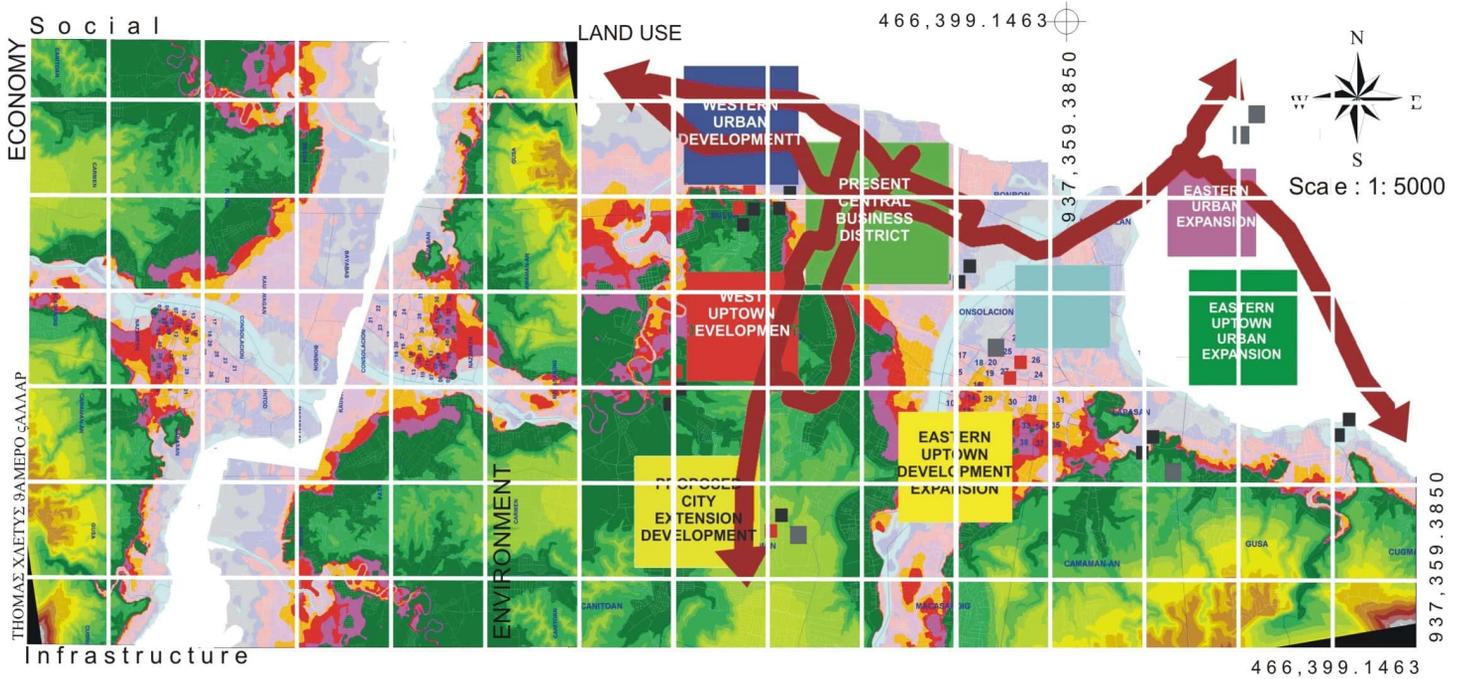




COMPREHENSIVE LAND USE PLAN

C a g a y a n d e O r o C i t y



2013 to 2022
CLUP
Volume 1

Republic of the Philippines
City of Cagayan de Oro

CITY DEVELOPMENT COUNCIL

Resolution No. 001-2013

**RESOLUTION APPROVING THE CAGAYAN DE ORO CITY 2022
COMPREHENSIVE LAND USE PLAN AND ENDORSING THE SAME TO
THE SANGGUNIANG PANLUNGSOD FOR ITS ADOPTION AND
ENACTMENT TO A ZONING ORDINANCE.**

WHEREAS, Section 20 (c) of the Local Government Code (RA 7160) states that "Local Government Units shall, in conformity with existing laws, continue to prepare their respective Comprehensive Land Use Plan (CLUP) enacted through Zoning Ordinances which shall be the primary and dominant basis for the future use of land resources";

WHEREAS, the City's Comprehensive Land Use Plan has been duly updated to mainstream Climate Change Adaptation and Disaster Risk Reduction factors;

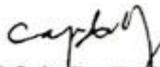
WHEREFORE, on motion jointly made and seconded by the members present, be it

RESOLVED, as the City Development Council hereby resolves to approve and endorse the Cagayan de Oro City 2022 Comprehensive Land Use Plan to the Sangguniang Panlungsod for its adoption and enactment of the Zoning Ordinance.

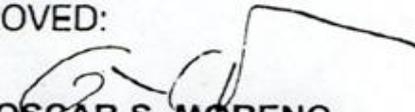
UNANIMOUSLY APPROVED.

Done in the City of Cagayan de Oro this 14th day of October 2013.

I HEREBY CERTIFY to the correctness of the above Resolution.


CHEDILYN AISSA P. DULGUIME-SAJULGA
City Planning and Development Office
HEAD-City Development Council Secretariat

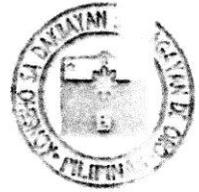
APPROVED:


OSCAR S. MORENO
City Mayor

Chairperson, City Development Council



Republic of the Philippines
CITY OF CAGAYAN DE ORO
OFFICE OF THE CITY COUNCIL
(090)257-4029; 857-4133; 857-2258; 857-4032



RESOLUTION NO. 11914 - 2015

RESOLUTION ADOPTING THE CAGAYAN DE ORO CITY COMPREHENSIVE LAND USE PLAN FOR CY 2013-2022

En motion by Councilor Alexander S. Dacer, duly seconded by Councilors Annie Y. Daba, Edna M. Dahino & Dante B. Pajo, be it

Resolved, to adopt the Cagayan de Oro City-Comprehensive Land Use Plan for CY 2013-2022.

Resolved further, to forward copies of this Resolution to all concerned, this City, for their information.

UNANIMOUSLY CARRIED.

Present:

1st District:

- Councilor Lourdes Candy R. Darimbang- Councilor Zaldy O. Ocon
- Councilor Annie Y. Daba - Councilor Edna M. Dahino
- Councilor Roger G. Abaday - Councilor Dante B. Pajo
- Councilor Alden D. Bacal - Councilor Adrian L. Barba

2nd District:

- Councilor Ramon G. Tabor - Councilor Nadya Emano- Elipe
- Councilor Teokulfo E. Lao, Jr. - Councilor Dometilo C. Aenas, Jr.
- Councilor Leon D. M. Gan, Jr. - Councilor Alexander S. Dacer
- Councilor President D. Elipe

Ex-Officio Member: - Councilor Yan Lam Lim, Liga Ng Mga Barangay President

On Official Business: - Councilor Enrico D. Salcedo

ADOPTED this 10th day of January 2015 in the City of Cagayan de Oro.

I hereby certify to the correctness of the aforesaid Resolution.

ARTURO S. DE SAN MIGUEL
CITY COUNCIL SECRETARY

Attested as duly adopted:

CAESAR IAN E. ACENAS
CITY VICE MAYOR
PRESIDING OFFICER



Republic of the Philippines
REGIONAL DEVELOPMENT COUNCIL
Regional Land Use Committee, Region X
 National Economic and Development Authority
 Regional Office X, Cagayan de Oro City
 Regional Development Council (RDC) Secretariat
 RDC Building, Corner Capistrano-Echem Streets
 Tel. No. (8822) 723434, 722168, MTI (068) 8881920 • Telefax (8822) 728072, 723436 • e-mail: nedr10@nomrnet.org.ph
 Website: www.nomrnet.org.ph

RLUC-X Resolution No.2 (s. 2013)

ENDORISING THE DISASTER RISK REDUCTION/CLIMATE CHANGE ADAPTATION (DRR/CCA)-ENHANCED COMPREHENSIVE LAND USE PLAN (CLUP) OF CAGAYAN DE ORO CITY

WHEREAS, the DRR/CCA-Enhanced CLUP of Cagayan de Oro City is among the major outputs of the Enhancing Capacities for Disaster Risk Reduction and Management and Climate Change Adaptation and Mainstreaming DRRM/CCA in Development/Physical Planning or the Enhancing Capacities on DRRM/CCA Project;

WHEREAS, the Enhancing Capacities on DRRM/CCA Project is implemented in the aftermath of Tropical Storm Sendong which hit the region in December 2011;

WHEREAS, the other deliverables of the Project are the DRR/CCA-Enhanced CLUPs of Iligan and Valencia, the DRR/CCA-Enhanced PDPFPs of the five provinces of the region, and the DRR/CCA-Enhanced Regional Physical Framework Plan (RPPF) of Northern Mindanao, 2013-2040;

WHEREAS, the said Project aims to mainstream the integrated concerns of DRR and CCA into local decision-making, and development and physical planning process and is undertaken by the National Economic and Development Authority (NEDA), in partnership with the United Nations Development Programme (UNDP), the Australian Agency for International Development (AusAID), and the New Zealand Aid Program (NZAP);

WHEREAS, the HLURB-X serves as the main partner of NEDA-X in the provision technical assistance to the cities in the formulation of DRR/CCA-Enhanced CLUPs;

WHEREAS, the formulation of the CLUP utilized the CLUP Guidebook (5 volumes) of the HLURB (2006) and in mainstreaming DRR and CCA, supplementary guidelines and tools were used for this purpose, namely: Guidelines on Mainstreaming Disaster Risk Reduction in Subnational Development Land Use/Physical Planning in the Philippines (NEDA-UNDP-ECHA, 2008) and Mainstreaming Disaster Risk Reduction/CCA Methodology in CLUPs;

WHEREAS, the CLUP of Cagayan de Oro City has three major volumes: Volume 1: Comprehensive Land Use Plan; Volume 2: The Zoning Ordinance; and Volume 3: The Sectoral Studies;

WHEREAS, the DRR/CCA-Enhanced CLUP of Cagayan de Oro City ensures balanced and harmonious development of resources towards achieving an improved quality of life;

WHEREAS, series of capacity building activities, several workshops and planning consultations involving the various stakeholders in the city were conducted to facilitate the completion of the plan;

WHEREAS, several comments and recommendations were raised by the member agencies and other

BE IT RESOLVED THEREFORE AS IT IS HEREBY RESOLVED, on motion duly seconded to endorse the said CLUP to the LGU of Cagayan de Oro City subject to the incorporation of comments and recommendations of the member agencies and other LGUs of the region;

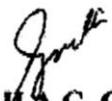
RESOLVED FURTHER, that the Secretariat shall coordinate the generation of all the comments/recommendations, and furnished the same to the concerned LGU and ensure that these are integrated into the plan if deemed appropriate and necessary;

RESOLVED FURTHER, that the LGU of Cagayan de Oro City shall closely update the Secretariat on the enhancement of its CLUP and shall provide final copy of the complete volumes of the plan;

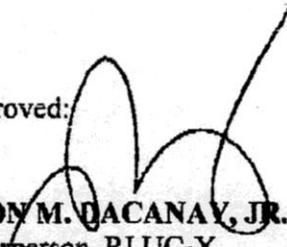
RESOLVED FINALLY, and provide copies of this resolution be furnished to Cagayan de Oro City, all RLUC members particularly HLURB-X, provincial and city LGUs of the region and other relevant institutions for guidance and appropriate action.

Approved, 3 December 2013
RLUC-X Meeting
RDC-X Main Conference Room
Cagayan de Oro City

Certified Correct:


LEONILA G. CAJARTE
Chief EDS, PFPD, NEDA-X
RLUC-X Coordinator

Approved:


LEON M. DACANAY, JR., CESO III
Chairperson, RLUC-X
Regional Director, NEDA-X
(Presiding Officer)



REPUBLIC OF THE PHILIPPINES
CITY OF CAGAYAN DE ORO

OFFICE OF THE CITY MAYOR



MESSAGE

I have in my lifetime practiced my profession, served the private sector, represented a provincial district in the august halls of congress, and governed that same province for almost a decade. Now as I take the helm of a city that is at the forefront of its province and that leads the fastest growing region of this island, there are new and unique challenges to face, a fresh set of hurdles to surmount. But the excitement of achieving our goals, both for Cagayan de Oro City and that of Northern Mindanao, is endlessly inspiring.

To help the course for the journey ahead, a map will of course be handy, and this is where Cagayan de Oro's Comprehensive Land Use Plan (CLUP) will prove very useful.

The CLUP brings together the expertise, ideas, knowledge and opinions of a veritable cross-section of Cagayan de Oro City, from high-minded academicians, to detail-oriented technical experts, to dedicated public servants, to staunch advocates, to the firsthand-conversant people on the ground.

It outlines the loftiest ideals for Cagayan de Oro and at the same time takes a long hard look at what needs to be done, the issues that need to be acknowledged, concerns deemed imperative to address. It identifies new areas for development that will throw open the floodgates for further growth and more diverse opportunities.

The CLUP also paces our progress so the city will not grow at the expense of the welfare of both habitat and inhabitants, of resources and consumers, catalyst and impetus.

It is the fruit of the collaboration of minds that has the best interests of Cagayan de Oro at heart, the guide by which we should abide if we are to overcome the challenges that are great but not insurmountable, reach goals that are lofty but not unreachable and journey together along this wide and inclusive road that is long but certainly worth traversing.



OSCAR S. MORENO
City Mayor



Republic of the Philippines
CITY OF CAGAYAN DE ORO
OFFICE OF THE CITY VICE MAYOR
(088)857-4029; 857-4035; 857-2258; 857-4032



MESSAGE

Cagayan de Oro City is already on the map as one of the most progressive cities in the country and the world's emerging city of tomorrow. We see before us a budding metropolis, a center of trade, education and recreation, an IT hub, a shopping capital and a favorite adventure and convention center.

But development is a continuous process. We should not rest on our laurels. We must build on that momentum. The world is constantly changing and our city has to adopt and evolve with it.

In order to achieve the vision, goals and objectives for Cagayan de Oro in the next couple of years, clear directions and meticulous planning are necessary. What do we really want our city to be in 2022?

This will be answered by the Comprehensive Land Use Plan (CLUP), endorsed by the City Development Council and adopted by the 17th City Council through Resolution No. 11914-2015.

The CLUP will provide long-term physical framework guide and strategies for the city to attain sustainable growth and make the most efficient use of its vast resources. It will attune our policies to these goals and pave the way for optimum allocation of land and protection of the environment.

It is the product of hard work and collaboration with concerned agencies and sectors. My congratulations and thanks to all those who shared their technical expertise and knowledge on vital issues and urban planning to come up with this comprehensive plan. The result will be our legacy to the people of Cagayan de Oro and the generations to come.

Our city is already poised for unprecedented growth but this is not the end in itself. The ultimate goal is to transform the lives of people as they too attain their dreams in their very own City of Golden Opportunities.

The CLUP is our collective vision for the future. Let us all move forward and focus our energies to make Cagayan de Oro City the best it can be.

CAESAR IAN E. ACENAS
City Vice Mayor

ACKNOWLEDGMENT

The Planning Management Team (PMT) and the Technical Working Group (TWG) for the updating of the Comprehensive Land Use Plan (CLUP) of Cagayan de Oro City acknowledges with appreciation the following:

- ✓ The Housing and Land use Regulatory Board – Northern Mindanao Region for providing technical assistance during the modular workshops;
- ✓ The National Economic Development Authority (NEDA) – Region 10 for providing technical and financial assistance in the preparation of the Disaster Risk Assessment (DRA) Report;
- ✓ The United Nations (UN) Habitat for providing technical and financial assistance in the preparation of the Vulnerability and Adaptation Assessment (VAA) Report;
- ✓ The representatives of the different sectors who actively participated in the workshops and consultations and for providing data and relevant information concerning their respective sectors:
 - Non-Government Organizations
 - Government Organizations and Line Agencies
 - Academe
 - Business Sector;
- ✓ City Mayor Oscar S. Moreno for giving his full support to the project;
- ✓ Vice Mayor Cesar Ian E. Acenas and Members of the City Council for taking the lead as chairman of the different sectors;
- ✓ The City Government Department Heads and Chiefs of Offices for providing data and for helping coordinate the formulation of priority programs and projects with their respective sectoral groups.

Engr. ISIDRO G. BORJA
City Planning and Development Coordinator

Executive Summary

The Cagayan de Oro City Comprehensive Land Use Plan for the period 2013 to 2022 was prepared pursuant to the Local Government Code of 1991 (RA 7160), which mandated the Local Government Units, to “**prepare their comprehensive land use plans and enact them through zoning ordinances**”.

This plan has been prepared by the City Government of Cagayan de Oro with technical assistance from the Housing and Land Use Regulatory Board (HLURB) and National Economic Development Authority (NEDA). The Plan is meant to guide the city’s future physical development and to steer the city’s growth as the business and trading center of Southern Philippines. It provides a framework of goals, objectives, strategies and actions required for the city by the year 2022.

I. Vision

“A city managed through good governance, empowering its citizenry to thrive in a highly competitive economy and a sustainable environment nurturing its diversity and multi-cultural heritage towards a resilient, progressive, and inclusive future.”

II. Brief Situationer

Demography

Cagayan de Oro is the 10th most populous city in the country with a total population of 602,088 based on May 2010 Census of National Statistics Office and constitutes 14.01% of the total population in Region X. Its annual population growth rate (APGR) of 2.69% from 2000-2010 is higher than that of the National and Region X which is 2.32%. The high APGR is mainly due to immigration from adjoining municipalities. The population will double in the span of 23 years or in 2036 (*CdeO SEP, 2011*).

Cagayan de Oro has a population density of 11 persons per hectare. Among the densely populated barangays are as follows: Macabalan, Consolacion, Lapasan, Barangays 12,13,17,18,19,22,25,26,32,34,35, Nazareth and Carmen. These barangays are located along Cagayan River and near Macajalar Bay which exposes more people to the risk of overflowing waterways during heavy downpour.

Local Economy

The city plays a very important economic role not only in Region X but also in the whole Mindanao Island.

Revenue Sources - The City gets its income and other revenue from the following: taxes; fees, permits & licenses, business and services, subsidies from the national government and other sources. Total revenue generated in

2011 amounted to PhP1.72 Billion. The biggest source of income is the Internal Revenue Allotment (IRA) of 52.46%.

Agriculture - About 34.65% of the City's total land area (57,851.00 has) is devoted to agriculture in 2011 and 33.27% in 2012. Of the agricultural, cover 6,008.40 hectares are devoted to crops in 2011 and 3,854.50 has. in 2012. Crops produced are both food and commercial crops. Food crops include rice, corn and vegetables while commercial crops are abaca, banana, cacao and coffee, root crops and fruits and nuts.

Livestock and Poultry - Hogs' population is highest among the livestock, comprising 59.2% in 2011 and 62.2% in 2012. Similarly, hogs ranks highest in number which is 87.4% of the total slaughtered animals in 2011 and 87.2 % in 2012. All animals slaughtered passed the meat inspection standard.

Trade and Industry - Wholesale and retail remain highest in number constituting 61% in 2011 and 59.7% in 2012. The top ten establishments can be gleaned in the table below. The other top Major Industries are Services and Financial. The lowest among industries is Agriculture/Fishery sector.

Tourism - Major attractions in the City consist of natural and man-made spots. Accommodations, Dining & Night Life, and Recreational Facilities are comparatively splendid. The whitewater rafting in Cagayan River has been one of the most famous tourism activities in CDO.

III Urban Development Challenges of Cagayan de Oro City

The availability and accessibility of the City to public services, key facilities, and critical infrastructures serves as a magnet to attract more people towards to City. This urban phenomenon drains the service delivery capacity of the city and poses a lot of urban development issues. Informality, poverty and vulnerability, and slums are increasingly becoming the key social and underdevelopment issues in the city.

Listed below are the general urban development challenges faced by the City.

Urban development issues faced by the city

Key Areas	Priority Issues
Urban Planning	<ul style="list-style-type: none"> • Need assistance for the preparation of Comprehensive Development Plan (incorporating elements for sustainable urban development) • Weak regulation and planning to manage slums (land management issues) and limited knowledge/approaches and experiences on resettlement development and management • Weak enforcement of zoning ordinance (e.g. cleared areas, danger areas) • Need technical assistance for city expansion and urban growth,

	<p>resettlement of households in danger areas, commercial use (mix-use development)- proposed site for city extension: west uptown and western growth nodes – preparation of “sustainable” urban design and technologies (green technologies)</p> <ul style="list-style-type: none"> • Limited baseline tool and data-base management for urban planning • Presence of informal settlers • Traffic Congestion • Frequent Flooding • Inadequate Supply of Potable Water in some areas • Water Pollution and Contamination • Frequent flooding in business districts • High level of GHG emission
Urban Economy & Finance	<ul style="list-style-type: none"> • City Economic Enterprises not meeting Operations & Maintenance costs(subsidized) • Limited livelihood and employment support for resettlement areas (5,000 families from sending and the communities within danger areas • Insufficient/low income • Mismatched skills and the need of the industry • Low farm productivity • Unregulated mining activities • Low agricultural productivity • Undeveloped tourism sites
DRRM and CCA	<ul style="list-style-type: none"> • Limited baseline on Vulnerability (impact quantification, detailed) and enhancement of the City DRRM Plan • Need training support/capacity building for City DRRM office • Problems on flooding/drainage system (also linked to urban planning) • Training on climate change adaptation and urban development
Urban Mobility	<ul style="list-style-type: none"> • encroachment of vendors to sidewalks/pedestrian • Need to have a city wide and comprehensive transport plan. Considering the closure of Lumbia Airport, the city has to prepare its mobility and connectivity plan to the new international airport (Laguindingan Airport) • Problem on parking areas, lack of green parking spaces (potential demo project)
Urban Energy	<ul style="list-style-type: none"> • High carbon emission (transport)- need support for city regulation and guidelines

	<ul style="list-style-type: none"> • Low capacity of LGU on urban energy standards (guidelines, minimum design, green building, etc.)- no clear local policy yet on energy efficiency and conservation
Governance & Land Management	<ul style="list-style-type: none"> • Demand for urban renewal (small sidewalks/blighted areas)/land re-adjustment intervention • No clear policy on migration • Boundary disputes with neighboring areas- need support for land assessment, inventory and administration • Need support/technical assistance on urban expansion development and designing • Inadequate protective services facilities • Absence of established evacuation centers • Absence of social welfare center

Comparative/Competitive Advantages

- Gateway to Northern Mindanao
- Center of trade/transshipment point in the region
- Competitive transportation services
- Presence of multi-national investors (SM, Ayala, LKKS)
- Major tourism destination in Northern Mindanao
- 21.062 km coastline potential for coastal tourism
- Presence of fishing grounds
- Modern facilities (health, school, market, terminal...)
- Strong public-private partnership
- Well-developed telecom facilities/power supply/road networks
- Existing natural resources and heritage(rivers, caves, flora and fauna, forest),natural landscapes (plateaus, gorges, terraces)

IV Major Development Goals & Objectives

- The upliftment of socio-economic condition by empowering the citizenry for a safe, healthy and secured community integrating the principles of DRR-CCA
 - To promote safe, peaceful, orderly, healthy and CCA+DRR resilient community
 - To improve the quality of education
 - To Implement housing and urban development-related initiatives
 - To promote values formation in the community
 - To promote skills development and technology transfer
 - To provide livelihood opportunities.

