the cities of San Carlos, Talisay, and Silay, and municipalities of Calatrava and Salvador Benedicto.





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The combined area¹ of the MKNP and NNNP covered by San Carlos City is about 17,673 hectares or equivalent to 42% of its total land area. Mangrove, however, which is also part of the forestlands is about 195 hectares (.46 %) and an addition to the total area of public domain. Encompassing the two Protected Areas is the Bago River Forest Watershed Reserve (BRWFR) which covers about 50% of total land area, including the Alienable and Disposable Lands. Of the total 18 Barangays of the City (including the Refugio Island, 8 Barangays are either partially or entirely within the two PAs. For Mt. Kanlaon, it is only covered by Barangay Codcod, while 7 Barangays comprise the NNNP. Mangrove area, is distributed in the 8 coastal Barangays, including San Juan and Ermita in Refugio Island.

Table 3. Area of Barangays Covered or Within Forestlands/Protected Area (in Hectares)

Barangay	A and D	Protected Area			Forestland	Total
		NNNP (MUZ)	MKNP		Mangrove	
			MUZ	SPZ		
1. Bagonbon	370.69	3,011.63				3,382.32
2. Buluangan	2,569.19	988.76			2.28	3,560.23
3. City Proper	361.98				22.75	384.72
4. Codcod	2,526.46		4,799.65	2,089.56		9,415.67
5. Ermita	144.83				23.98	168.80
6. Guadalupe	2,681.89	723.89			82.52	3,488.30
7. Nataban	1,769.74	940.18				2,709.92
8. Palampas	3,192.47	1,731.45			5.82	4,929.75
9. Prosperidad	2,542.81	1,003.94				3,546.75
10. Punao	1,233.71				42.48	1,276.19
11. Quezon	5,009.86	860.88				5,870.74
12. Rizal	1,439.92	1,523.41			5.34	2,968.67
13. San Juan	224.40				9.61	234.01
Total	24,067.95	10,784.13	4,799.65	2,089.56	194.78	41,936.06
% of Area	57.39	25.72	11.45	4.98	0.46	100.00

Based on existing zones of the two Protected Areas, NNNP covered by the City is designated primarily as Multiple Use Zone (MUZ), while MKNP, through its approved zone, covered both the Multiple Use Zone (MUZ) and the Strict Protection Zone (SPZ). Based on NIPAS Law, there is a huge distinction between the two zones, MUZ as it is termed allow multiple uses based on approved management plan, while strict protection zone, is basically a 'no touch zone' in consideration to the fragility of ecosystem and mainly intended for the conservation of biodiversity, research, and traditional uses of the IPs. While MUZ allows multiple uses,

¹ Based on GIS calculation which may differ from record.





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overarching principle or "overlay regulation" should be enforced for the conservation of soil and water, biodiversity, and protection of freshwater ecosystems.

3.3 Land Uses Pattern in the Two Protected Areas

The validated Google Earth Image of 2013 provides a clear situation of the existing vegetative cover and land uses in the two PAs within the territory of San Carlos City.



Photo 1. Top view of part of Mt. Kanlaon within San Carlos City that shows the upward creeping forest fragmentation. Google Earth Image, 2013.

The forest along the slope of MKNP is continuously being encroached and degraded. The remaining natural forest of the park is only comprise 30% of the entire park area or about 2100 hectares. Mostly, the remaining forest can be found in the higher slopes of the SPZ and few patches left in MUZ. Continuous encroachment within the SPZ was observed with the presence of houses and agricultural plots in the lower part of the Zone.

The MUZ, on the other hand, is dominated by agriculture use with settlement spread in areas having road access. Dominant agricultural crops include rice and vegetables. Sugarcane is also among crops that has found its way inside the Protected Area. The expanse of individual lot indicates that ownership claims ranges from small to large scale.

Table 4. Forest and Semi-forest Uses (vegetative Cover) of the Protected Areas

Vegetative Cover	A and D	NNNP (MUZ)	MKNP		(Forestland) Mangrove	Total
			MUZ	SPZ		
Natural Forest (NF)	1,516.31	1,957.32	249.96	1,861.18		5,584.77
Agro-Forestry (Agro)	121.24	85.80	29.00		0.05	236.09
Mixed Perennial (MP)	6,900.60	4,289.08	725.15	16.21	7.82	11,938.86
Mangroves (M)					71.09	71.09
Total	8,538.15	6,332.20	1,004.12	1,877.38	7.87	17,759.71
Total Land Area	24,067.94	10,784.13	4,799.65	2,089.56	194.78	41,936.06
% Cover NF	6.30	18.15	5.21	89.07	-	13.32
% Cover Agro	0.50	0.80	0.60	-	0.03	0.56
% Cover Mixed Perennial	28.67	39.77	15.11	0.78	4.01	28.47
% Cover Mangrove	-	-	-	-	36.50	0.17
Total % Cover	35.48	58.72	20.92	89.85	40.54	42.52





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Source: Vegetative Cover Map of SCC, 2013; Google Earth Image 2013.



Photo 2. Portion of MUZ of MKNP showing large area used for agriculture and settlements. Google Earth Image, 2013.

NNNP shows a different pattern of land uses. Its remaining natural forest is also comparatively small which is about 18% of the total area of the Park and is mainly in the highest part along ridges. Dominated by mixed perennials (perennial crops, orchard, banana, coconut, bamboo, etc.), there is also a large area of Open/Cultivated (A/C). Sugarcane is also among the crops planted in a more fertile part. NNNP is generally very steep by slope category and the growing area of open cultivation along slopes is considered detrimental to the overall health of the forest and watershed.

Table 5. Other Uses of Protected Areas and Mangrove Area

Land Uses	A and D	NNNP (MUZ)	MKNP		Forestlands (Mangrove)	Total
			MUZ	SPZ		
Riceland	2,334.64	257.72	1,832.58	15.05		4,439.99
Sugarland	6,068.03	289.59	86.64		38.52	6,482.78
Open/Cultivated	4,610.51	3,113.92	1,064.03	135.54		8,924.00
Brushland/Grassland	1,458.08	776.07	785.30	61.59	3.42	3,084.46
Settlement/Built-up	767.33	14.63	26.98		26.25	835.19
Mangroves						
-- Fish ponds					36.13	
-- Mudflat					11.50	
Total	15,238.58	4,451.93	3,795.54	212.17	115.83	23,766.42
Total Land Area	24,067.94	10,784.13	4,799.65	2,089.56	194.78	41,936.06
% Rice Land	9.70	2.39	38.18	0.72	-	10.59
% Sugar cane	25.21	2.69	1.81	-	19.78	15.46
% Open/Cultivated	19.16	28.88	22.17	6.49	-	21.28
% Brushlands	6.06	7.20	16.36	2.95	1.76	7.36
% Total	60.13	41.15	78.52	10.15	21.53	54.68





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Source: Vegetative Cover Map of SCC, 2013; Google Earth Image 2013.

In some part of the A & D land covering Barangay Nataban and Quezon, a stretch of the natural forest can be found in the higher slope (30-50%).

Overall, natural forest cover remaining in San Carlos City is about 13% of the total area (18% in NNNP and 30% in MKNP). Perennial cover including trees, is calculated at 42% of the total area. NNNP and MKNP has a calculated total perennial vegetative cover of 52% and 42% respectively. **See Vegetative Cover and Land Use Map in Annex 4.**

3.3.1 Implication of Existing Pattern of Land Uses vis-à-vis PAs Protective Functions

Balancing economic and ecologic gains from the use of the land, especially covering Protected Areas, involve an array of factors and challenges. Often, the biases put forth for the management of the Protected Areas run contrary to the existing or traditional practices on land uses, which oftentimes are ecosystem-altering. Simple fact is existing, huge number of people are now within the Park and majority of them use the land for subsistence. Some however, occupy the land for expansion of land holdings. The huge challenge is how to regulate these uses and harmonize them with the desired uses of the two PAs.

Primarily, the PAs support high order conservation concerns such as biodiversity, carbon sequestration, watershed/water production functions, and ecotourism/ aesthetics uses. Even in MUZ, all of these have to be put as an overarching regulation on how the land should be managed and used. Current situation in both protected areas, however, show indiscriminate land uses that disregard slopes, habitat, and the needed balance on the protective and productive values are not observed.