- Strong and responsive governance
 - To strengthen government-private collaboration
 - To strictly implement environmental and other laws and ordinances
 - To improve efficiency in fiscal management
 - To promote transparency and accountability in government transactions

- Sustainable development for the protection and utilization of natural resources for inclusive growth
 - To preserve natural tourist attractions and cultural heritage sites
 - To protect, maintain and enhance inland and coastal waters
 - To ensure effective solid and liquid waste disposal
 - To arrest degradation and rehabilitate denuded forest areas
 - To promote sustainable use of mineral resources
 - To protect wildlife and vegetation and preserve biodiversity
 - To minimize occurrence of flooding in the low lying areas and along the riverbanks and its adjoining areas
 - To minimize air pollution in the Urban areas
 - To protect and conserve ground and surface water

- Investment Enabling City
 - To maintain good peace and order condition
 - To promote green and disaster resilient infrastructure
 - To provide infrastructure facilities and utility support
 - To Increase agricultural productivity
 - To organize and develop alternative livelihood system
 - To provide adequate supply of potable water
 - To strengthen human resources development
 - To promote private-public partnership
 - To reduce cost of doing business

V Preferred Development Thrust

Major Spatial Development Strategies

1. Entice development through the provision of basic and excellent facilities in identified growth areas (Western Urban Development, West-Uptown Urban Development, East-Uptown Urban Development, and Eastern Urban Development).

2. Conservation and protection of natural sites and heritage i.e. gorges landscape, critical habitat, wetlands and river system (Macahambus, Mambuaya, FS Catanico, Malasag, Dansolihon, Bayanga, Cugman, Agusan, Indahag, Balubal)

3. Incorporate provisions of pedestrian (walkways, bicycle lane) on proposed road right-of-way (Divisoria, Poblacion)
4. Identify and legally declare built heritage sites in Divisoria, Taguanao and Poblacion and regulate building heights, architecture and color for historical-cultural tourism
5. Intensify and sustain urban greening in Poblacion, Isla de Oro and along riverbanks
6. Establish new sanitary landfill in Pagatpat/other suitable alternative site
7. Enforce the setback requirements along public roads for yield points/loading-unloading bay
8. Intensify greening and fruit tree growing in sloping areas of Barangays Bayanga, Lumbia, Agusan, Baikingon, Besigan, Camaman-an, Canitoan, Carmen, Taglimao, Pigsag-an, Balulang, Tignapoloan, and Dansolihon
9. Light-Medium Industrial Areas – Tablon, Cugman, Agusan, Bugo, Puerto, Lumbia
10. Mangrove reforestation - Bayabas, Bonbon, Agusan, Tablon, Cugman, Bugo, Puerto, Bulua
11. Provision of structural mitigation measures (special land use planning) for hazard prone areas
12. Provision of housing for settlers in blighted areas

Development of Urban Centers

Urban Expansion Area # 1 - Western Urban Development

Serve as major convergence point for goods and products, people and transport service to and from the western part of the region as well as Laguindingan Airport.

House new commercial mixed use medium to high density pedestrian friendly center for CdeO

Urban Expansion Area #2 - West-Uptown Urban Development

Covering Barangays Carmen, Canitoan, Lumbia and Pagatpat. This will be a medium to high-density, mixed-use pedestrian friendly center with high end, low-density type of development for residential and commercial uses. The

Lumbia Airport shall be converted into an industrial area/economic zone now that the Laguindingan Airport is operational.

Urban Expansion #3 - East-Uptown Urban Development Area

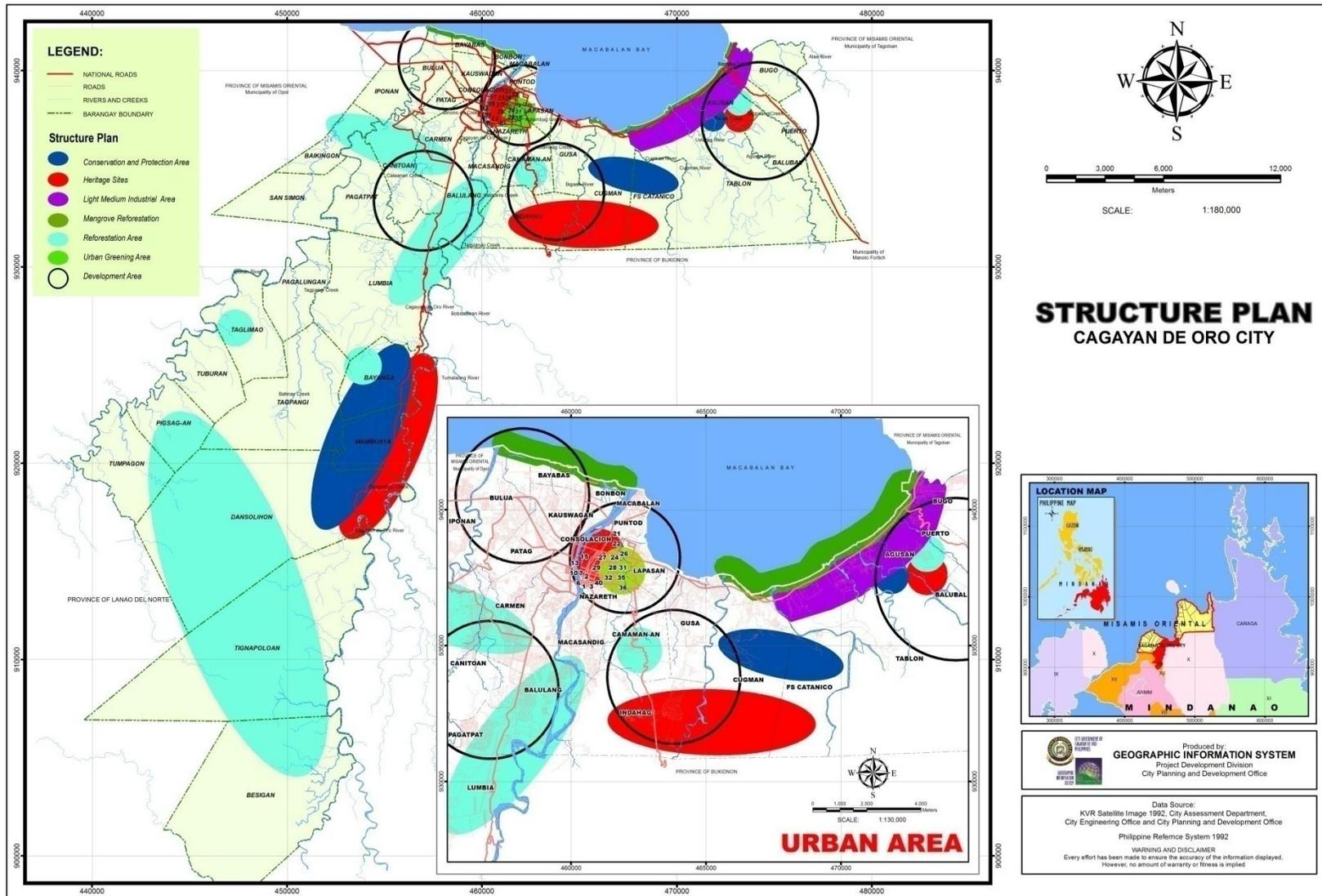
Located in Barangays Gusa, Indahag, Macasandig and Camaman-an. This area will have the same function as that of the West-Uptown Development Area with the presence of high-end subdivisions like the Fil-Estate Subdivision and Alegria Hills. Presence of convention center, presence of government institution (Court of Appeals in Indahag), high end residential, heritage area (Huluga Cave in Indahag).

Urban Expansion #4 - Eastern Urban Development

This area is composed of the following sub-nodes, namely: Upper Puerto, which is identified as an Agro-Industrial Area; Lower Puerto and Bugo which are existing industrial and residential areas; Agusan and Balubal, which are hosts to high-end subdivisions; Tablon, which is an existing industrial area; and, Palalan, Tablon, which is identified for Agro-Tourism.

Urban Expansion Area #5 - Downtown Development Area

This area is composed the existing major urban center of the City, the Poblacion/Carmen and its contiguous areas comprising the present Central Business District (CBD) expanding to Lapasan, Gusa, Puntod, Macabalan, and Patag. The Poblacion (CBD) is host to the city government center, major trade businesses and financial facilities serving both the individual and business sector needs of the City.

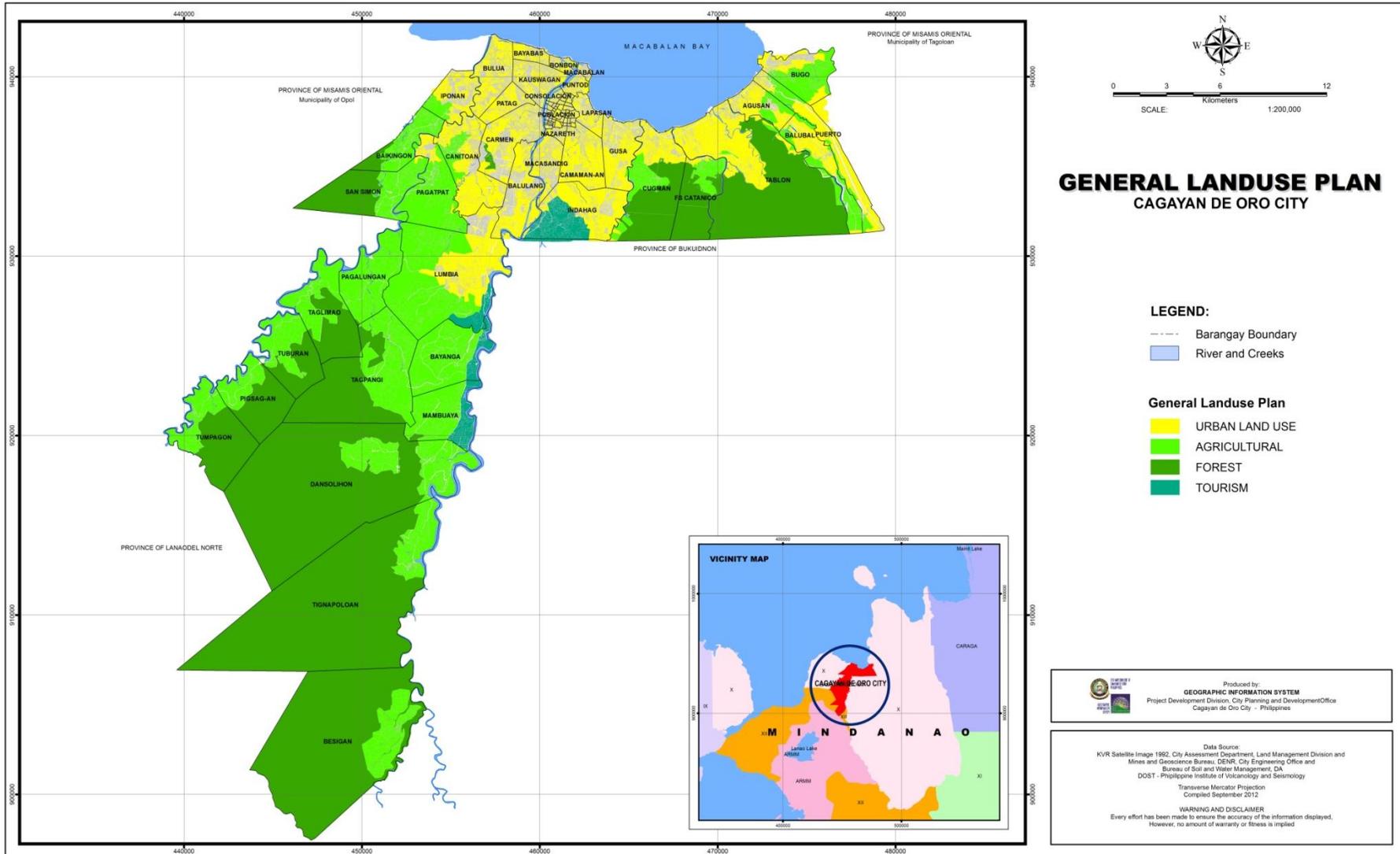


VI The Land Use Plan

A. General Land and Water Uses

Proposed General Land Use

DESCRIPTION	AREA (has)	% to total
AGRICULTURAL	14,760	26%
FOREST	27,730	48%
TOURISM	1,167	2%
URBAN LAND USE	12,123	21%
TOTAL	55,781	
AREA COVERED BY UTILITIES/ROADS/ETC	2,070	4%
TOTAL LAND AREA	57,851	100%



Urban Land Uses

Proposed Urban Land Use

DESCRIPTION	AREA (has)	% to total
AGRO-INDUSTRIAL	1,189	10%
BUSINESS DISTRICT	219	2%
GENERAL INSTITUTIONAL	373	3%
HIGH DENSITY RESIDENTIAL AREA	113	1%
INDUSTRIAL DISTRICT	285	2%
LOW DENSITY RESIDENTIAL AREA	550	5%
MEDIUM DENSITY RESIDENTIAL AREA	8,452	70%
OTHER COMMERCIAL DISTRICT	470	4%
PARKS/OPEN SPACES	325	3%
SOCIALIZED HOUSING	69	1%
SWAMP/MARSHLAND	80	1%
TOTAL	12,123	100%

VII Proposed Major Programs and Projects

A. Development of Urban Growth Areas

1. Western Urban Development Plan
 - ✓ Commercial Strip along Western Coastal Highway
 - ✓ Completion and widening of western coastal highway
 - ✓ Main drain (canal)
 - ✓ Waste water treatment
 - ✓ Preservation and expansion of wetlands in Bulua, bonbon and Bayabas.

2. West-Uptown Urban Development Plan
 - ✓ Development Master and Urban Design Plan
 - ✓ Road Network Development
 - ✓ Green belt along more than 18% slope areas
 - ✓ Tree parks in subdivisions
 - ✓ Main drain at Lumbia from airport going to Calaan Creek
 - ✓ Waste water treatment for subdivisions
 - ✓ Retention/Detention basins
 - ✓ Rain Harvesting Facilities for commercial establishments and residential
 - ✓ Retirement community
 - ✓ Provision of multi-purpose and socio-economic centers (reading centers, parks, and the like)

3. East-Uptown Urban Development Plan

- ✓ Slope protection/regulated development
- ✓ Green belt areas & tree parks in subdivision projects
- ✓ Retention/Detention Basins
- ✓ Waste water treatment for subdivisions
- ✓ Rain Harvesting for commercial establishments and residential

4. Eastern Urban Development Plan

- ✓ JR Borja Extension shall be connected to Agusan, Balubal and Puerto.
- ✓ Concreting from Agusan to Manolo Fortich Highway
- ✓ Waste water treatment for subdivisions
- ✓ Green belt along more than 18% slope areas
- ✓ Tree parks in subdivisions
- ✓ Rain Harvesting Facility for commercial establishments and residential
- ✓ Slope protection/regulated development
- ✓ Regulate/Limit industrial land use along coastal area at Tablon
- ✓ Harmonize the various land uses in Tablon and enhance the ecology (mangrove reforestation)
- ✓ Livelihood improvement for the marginal fisherfolks affected at the same time retain the industrial base
- ✓ Provision of multi-purpose and socio-economic centers (reading centers, parks, and the like)
- ✓ Agro-Tourism development at Palalan, Tablon
- ✓ Secondary Road (20m) Network for Palalan, Tablon

5. Downtown Urban Development Plan

- ✓ Expanded Downtown Master Plan
- ✓ Provision of sidewalks and pedestrian lanes
- ✓ Waste water Interceptors along Cagayan de Oro River
- ✓ Green belt areas at Islas de Oro, Bugnaw, Baksan
- ✓ Rain Harvesting facility for commercial establishments and residential
- ✓ Urban renewal for blighted areas
- ✓ River front development project
- ✓ Urban greening of Divisoria
- ✓ Mixed high-density residential and commercial establishments at Poblacion
- ✓ Parking Buildings

B. Natural sites and Heritage Development

C. Pedestrian Network Development

D. Transport Master Plan

- ✓ Downtown check-in and shuttle for airport passengers from Cagayan de Oro to Laguindingan Airport
- ✓ Fast craft to Laguindingan Airport
- ✓ Introduction of new traffic scheme

E. Drainage System Master Plan

F. Urban Greening Program

G. Wastewater Management Plan

1. Septage Management Plan (Septage Treatment Plant)
2. Waste water Interceptor
3. Waste water Treatment Plant

H. Solid Waste Management Plan

1. Sanitary Landfill at Pagatpat
2. Closure/Rehab of Dagong Dumpsite
3. Transfer Station
4. Material Recovery Facility

I. Reforestation Program

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Chapter 1

Brief Profile of the City

1.1 Brief History

The City's history dates back many centuries before the Spaniards came when the territory was called Kalambagohan. Its main town, Himologan, was an uphill fortress situated some eight kilometers south of the present Poblacion.

At the time when the first Spanish missionaries came in 1622, the people of Cagayan had tributary relation to Kudarat, the Muslim Sultan of Maguindanao Empire in Cotabato. However, the people had not embraced Islam and instead, many became Christians after sometime. Because of this, Muslim warriors began to attack the settlement. As a defense strategy, the priests persuaded the people to transfer from the hilltop to a better location which is the present site of the Saint Augustine Cathedral. The Cagayanons were able to defend themselves for almost 250 years from Muslim harassment.

In 1738, Spanish dominance was felt in Cagayan. When Misamis gained status of province in 1818, one of its four districts was the Partidos de Cagayan.

In 1871, the "Partidos" became a town and was made permanent capital of Misamis. In 1883, the town became seat of the Spanish government in Mindanao for the provinces of Misamis Oriental, Misamis Occidental, Bukidnon, Lanao del Norte. Consequently, from a purely farming-fishing area, Cagayan emerged into a booming commerce and trade center.

The war years in Cagayan were prompted by the presence of the Americans in 1898. The Americans were initially and successfully repulsed by the local forces led by Major Apolinar Velez at the historic battle of Macahambus in June 4, 1900.

After the troubled years, peace finally brought back the economic activities to normal under the guidance of Americans. St. Augustine School, the forerunner of the present Xavier University and of Lourdes College, was inaugurated in 1928.

On June 15, 1950 President Elpidio Quirino signed Republic Act No. 521, which granted the status of a chartered city to the municipality of Cagayan de Oro.

Following these events, the socio-economic order underwent some far-reaching changes. Activities grew in scale and importance until it developed as the administrative center for the entire Northern Mindanao (Region X and XIII).

1.2 Human Resources

1.2.1 Population Size and Growth Rate

Cagayan de Oro City posted a total population of 602,088 persons as of May 1, 2010 (NSO actual), which is 73.98 percent of the total provincial population of 813,856. This represents an increase of 140,211 persons over the total population of 461,877 in 2000. The 2010 figures translated to an annual population growth of 2.69 percent from 2000 to 2010. It is expected that the population will double in 26 years or in 2036.

Table 1.1
Historical Growth of Population, 1903-2010
Cagayan de Oro City

Year	Population	Increase/ Decrease	Growth Rate %	Growth Rate		
				Provincial	Regional	National
1903	11,029					
1918	21,179	92 %				
1939	28,062	32.5 %				
1948	48,084	71.3 %				
1960	46,266	-3.8 %				
1970	128,319	177.35 %	5.19		3.56	2.78
1975	165,220	28.8 %	6.59		3.28	2.71
1980	227,312	37.6 %	4.10		2.22	2.35
1990	339,598	49.4 %	4.44		2.32	2.32
2000	461,877	36.0 %	2.54		1.67	2.04
2010	602,088	30.4 %	2.69			

Source: National Statistics Office

1.2.2 Population Density

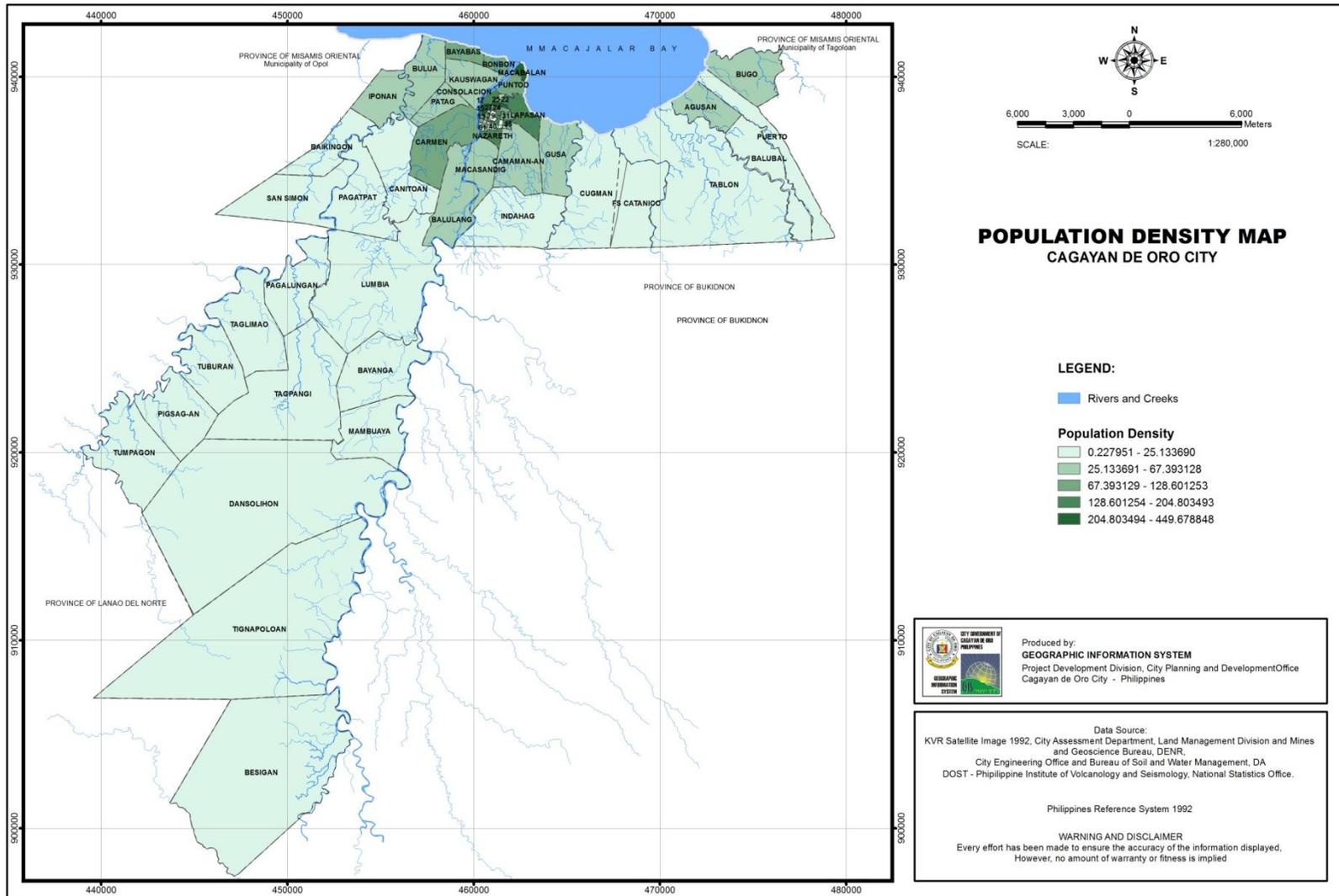
The average population density of the City is 11 persons per hectare. The most densely populated barangay is Macabalan with a population density of 450 persons per hectare. It is followed by Barangay 35 and Barangay 18. Barangay Besigan has the lowest population density of about 0.25 person per hectare.

Table 1.2
Urban-Rural Population Density, 2010
Cagayan de Oro City

Barangays	Population Density (person per hectare)	Barangays	Population Density (person per hectare)
CdeO	10.57		
Urban		41. Barangay 15	302.96
1. Agusan	28.89	42. Barangay 16	55.64
2. Balulang	36.96	43. Barangay 17	303.76
3. Balubal*	4.01	44. Barangay 18	316.95
4. Bayabas	73.37	45. Barangay 19	160.54
5. Bonbon	79.08	46. Barangay 20	57.62
6. Bugo	33.60	47. Barangay 21	53.81
7. Bulua	47.41	48. Barangay 22	164.86
8. Camaman-an	33.68	49. Barangay 23	111.03
9. Canitoan	12.20	50. Barangay 24	78.53
10. Carmen	70.65	51. Barangay 25	247.61
11. Consolacion	200.59	52. Barangay 26	269.27
12. Cugman	11.75	53. Barangay 27	140.96
13. Gusa	37.51	54. Barangay 28	74.62
14. Indahag*	4.44	55. Barangay 29	24.00
15. Iponan	34.11	56. Barangay 30	139.78
16. Kauswagan	67.39	57. Barangay 31	76.56
17. Lapasan	184.38	58. Barangay 32	158.07
18. Lumbia	4.24	59. Barangay 33	10.30
19. Macabalan	449.68	60. Barangay 34	152.96
20. Macasandig	58.63	61. Barangay 35	318.91
21. Nazareth	156.02	62. Barangay 36	118.06
22. Pagatpat*	4.71	63. Barangay 37	27.60
23. Patag	57.40	64. Barangay 38	25.13
24. Puerto	12.92	65. Barangay 39	19.83
25. Puntod	111.58	66. Barangay 40	60.98
26. Tablon	4.25	Rural	
27. Barangay 1	42.74	67. Baikingon	3.47
28. Barangay 2	22.88	68. Bayanga	2.01
29. Barangay 3	23.02	69. Besigan	0.25
30. Barangay 4	39.27	70. Dansolihon	0.66
31. Barangay 5	32.30	71. FS Catanico	1.55
32. Barangay 6	49.07	72. Mambuaya	2.25
33. Barangay 7	90.64	73. Pagalungan	1.68
34. Barangay 8	53.77	74. Pigsag-an	1.18
35. Barangay 9	42.44	75. San Simon	1.00
36. Barangay 10	128.60	76. Taglimao	1.13
37. Barangay 11	104.59	77. Tagpangi	1.23
38. Barangay 12	205.23	78. Tignapoloan	0.61
39. Barangay 13	266.90	79. Tuburan	1.34
40. Barangay 14	107.40	80. Tumpagon	1.55

*proposed urban barangays

**Figure 1.1
Population Density Map
Cagayan de Oro City**



1.2.3 Population Distribution

Based on 2010 data on population, the total urban population reaches 569,911 and 32,177 for the rural population. Barangay Carmen has the highest number in population which is 11.22 percent of the total population. Barangay 39 has the lowest in population of about 0.007 percent of the total population.

Table 1.3
Population by Urban and Rural Barangay, 2010
Cagayan de Oro City

Barangays	Population	Percent	Barangays	Population	Percent
Urban	569,911	94.66	Barangay 16	143	0.02
Agusan	14,812	2.46	Barangay 17	2,342	0.39
Balubal*	2,893	0.48	Barangay 18	1,496	0.25
Balulang	32,531	5.40	Barangay 19	419	0.07
Bayabas	12,999	2.16	Barangay 20	121	0.02
Bonbon	9,195	1.53	Barangay 21	254	0.04
Bugo	27,122	4.51	Barangay 22	1,944	0.32
Bulua	31,345	5.21	Barangay 23	916	0.15
Camaman-an	24,651	4.09	Barangay 24	929	0.15
Canitoan	15,069	2.50	Barangay 25	1,295	0.22
Carmen	67,583	11.22	Barangay 26	2,383	0.40
Consolacion	9,919	1.65	Barangay 27	1,380	0.22
Cugman	20,531	3.41	Barangay 28	541	0.09
Gusa	26,117	4.34	Barangay 29	485	0.08
Indahag*	6,235	1.04	Barangay 30	875	0.15
Iponan	20,707	3.44	Barangay 31	1,506	0.25
Kauswagan	34,541	5.74	Barangay 32	1,410	0.23
Lapasan	41,903	6.96	Barangay 33	86	0.01
Lumbia	14,079	2.34	Barangay 34	621	0.10
Macabalan	20,303	3.37	Barangay 35	2,395	0.40
Macasandig	23,310	3.87	Barangay 36	791	0.13
Nazareth	10,658	1.77	Barangay 37	77	0.01
Pagatpat*	5,178	0.86	Barangay 38	94	0.02
Patag	17,219	2.86	Barangay 39	46	0.01
Puerto	11,475	1.91	Barangay 40	830	0.14
Puntod	18,399	3.06			
Tablon	18,608	3.09			
Barangay 1	453	0.08	Rural	32,177	5.34
Barangay 2	84	0.01	Baikingon	2,342	0.39
Barangay 3	177	0.03	Bayanga	2,769	0.46
Barangay 4	108	0.02	Besigan	1,404	0.23
Barangay 5	83	0.01	Dansolihon	4,811	0.80
Barangay 6	212	0.04	FS Catanico	1,710	0.28

Barangay 7	542	0.09	Mambuaya	2,490	0.41
Barangay 8	157	0.03	Pagalungan	1,806	0.30
Barangay 9	132	0.02	Pigsag-an	1,256	0.21
Barangay 10	616	0.10	San Simon	1,346	0.22
Barangay 11	342	0.06	Taglimao	1,418	0.24
Barangay 12	469	0.08	Tagpangi	2,684	0.45
Barangay 13	2,330	0.39	Tignapoloan	4,514	0.75
Barangay 14	479	0.08	Tuburan	1,395	0.23
Barangay 15	2,966	0.49	Tumpagon	2,232	0.37

Source: Socio-Economic Profile of Cagayan de Oro City, 2010

*proposed urban barangays

The City has 66 urban barangays; most of these barangays are considered the location for the essential and non-essential establishments and the center for trade and commerce. Since Cagayan de Oro is one of the fastest growing cities in the country it becomes the favorite investment of many investors and tourism haven to many tourists.

The 14 rural barangays of the city serve as the City's vegetable and crops provider.

1.2.4 Labor Force

The average labor force participation rate for both sexes comprises 69.8 percent (81.7 male and 57.7 female) as of 2010 for ages 15 years old and up; lower than that of 2007 which is 70.9 percent (based on NSO Regional Survey). The decreasing number of labor force indicates that there are more members of the household who are not in the labor force.

Table 1.4
Labor Force Population, 2010
Cagayan de Oro City

Age Group	Both Sexes	Percent age	Male	Percent age	Female	Percent age
Total	387,180	100.00	192,882	49.82	194,299	50.18
15-19	70,220	18.14	34,982	9.03	35,239	9.10
20-24	62,407	16.12	31,089	8.03	31,318	8.09
25-29	54,197	14.00	26,999	6.97	27,198	7.02
30-34	44,243	11.43	22,041	5.69	22,203	5.73
35-39	39,690	10.25	19,772	5.11	19,918	5.14
40-44	33,795	8.73	16,836	4.35	16,959	4.38
45-49	29,968	7.74	14,929	3.86	15,039	3.88
50-54	24,863	6.42	12,386	3.20	12,477	3.22
55-59	17,517	4.52	8,726	2.25	8,791	2.27
60-64	10,280	2.65	5,121	1.32	5,159	1.33

Source: NSO/CPDO

1.3 Physical Features

1.3.1 Geographic Location

Cagayan de Oro City is the gateway to Northern Mindanao. It is geographically nestled between the central coastline of Macajalar Bay to the North and the naturally-rich plateaus and mountains of Bukidnon and Lanao del Norte to the South. The municipality of Opol bounds the City on the west while the municipality of Tagoloan, with its heavy industrial activities, is its immediate neighbor to the east. The City lies between the latitude 8°14'00" to 8°31'00" north and longitude 124°27'00" and 124°49'00" east.

1.3.2 Land Area

Cagayan de Oro City has a total land area of 57,851.00 hectares. Its territorial size is 2.8 percent of the region and 22.8 percent of Misamis Oriental.

The total land area of the city is based on the definitions set forth by Republic Act No. 521 Series of 1950, *an act creating the city of Cagayan de Oro* which was signed by then President Elpidio R. Quirino and of the 1994 Codified Ordinance which is a total extract of Resolution No. 6, Series of 1960 which defines the city's territory comprising the forty (40) urban and forty (40) rural barangays. This was further corroborated by the political subdivision survey commissioned and initiated by the DBM through the LMB-DENR's PRS 92 Project conducted last 2012 in accordance with DENR Administrative Order Nos. 98-12, s. 2010-13 and 2007-29 under the supervision of the Regional Executive Director, DENR-X, Cagayan de Oro City.

Table 1.5
Land Area by Barangay by District, 2010
Cagayan de Oro City

Barangay	Land Area (has.)	Barangay	Land Area (has.)
Cagayan de Oro City			57,851.00
District 1	43,637.40	Tablon	4,381.01
Baikingon	675.40	Barangay 1	10.60
Balulang	880.25	Barangay 2	3.67
Bayabas	177.17	Barangay 3	7.69
Bayanga	1,378.22	Barangay 4	2.75
Besigan	6,159.23	Barangay 5	2.57
Bonbon	116.28	Barangay 6	4.32
Bulua	661.21	Barangay 7	5.98
Canitoan	1,234.86	Barangay 8	2.92
Carmen	956.65	Barangay 9	3.11
Dansolihon	7,267.19	Barangay 10	4.79

Iponan	607.14	Barangay 11	3.27
Kauswagan	512.53	Barangay 12	2.29
Lumbia	3,320.31	Barangay 13	8.73
Mambuaya	1,104.29	Barangay 14	4.46
Pagalungan	1,075.79	Barangay 15	9.79
Pagatpat	1,100.07	Barangay 16	2.57
Patag	299.90	Barangay 17	7.71
Pigsag-an	1,063.87	Barangay 18	4.72
San Simon	1,339.50	Barangay 19	2.61
Taglimao	1,256.36	Barangay 20	2.10
Tagpangi	2,174.96	Barangay 21	4.72
Tignapoloan	7,795.12	Barangay 22	11.79
Tuburan	1,037.51	Barangay 23	8.25
Tumpagon	1,443.59	Barangay 24	11.83
District 2	14,213.60	Barangay 25	5.23
Agusan	512.69	Barangay 26	8.85
Balubal	721.32	Barangay 27	9.79
Bugo	807.31	Barangay 28	7.25
Camaman-an	731.92	Barangay 29	20.21
Consolacion	49.45	Barangay 30	6.26
Cugman	1,747.61	Barangay 31	19.67
F.S. Catanico	1,101.03	Barangay 32	8.92
Gusa	696.18	Barangay 33	8.35
Indahag	1,405.39	Barangay 34	4.06
Lapasan	227.26	Barangay 35	7.51
Macabalan	45.15	Barangay 36	6.70
Macasandig	397.58	Barangay 37	2.79
Nazareth	68.31	Barangay 38	3.74
Puerto	887.99	Barangay 39	2.32
Puntod	164.90	Barangay 40	13.61

Source: Socio-Economic Profile of Cagayan de Oro City, 2010

1.3.3 Territorial Jurisdiction and Barangay Subdivision

There had been changes in the political subdivision of the city. Cagayan de Oro is divided into two districts by Republic Act 9371. The first district comprises the 24 barangays; barangays Baikingon, Balulang, Bayabas, Bayanga, Besigan, Bonbon, Bulua, Canitoan, Carmen, Dansolihon, Iponan, Kauswagan, Lumbia, Mambuaya, Pagalungan, Pagatpat, Patag, Pigsag-an, San Simon, Taglimao, Tagpangi, Tignapoloan, Tuburan, and Tumpagon while the second district are barangays; Agusan, Balubal, Bugo, Camaman-an, Consolacion, Cugman, F.S. Catanico, Gusa, Indahag, Lapasan, Macabalan, Macasandig, Nazareth, Puerto, Puntod, Tablon, and all Poblacion Barangays 1-40.

**Figure 1.2
Region 10 Map**

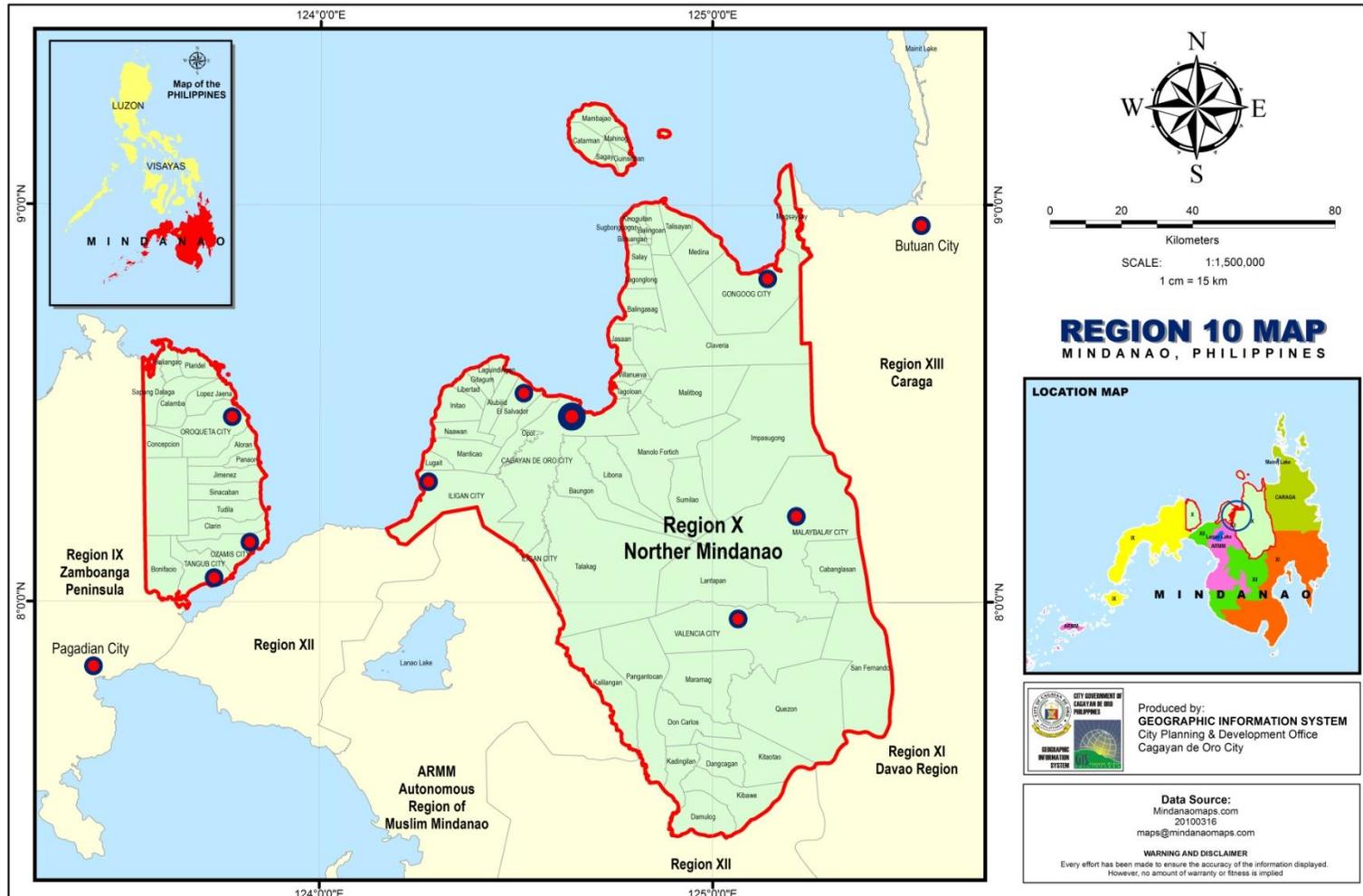
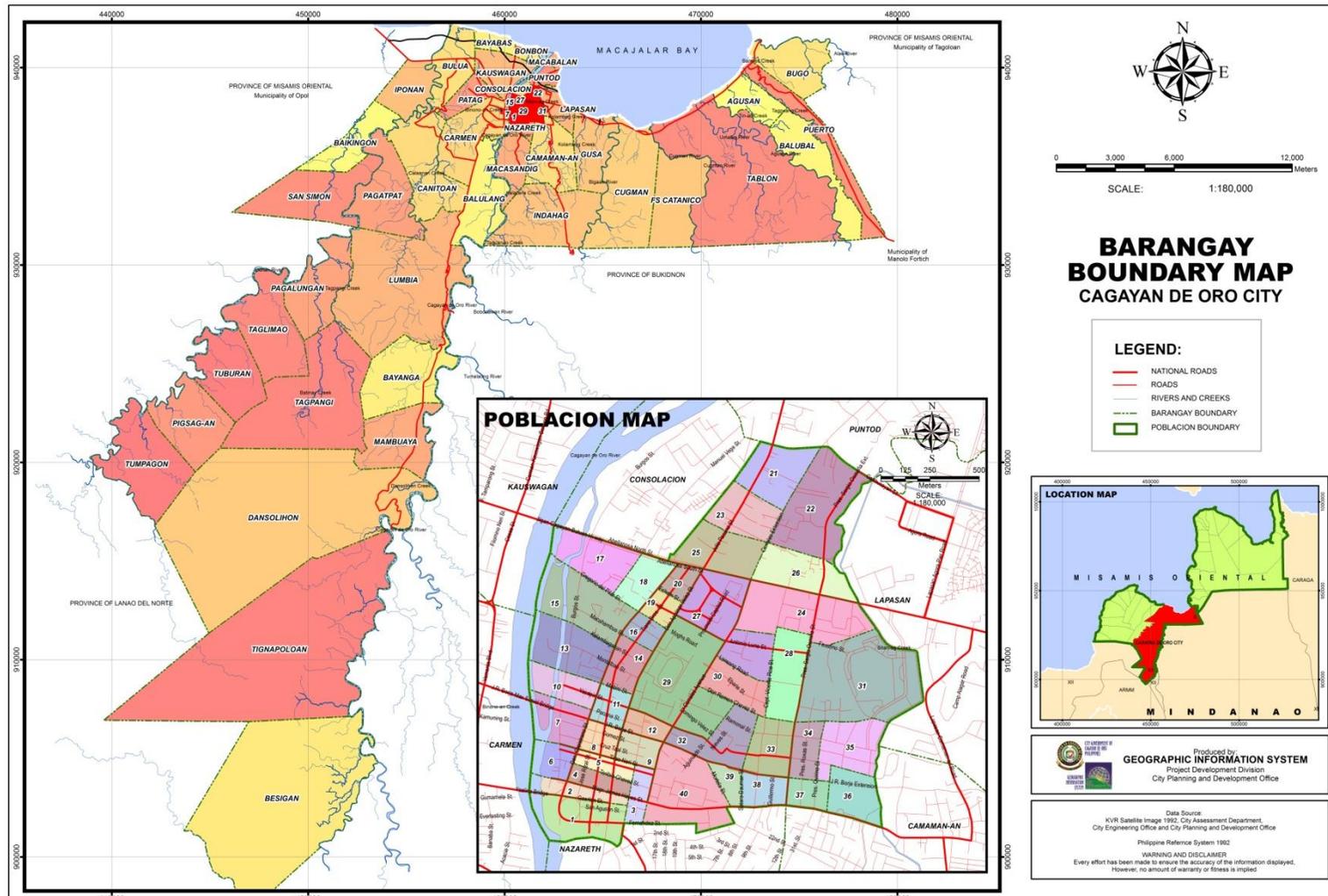


Figure 1.4
Barangay Boundary Map
Cagayan de Oro City



1.4 Physical/Infrastructure Resources

1.4.1 Transportation Network

1.4.1.1 Land Transportation

Cagayan de Oro City, connected to five other regions in Mindanao with a good network of highways, is the strategic gateway to the rest of Mindanao. Travel by land takes 40 hours from Manila via Surigao City, 9 hours from Davao City via Butuan City, and 6 hours via Bukidnon. Cagayan de Oro City has a total road length of **635.80755** kilometers, of which roughly 300 kilometers are paved.

There are 17 existing bridges along the national roads of Cagayan de Oro which include four steel bridges and thirteen concrete bridges. There are other 25 bridges along city roads, 20 of which are located in District 1 while the other 5 are located in District 2. All bridges are generally in good condition.

1.4.1.2 Air Transportation

Laguindingan airport is approximately 40 kilometers from the city.