Table 6. Existing Land Use Implication vis-à-vis PA Management Concerns

Existing Land Use	Environmental Concerns				Agronomic Sustainability (for Smallholders)	Institutional and Policy Issues
Description	Carbon Sequestration	Biodiversity	Watershed Functions	Ecotourism		
Natural Forest	<i>Constrained</i> , with continuing fragmentation occurring even in SPZ	<i>Constrained</i> Habitat loss, diminution of wildlife population	Constrained, with large fragmentation in steep slopes	Loss of aesthetic value if degraded	Limited to short production cycles	Priority area for protection and yet highly vulnerable to degradation
Mixed Perennials/Agro forestry/Tree Plantation	Perennial crop component as net carbon gainer	Possible sources of food for wildlife; but	Supportive of protection of slopes; improve	Low index; Organic farming can be practiced;	With proper mgt., long term productivity is	Absence of tenurial rights is an issue to access benefits





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Table 6. Existing Land Use Implication vis-à-vis PA Management Concerns

Existing Land Use	Environmental Concerns				Agronomic Sustainability (for Smallholders)	Institutional and Policy Issues
Description	Carbon Sequestration	Biodiversity	Watershed Functions	Ecotourism		
		disturbance if natural forest is converted	watershed function if well-dispersed	High index if showcased traditional agriculture (like "Muyong")	ensured	(harvesting and selling products)
Open Cultivation (Cash crops including sugarcane)	Cyclical carbon depleter	Low biodiversity index	Siltation and erosion a common concern;	Low index; Organic farming can be practiced; High index if showcased traditional agriculture (like "Muyong")	limited to short cycles; high return for sugarcane	Challenge of regulating large land holdings within PA
Grassland	Low index carbon	Low diversity index	Prone to grassfire; low	Low aesthetic value	Unutilized; high opportunity cost	Can be protected for natural re-colonization/succession in support of biodiversity and watershed conservation
Settlement	Contributor to emission for other land use practices	Serve as threat to biodiversity because of other land use practice	Practices may or may not contribute to watershed improvement	Low aesthetics value unless showcased traditional or heritage settlement or houses	Preferred near farm plots	Designation of settlement sites; High cost for resettlement.

3.4 Biodiversity ²

² Lifted from the IEM Framework Plan for Bago Watershed, 2011-2030. Biodiversity studies were taken from various source.





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PA declaration gives primacy to the conservation of biodiversity. The two protected areas are part of the Western Visayas Bio-geographic Region (WVBR) that are said to harbor assemblage of flora and fauna found in various types of ecosystems within these PAs. The last biodiversity studies for MKNP was conducted in 2000 through the Conservation of Priority Protected Areas Project or CPPAP, while NNNP initial Resource Basic Inventory (RBI) was done in 2003 to support the recommendation for NIPAS enactment. While this is not specific to areas of PAs within San Carlos City, the results of inventory are indicators of the diversity of the entire PA which should be factored-in in any development interventions. There was a follow-up but partial study also done for the buffer zone and area of operation by the Energy Development Corporation (EDC) by Maunsell-AECOM (2007) which was part of the EIA requirements by the DENR of its North Negros Geothermal Project .

The floral endemism in MKNP is relatively high: so far 80 endemic species are found to thrive in the lowland areas, 55 in the montane forest and 15 in the mossy forest. There are at least 12 highly threatened or endangered tree species including Almaciga, Sambulawan and Toog. About 17 of the tree species distributed in the montane and mossy forests are endemic to Negros Island such as Akle, Governor's plum, Elmer's Abiki, among others. Two species of grasses endemic to Negros, namely: *Isachne vulcanica* (Geollegue, 1983) and *Miscanthus depauperatus* are found only near the crater of Mt. Kanlaon (MKNP Master Plan-lifted from CPPAP studies). *Also See Annex for Lists of Flora and Fauna based on Biodiversity Inventory.*

Both the MKNP and the NNNP are habitats of flora and fauna that are high on the list of economically important as well as threatened and critically endangered species that are included in the CITES and IUCN Red Lists (*Annex 3*). The sites are also home to species of flora and fauna that are not found elsewhere in the world. Besides their inherent high value for biodiversity particularly in terms of species endemism and richness, both account for the few remaining areas in Negros where primary forest cover is left intact, where natural landscape is at its best and where the remnants of culture and history of Negros can be traced.

The NNNP still harbors abundant species of dipterocarp forests and other important tree species, providing habitats and niches for endemic and highly threatened species of animals. Among the most abundant and well distributed are Udling, Tangile *Shorea polysperma*, Almaciga, Alom and Bagtikan *Parashorea malanonan*. Other dipterocarps are Almon *Shorea almon*, Red Lawa-an *Shorea negrosensis*, Red Nato *Palaquium luzoniense*, and the White Lawa-an *Shorea contorta*. A partial listing of the flora and fauna inventory of MKNP and their conservation status is attached in **Annex 3**.

There is a need to conduct new biodiversity studies having changed land use configuration of the two protected areas, over the last 5 years with threats remain unabated since the conduct of the last study.





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3.4.1 Birds of MKNP: Their Conservation Status and Local Importance

The inventory of birds conducted at MKNP recorded 140 species, which account for about 55% of the total bird record in the Negros Island. Of these, 44 species are considered endemic to the Philippines. Thirty-three percent (33%) of the avian species are endemic to the Visayas faunal region. The NNNP also serves as habitat to some of the world's threatened bird species including the famous Negros Bleeding Heart, *Gallicolumba keayi*, and the two critically threatened hornbills: *Penelopides panini* (Tarictic Hornbill) and *Aceros waldeni* (the Visayan Writhed or Walden's Hornbill), among eight others (Also see Annex 3).

3.4.2 Mammals, Amphibians and Reptiles

The NNNP harbors six Negros Island species of large mammals, two of which are globally endangered: the Philippine Spotted Deer, *Cervus Alfreddi*, and the Visayan Warty Pig, *Sus cebifrons*. The conservation status of the mammals in MKNP on the other hand is shown in **Annex 3**. The same conservation status on Amphibians and Reptiles that were inventoried in the area.

3.4.3 Terrestrial Ecosystems of MKNP and NNNP

Generally, there are two types of forest formations found in the two PAs. The formations are best characterized by their dominance at various altitudinal ranges. They are briefly described as follow:

The Scrub Formation above the Timberline and the High Montane Mossy Forest

This formation typifies elevation range of over 2200 to more than 2500 meters above sea level which is also partly can be found in MKNP covered by San Carlos City. At this range, as in the summit of Mt. Kanlaon Volcano, the trees could hardly grow. If ever, they are confined along gullies and crevices, where they are shielded from strong winds and the elements. The dominant growth in exposed boulders and rock faces are lichens, mosses, sedges and thick growth of ferns. Along gullies, gnarled shrub like growth of sturdy trees are found dominated by *Leptospermum suaveolens* (Myrtaceae), and *Dacrydium sp.* *Styphelia sp.*, *Rhododendron, spp.* and *Vaccinium spp* are sometimes observed to be growing in dense clumps and in isolation. *Rhododendron spp* are oftentimes observed growing as a saprophyte.

NNNP has a lower elevation than MKNP, and therefore, the grass vegetation which occur at above 2000 MASL is not observed at the higher peak. In the rocky summit approaching the crater of MKNP an endemic grass *Isachne vulcanica* is the dominant





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vegetative growth sparsely inserted here and there by a yellow flower orchid *Cymbidium sp.*

In Margaha Valley in Mt. Kanlaon (an old crater measuring over 30 hectares at the basin), which is estimated to be over 2,000 meters above sea level, thick stands of *Dacrydium* interspersed with small trees species from the family Myrsinaceae could be found in depressed gullies along the valley perimeter. The forest floor is thickly carpeted by mosses and lichens. *Rhododendron* and *Vaccinium spp* are also commonly seen mixing with co-dominant tree species *Dacrydium. sp* and *Leptospermum suaveolens*

The Podocarp species, *Dacrycarpus imbricatus (Blume) de Laub*, *Dacrydium beccarii Parl*, *Phyllocladus hypophyllus Hook*, *Podocarpus pilgeri Foxwand*, and even the softwood *almaciga (Agathis philippinensis)* are dominant at elevations of 1800 to 2200 meters above sea level (MKNP Master Plan).