Table 1.6
Schedule of Flights, 2013
Laguindingan Airport

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
PAL (Mla-CdeO-Mla)	5	5	5	5	5	5	5
CEBU PACIFIC (Mla-CdeO-Mla)	5	5	5	5	5	5	5
CEBU PACIFIC (Cebu-CdeO-Cebu)	3	3	3	3	3	3	3
PAL EXPRESS (Cebu-CdeO-Cebu)	1	1	1	1	1	1	1
ZEST AIRWAYS (Cebu-CdeO-Cebu)	1	1	1	1	1	1	1

Source: CAAP (Temporary Schedule)

**Figure 1.5
Road Network Map
Cagayan de Oro City**

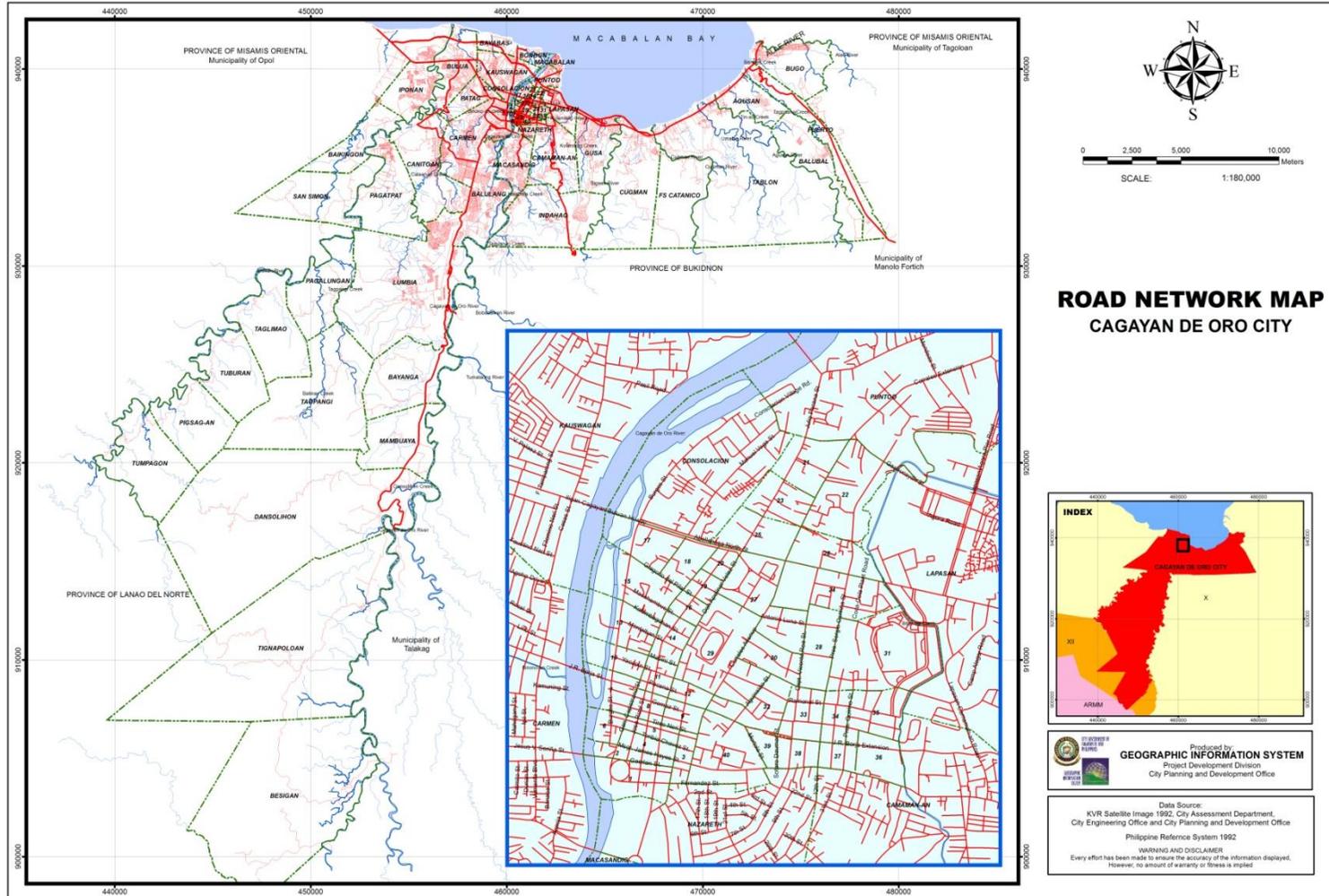
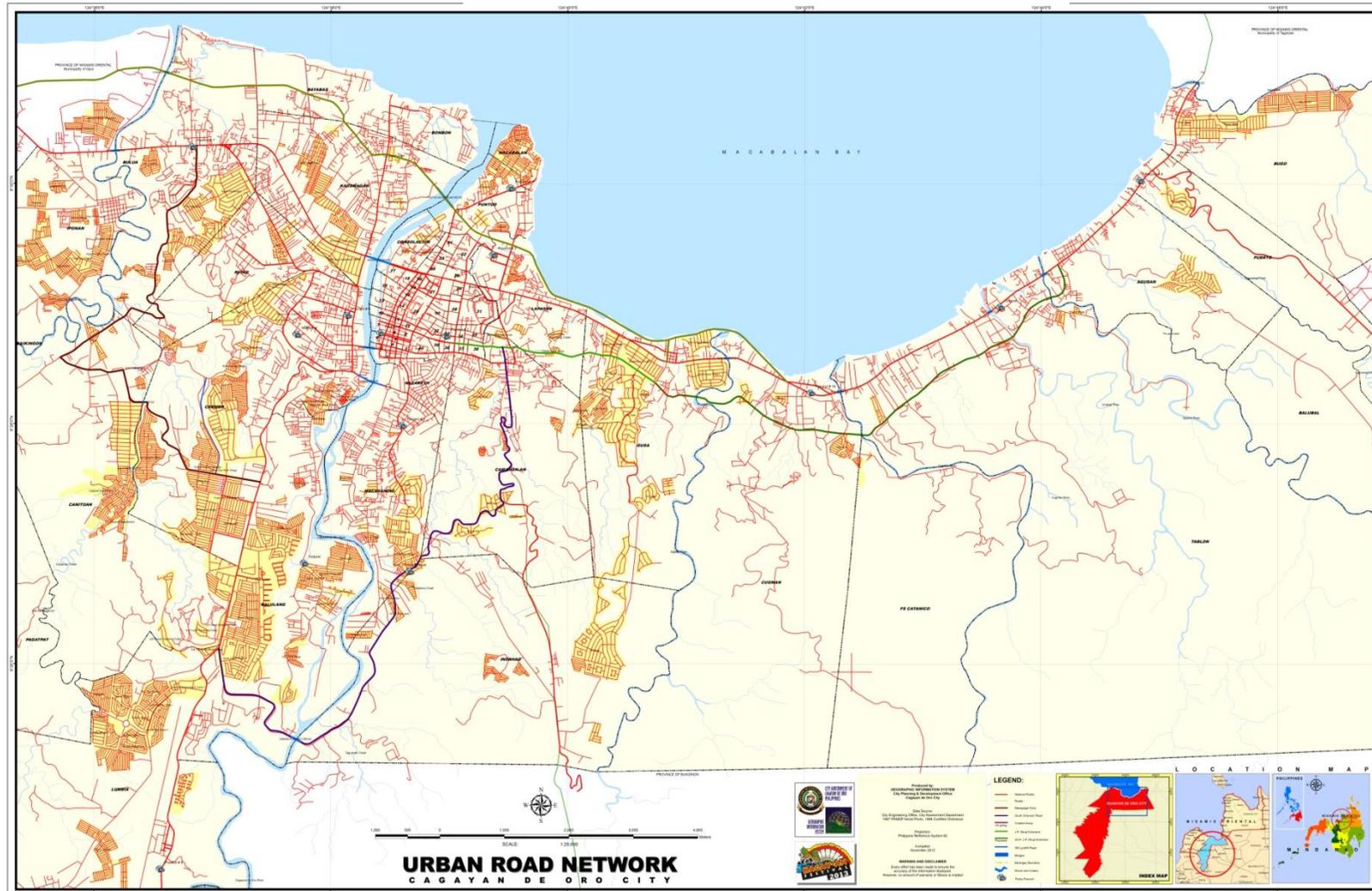


Figure 1.6
Urban Road Network Map
Cagayan de Oro City



1.4.1.3 Sea Transportation

The Port of Cagayan de Oro and other five private ports serve as entry points by sea from other areas of the country.

- Port of Cagayan de Oro in Macabalan
- Cagayan de Oro Oil Mill in Tablon
- Cagayan Corn Products, Corp., Tablon
- Del Monte Phils., Inc. in Bugo
- General Milling Corporation in Tablon
- Carlos A. Gothong Inc. in Baloy, Tablon

1.4.2 Services/Facilities/Utilities/Amenities

1.4.2.1 Power

There are two power distribution utilities that serve the city namely, CEPALCO and MORESCO 1 and Minergy serves as power generation company.

CEPALCO serves 103,074 households or 84 percent of the total 123,326 households of the service area as of December 2012. MORESCO 1 serves sixteen (16) barangays in the west with 8,129 households or 54 percent of the 14,139 households of the service area as of December 2012.

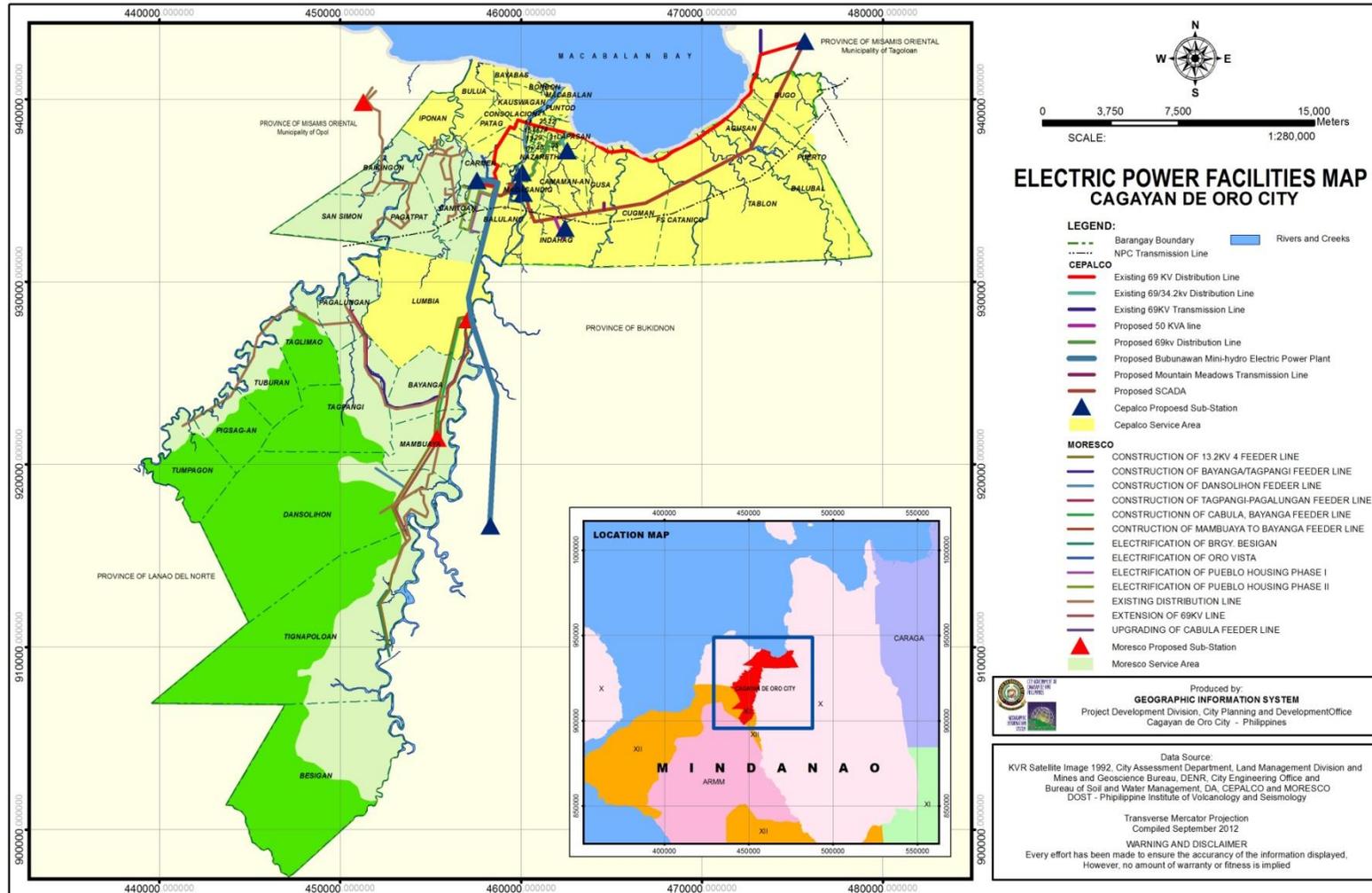
Table 1.7
Number of Households Served by Distribution Utility, 2012
Cagayan de Oro City

Name of Electric Cooperative/ Utility/Barangay	Number of Households Served	Total Number of Households of Service Area	Percentage Served (%)
CEPALCO			
66 barangays (40+26) CDO City	103,074	123,326	84
MORESCO-1			
16 barangays	8,129	14,139	54
Total Number of HHs served	111,203	137,465	81

Source: CEPALCO and MORESCO-1

*Canitoan and Lumbia are served by both CEPALCO and MORESCO-1

Figure 1.7
Electric Power Facilities Map
Cagayan de Oro City



1.4.2.2 Water

Cagayan de Oro Water District (COWD), the first registered water district in the country, supplies water to 65 barangays of the city.

Water production in 2010 was 53,616,511 cubic meters. The average production per month is 4,468,043 cubic meters and the water consumption per capita per day is 109 liters.

Service connections reached 74,020 in 2009, and 76,351 in 2010, majority of which were residential and government. Water consumption in the City sums up to 23,916,766 cubic meters being consumed by residential/government and commercial users.

As to status of water supply in the city, data from the City Health Office in 2012 shows that 80.40% of households have access to potable water supply. Level I, II and III connections is shown in Table 1.8 below.

Table 1.8
Status of Water Supply System, 2012
Cagayan de Oro City

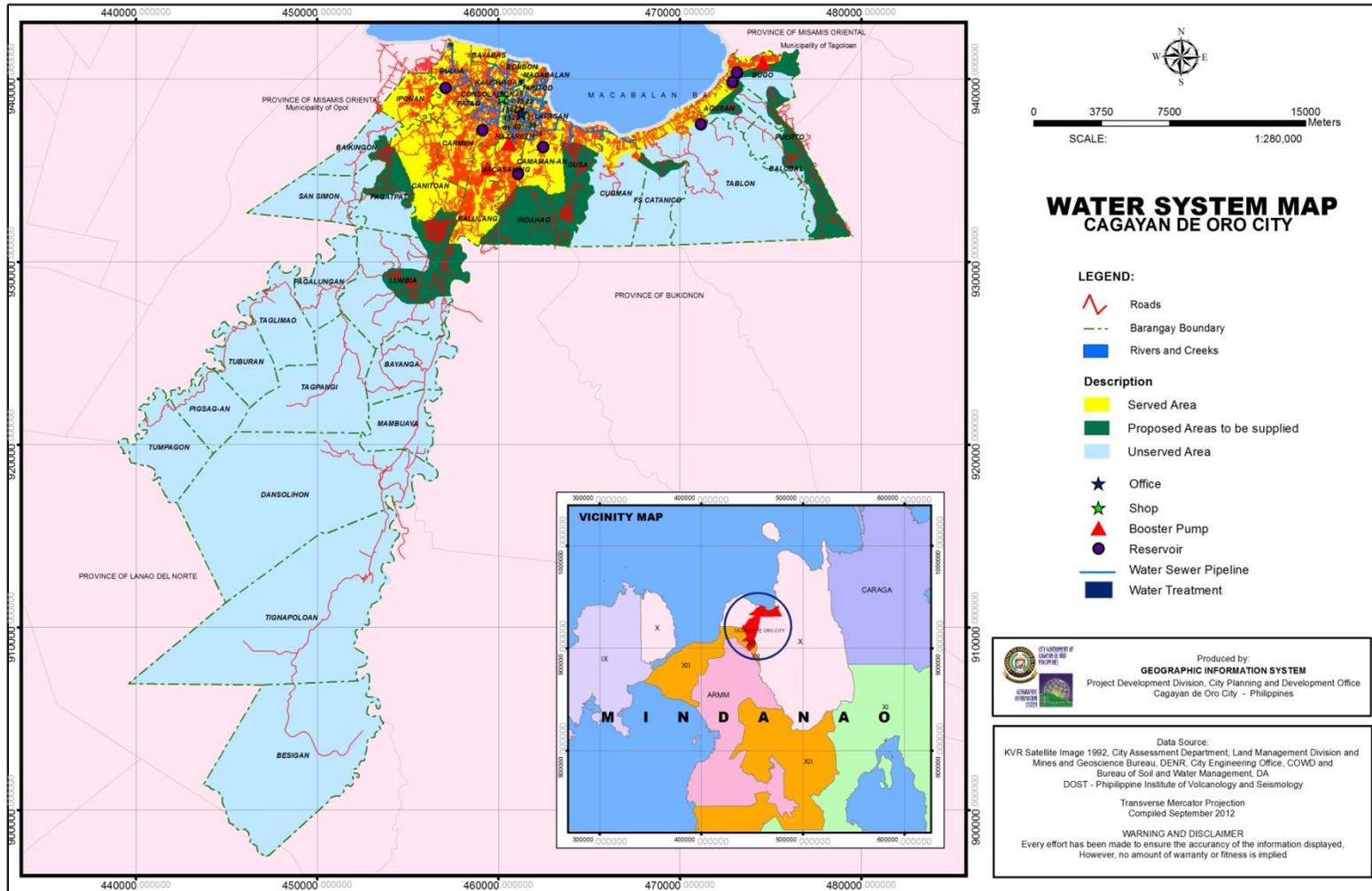
Source of Water	Number of HHs served	Percentage to total (%)
Level I	6,395	4.60
Level II	9,793	7.04
Level III	96,034	69.04
<i>Total Number of HHs served</i>	<i>112,222</i>	<i>80.68</i>
No access	26,884	19.32
Total Number of HHs of the City	139,106*	

Source: COWD/CPDO (number of households)

*2012 HHs less doubled-up HHs

The COWD sources of water included the following: Malasag Spring, twenty seven production wells, and reservoirs. Moreover, the Rio Verde Consortium supplies water to COWD by tapping surface water of Cagayan River. It currently supplies 40,000 cu. m. per day. The water sufficiency rate is posted at 44.36 percent while the non-revenue water (NRW) is 55.64 percent (way above the industry standard of 20-30%). The problem of high NRW is aggravated by the presence of informal settlers which tap water connections without permit from the COWD. Further, leaks in the old asbestos distribution pipelines in the eastern part of the city also contributed to high NRW.

**Figure 1.8
Water Facilities Map
Cagayan de Oro City**



1.4.2.3 Communication Network

Sophisticated services give the City its modern character. Internet has experienced significant growth as service providers increased.

The existing communication facilities in CDO are postal service, seven telephone service providers, three cellular mobile telephone service providers, three telephone long distance exchange (international exchange carrier), nine Broadband Networks, one Trunked Radio Station, seven Internet Service Providers (registered), seven TV Stations, three Cable TV Providers, five AM Broadcast Stations, and thirteen FM Broadcast Stations.

1.4.2.4 Waste Management

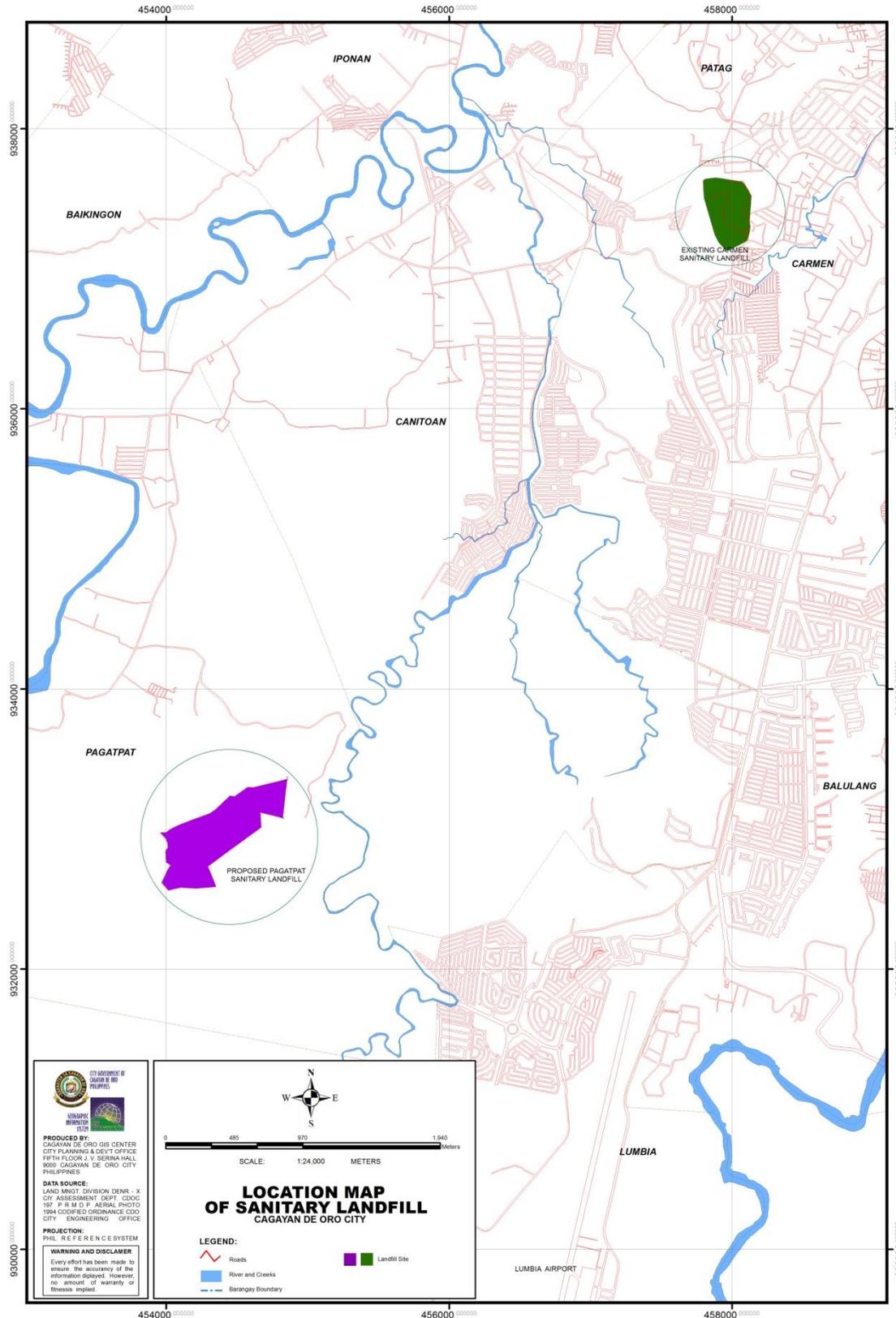
Cagayan de Oro City's 17-hectare landfill located in Upper Dagong, Carmen is 3.7 kilometers away from downtown with an average travel time of 16 minutes from the Poblacion. It has a capacity of approximately 1.9 million cubic meters and is expected to be adequate for 12 to 20 years of use starting 1997.

The location map of the existing landfill and the proposed sanitary landfill is shown in Figure 1.6.

Volume of waste collected and dumped at the existing landfill averaged at approximately 700 cubic meters per day based on the data of garbage collected and disposed at the landfill in 2011.

Monthly records of average volume of garbage dumped show that August and December have the highest volume of garbage compared with the other months. Volume of garbage is highest in August being the fiesta month of the city. December is the second highest due to Christmas celebration.

Figure 1.9
Location Map of Sanitary Landfill
Cagayan de Oro City



1.5 The Economic Structure

1.5.1 Revenue Sources

The City of Cagayan de Oro gets its income and other revenue from the following: taxes; fees, permits & licenses, business and services, subsidies from the national government and other sources allowed by law. Total revenue generated in 2011 amounted to PhP 1,719,874,752.98. The biggest source of income is the Internal Revenue Allotment (IRA) of PhP 902,306,610.00 which is about 52.46%. Income generation by source in the last three (3) years is shown in below.

Table 1.9
Income Generation by Source for the last Three Years
(2009-2011)
Cagayan de Oro City

Income Source	Income (PhP)		
	2009	2010	2011
Internal Revenue Allotment (IRA)	776,465,278.00	840,735,811.00	902,306,610.00
Tax Revenue	528,910,558.20	622,571,709.70	635,392,667.87
Fees, Permits & Licenses Income	27,483,524.77	22,248,602.67	24,347,761.66
Business & Service Income	40,228,723.33	101,388,672.19	108,867,553.87
Other Income	27,826,932.86	60,081,607.07	48,960,159.58
TOTAL INCOME	1,400,915,017.16	1,647,026,403.63	1,719,874,752.98

Source: Office of the City Accountant, Cagayan de Oro

1.5.2 Employment

The average employment rate increased to 95 percent in 2010 from 94.0 percent in 2007 (based on NSO Regional Survey). This slight increase of employment rate indicates that there are more members of the household falling under 'not in the labor force' category. Underemployment rate in 2010 was about 28.0 percent, lower than that of 2007 which is 30.7 percent. This further indicates that the City has available human resource for new industries.

Table 1.10
Employment Rate, 2010
Cagayan de Oro City

City	Population 15-64 years old	Labor Force				Not in the Labor Force
		Employed	%	Unemployed	%	
City	387,180	367,821	95	19,359	5	214,908
Male	192,882	183,238		9,644		107,061
Female	194,299	184,584		9,715		107,847

Source: National Statistics Office (Regional Data)

1.5.2 Average Family Income vis-à-vis Poverty Level

Based on 2009 NSO Regional survey on family income and expenditures, the average regional family income for 2009 goes up to PhP 165,000 from PhP142,000 in 2006. Total number of families was recorded at 839,000 in 2009 and 789,000 in 2006 respectively. This 50,000 rising number of families from 2009 to 2006 indicates the increasing number of population in this time span. This is directly proportional to the growing income/needs and number of families at a certain time.

Based on 2003 Small Area Poverty Estimates of the National Statistical Coordination Board (NSCB), Cagayan de Oro City posted the least in poverty incidence in Northern Mindanao. According to the said estimates, the City had a poverty incidence of 15.50% which implies that 15.50 % of the City's population has an income below the poverty line for 2003.

1.6 Existing Land Use and Land Use Trends

The 2012 land use cover of Cagayan de Oro was updated through the combination of the following:

- Tax map of the Assessor's Office
- Land Database of City Finance/City Assessor's Offices
- Spatial Database of GIS Center/CPDO
- Google Earth satellite image as of 2012

The existing land uses were analyzed through the GIS based data gathered from the results of the above-mentioned methods.

General Land Use

The general land use of the city emphasizes on the following districts/areas: agricultural, built-up, forest, mining and quarrying, open land, swamp/marshland, and other areas (roads, rivers and creeks).

Table 1.11 shows the existing General Land Use of Cagayan de Oro as compared with CY 2000 General Land Use of the City.

Agriculture

The agricultural areas of Cagayan de Oro are located mostly in the rural barangays, although patches of productive agricultural lands are still found in the lowland barangays, some of which already belong to the urban classification. Most agricultural lands are located in the southern parts of the city. They contain mostly upland crops grown on the plateaus and terraces and piedmont areas. Agricultural produce in the lowlands is taken from the river flood plain areas. Existing agricultural areas of the city totaled 16,393.39 hectares.

Settlement Pattern and Settlement Areas

Cagayan de Oro demonstrates a settlement pattern of concentrated dispersed development. Major nodes are in the lowland areas. Existing primary nodes are found in the Poblacion (CBD), Carmen and Lapasan while existing secondary nodes are in the uptown area (Pueblo de Oro and Xavier Estates), Bulua and Puerto.

On the other hand, strip or linear urban development occur along the national highway from Bugo to Iponan, or from east to west of Cagayan de Oro.

In the rural barangays, patches of settlements can be found.

Forest

Forest area of the city summed up to 24,652.75 or 45.41 percent of the city's total land area. This area includes the 11,334.9 hectares difference of the city's area in 2000 and 2012. Forest areas are located in Besigan, Tignapoloan, Bayanga, Mambuaya, Dansolihon, Tumpagon, Pigsag-an, Tuburan, Taglimao, Tagpangi, Pagalungan, Baikingon, San Simon, Cugman, Tablon, and F.S. Catanico. Activities in these areas include Community-Based Forestry Management (CBFM), Integrated Social Forestry (ISF), IFMA, FLGA, Co-forest management and mining of copper ore. Some of these areas are claimed by Indigenous People (IP).

Mining and Quarrying

Existing mining and quarrying areas are mostly found in barangays along Iponan River such as Pagatpat, San Simon, Baikingon, Canitoan, and Iponan. However, only the mining and quarrying areas in Isla Puntod, Balulang and Lumbia are reflected in Table 1.11. Mining and quarrying areas summed up to 31.12 hectares or 0.05 percent of the city's total land area where only sand and gravel, as well as filling materials are extracted.

Open Land

The city's existing vacant land, which summed up to 3,079.18 hectares, are very prominent in the many rolling hills and plateaus that are found in the uplands, conglomerates, and sandstone hills. These are found in Lumbia, Pagalungan, and other hinterland barangays. These are vast areas of open grassland; although suitable for pasture, there seems to be little activity of that kind.

Mangroves, Marshes and Swamps

- **Mangroves, marshes and swamps** are areas containing brackish waters in tidal flats. These areas which are found along the seacoast and the lower river basins of the city sustain important ecosystems. Cagayan de Oro has limited area of this type of ecosystem which is mostly located at the river deltas, particularly at Barangays Bonbon and Kauswagan. Several patches are also found in Barangays Bayabas and Bulua.

Mangroves, marshes and swamps play a pivotal role in the sustainability of the city's forest ecosystem and climate change adaptability.

1. Purifies the adjacent aquatic environment (aeration capacity);
2. Stabilizes and protecting the shorelines from tidal surges and strong wind forces;
3. Serves as depository and breeding area for marine wildlife;
4. Improves local thermal environment by lowering ambient temperature, and increasing moisture;
5. Provides natural abatement buffer during floods

Mangroves in the city serve as spawning and breeding grounds of some fish and marine species. The City's mangroves are disappearing due to encroachment by people needing land for the construction of residential houses. To save whatever mangrove area is left, replanting and maintenance of these areas are implemented in Barangays Gusa and Cugman.

Coastal and Marine Areas

The total coastline length of the City is 25 kilometers from east to west. From this coastline, the potential area for mangrove and wetland development is approximately 21 kilometers. There are 11 coastal barangays, namely: Barangays Puerto, Bugo, Agusan, Tablon, Gusa, Cugman, Lapasan, Macabalan, Bonbon, Bayabas and Bulua.

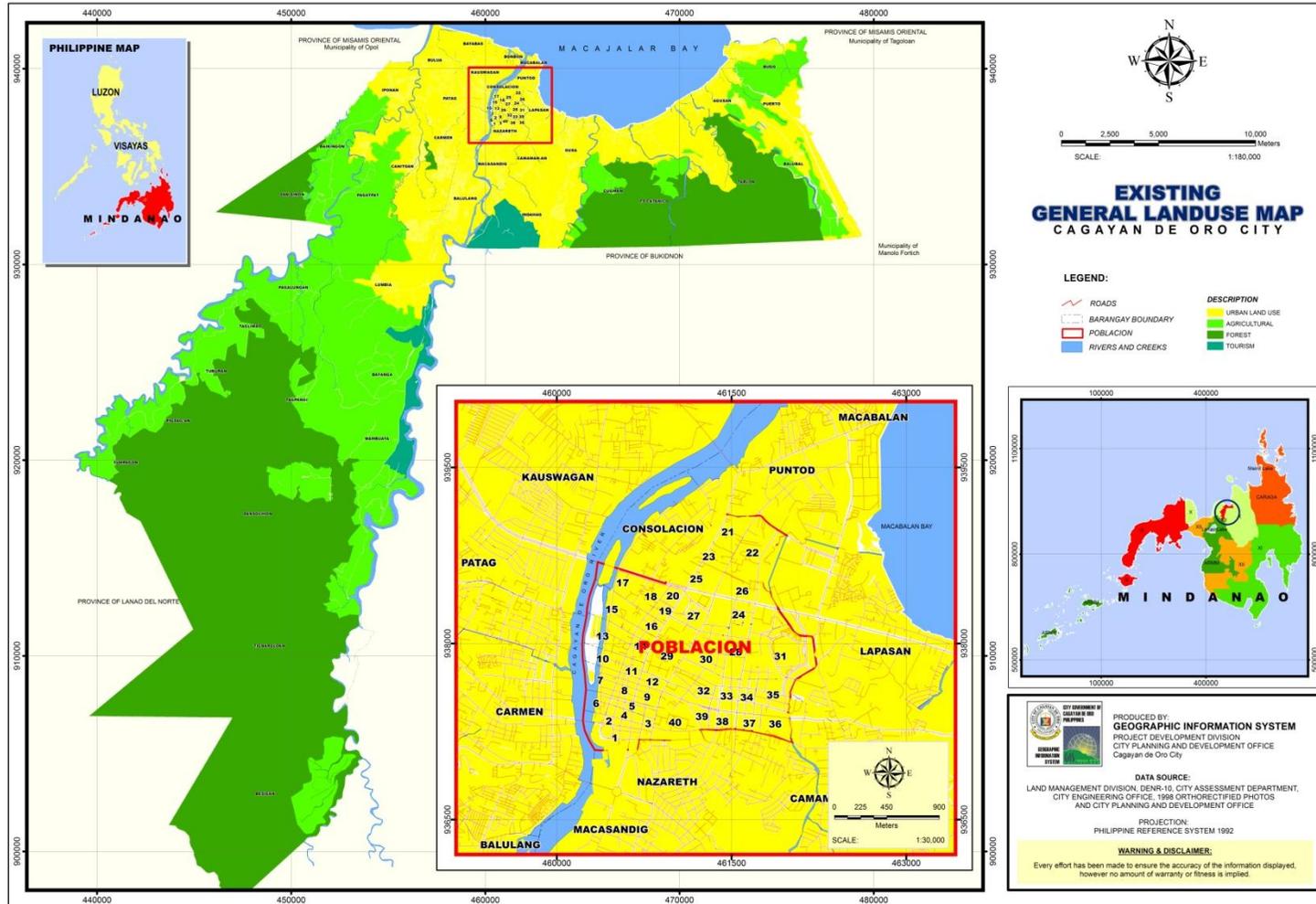
The following table shows the comparative 2000 and 2012 General Land Use of the City:

Table 1.11
Comparative General Land Use (2000 and 2012)
Cagayan de Oro City

General Land Use	2000		2012	
	Area (has.)	Percent to Total	Area (has.)	Percent to Total
Agricultural	13,704.92	29.63	16,393.39	28.34
Built Up Area	7,714.50	16.68	11,977.09	20.70
Mining and Quarrying	23.35	0.05	31.12	0.05
Open Land	7,037.09	15.22	3,079.18	5.32
Preservation Area				
Forest	17,726.57	38.33	24,652.75	45.41
Swamp/Marshland	39.70	0.09	102.53	0.18
Roads, Rivers and Creeks	-	-	1,614.93	
Total	46,246.13	100.00	57,851.00	100.00

Source: Research Division, City Assessment Department/GIS-CPDO

Figure 1.10
Existing General Land Use Map
Cagayan de Oro City



Urban Land Use

The urban land use of the city is dominantly built-up area stretching from east to west between Macajalar Bay and escarpment areas, as well as in the uptown areas Lumbia, Macasandig and Indahag.

Agricultural

Although agricultural areas are located mostly in the rural areas of the City, there are also agricultural lands in the urban areas. At present, a total of 8,065.10 hectares or 33.82% of the total urban area is agricultural. These areas are located in Barangays Lumbia, Canitoan, Iponan, Bayabas, Bulua and Pagatpat.

Agro-Industrial

Existing agro-industrial areas in the city having 14.07 hectares are situated along the strip of Sayre Highway in Upper Puerto and include feedmills, post-harvest and warehousing facilities. This area, abutting the province of Bukidnon caters to its large volume of agricultural production.

Commercial

The commercial land use category covers lots where there are business activities. This includes offices, services, supermarkets, and shopping centers. Regional offices and financial establishments concentrated in the Poblacion (CBD) create pressure in the area. Large-scale shopping centers (such as the Limketkai Mall, Gaisano, Ororama, and Centrio) are also within the CBD. Small-scale operations (like hardware, store and services) are located in all parts of urban area, as well as in dominantly residential areas.

Existing commercial areas of the city summed up to 317.31 hectares. This area is slightly higher than the commercial area in CY 2000 which is 291.41 hectares.

Forest

Existing forest cover in the urban area of Cagayan de Oro summed up to 591.61 hectares located in Barangays Cugman and Carmen.

Industrial

Areas used for manufacturing, processing, bottling, fabrication, and assembling are classified under the Industrial category. This also includes small scale industries like repair shops, food processing and handicraft factories. Mostly, these activities are concentrated along the National Highway.

Existing industrial area of the City is 175.58 hectares. This is almost twice the industrial area of the City in CY 2000 which is 88.36 hectares. The increasing number of industries attributed to the expansion of the industrial area.

Institutional

The various school sites with their corresponding open spaces comprise the bigger share of institutional uses. Xavier University Manresa Farm occupies the biggest area while elementary and secondary schools, barangay centers, churches and government center/offices of the region, the province of Misamis Oriental and the City occupies the remaining area.

Existing institutional area covers 383.25 hectares which is slightly higher than its area coverage in CY 2000 which is 287.94 hectares.

Mining and Quarrying

Of the existing total urban area, 31.12 hectares has been allowed for mining and quarrying along Iponan River, located in Barangays Pagatpat, Canitoan and Iponan.

Open Space/Vacant Land

Open space/vacant lands accounts to 3,136.41 hectares. This is relatively higher than the 2,542.43 hectares in CY 2000. These vacant lands are mostly unoccupied lots in subdivision areas and undeveloped lands.

Residential

Residential areas are the largest in the urban land use and covers 10,911.61 hectares or 45.76 % of the total urban area. This is relatively higher than the figure in CY 2000 wherein residential land use is only 24.37% of the total urban area.

Residential areas are divided further into: residential area within planned subdivision with appropriate road network system and facilities; low density residential area with sub-standard road facilities; and blighted areas as well as resettlement sites.

Swamp/Marshland

As of 2012, existing swamp/marshland of the City summed up to 102.53 hectares or 0.43 percent of the City's total urban area.

Utilities

Airport

Laguindingan Airport, which is approximately 40 kilometers from the city, is operational since June of 2013.

Sea Port

There are six sea ports in the City; one is a government port, located at Macabalan, while five others are private ports. One private port is located in Bugo while the remaining four are in Tablon.

Bus Terminals

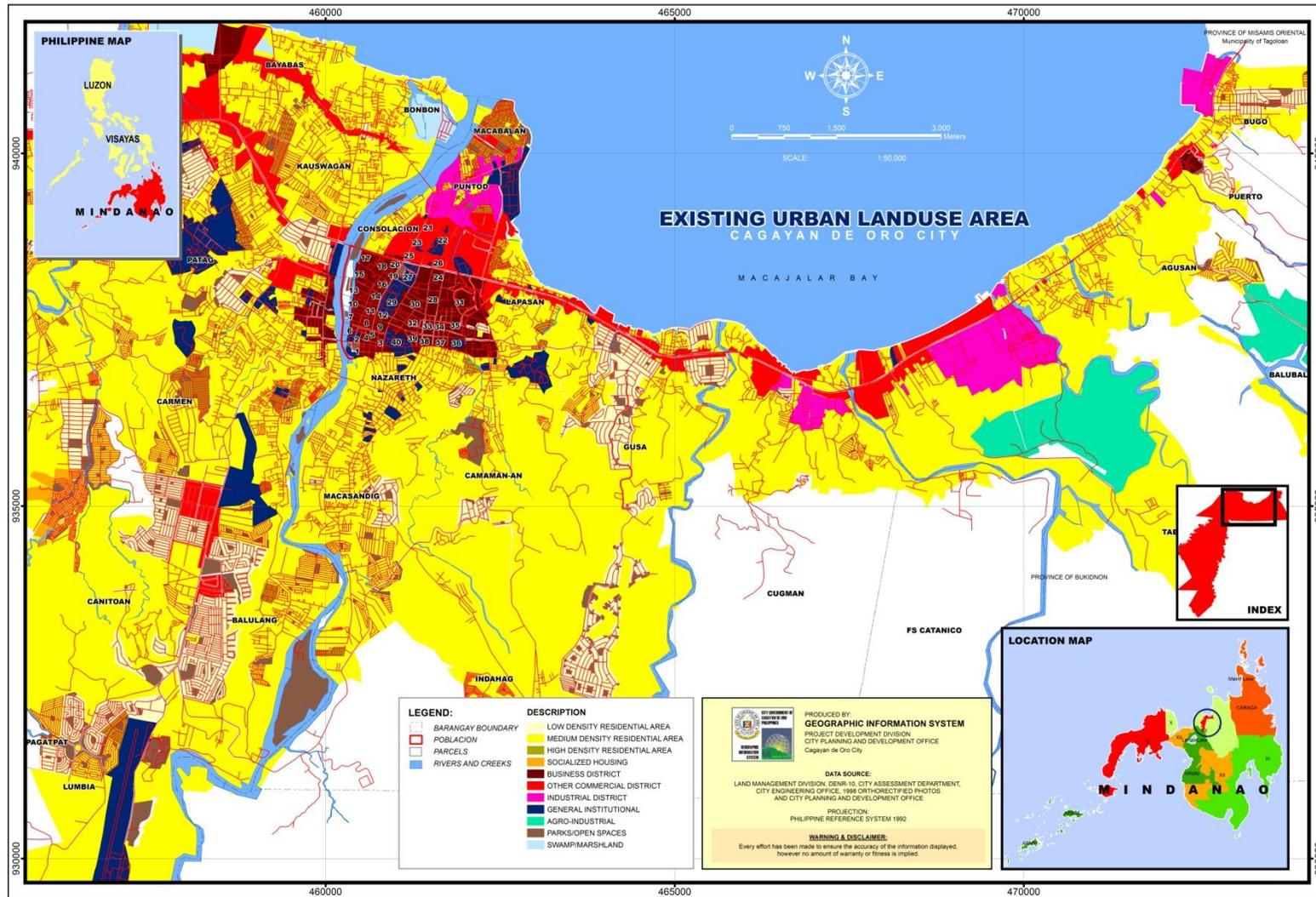
The City has two integrated bus terminals strategically located in the west at Barangay Bulua and in the east at Barangay Lapasan.

The following table shows the comparative 2000 and 2012 Urban Land Use of the City:

**Table 1.12
Comparative Urban Land Use (2000 and 2012)
Cagayan de Oro City**

Urban Land Use	2000		2012	
	Area (has.)	Percent to Total	Area (has.)	Percent to Total
Agricultural	-	-	8,065.10	33.82
Agro-Industrial	-	-	14.07	0.06
Commercial	291.41	3.78	317.31	1.33
Forest	-	-	591.69	2.48
Industrial	88.36	1.15	175.58	0.74
Institutional	287.94	3.73	383.25	1.61
Mining and Quarrying	-	-	31.12	0.13
Open Space/Vacant Land	2,542.43	32.96	3,136.41	13.15
Residential	1,879.83	24.37	10,911.61	45.76
Swamp/Marshland	-	-	102.53	0.43
Utilities	131.97	1.71	118.04	0.49
Planned Unit Development (PUD)	565.79	7.33	-	-
Covered by Road, etc.	1,926.77	24.98	-	-
Total	7,714.50	100.00	23,846.72	100.00

Figure 1.11
Existing Urban Land Use Map
Cagayan de Oro City



1.7 Comparative/Competitive Advantages

- Gateway to Northern Mindanao
- Center of trade/transshipment point in the region
- Competitive transportation services
- Presence of multi-national investors (SM, Ayala, LKKS)
- Major tourism destination in Northern Mindanao
- 21.062 km coastline potential for coastal tourism
- Presence of fishing grounds
- Modern facilities (health, school, market, terminal...)
- Strong public-private partnership
- Well-developed telecom facilities/power supply/road networks
- Existing natural resources and heritage (rivers, caves, flora and fauna, forest), natural landscapes (plateaus, gorges, terraces)

1.8 Weaknesses: Priority Issues and Concerns

- Insufficient/low income
- Presence of informal settlers
- Mismatched skills and the need of the industry
- Traffic Congestion
- Frequent Flooding
- Inadequate Supply of Potable Water in some areas
- Water Pollution and Contamination
- Low farm productivity
- Frequent flooding in business districts
- Lack of area for public burial sites
- High level of GHG emission
- Inadequate protective services facilities
- Absence of City Sports Complex
- Unregulated mining activities
- Low agricultural productivity
- Water pollution and contamination
- Undeveloped tourism sites
- Low student performance in the ff: promotion, graduation and survival rates
- Absence of established evacuation centers
- Absence of social welfare center

1.9 Functional Role of the City

- A major transport and transshipment hub in Mindanao, that has long established trade and cultural linkages with Visayas and Mindanao
- Regional capital of Northern Mindanao (Region X) and serves as the primary gateway to the rest of the Mindanao regions
- Region X's administrative-educational-business center
- Convention Capital of Northern Mindanao

Chapter 2

Climate and Disaster Risk Assessment

Disaster Risk Assessment

Summary of Areas Susceptible to Hazards

Out of the total 80 barangays in Cagayan de Oro, 54 barangays are considered as flood-prone areas, and 25 barangays are susceptible to rain-induced landslide. While the city did not experience any major storm surge occurrences, 11 coastal barangays are still prone to storm surge should future occurrences take place. Also, groundshaking will likely happen to seven barangays, liquefaction will likely be experienced by 45 barangays, and earthquake-induced landslide will also likely occur in 15 barangays. Meanwhile, with the occurrence of TS Ondoy and Sendong in 2009 and 2011, respectively, the City is no longer considered as typhoon-free area since all the barangays will likely experience future similar heavy downpours.