The Mid- Montane Forest

This is the type of forest that can be seen at an elevation of 1,300 to 1,800 meters above sea level in MKNP largely located in the designated SPZ and portion within the Multiple Use Zone. The dominant tree species in the forest canopy is *Agathis philippinensis* (almaciga, Araucariaceae) associated with *Lithorcarpus spp.* (Philippine oak, Fagaceae). The middle layer canopy is characterized by the abundance of *Syzgium spp.* and lauraceae species. In disturbed patches of forest, rattan and many species of vines cover the ground and the periphery of forest stands.

In very steep slopes with very unstable and mostly sandy soil, the species *Casuarina rumphiana* (Mountain agoho, Casuarinaceae) are commonly growing as pure stands. The fairly fertile soil, disturbed and open forest patches are often invaded by pioneer trees such as *Macaranga*, *Trema orientalis*, *Mallotus spp.*, and *Homalanthus spp.*

The high elevation forest in both protected area is dominated by gymnosperms, pandans, small to medium trees and shrubs, herbaceous species, orchids, vines and other epiphytes, ferns and mosses. Meanwhile, trees that dominate the lowland landscape are White Nato *Pouteria macrantha*, Baguilmombi *Eugenia wenzelii*, Hungot-hungotan, Almaciga *Agathis philippinensis*, Pagsahingin *Canarium asperum*, Kaldemon *Atalantia disticha*, Dao *Dracontomelum dao*, Dungon *Tarrieta javanica*, Takip-asim *Mallotus recenoides (?)*, and *Macaranga spp.* Species found in the cultivated areas are arabica coffee, several kinds of vegetables, and Mahogany species. Trees found in the montane forests are Hublas *Tristania sp.*, Lokinai *Dacrydium elatum*, Igem *Podocarpus imbricatus*, Pagatpat-gubat *Carallia brachiata*, baguilmombi *Eugenia wenzelii*, Malignis, Tungaw-gubat *Everettia octodonta*, Akle *Albizzia acle*, Anabiong *Trema orientalis*, Anino *Evodia confusa* and Banagan *Smilax bracteata*, among others. This elevation is hardly





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beyond the habit range of *Dipterocarp* species (lauan group). Sightings of lauans are seldom at this altitude. Instead, species from the family Elaeocarpaceae, Theaceae and Guttiferae are more common (MKNP Development Plan, 2011).

The Lowland Tropical Rainforest

Only remnants of the lowland tropical rainforest could be found in the lower slopes of Mt. Kanlaon and the North Negros Natural Park. Most of these areas have been encroached and converted into agricultural use, especially for MKNP's MUZ. Growing at elevations from sea level up to over 800 meters, the lowland tropical rainforest dominated by the family *Dipterocarpaceae* has given way to agriculture. The lower slopes of MKNP and NNNP are now devoid of forest and instead are predominantly devoted to rice, cash crops, and sugarcane production.

The Riparian Vegetation

Riparian biodiversity (vegetation) has been subjected to conversion. Large area of riparian/river easement are mostly utilized for agricultural use, mainly sugarcane and cash crops. By and large, trees and perennial should at least cover the entire easement which by law should be intended for forest uses.

Based on inventory, distinct communities of plants colonize floodplains and riverbanks. These common plants are grasses (Talahib), shrubs, and ferns. Few species of trees can also be found along river banks, such as *Kleinhovia hospita* (tan-ag, *Sterculiaceae*), *Ficus nota* (tibig, *Moraceae*), and a lot of pioneer species under the genera *Macaranga*, *Mallotus*, *Homalanthus*.

3.4.3 Threats to Biodiversity

- **Population pressure** and massive encroachment of ecosystems into various forms of agricultural use is prevalent and destroyed the habitat of important species of flora and fauna. Conversion is rampant and with peoples lack of knowledge on the importance of each ecosystem, lead to the total local extinction of some of these species.
- In the higher elevation of Mt. Kanlaon (which is part of the Strict Protection Zone) and the NNNP, **continuous fragmentation** of forest occurs, also as a result of encroachment for agricultural cultivation. Even the part of MKNP at around 1600 in elevation are not spared and the increasing area of cultivated plots can also be observed.
- The strategic location of the two protected areas is supposed to provide the connectivity and interchange route for the key wildlife species. But **loss of biodiversity corridors** such as the riparian vegetation, and some intact forest or perennial cover disrupted this route that also lead to the local extinction of key endemic species.





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Management System and Tenure Status Within PAs

Overall management of the Protected Areas is lodged with Protected Area Superintendent (PASu) and the PAMB. The PAMB provides the oversight functions, but actual protection and management should be provided through the Protected Area Superintendent and staff. A common concern on the lack of manpower, training, and budget negate the ability of this assigned group to ensure the sustainability of protection and management of the two Parks. This situation puts the PAs under technical open access situation when there is absence of legitimate entity to put onsite management that invites free entry and or illegal occupation leading to degradation. On the economic side, the situation created huge opportunity cost or forgone benefits from the lost of value of these natural assets.

Based on existing laws and policies, tenure can be issued for the Buffer Zone and Multiple Use Zone of the Protected Area. The communal type of tenure can be issued to legitimate occupants or tenured migrants of the PAs through the Protected Area Community Based Forest Management Agreement (PACBRMA). Existing tenure in the PAs are based in old issuances and yet to be converted to PACBRMA. **See Tenure Map.**

Table 7. Existing and Proposed Tenure within Protected Areas

Tenure	No. (of Tenure or Orgn)	NNNP (In hectares)	MKNP (in hectares)	Contribution in PA Management
CBFMA	1	390.84		Mobilized for various forest rehabilitation projects of DENR and LGU
ISF Area	7	581.58		-do-
Proposed CADT	1		1,201.30	Constrained; Application under processing
Total		972.42	1,201.30	

Source: DENR, PEMO Records, 2012.

The existing tenure are all in NNNP while application and processing of Certificate of Ancestral Domain Title (CADT) is ongoing in MKNP.

While it works within the premise of putting onsite management system, CBFM and ISF tenure holders are highly dependent from grants and other form of subsidy. Various grants and supports from the City and the Provincial Government (PEMO) were obtained in the past years for livelihood support and forest rehabilitation projects. Lately, the World Bank-supported Bago River Rehabilitation Project provided a total grant of more than 20 Million for forest rehabilitation and fuelwood production. Other forms of subsidy also comes in handy, but





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whether or not its assessed value in terms of contributing to effective forest management and uplifting the economic status of members and overall self-empowerment are realized remain to be seen.

Open Access Situation. There are thousands of households (and land claimants) benefiting from the use of the land inside the Protected Area. The sole intention of usage is mainly economic and agricultural in nature. The agricultural usage are often intrusive to biodiversity and overall pristiness demanded of the Parks. The prevailing situation remain in open access for lack of organized mechanism to regulate land uses within the PAs.

The legitimacy of tenurial rights can be recognized for tenured migrants covering the remaining untenured areas of the MUZ. The process of CADT issuance may also be facilitated to ensure the rights of IPs are recognized. The issuance of tenure, with sustained efforts to assist community can help eliminate the technical open access situation of the Protected Area and facilitate regulation and management.

3.6 Forest Rehabilitation Projects

The City, the DENR, and the PLGU through the PEMO availed of various projects for CBFM and ISF Peoples Organizations supporting various forest rehabilitation and biodiversity conservation efforts. For the last 3 years, the National Greening Program on reforestation and agroforestry is on top of the list in terms of area covered. The San Carlos Development Board (SCDB) which finance watershed rehabilitation through the proceeds from the City's Water Levy Program, covers more or less 600 hectares of various type of measures (agroforestry, reforestation, ANR).

Table 8. Coverage (in Hectares) of Past (since 2010) and Ongoing Forest Rehabilitation Projects in SCC, 2013.