Table 2.1
Summary of Areas Susceptible to Hazards
Cagayan de Oro City

Barangay	Flood	Rain-induced Landslide	Storm Surge	Ground Shaking	Liquefaction	Earthquake-induced Landslide	Typhoon
Barangay 1	✓				✓		✓
Barangay 2	✓				✓		✓
Barangay 3	✓				✓		✓
Barangay 4	✓				✓		✓
Barangay 5	✓				✓		✓
Barangay 6	✓				✓		✓
Barangay 7	✓				✓		✓
Barangay 8	✓				✓		✓
Barangay 9	✓				✓		✓
Barangay 10	✓				✓		✓
Barangay 11	✓				✓		✓
Barangay 12	✓				✓		✓
Barangay 13	✓				✓		✓

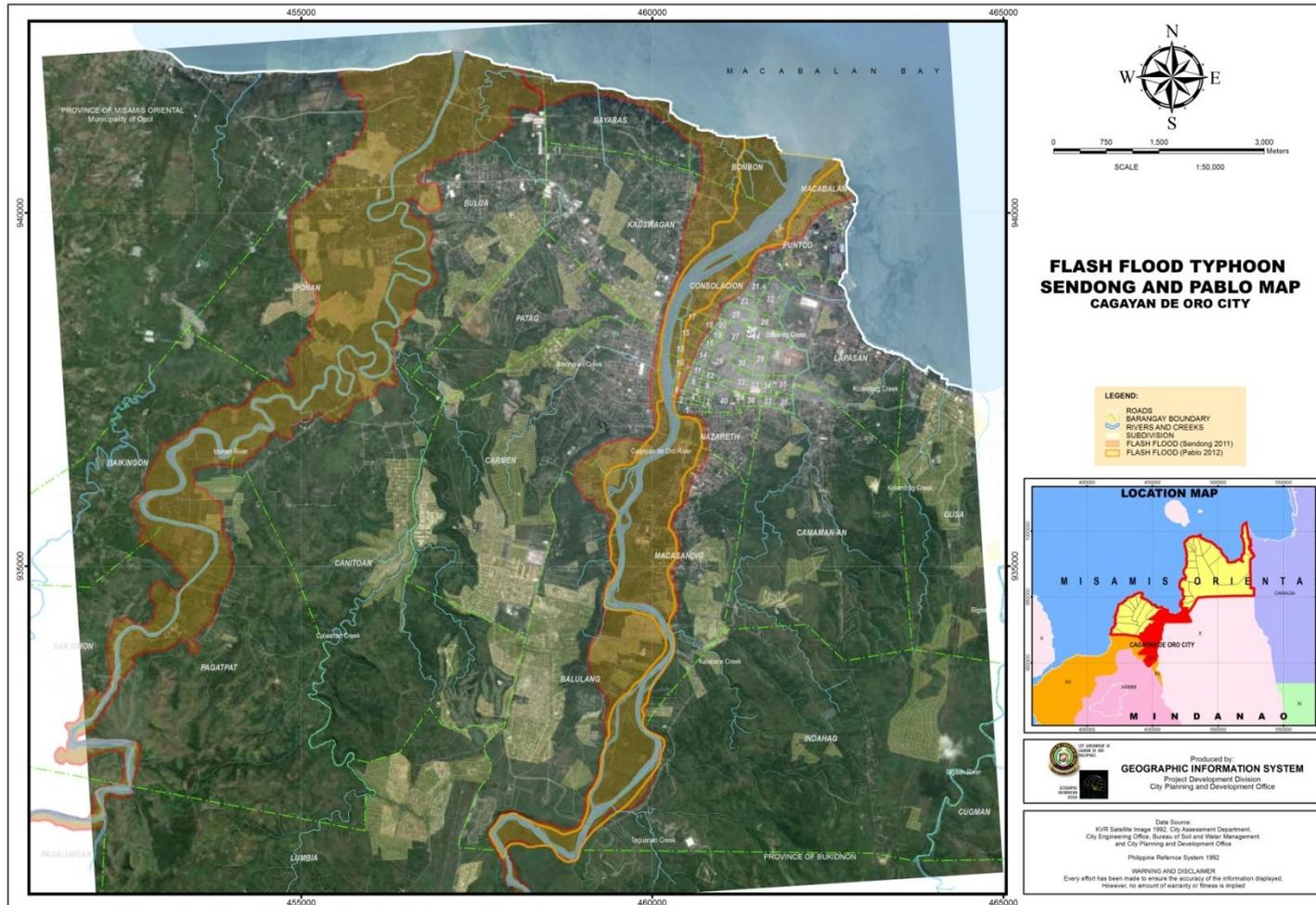
Barangay	Flood	Rain-induced Landslide	Storm Surge	Ground Shaking	Liquefaction	Earthquake-induced Landslide	Typhoon
Barangay 14	✓				✓		✓
Barangay 15	✓				✓		✓
Barangay 16	✓				✓		✓
Barangay 17	✓				✓		✓
Barangay 18	✓				✓		✓
Barangay 19	✓				✓		✓
Barangay 20	✓				✓		✓
Barangay 21	✓				✓		✓
Barangay 22	✓				✓		✓
Barangay 23	✓				✓		✓
Barangay 24	✓				✓		✓
Barangay 25	✓				✓		✓
Barangay 26	✓				✓		✓
Barangay 27	✓				✓		✓
Barangay 28	✓				✓		✓
Barangay 29	✓				✓		✓
Barangay 30	✓				✓		✓
Barangay 31	✓				✓		✓
Barangay 32	✓				✓		✓
Barangay 33	✓				✓		✓
Barangay 34	✓				✓		✓
Barangay 35	✓				✓		✓
Barangay 36	✓				✓		✓
Barangay 37	✓				✓		✓

Barangay	Flood	Rain-induced Landslide	Storm Surge	Ground Shaking	Liquefaction	Earthquake-induced Landslide	Typhoon
Barangay 38	✓				✓		✓
Barangay 39	✓				✓		✓
Barangay 40	✓				✓		✓
Agusan		✓	✓		✓	✓	✓
Baikingon		✓					✓
Balubal		✓				✓	✓
Balulang	✓	✓					✓
Bayabas	✓	✓	✓				✓
Bayanga							✓
Besigan		✓		✓		✓	✓
Bonbon	✓		✓				✓
Bugo		✓	✓				✓
Bulua	✓		✓				✓
Camaman-an		✓					✓
Canitoan	✓	✓					✓
Carmen	✓	✓					✓
Consolacion	✓				✓		✓
Cugman		✓				✓	✓
Dansolihon		✓		✓		✓	✓
FS Catanico		✓				✓	✓
Gusa		✓	✓				✓
Indahag		✓				✓	✓
Iponan	✓			✓			✓
Kauswagan	✓						✓

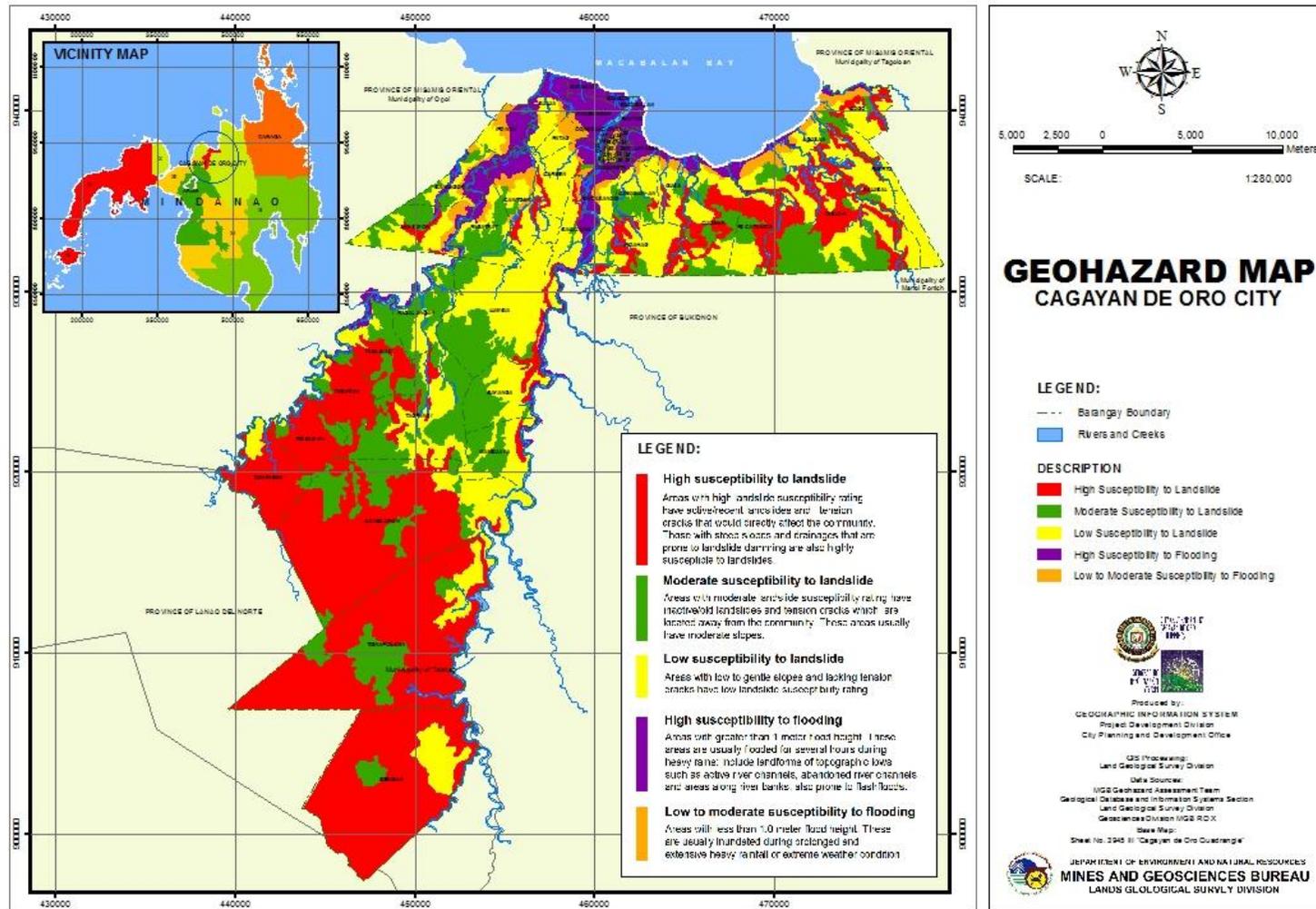
Barangay	Flood	Rain-induced Landslide	Storm Surge	Ground Shaking	Liquefaction	Earthquake-induced Landslide	Typhoon
Lapasan	✓		✓				✓
Lumbia		✓					✓
Macabalan	✓		✓		✓		✓
Macasandig	✓						✓
Mambuaya		✓				✓	✓
Nazareth	✓				✓		✓
Pagalungan		✓				✓	✓
Pagatpat							✓
Patag							✓
Pigsag-an		✓		✓		✓	✓
Puerto		✓	✓			✓	✓
Puntod	✓		✓		✓		✓
San Simon		✓		✓		✓	✓
Tablon		✓	✓			✓	✓
Taglimao		✓					✓
Tagpangi		✓		✓			✓
Tignapoloan		✓				✓	✓
Tuburan		✓				✓	✓
Tumpagon		✓		✓		✓	✓

Source: MGB 10 Landslide Susceptibility Map
GIS-CPDO, Cagayan de Oro

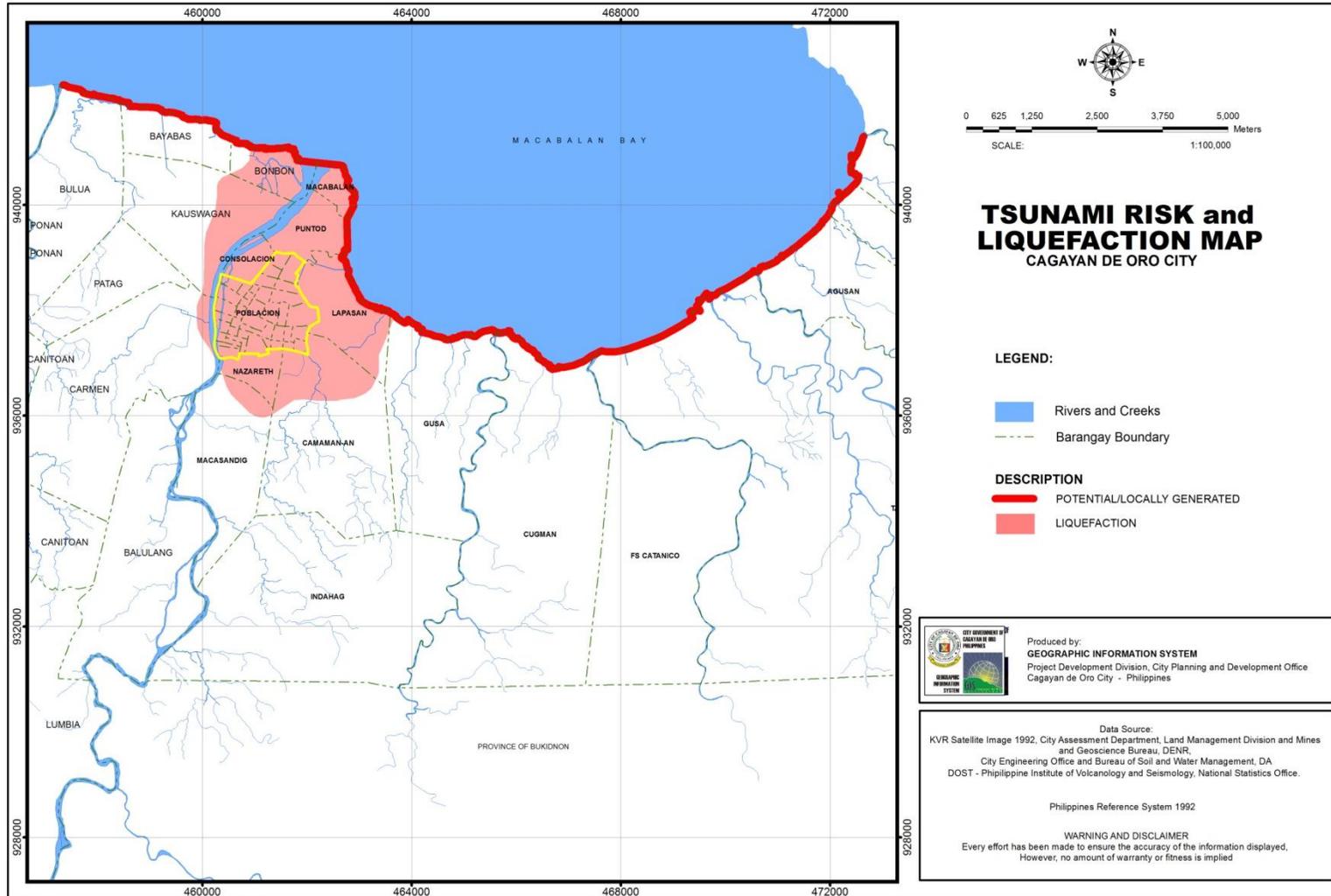
Figure 2.1
Flash flood Typhoon Sendong and Pablo Map
Cagayan de Oro City



**Figure 2.2
Geohazard Map
Cagayan de Oro City**



**Figure 2.3
Liquefaction Risk Map
Cagayan de Oro City**



**Figure 2.4
Tsunami Risk Map
Cagayan de Oro City**

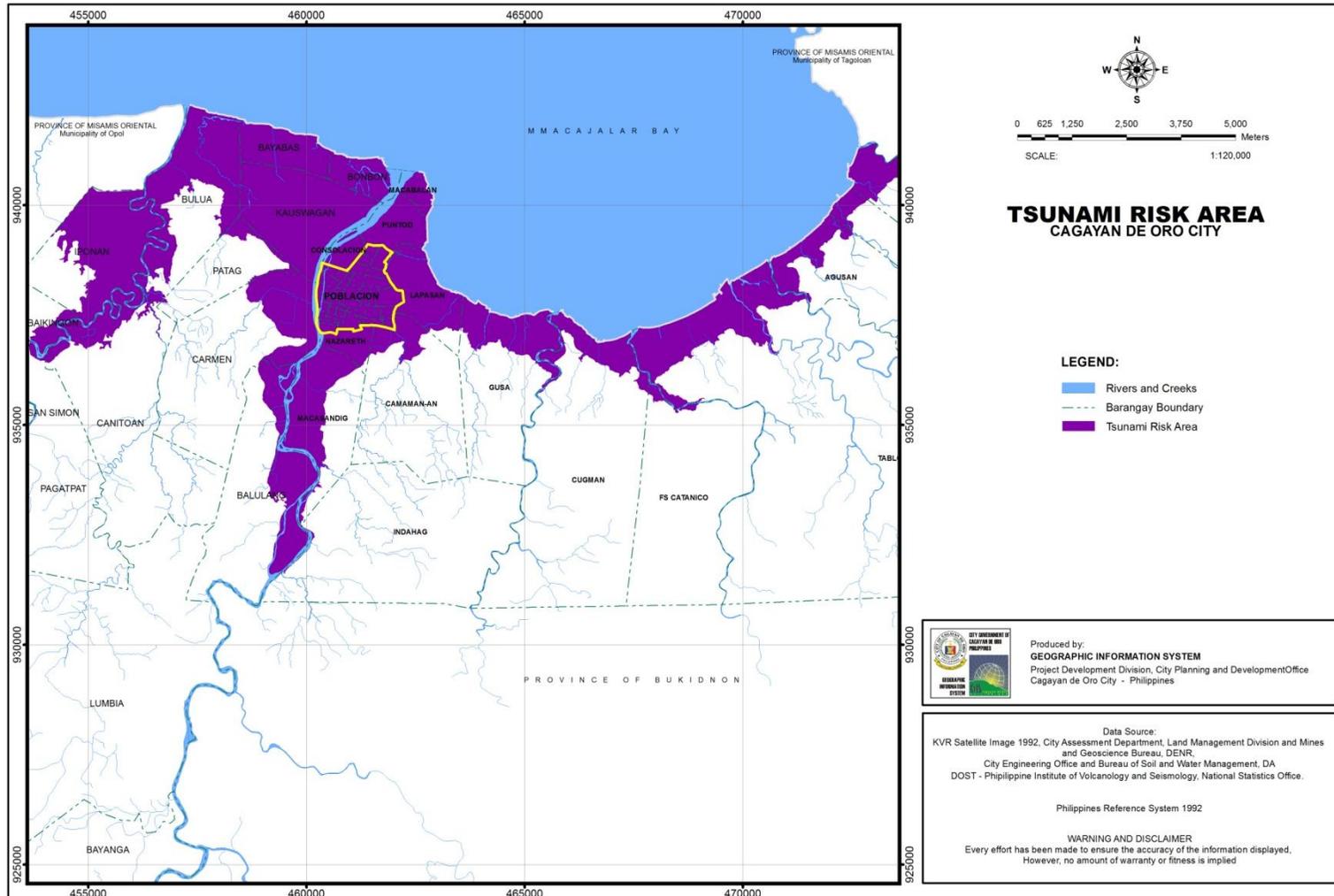
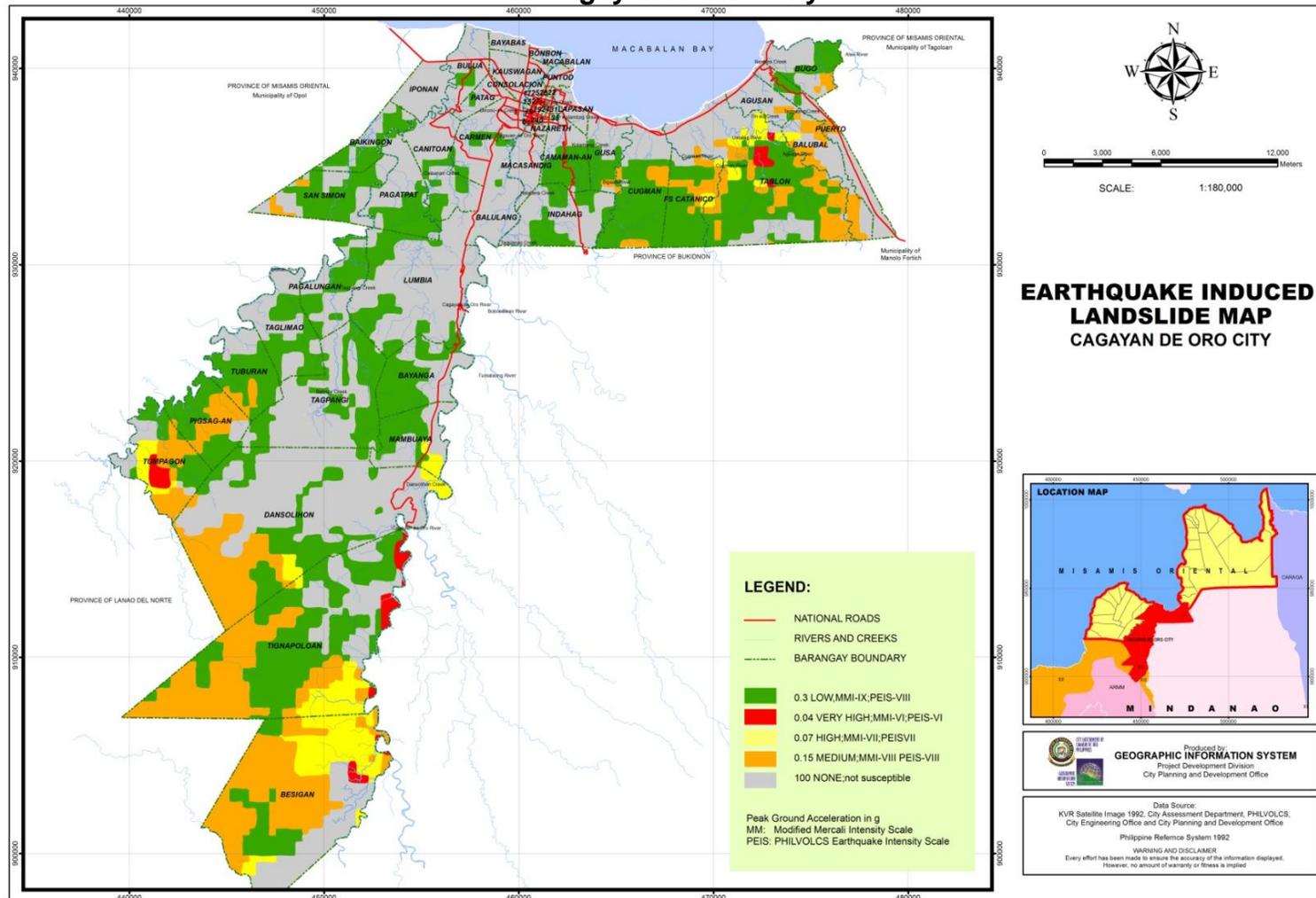


Figure 2.5
Earthquake Induced Landslide Hazard Map
Cagayan de Oro City



RISK EVALUATION

This section provides discussions on the evaluation from the city and local risk assessment and should reveal implications of the losses that would occur; e.g., how much a hazard may cost (in terms of financial and other resources needed for relief and rescue, reconstruction and rehabilitation) were it to occur; and how the lives and quality of life in the community or city or the clusters might be affected in view of the estimated risk.