Project	A and D	NNNP	MKNP		Total
			MUZ	SPZ	
NGP					
Agroforestry, Reforestation	1.06		49.58		50.63
Reforestation	15.89	839.45	85.63	48.11	989.08
Urban Greening	5.70				5.70
SCDB (Water Levy)					
Composite Forest	275.81	194.06			469.87





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Table 8. Coverage (in Hectares) of Past (since 2010) and Ongoing Forest Rehabilitation Projects in SCC, 2013.

Project	A and D	NNNP	MKNP		Total
			MUZ	SPZ	
Existing Stand	0.40				0.40
Existing Stand (Ipil-ipil)	6.54				6.54
High Forest	115.55	32.46			148.00
Mango Plantation		0.89			0.89
Trial Site		0.97			0.97
Bago River Rehabilitation Project (NPS World Bank)					0.00
Reforestation and Agroforestry		290.00			290.00
Integrated Woodlots		165.00			
Total	420.94	1232.83	135.21	48.11	1837.09

Source: DENR LEP, 2013; SCDB Map, 2013.

3.7 Status of the Watersheds Within San Carlos City

The watershed best typifies the land use connections between the upland and the lowlands as it is linked by rivers/river system in a continuum. The entire territory is cut across by 10 watersheds/sub-watersheds. Balabag Range in NNNP serves as corridor divide between watersheds that drain to Bago River (Upper Ulay, Bago, and Sangay), and those that drains directly towards urban lowland area in the west to the Tañon Strait, with most springs and headwaters emanating from area covered by NNNP. This distinction is relevant to distinguish which watersheds directly contributing to the local economic development and to both local and province-wide importance.

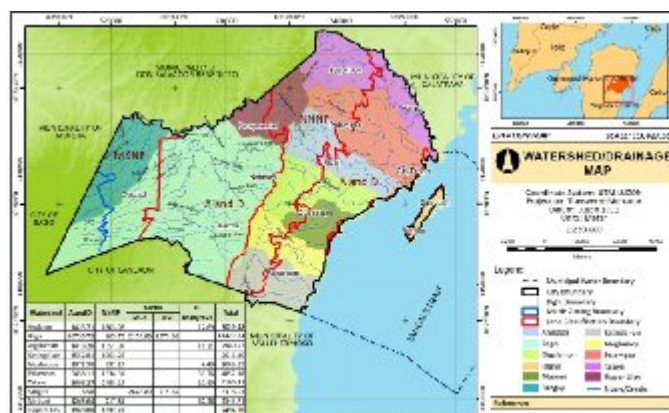


Figure 4. Map showing the watersheds with San Carlos City and portion covered by NNNP and MKNP. Watershed Map, 2013.

Table 9. Distribution of Land Classification by Subwatershed/Watershed, San Carlos City, 2013.

Watershed		A and D	NNNP	MKNP		Forestland (Mangrove)	Total	%
				MUZ	SPZ			
1	Talave	1,696.27	2,483.14			10.80	4,190.21	10.09
2	Palampas	3,458.11	1,334.31			59.76	4,852.18	11.68





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Table 9. Distribution of Land Classification by Subwatershed/Watershed, San Carlos City, 2013.

Watershed		A and D	NNNP	MKNP		Forestland (Mangrove)	Total	%
				MUZ	SPZ			
3	Andoon	1,423.71	1,603.08			12.69	3,039.48	7.32
4	Gigalaman	1,418.28	1,551.07			11.21	2,980.57	7.18
5	Mabuni	1,263.64	217.81			62.26	1,543.71	3.72
6	Magbaboy	1,072.58	932.29			4.49	2,009.35	4.84
7	Katingal-an	1,552.81	1,063.28				2,616.10	6.30
8	Upper Ulay	1,060.99	1,433.39				2,494.38	6.01
9	Bago	10,735.73	165.75	2,153.86	1,373.90		14,429.24	34.74
10	Sangay	16.58		2,645.80	715.65		3,378.03	8.13
Total		23,698.71	10,784.13	4,799.65	2,089.56	161.20	41,533.25	100.00

Source: Watershed/Drainage Map of SCC, 2013; NAMRIA Topographic Map.

Largely, the watersheds with river system emanating from NNNP and drains directly to downstream Poblacion supports both the surface and ground water supplies for industries, commercial, and large sugarcane and irrigation facilities of San Carlos City. While watershed that drains to Bago River (Sangay, Bago, and Upper Ulay) support local irrigation facilities and domestic uses.

The watershed's water production value cannot be overemphasized. With the growing trend of the City towards industrial and residential advancement, water will become an increasingly important commodity. Regulation of land use is paramount but imposing this is more feasible for the (public) Protected Area or forestlands, than in Alienable and Disposable Lands (A & D) where private-owners control land use decisions. Nonetheless, the City of San Carlos by law is in the best position to ensure the protection of slopes regardless of land classification, especially in cases where protection of lives and national interest are at stake.

In the watershed continuum, the assessment of vulnerability is not only limited in the confines of forestlands, but extend to downstream or offsite areas. A universal norm of protecting and rehabilitating degraded slopes are needed where effective management of the springs and headwaters can serve best in upgrading watersheds and sub-watersheds integrity in order to sustain ecological benefits in the process.

3.7.1 Brief Characterization (*of the Importance*) of Watersheds

Watershed represents a unique ecosystem that can provide various goods and services. The IEM framework lengthily discussed these importance for Bago River Watershed Forest Reserve





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as the primary set aside of Negros Occidental, e.g., water production, biodiversity, protective functions, and source of raw materials. The realization of these benefits hinges on the integrity or health of these watersheds. On the contrary, the negative impacts may occur if the watersheds are not protected and put into best management possible, also rendering other uses and benefits unsustainable. Various priorities, influences, and or externalities often times create a situation of inappropriate land uses detrimental to overall health or integrity of these important natural assets.

Table 11. Brief Characterization of Watersheds (including importance) of San Carlos City.³

Watershed		Total	Characteristics and Importance (Upland & Lowland Link)
1	Talave	4,190.21	In the upper easternmost part of the City, it drains to Walos River where it passes through the mangrove area further to Tañon Strait. It support small areas of sugarcane plantation and open cultivated area. With 3 private deep well in lowest part near coast. It has more or less 2100 household, with the large portion concentrated in the downstream with smaller part dispersed in the upstream. Largely with poor permeability for water recharge with most area having rocky mountainous soil formations.
2	Palampas	4,852.18	The largest of the watersheds with river system emanating from NNNP. The downstream is part of the proposed economic zone (industrial sites), now established the ethanol/bio-fuel plant, and solar power energy plant. It harbors three major government owned deep wells and 1 spring that is the main source of the Level III water supply for domestic and commercial establishment alike. It has also 12 private deep wells from where water supply for industries and sugarcane irrigations are tapped. It has high protective value for the large number of population (5628 HH) including part of the Poblacion, but large area that are landslide susceptible (MGB) with poor permeability being rocky mountainous in the upper part mainly in NNNP.
3	Andoon	3,039.48	River systems emanate from NNNP and pass through the City's Poblacion further to Tañon Strait. It harbors five private deep wells and 1 government owned deep well which support domestic and commercial requirements as well as irrigation requirements for large area of sugarcane and residential. Also with high protective importance with more than 3000 households settled inside. Large area is also landslide susceptible based on MGB's Geo-hazard assessment.
4	Gigalaman	2,980.57	In the southern part of Andoon it drains in the lowest portion of designated urban. It has population of about 1300 HH. It is also where private deep well are located to supply the needed water for sugarcane irrigation.
5	Mabuni	1,543.71	Among the smallest but the larger part within A & D lands and also drains to the coastal area of Tañon Strait. It harbors more than 1200 HH and numerous sports and schools facilities, with 1 government owned deep well. Large area of sugarcane.
6	Magbaboy	2,009.35	Emanates from NNNP. Supports five privately owned deep wells to supply large

³ Also see watershed maps, Settlement by Watershed, CLUP Zones of San Carlos City, Hazard Map by Watershed, Water Infrastructure by Watershed, in San Carlos City.





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Table 11. Brief Characterization of Watersheds (including importance) of San Carlos City.³

Watershed		Total	Characteristics and Importance (Upland & Lowland Link)
			area of sugar cane plantation. Drains to Tañon Strait. With more than 1000 household.
7	Katingal-an	2,616.10	In the southernmost part of San Carlos City. Springs/River Systems emanates from NNNP. Harbors 6 privately owned deep wells that supply large sugarcane irrigation. With 970 households.
8	Upper Ulay	2,494.38	In the upper part of the territory. River/springs emanates from NNNP and drains to Bago River. Land uses are dominated by perennial plants and sugarcane. With about 800 HH settlers. More than half of the land area is within NNNP.
9	Bago	14,429.24	The largest and drains to Bago River. The largest part within the A & D lands while numerous streams also emanates from MKNP and NNNP. Largely support the large irrigated rice-lands in Barangay Codcod, Nataban, and Quezon. Population is more than 6000 households. Large number of various infrastructure facilities including water reservoir to support local water requirements.
10	Sangay	3,378.03	Drains to Bago River. Support large riceland and cultivation in the MKNP MUZ. There are estimated 886 households in the watershed.

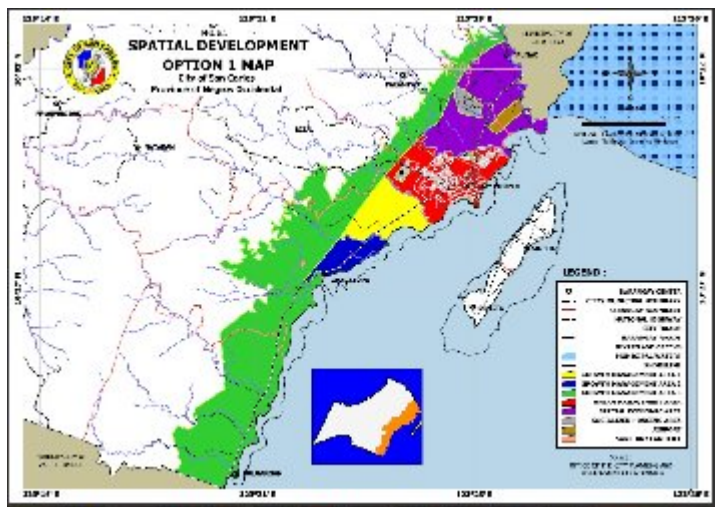


Figure 5. Map showing the proposed and envisioned development of San Carlos City which has implication on its increase water use. (CLUP 2014-2033)

Based on this initial characterization, Talave, Palampas, and Andoon has the largest watershed production and protective importance. The growing demand for both surface and underground water in that area, plus the number of the people that may be affected due increased exposure to climate change due to geologic hazards put these watershed in high order of importance and should be prioritized for protection, management, and development. Bago Watershed also supports the larger part of

agricultural economy of the City with large area of rice land (staple food) and sugar cane that is also supported. The challenge for Bago

lies on putting the holistic approach for management of the watershed because it covers large area that are privately owned.

3.7.2 Watershed Geologic Hazard Susceptibility

Areas that are assessed prone to geologic hazard also have high exposure to impact of extreme climate variability. Large area of the entire territory, especially those with steep slope, high





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elevation, and characterized by mountainous rock soil formation, and highly erodible were assessed by MGB as landslide susceptible. These areas are mainly in the upland part within Barangay Codcod in MKNP, and all Barangays within the NNNP. Flooding susceptible, on the other hand, are those located along the coast, covering portion of the Poblacion area. (See Geologic Hazard Map) The connectivity of the upstream and the downstream, steep slopes, and absence of perennial vegetation, may heighten the extreme scenario of disaster and risk in some areas. Not only are the population may be affected, but are also the public (e.g., roads, bridges, schools) and private properties within its path.

Table 12. Geologic Susceptibility of Watershed and Population that May be Affected

No.	Watershed	High Susceptibility (hectares)			Household in High Susceptibility (No.)		
		Landslide	Flooding	Liquefaction	Landslide	Flooding	Liquefaction
1	Talave	2,432.06			497		
2	Palampas	2,944.93	61.367	379.546	673	119	4162
3	Andoon	1,889.04	16.355	139.807	513	78	1381
4	Gigalaman	1,815.61	314.395		469	355	
5	Mabuni	477.48	335.831		93	681	
6	Magbaboy	1,064.82	234.825		140	673	
7	Katingal-an	1,215.95	15.097		218	3	
8	Upper Ulay	515.99			74		
9	Bago	2,275.61			284		
10	Sangay	1,585.62			145		
Total		16,217.11	977.87	519.35	3,106	1,909	5,543

Source: MGB Geohazard Map; Google Earth Image (for interpretation of Popn.)

In the above table, areas that are prone to geologic hazards are distributed in all watersheds. There are also more than 9000 households within this area that may be affected. This parameter should be factored-in in the land use decision, and on the planned interventions for the management of the Protected Areas and watersheds.



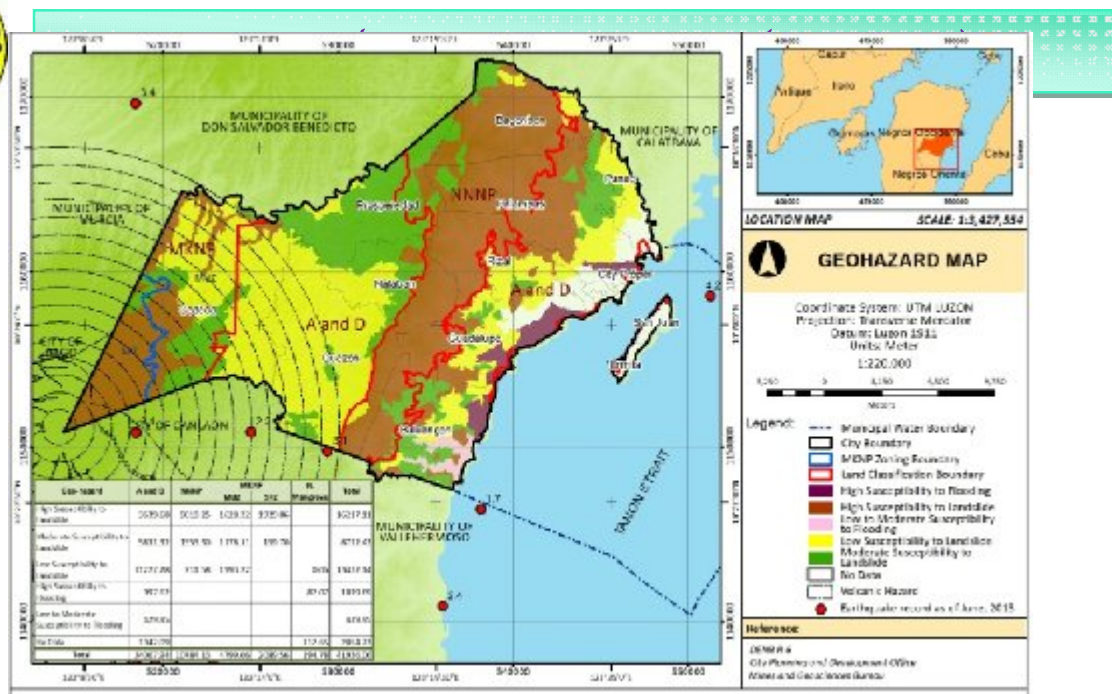


Figure 6. Map showing geologic hazard areas based on Mines and GeoSciences Bureau Assessment (MGB).

3.7.3 Approximating Watershed Integrity

The preceding characterization of watersheds provide the compelling reasons that these natural assets should be protected. One of the key proxy indicators of approximating the health of the watershed is through the presence of perennial cover and trees. Some norm (UNDP-FAO) utilize 40% of a well dispersed perennial cover per unit land area to approximate that it carries good integrity for watersheds to sustain its service functions.

However, it is important to conduct a thorough assessment of the watersheds, including the hydrologic parameters covering both surface and underground water supply to come up with conclusive results. Geohazard, edaphic (soil), and other watershed vulnerability parameters may also be included in the study.