Considering that local governments have many priorities and limited resources and cannot implement all risk reduction measures at once, risk evaluation or prioritization must be undertaken to identify which identified measures must be implemented immediately and those that may still be delayed. Thus, it is important that multi-stakeholders, including communities and local authorities can jointly agree on certain criteria to rank the risks. These could be ranked as high, moderate or low priority. As a start, risks may be ranked according to the following: a) their significance or the impact to population and property; b) existence and feasibility of risk reduction solutions; c) cost effectiveness of potential risk reduction solutions; and d) availability of funds to implement such solutions.

The measures that may be undertaken by the city also depend on the types of risks. The choice as to which final DRR measure or approach to adopt will depend on the decision-making process of the city. Generally, the city may adopt corresponding intervention approaches or options to address the impact of the disaster risks, the measures of which are classified into four major categories, as follows: (a) risk avoidance or elimination; (b) risk reduction or mitigation; (c) risk sharing or transfer; and (d) risk acceptance or retention.¹ Table 9 the strategies under these four major categories that the city may adopt in responding to the varied disaster risks identified.

This DRA should guide the thrusts and direction of the Disaster Risk Reduction and Management (DRRM) Plan of the city as mandated under the Republic Act (RA) 10121, otherwise known as the Philippine DRRM Law of 2010.

Specifically, the various sectors identified initial risk evaluation based on the risk estimation as follows:

- Formulate the Disaster Risk Reduction and Management (DRRM) plan of the city to provide comprehensive direction for the disaster risk reduction and climate change adaptation strategic options, thrusts and priorities covering the four pillars of DRR/CCA namely; 1) prevention

¹ Source: Guidelines on Mainstreaming DRR in Subnational Development Land Use Planning

and mitigation, 2) preparedness, 3) response, and 4) recovery and rehabilitation;

- Efforts to intensify community disaster awareness needs to be strengthened to reduce the incidence of diseases, deaths and loss of properties. These efforts will include the conduct of information education campaign, drills on disaster preparedness, formulation, implementation and monitoring of DRRM Plan, establishment of warning system devices in every school/barangays, and establishment of evacuation centers in every barangay with appropriate infrastructure utilities;
- The passage of ordinance for no build zone areas will prohibit the illegal construction of properties by the informal settlers. The provision of decent, affordable housing on environmentally safe areas is a strategy to relocate and resettle affected families (Map 15). The national and local government needs to increase funds for the housing program especially for the poor families;
- For housing, there is a need to ensure the security of tenure since presently these families do not own nor rent the area they occupy so there is always a threat for displacement; improvement of the living condition of the occupants through provision of adequate facilities and strengthen the housing structures in such a way that they can withstand from bad weather conditions;
- The City Government should provide a good sports venue and recreations facility with good ambiance for the wellbeing and interests of the people. The construction of a Cagayan de Oro Sports Dome is essential to promote/intensify the sports program in the city as well as, upgrade the existing barangay sports facilities to create sports-friendly environment that will inspire people to be “sports-minded” especially the youth in the community;
- Repair and rehabilitation of damaged lifeline structures and construction of flood mitigating facilities should be prioritized to protect the low-lying and flood-prone areas of Cagayan de Oro City that are densely populated;
- Complete drainage masterplans for all priority basins of Cagayan de Oro City as basis to improve drainage system of the city;
- Implementation of all lifelines and major infrastructures programs/projects should be supported with geo and hydrometeorological hazard clearance from MGB and other mandated government agencies. Consequently, disaster resilient infrastructures should be considered in the design of programs and projects to mitigate the effects of disasters.

- To address/minimize destruction of the natural environment due to landslides, the following measures are recommended:
 - 1) Strict enforcement of existing environment laws and land use policies'
 - 2) Conduct a comprehensive landslide hazard assessment;
 - 3) Adopt responsible mining and appropriate farming practices
 - 4) Improve slope protection in high risk areas by introducing SALT and other appropriate slope stabilization projects

**Table 2.2
Disaster Risk Reduction Strategies
Cagayan de Oro City**

Risks/ Strategies	Avoid or Eliminate Risks	Reduce and Mitigate Risks	Share and Transfer Risks	Risk Retention
Infrastructure risks	Prohibit development in high risk areas Buyout and relocate structures in highly prone areas Destroy and remove structures in hazard-prone areas	Strengthen structure’s ability to resist hazard Change use or occupancy pattern of structure Enforce stricter zoning and building standards Develop response plans and improve hazards warning systems Build redundant infrastructure systems	Develop alternate locations for key functions Institute a geologic hazard abatement district for home owners to share in future repair costs Real estate disclosures	Take no action Self-insure the stocks Treat physical losses as expenses

Risks/ Strategies	Avoid or Eliminate Risks	Reduce and Mitigate Risks	Share and Transfer Risks	Risk Retention
		Promote “Green” Building technology Prioritize development of renewable energy sources		
Social and cultural risks	Deny occupancy of hazardous buildings Protect cultural assets through zoning standards	Integrate sociocultural indicators into risk assessment Fund hospitals and social services mitigation Identify needs of various population groups (e.g.,elderly, handicapped, women, children)	Promote incentives for homeowners, renters and businesses to purchase insurance Create mutual aid agreements	Take no action Prepare shelter plans for displaced residents
Economic risks	Avoid or eliminate capital stock risks by mandating “smart”	Provide incentives to mitigate or reduce risk	Shared responsibilities between government	Take no action

Risks/ Strategies	Avoid or Eliminate Risks	Reduce and Mitigate Risks	Share and Transfer Risks	Risk Retention
	growth or avoiding high risk areas Develop business retention and job placement programs	Diversify income sources Attract wide range of business types Mitigate risks to key income generators (base industries, large employment sectors) Incentives for “smart” growth Build economic alliances and partnerships	and private / business sector	Special funds or lines of credits for lost revenues
Natural resource/ environmental risks	Eliminate sources of pollution	Eliminate point sources of pollution Launch clean-up efforts	Develop transfer of development rights programs, or environmental land swaps	Take no action Brownfield clean-up and

Risks/ Strategies	Avoid or Eliminate Risks	Reduce and Mitigate Risks	Share and Transfer Risks	Risk Retention
	<p>Mandate use of Technologies (e.g., emissions free vehicles)</p> <p>Enforce strictly zoning ordinances</p>	<p>Regulate use and storage of potential pollutants</p> <p>Reduce densities in sensitive areas</p> <p>Habitat conservation plans</p> <p>Incentives for use of specific technologies</p> <p>Incentives for good development decisions</p>	<p>Greater shared responsibilities of Indigenous Peoples in the management and protection of forests</p>	<p>reuse costs</p>

Vulnerability and Risk Assessment

Assessment Framework and Methodology

The Climate Change Vulnerability and Adaptation Assessment used by Cagayan de Oro City focused on defining the city's vulnerability through analysis of its adaptive capacities, sensitivity, and exposure to climate change and its impacts. The recommendations and assessment frameworks presented in the Intergovernmental Panel on Climate Change (IPCC) reports and the UN-Habitat's "Planning for Climate Change" tool together with other local assessment techniques were considered in the methodology.

The vulnerability framework is a simplified illustration of how vulnerability is a function of exposure, sensitivity and adaptive capacity. Written as a basic formula, ***Vulnerability = (Exposure + Sensitivity) – Adaptive Capacity***.

Cross-Sectoral Analysis

A. Threat Level

Per cross-sectoral analysis, Flooding and Typhoon scored the highest threat levels to the City. This rating is determined not only from the level or scope of exposure to the climate change driver or hazard but the degree to which it can adversely impact the communities. Hence, the more dense settlements with higher risks of being flooded and affected by typhoons, as aggravated by negative and unsustainable practices of the people, are considered the hotspot areas.

Table 2.3
Average Threat Level Scores Across all Five Development Sectors

CC Hazard	Social	Economic	Environment	Infrastructure	Land Use	Average THREAT LEVEL*
Flooding	5	5	5	4	5	4.8
Drought	3	3	2	3	1	2.4
RIL	2	2	3	1	3	2.2
Typhoon	5	5	5		2	4.25

* High – 5; Low - 1

The GIS experts of the City TWG have prepared risk maps to provide a visual presentation of the location of at risk elements for each sector (social, economic, environmental, infrastructure, and land use), as shown in the Figures below. Taking off from this information, an overlay analysis of the

cross-sectoral risks for each identified climate change hazard was also prepared.

Figure 2.6 shows the location of elements at risk for all the five sectors in three identified climate change hazards, namely: Flooding, landslide, and drought. Figure 2.7 is an overlay of the drought map (across all five sectors- social, economic, environment, infrastructure, and land use) to the population density map of CDO. This map depicts that the entire city is vulnerable to drought but the ones that were highly impacted are the following barangays: Bayabas, Bulua, Iponan, Patag, Carmen, Consolacion, Kauswagan, Bonbon, Macabalan, Puntod, Lapasan, Nazareth, Agusan, Bugo, and Barangays 13, 15, 22, 24, 29, 31. Meanwhile, Figure 2.8 shows the location of cross-sectoral (high to medium) risks to flooding overlaid with the population density map. This map shows the high level threat of flooding in the coastal and river-side barangays where most residential areas are situated. High risk barangays in the coast (Macajalar Bay) include: Bayabas, Bulua, Bonbon, Macabalan, Puntod, Lapasan, and the settlements in the coast line of Bugo. Moreover, Barangays along Cagayan River (Kauswagan, Consolacion, portions of Carmen, Nazareth, Macasandig, and Balulang, Barangays 1,13,15,22,24,28,31,35,36, settlements along the riverbanks of Lumbia, Bayanga, and Mambuaya) and Barangays along Iponan River (Iponan, portions of Bulua, Canitoan, Pagatpat, Baikingon, Taglimao) are also being threatened by flooding.

**Figure 2.6
Social Sector Risk Map
Cagayan de Oro City**

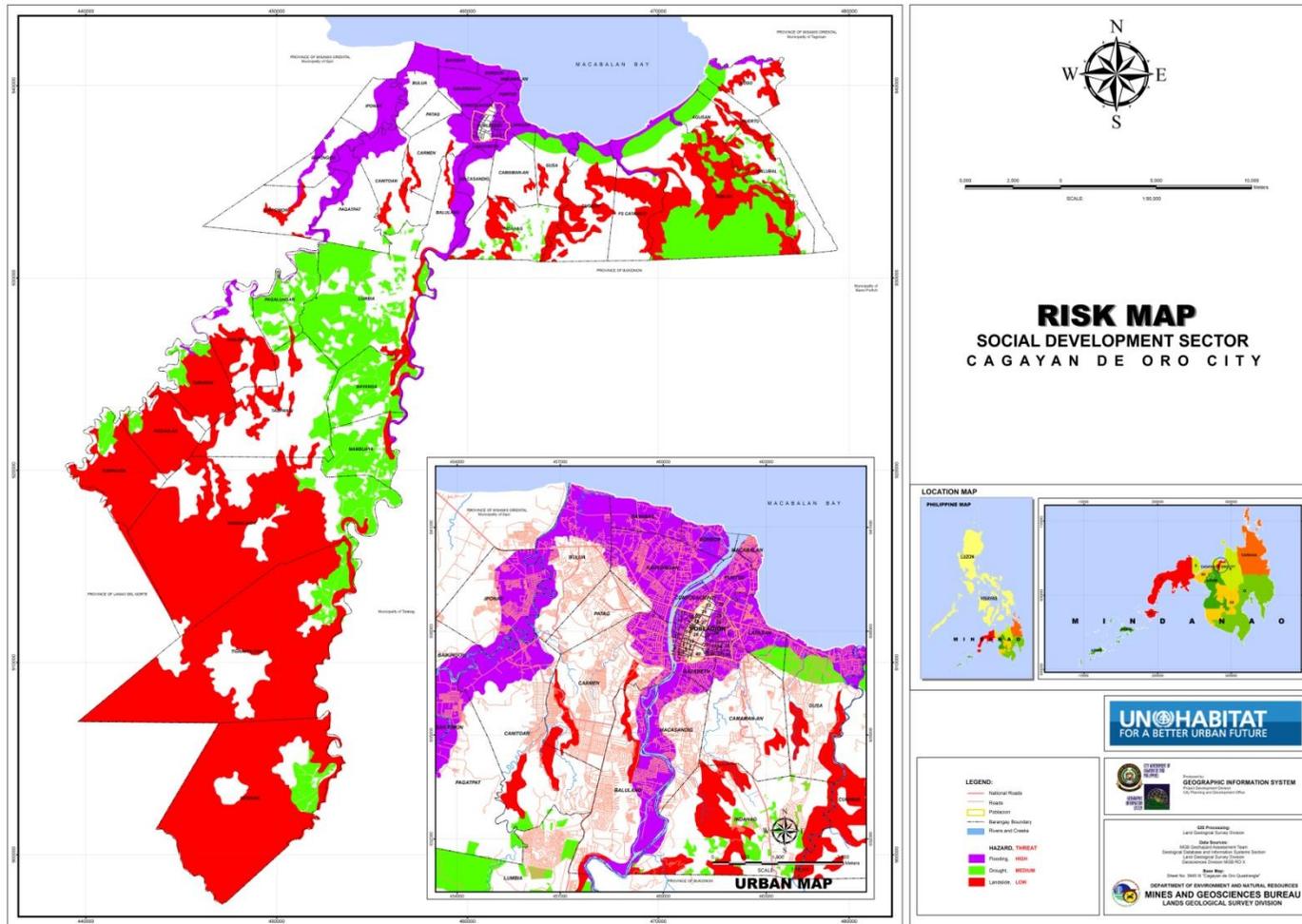
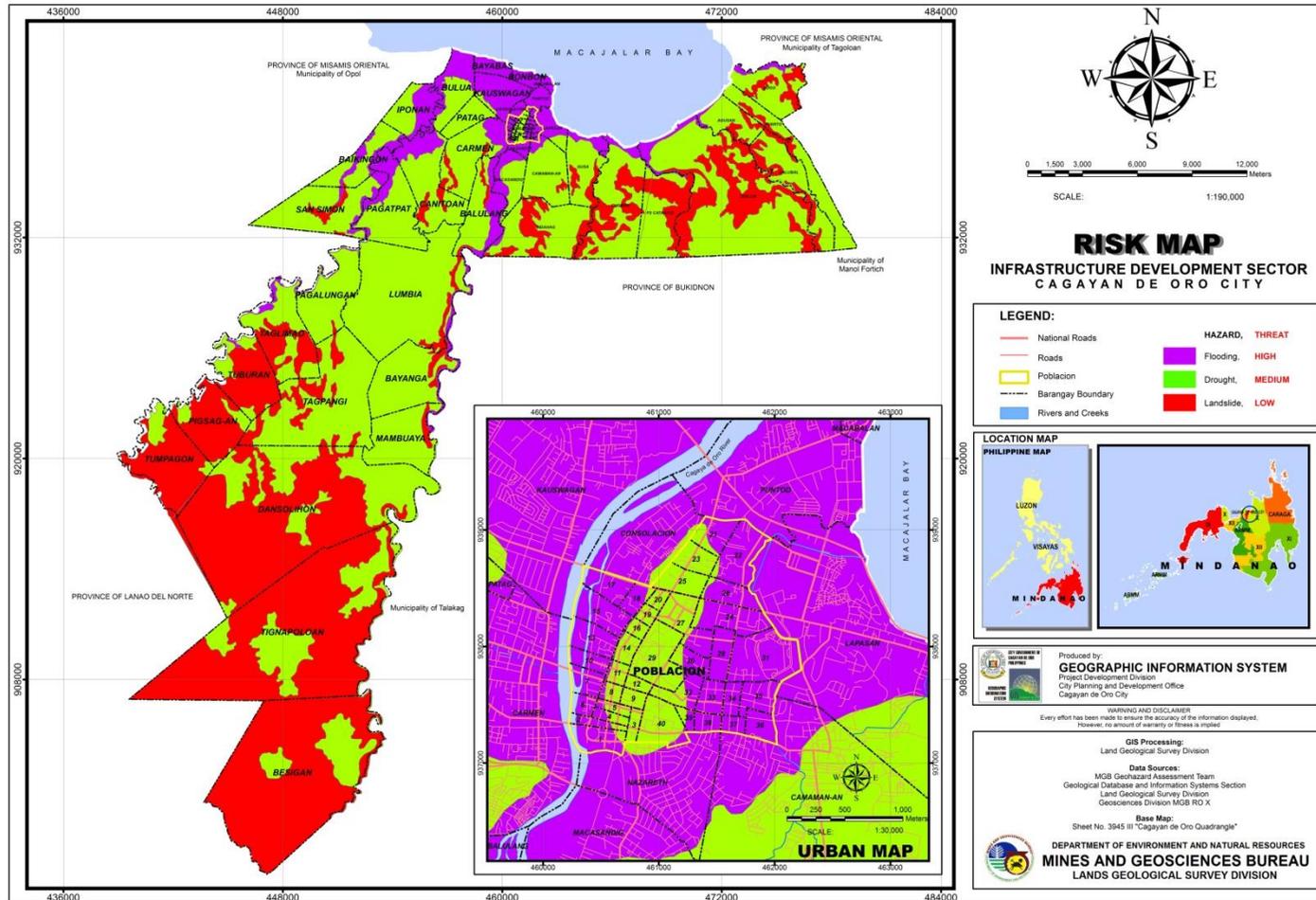