Assessing watershed health is part of the complex science that demand extensive time and numerous discipline. Such indicator of health may include biological/biodiversity component, connectivity of habitat and stream system, geomorphology (e.g., soil, erodibility, and climate change vulnerability), hydrology, water quality, and land use influences.⁴

⁴ <http://www.dnr.state.mn.us/whaf/about/scores/index.html>





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In the absence the detailed assessment, perennial vegetation (especially the natural forest vegetation) provides an encompassing substitute indicator to approximate health because it also plays indispensable role in improving the general ecological functions as indicated in the parameters mentioned above. The amount of vegetation covering the land surface affects the way water moves and is used across the entire landscape within a watershed. The importance of forest cover or perennial cover in general, influences many aspects of the hydrologic cycle including, the surface infiltration, overland flow rates, surface evaporation, and transpirations⁵.

The vegetation is important to protect soil surfaces during intense rainfall, and the root growth and decay increase macro-channels that increase infiltration rates for underground water recharge. Biomass of decomposed leaves and branches are incorporated into the soil increasing substrate permeability and infiltration and reduces runoff and flooding. Vegetation absorbs large proportions of rainfall through transpiration also reducing total runoff. Overall, the perennial cover provides the basics of watershed ecosystems health, specifically in regulating water regime and promoting soil and geologic stability. In relation to mitigating the impact of climate change and natural disaster, perennial cover thus play an important role across all types of ecosystems within the watershed continuum, ranging from carbon sequestration to regulating water regime, and biodiversity conservation.

Table 13. Vegetative Cover by Subwatershed/Watershed of San Carlos City

Watershed	Area Watershed	Vegetative Cover			Total	%
		MP	NF	Mangrove		
1 Talave	4,190.21	1392.69	714.75	22.27	2,129.71	50.83
2 Palampas	4,852.18	1983.63	100.84	36.23	2,120.70	43.71
3 Andoon	3,039.48	994.32	244.40	11.70	1,250.42	41.14
4 Gigalaman	2,980.57	1130.17	375.06	9.32	1,514.55	50.81
5 Mabuni	1,543.71	476.76	5.08	40.98	522.82	33.87
6 Magbaboy	2,009.35	666.52	304.64	9.59	980.75	48.81
7 Katingal-an	2,616.10	956.03	367.62	0.00	1,323.65	50.60
8 Upper Ulay	2,494.38	818.30	122.88	0.00	941.18	37.73
9 Bago	14,429.24	2817.00	2511.61	0.00	5,328.61	36.93
10 Sangay	3,378.03	505.76	837.89	0.00	1,343.65	39.78
Total/Average	41,533.25	11,741.18	5,584.77	130.09	17,456.04	43.42
% by Cover Type		28.27	13.45	0.31	42.03	

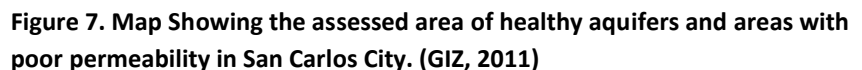
Source: Vegetative Cover Map, 2013; Watershed and Drainage Map of SCC, 2013.

⁵ Minnesota Department of Natural Resources: Assessing Watershed Health, 2012.





The aquifers should be protected, where land use and land use changing activities should take into account the protection of recharge areas as well as in minimization of pollution that can contaminate groundwater. The upper streams of these watersheds can also serve as the recharge points which need protection.



The role of trees to protect the slopes and to enhance permeability for groundwater recharge should also be considered in the overall land use and development schemes. The groundwater assessment made by GIZ (***See Groundwater Map***) shows the higher slopes (in NNNP and MKNP) where headwaters are located have poor permeability due to rocky mountainous soil formations. In some part are areas with Karst and fragmented groundwater zone that may limit recharge. This adds to reasons for the needed protection and regulation of land use to ensure the healthy recharge of aquifers and sustainable quantity and quality of water supply for the City.

The aquifers should be protected, where land use and land use changing activities should take into account the protection of recharge areas as well as in minimization of pollution that can contaminate groundwater. The upper streams of these watersheds can also serve as the recharge points which need protection.



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Priority Watersheds

The preceding discussions illustrate the importance of the watersheds to the LGUs . Along this line, the projected increase in the demand for water, as well as in the protective necessities to anticipate and mitigate disaster and risk, and climate change impacts, requires some degree of prioritization to focus limited investments and obtain a more strategic results from improving the ecological status of the watershed. The watershed of **Talave, Palampas, and Andoon** at present have high water production benefits with the presence of various water production facilities, industries, as well as the highest number of population and commercial activities that will be supported. In a scenario where resources is limited, these watersheds can be prioritized for strategic investments of the City. Otherwise, the situation of all watersheds is pressing in terms of required support for protection, development, and management.

3.8 Projected Water

The population is increasing, with the City's leaning towards strengthening its agricultural production and industrialization, demand for water is expected to increase. Overall, the country is experiencing shortage of quality water supply. While various sources (underground and surface) are tapped, the declining water level caused by deteriorating watersheds and aquifers cause the overall supply to also decline. In short, water production cannot cope to the increasing demand while the source is continue deteriorating.

San Carlos City usage of water has increased over the years (City Water District). Current services of the City is not even enough to supply the domestic requirements alone. Based 10-year water projection, demand will reach more than 300 Million cubic meters for domestic, agriculture, and industrial uses. It does not include possible wastage and/or expansion of water-based industries. All in all, the domestic demand (commercial and households) is projected to have more or less 93 Million Cubic meters, while sugarcane is projected the highest consumer pegged at more or less 180 Million cubic meters in the next ten years based on current area of sugar cane plantation.

Table 14. Projected 10-year water Demand(in cubic meters) of San Carlos City (2014-2023)

As	Sectors	Five-year Projected Demand	10-year Projected Demand
	Irrigation (Rice)	738,500.00	6,346,484.38
	Sugarcane (2700 hectares)	89,505,000.00	179,010,000.00
	Domestic/Small business	45,761,664.18	93,738,701.53
	Industries	11,859,000.00	29,118,000.00
	Total	147,864,164.18	308,213,185.90

Note: Domestic consumption is pegged at 150 lcpd (liters per capita per day)





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Water becomes the most important commodity, it is thus important to protect the source and to establish the best means to ensure sustained production. It is compelling to ensure the good quantity of vegetation for regulating water regime in the surface and underground. As mentioned, a more thorough study of hydrologic parameters is timely, considering the degraded status of the watershed, to determine the best course of action, other than forest and watershed rehabilitation, are necessary to ensure the sustainability of quality supply.

Table 15. Area of Ricelands/Watershed Service Area As of December 2011

Barangay	No. of Irrigation Facilities	AREA (Hectares)			No. of Farmer Beneficiaries		
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
Codcod		1,135.54	85.00	1,220.50	804	54	858
Quezon		1,155.00	239.50	1,394.50	778	230	1,008
Prosperidad		76.30	61.80	138.10	104	90	194
Nataban		10.00	30.00	40.00	13	54	67
Bagonbon		137.40	20.00	157.40	133	17	150
Total		2,514.24	436.30	2,950.50	1,832	445	2,277

Source: City Agriculture Office, 2013.

3.9 Socio-Political and Institutional Influences on Land Use in the Protected Areas

3.9.1 Population Pressure

Mapping and Inventory of settlements using satellite images (Google Earth 2010) showed the huge number of houses within the two PAs and portion of the mangrove area (which is also classified forestlands) accounts to a combined total of more than 4,800 households. The survey made by the FLUP Technical Working group obtained a total of more than 20,000 individuals, and for a family of five, this equates to 5000 households. All in all, this is equivalent 20% of the total number household population in the entire City. This number may speak well of pressure to the forestlands as each occupy space, and demand resource to support a living. Added pressure may be exacerbated by offsite population, especially those in the periphery or adjacent but have occupation or land tilling within the Protected Area and forestland.





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Table 16 .Distribution of Settlements/Households by Barangays within PAs and Forestlands, SCC 2010.

Barangay	A and D	NNNP	MKNP		Forestland (Mangrove)	Total in PAs and Forestland	Total
			MUZ	SPZ			
Bagonbon	312	802				802	1,114
Buluangan	1,749	208				208	1,957
City Proper	5,287					-	5,287
Codcod	1,259		2,109	24		2,133	3,392
Ermita	324				2	2	326
Guadalupe	2,113	178			122	300	2,413
Nataban	489	152				152	641
Palampas	1,326	302				302	1,628
Prosperidad	1,548	351				351	1,899
Punao	992					-	992
Quezon	2,520	182				182	2,702
Rizal	1,467	420			5	425	1,892
San Juan	521				3	3	524
Total	19,907	2,595	2,109	24	132	4,860	24,767

Source: Interpreted from Google Earth Image, 2010.

Note: The data is mainly to determine the relative distribution of Settlements within San Carlos City and not intended to replace results of actual survey made for the purpose.

Encroachment in PA or forestland for agronomic uses and settlement is normally caused by poverty and lack of other economic opportunities in lowland areas. The large percentage of upland population of San Carlos City lives below poverty level as indicated by the large number (25%) of families who are beneficiaries of the Pantawid Pamilyang Pilipino Program (4Ps)..

Table 17. Number and Percentage of DSWD Pantawid Pamilya Program (4Ps) Recipients in Barangays Covered by Protected Areas (MKNP and NNNP)

Barangay	Total Population	No. of Recipients	%
Codcod	2,866	646	22.54
Quezon	1,737	792	45.60
Nataban	922	290	31.45
Prosperidad	1,194	377	31.57
Rizal	2,978	672	22.57
Buluangan	2,974	634	21.32





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Palampas	1,701	562	33.04
Punao	1,416	311	21.96
Guadalupe	2,574	510	19.81
Bagonbon	1,256	298	23.73
TOTAL	19,618	5,092	25.96

Source: CHO Population Record of 2012; DSWD 4Ps Record, 2014.

3.9.2 Livelihood Practices of Upland Settlers

Most upland settlers are into subsistence type of economic activity. The scale of land use by local occupants vary from small home gardens (.5 to 1 ha) to large occupation that reaches 5 or more hectares under informal claims (FGD, 2013). ISF/CSC and CBFM participants in NNNP, on the other hand, enjoy the legal entitlement on the land they occupy but also limited by capitalization and technology to boost yield and income. The topographic limit (steep slopes) in NNNP covering some farm lands, and the minimal inputs on fertilization affects the overall food security production. This resulted to frequent observance of fallow, and for some farmers, resorting to nomadic approaches of land clearing that lead to gradual expansion. In the absence of sustainable means, finding the equilibrium between economic gains for farmers and ecological gains is at risk.

A different situation can be observed in MKNP, where farmers enjoy a more fertile volcanic soil and good supply of water. Yield accordingly for Palay is among the highest Negros, farm holdings also ranges from small to large.

Table 18. Indicative Observed Scale of Various Land Use Practices in MKNP and NNNP.

Barangay Surveyed	Farming Practices/Indicative Observed Scale				
	Slash and burn (kaingin)	Open Cultivation	Application of SALT	Use of Commercial Fertilizer	Organic Method
Buluangan	Few to several	Few to several	Many	Many	none
Prosperidad	Few to several	Many	Few to several	Many	Few
Bagonbon	Few to several	Few to several	Few to several	Many	none
Palampas	Many	Few to several	Few to several	Many	few
Nataban	few	Few	Many	Many	Few
Codcod (MNNP)	Several	Many	Many	Rampant/Many	several

Source: Sampling survey conducted by the FLUP Technical Working Group of SCC, 2013.

3.9.3 Stakeholders Analysis

San Carlos City, Negros Occidental





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The two Protected Areas belong to high order conservation areas in the country which demand that it maintains high degree of ecosystems integrity. Most Protected Areas by its unique characteristic belong to national heritage sites of high intergenerational importance. The alteration of land uses run contrary to this goal. The case of MKNP and NNNP in San Carlos City is no different from most public land in the country. The issue of degradation are products of internal, external and socio-political, and cultural influences. The perspective of how the forestland or Protected Areas are utilized hinges on various interest, sometimes conflicting and destructive, and deviate from envisioned land use desired or expected. The nature of these dynamics may command success or failure especially with respect to how regulation is enforced in these areas. It is important to look at these dynamics in terms of stakeholders interest and influences, in order to come up with collective solution to the issue. There are different stakeholders both in the MKNP and NNNP. Some of them may vary in degree of stake and influence.

Table 19. Stakeholders Interests, Capacity, and Influence in the Management of Protected Area

Stakeholders	Interest/Mandate	Current Situation/Capacity	Influence
National and Local Governments			
1. DENR - PAMBs and PASu (1 for each Protected Area)	General mandate under EO 192 and NIPAS Law (and its Implementing Rules and Regulation)	For PAMB: Organized, holds regular meetings, and provide a venue for information and learning exchange. For PASu: Constrained, with limited budget and manpower resource to do regulation and enforce	PAMB has power to oversee and recommend to approve or disregard projects or interventions within PA; Multisectoral, with individual member capacity foster advocacy and information across sectors
2. City of San Carlos/City Environment Management Office	Sharing of responsibility on ENRM under LGC; sustainable ecological functions (water, biodiversity); safeguards from disaster and hazard; Ensure safety and improve economic standing of constituents	Full-pledged CEMO with staff and regular budget; Involvement on various environment-related awareness programs	Steer local actions from stakeholders participation; Leverage funding through proposal preparation and use of levy; Foster inter-agency collaboration (vis-à-vis DA on agroforestry, etc.); Run local environmental advocacy and leverage inter-LGU collaboration
3. San Carlos Development Board (SCDB)	With imprimatur from the Sangguniang Panglungsod to use water levy for the rehabilitation of watershed in line with Payments for Environmental Services scheme	With 3 Million Annual Budget from Water Levy used to support afforestation, reforestation, and agroforestry measures through family approach; Developed a total of about 600 hectares for the last	Can organize farmer-farmer learning exchange; Lesson from years of experience in watershed rehabilitation can be shared for a bigger scale application.





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Table 19. Stakeholders Interests, Capacity, and Influence in the Management of Protected Area

Stakeholders	Interest/Mandate	Current Situation/Capacity	Influence
4. City Agriculture Office (CAO)	Improve yield and promote sustainable integrated farming methods	five years. Provision of technical assistance, technology, and inputs farmers to foster increase yield.	Support wider advocacy for integrated/sustainable upland farming; Infusion of biodiversity concerns on overall integrated farming techniques; Leverage farmer to farmer learning exchange.
5. City Water District Office (CWDO)	Mandated to ensure the sustainability of effective water services for the populace of San Carlos City	With manpower and capital; Recorded an earned profit part of which go to water levy program of LGU for the rehabilitation of watershed; Baseline data for underground water levels.	Leverage support and advocacy for efficient utilization of water, and foster the protection of and management of the watershed and water sources.
Other Government Agencies (OGAs)			
6. NCIP	IPRA Law; Support IP claims over ancestral domain; Ensure rights of IPs are protected; Facilitate FPIC of projects	Ongoing probing of Ancestral Domain claims within MKNPs	Promoting legitimate rights of IPs towards self-governance; can rally support to defend IP Rights; Strong emphasis on rights of IPs under IPRA Law.
Peoples Organizations (POs)			
7. IPs (Applicant in MKNP)	Empowered by IPRA Law	Tribal Council in place; Application for Ancestral Domain still being assessed; Claims fall within MUZ of MKNP	As empowered by IPRA Law for IPs/ICCs
8. CBFMA and ISF/CSC Holders (NNNP) - AMMA and others	EO 173; EO 318 CBFM as the national Strategy; Legitimate tenurial rights for use of forestlands and MUZ and Buffer Zone of the Protected Area	Been involved in various forest rehabilitation measures (NGP, WB assisted reforestation and fuel wood production project); Organized; Sustained PEMO support for ISF Participants	Farmer-farmer or PO-PO collaboration;
9. Irrigators Association (Bagonbon Natuyay IAs), (unregistered-Nibaca IA and Cansay-an IA and Prosperidad IA,	Sustainable Supply of Water for Farms; Increase farm yield/productivity	Organized with strong tie with NIA; No organize effort yet to contribute to watershed conservation and management	Leverage PO to PO learning exchange; Application for the Use of Payment for Environmental Services Scheme (water levy) can be potential watershed protection and development reinvestments
Non-Government Organization/Civil Society Organization			
10. Gynsys Foundation	Research, development and innovation, knowledge management, technology transfer, advocacy and education on ENRM	Various projects on organic farming methods, solid waste (?), among others	Can run advocacy for the effective management of the PAs and watershed; Membership to PAMB and Bago Watershed Management Council
11. MUAD	Promote organic	Worked with various POs in	Can provide training and





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Table 19. Stakeholders Interests, Capacity, and Influence in the Management of Protected Area

Stakeholders	Interest/Mandate	Current Situation/Capacity	Influence
	farming/integrated sustainable upland farming means	NNNP and MKNP to promote sustainable upland farming methods	sustainable upland farming means; Leverage PO to PO or Farmer to farmer learning exchange
Industries/Businesses/Corporation			
12. San Carlos Biopower Inc./ San Carlos Bioenergy Inc.	Biomass feedstock utilization from Sugarcane; Use of energy crops to produce clean energy	Organized private land holders for the of ECPs (and for collection of cane trash as feedstock; Produces clean energy	Green energy promotion; Research and lessons from use of ECPs to promote wider industrial forest corridor within San Carlos City; Can be leveraged to exercise CSR to contribute to PA and watershed management.
13. Solar Power Company	Use of solar power for clean energy production	Established solar power plant	Foster clean energy promotion; Can be leveraged to exercise CSR to contribute to PA management.

There are other offices and stakeholders that can contribute to promotion of effective PA and mangrove management; City's Tourism Office for their promotion of tourism in PA, Watershed Development Projects such as B+WISER for the development of mechanism and foster effective PA and watershed management, fisher folks for the need to protect the mangroves, and Provincial Environment Management Office (PEMO) for their sustained support for the implementation of ISF Program as well as their involvement in various advocacies on ENR Management, particularly in the management of the two PAs.

3.4 Summary of Issues and Threats

The issues and threats to the Protected Areas are cyclical and intertwined and are anthropogenic in nature. Some are by-product of absent or weak regulation, but largely are based on the overwhelming poverty-related pressure from population. At some point, inequity on land access and access to other basic services forced people to occupy the Protected Area and eke out a living. There are instance, however, that occupation is borne out of insatiability to have more lands controlled and utilized for individual advantage.

With the advance stages of forest and ecosystems alterations in the Protected Area, the challenge for restoration as demanded by biodiversity conservation is huge. The alteration is largely intrusive in a manner that human interventions for forest renewal and ecosystem rehabilitation may not be enough to achieve the original condition of the ecosystem. Always critical is tipping the balance between the economics of the local people vis-à-vis ecological benefits, which can be achieved through setting up of working protocols on regulation, educating the people, and finding alternative means for livelihood that will not endanger the environment.





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Institutional Issues

- a) Weak or absent mechanism or framework to regulate land uses in MKNP and NNNP with inadequate manpower and resource of the PASu.
- b) Unclear protocol or authority of LGU to enforce regulation within the PA, and likewise, unclear policy and operational support at the level of Local Government Unit for the effective management of the Protected Areas;
- c) Sectoral priorities of LGU vis-à-vis PA requirement (e.g., expansion of agricultural area, particularly rice land in MKNP)
- d) *Absence of venue for collaborative discussion and fostering awareness* on PA and watershed management at the Local level
- e) *Unregulated Land Uses*. More steep slopes are used into swidden, settlements are discriminately spread regardless of danger pose by landslides.
- f) Prevailing ***open access*** condition in the two Protected Areas. Only with small area covered with tenure, the rest of the PA prone to encroachment and unregulated practices with weak or absent regulation and enforcement mechanism.

Socio-economic Issues

- g) High poverty incidence in the Barangays within PAs - large number of people earn below the poverty level;
- h) Lack of programs to promote alternative source of livelihoods for the upland farmers.
- i) Increase in population/settlement in the upland/Uncontrolled in-migration to the Protected Area with household count now pegged at around 4600 within the PA.

Technical Issues

- j) **Overall degradation of PAs.** Loss of forest cover altered habitat and cause species local extinction. Large area of to PAs have been utilized for agriculture, with continuous encroachment towards the remaining forest. Riparian vegetation are also gone to protect streams. The wanton conversion made the key terrestrial ecosystem (mossy forest, montane forest, and lowland/dipterocarp forest ecosystem) can be barely distinguish on the two PAs.
- k) **Continuous Fragmentation of Remaining Natural Forest.** Sustained encroachment led to the gradual fragmentation of natural forest in the upper slope of the Strict Protection Zone of MKNP, and in the highest part of the NNNP. The remaining natural forest is the





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same last frontier of forest assessed to be critical habitat of highly threatened species in this part of Negros Island.

- l) Conversion of Forest to Non-forest Use.** All related to encroachment, population increase, and absence of regulation, the conversion bring the primary threats to PA and biodiversity, and overall loss of ecosystems integrity.



Figure 8. Google Earth Image 2013 Photo showing massive forestland degradation in NNNP.

- m) Topographic Limitation and Geologic Hazards.** The concerns on safety is becoming paramount that a national law is passed in this regard. The large chunk of the PA (especially NNNP) is landslide susceptible based on Mines and GeoSciences Bureau (MGB). Considering other limitation provided for by law such as steep slopes, mosaic of natural forest, and biodiversity spots, almost the entire area shall fall under the protection category. The challenge is finding the balance of technical requirements for protection area and softening some regulations to give way for production activities to take place to support food and subsistence requirement of the upland settlers. Resettlement is a possible option, but its cost requirement is not viable, adding that resettlement is not a guarantee that the PA will not be encroached.

3.5 Opportunities

Various opportunities can be tapped for effectively pursuing sustainable management of the Protected Area in San Carlos City. It is an advantage in the implementation of FLUP the high awareness of LGU (and various departments) on climate change and disaster and risk management. The City's membership in various environment councils, various training attended, and strong governance and leadership of the Executive and Legislative Council has facilitated the design and implementation projects in support of environment and natural resources management . Other facilitating opportunities vis-à-vis key indicators for effective FFM.

Table 20. Opportunities for Improving Management of the Protected Areas and Forestlands (mangrove).

Indicators for Effective FFM	Sectors Involved	Status (Existing and Potential) of Contribution
A. Onsite Protected Area Management		
a) Site Development (PA and watershed rehabilitation)	DENR	Implementation of National Greening Projects in MKNP and NNNP
	City of San Carlos	Annual allocation to support rainforestation, agroforestry, and riverbank stabilization for





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Table 20. Opportunities for Improving Management of the Protected Areas and Forestlands (mangrove).

Indicators for Effective FFM	Sectors Involved	Status (Existing and Potential) of Contribution
		NNNP, MKNP and Bago River Watershed (Thru regular funding); and implementation of Water Levy scheme for the rehabilitation of watershed thru the San Carlos Development Board (SCDB).
b) Forest Protection and Enforcement	City of San Carlos	Deployment of Bantay Gubat for protection and enforcement in the PA.
c) Biodiversity and Watershed Conservation	B+WISER Project of USAID	Technical assistance to the LGU, the PAMB, and the Watershed Management Council in coming up with more scientific and effective mechanism to manage the PAs and Bago River Watershed.
B. Institutional Support and Governance		
a) LGU Structure supporting ENRM	CEMO	Created Office with staff and llocated annual budget in support of various project in PA and Watershed Management.
b) Oversight Support	PAMB and Bago Watershed management Council	Regular meeting conduct to thresh out issues in the PA management, including discussion of policy and strategic interventions needed. A venue for information and knowledge exchange among stakeholders.
c) Network and Linkage with Support Groups	LCE/CEMO/ SCDB	Strong network of LGU to leverage project or funding for project supporting ENRM

Other opportunities on collaboration for the implementation of the FLUP are presented in the Stakeholders Analysis Matrix. The presence of NGOs and Civil Society Organizations to support advocacy, industries who can be leveraged to support ENRM and the implementation of this FLUP, and various People's Organizations who can be made partner in development are among the many opportunities that can help advance collective interventions in sustainable watershed and protected area management.

In the context of economic advancement, the two PAs present opportunities that can be tapped to contribute to local development. Among others it includes;

- Sceneries and natural landscape that utilized for tourism/ecotourism development;
- Large area that can be developed for orchard/agroforestry in MKNP/NNNP as long as development supports biodiversity conservation and overall soil and water conservation;
- Rich water/river system from where to tap sustainable water for various uses.