Figure 2.8
Infrastructure Sector Risk Map
Cagayan de Oro City



**Figure 2.9
Environment Sector Risk Map
Cagayan de Oro City**

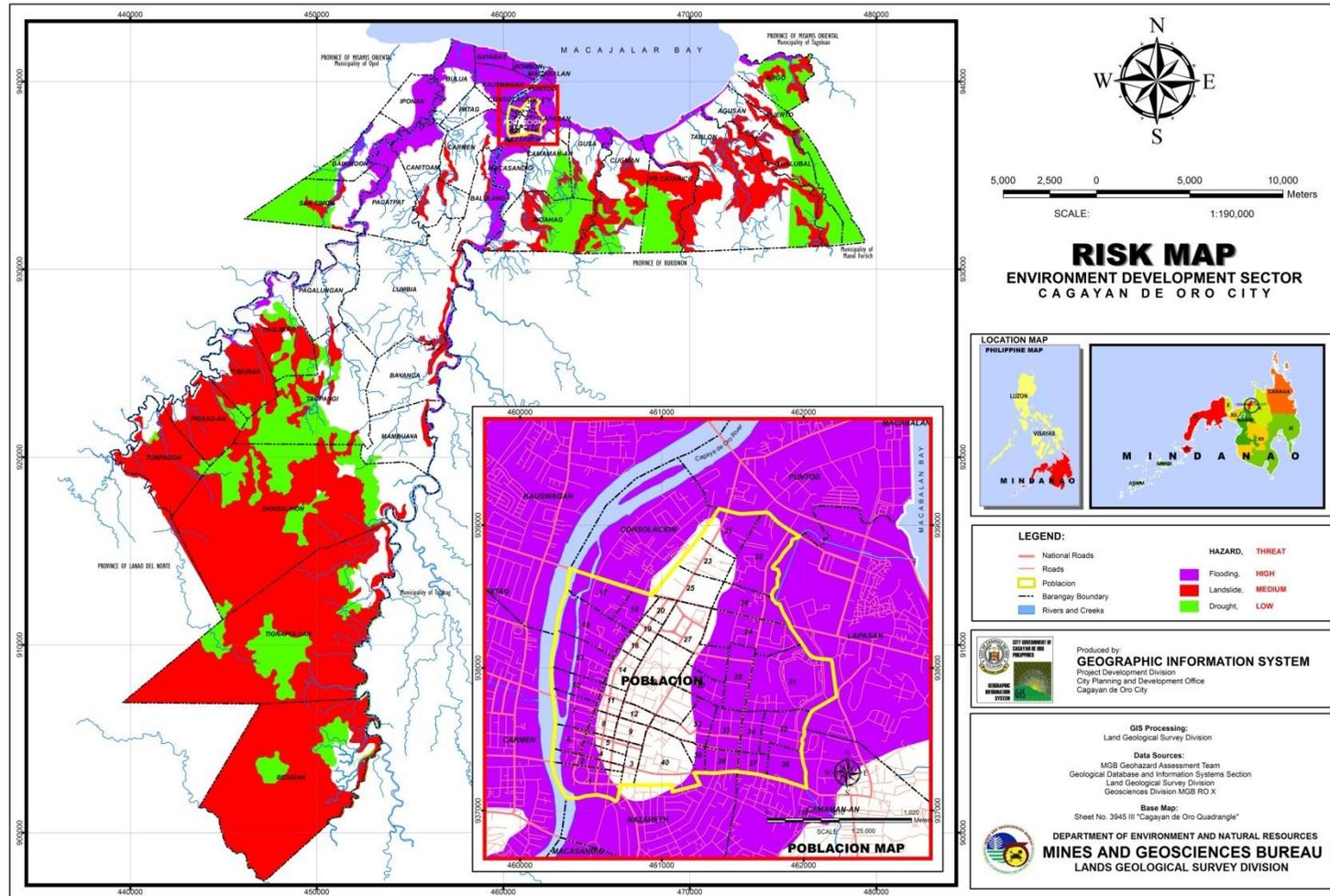


Figure 2.10
Land Use Sector Risk Map
Cagayan de Oro City

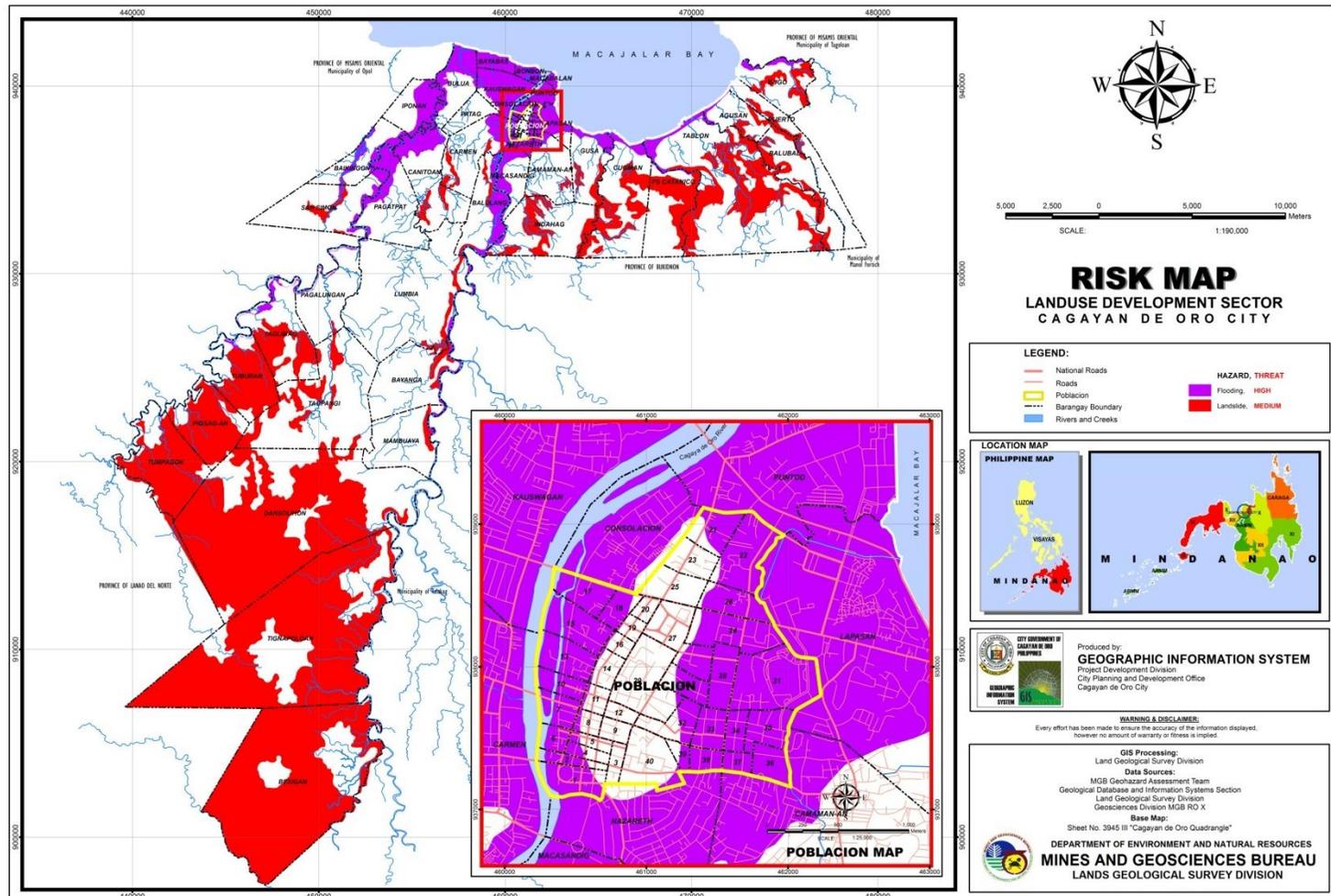


Figure 2.11
Multi-hazard Risk Map
Cagayan de Oro City

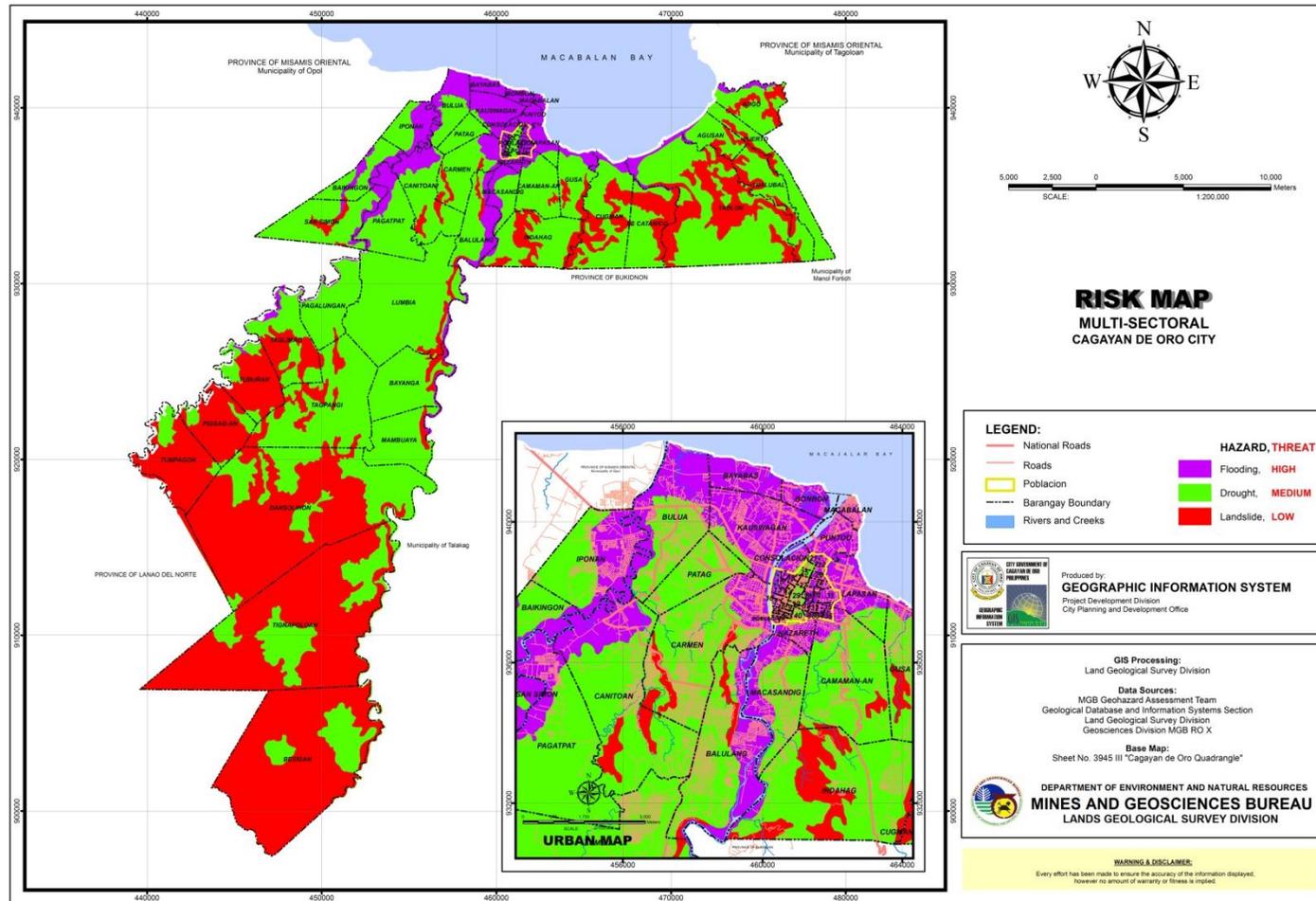


Figure 2.12
Drought Vulnerability Map of Cagayan de Oro City

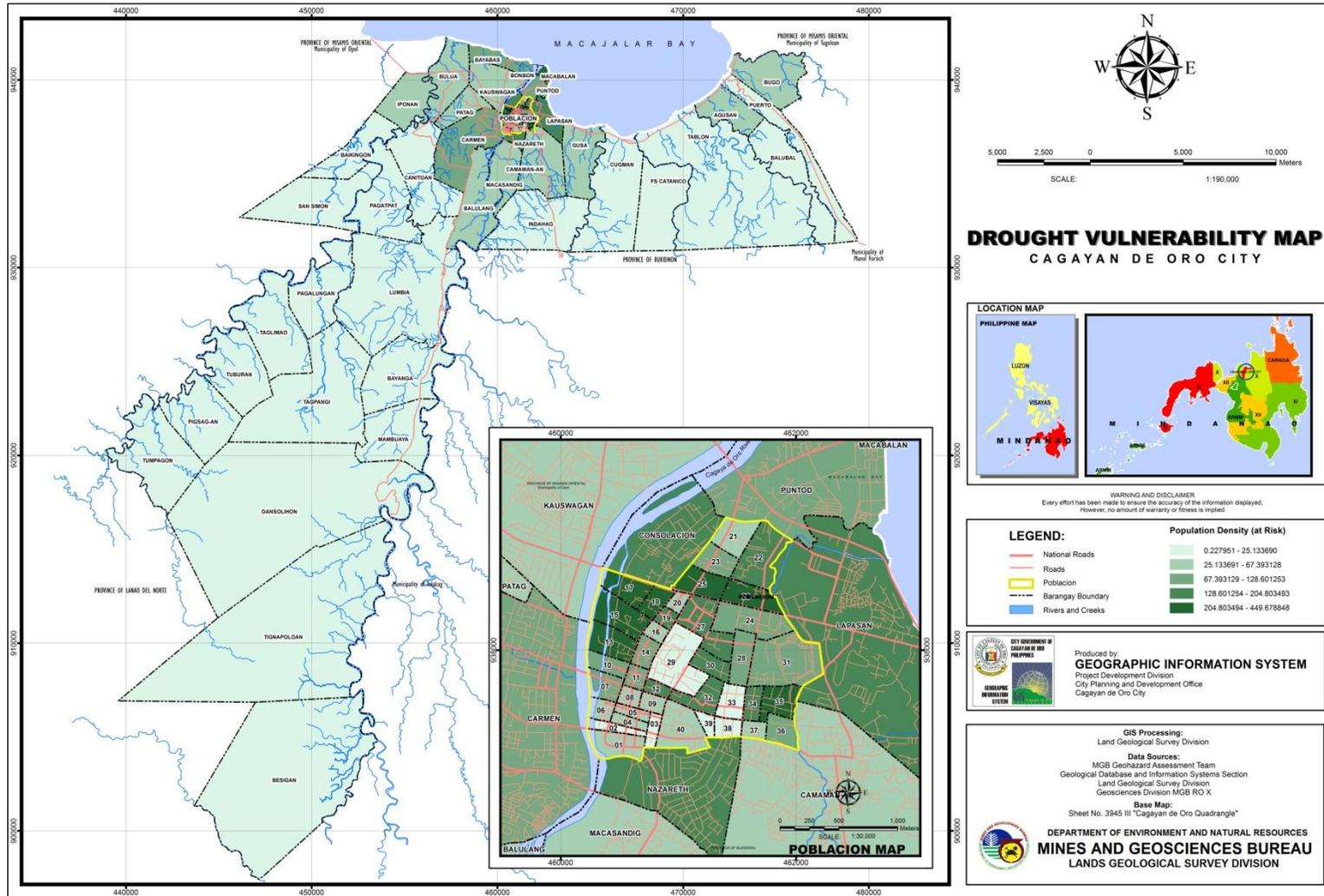


Figure 2.13
Flood Vulnerability Map of Cagayan de Oro City

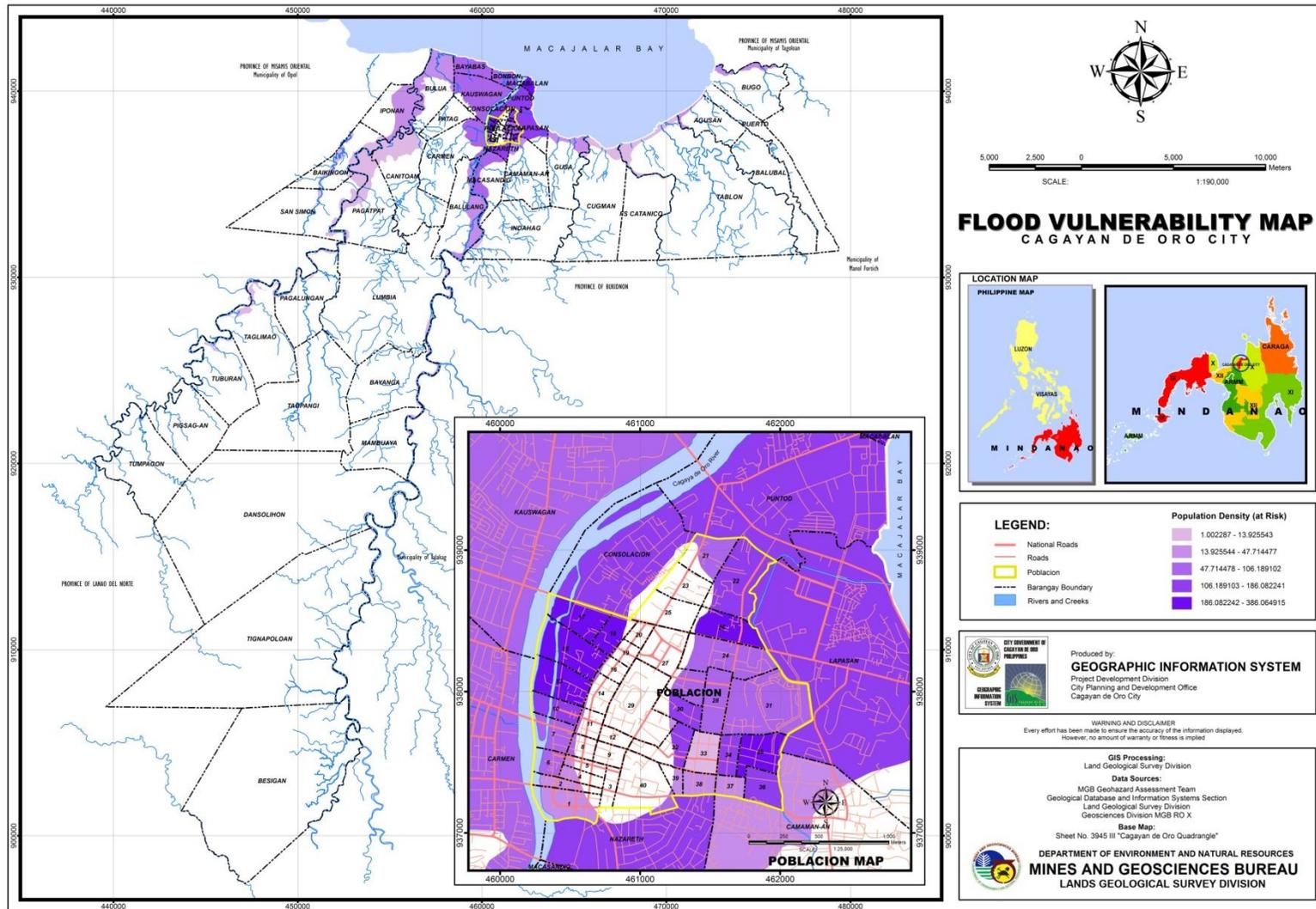
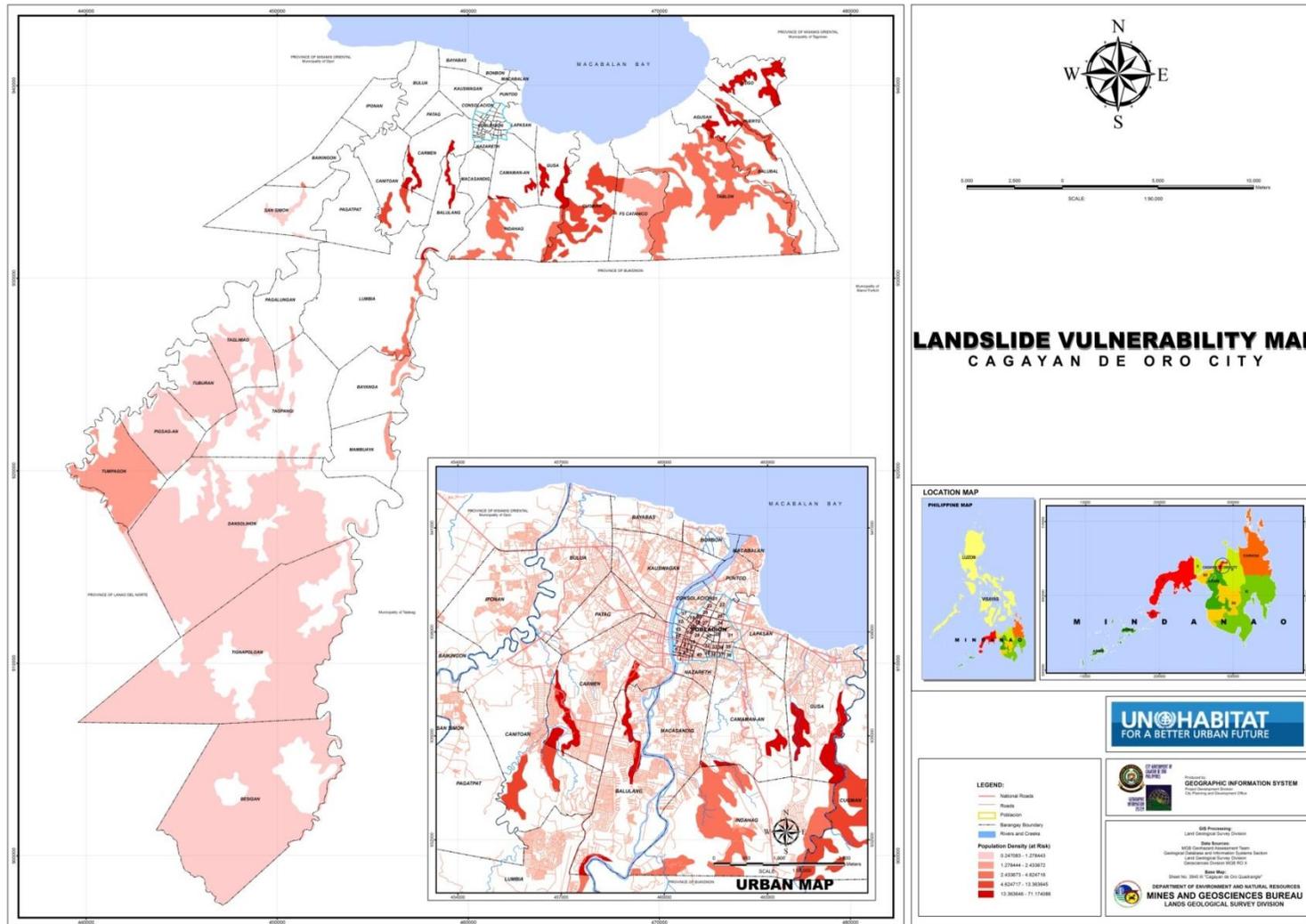


Figure 2.14
Landslide Vulnerability Map of Cagayan de Oro City



SOCIAL SECTOR								
Exposure and Sensitivity Summary							AC	Vulnerability
CC Hazard	Triggers	Primary / Secondary Impacts	Elements at Risk	Consequence (Current and Future)	Threat Level	AC Status	Relative Vulnerability	
Drought	<ul style="list-style-type: none"> Increase in average temperature for CDO Less total seasonal rainfall during summer months 	<ul style="list-style-type: none"> More frequent and longer period of droughts Increased severity of drought events Lower crop yield and income of farmers Over-extraction of groundwater 	<p>Farming communities 13 Highland (Bayanga, Besigan, Dansolihon, Lumbia, Mambuaya, Pagalungan, Pigsag-an, Tignapoloan, Tuburan, Tumpagon, FS Catanico, Balubal, Indahag) Fishpond operators & Fisher folks: 11 coastal brgys: Bayabas, Bonbon, Bulua, Macabalan, Puerto, Bugo, Consolacion, Tablon, Lapasan, Gusa, Cugman, Agusan)</p>	<ul style="list-style-type: none"> Reduced agricultural production Reduced income/productivity of fisher folks/farmers High price of agricultural products Increasing demand of food supply Likelihood of salt water intrusion Risk to shortage on safe water supply Ground water depletion leads to land subsidence Potable and irrigation water affected by salt water intrusion shall result to lesser access to safe water and lower productivity 	Medium 3	3.5	6.5	
Flooding	<ul style="list-style-type: none"> Increase in rainfall volume during rainy season coupled with monsoon rains and wave surges Sea Level Rise Influence of new developments in formerly undisturbed watershed areas Clogged and inadequate drainage Encroachment of ISF to riverbanks 	<ul style="list-style-type: none"> Increased # of vulnerable groups due to disruption of mobility & access to social services Loss of lives; loss/damage to properties and shelter Emotional distress due to loss of income Hampered school activities 	<p>Families-20,088 Children-6,977 CWDs-99 Youth-1,650 Elderly-520 Women-19,021 PWDs-268</p> <p>DCC-143; SDC-1; BT-1; TNK-1; RCE-1; HMC-1; HC – 6 Houses-19,000</p> <p>45 barangays affected</p>	<ul style="list-style-type: none"> Decreased educational performance Demand for psychosocial support services Additional land allocation and funds for houses Increase in demand for basic needs Increase in incidence of water-borne diseases Increase in crime rates Increase in malnutrition rate Risks on access to public facilities and emerging temporary housing on vulnerable areas and increasing urban poor Coastal communities at risk to coastal inundation and wave surges Salt water intrusion due to sea level rise 	High 5	2.5	7.5	
RIL	<ul style="list-style-type: none"> Increased rainfall volume within CDO watershed Poor soil condition/quality Decreased vegetation Slope failures along road cuts & quarrying activities 	<ul style="list-style-type: none"> Loss of shelter Soil degradation River Siltation Loss of lives Loss/damage to livelihoods Severe soil erosion 	<p>57,540 people living in 18 brgys: Agusan, Baikingon, Balubal, Balulang, Bayanga, Besigan, Bugo, Camaman-an, Canitoan, Carmen, Cugman, Dansolihon, FS Catanico, Gusa, Indahag, Lumbia, Macasandig, Mambuaya, Pagalungan, Pagatpat, Pigsag-an, Puerto, San Simon, Tablon, Taglimao, Tagpangi, Tignapoloan, Tuburan, Tumpagon</p>	<ul style="list-style-type: none"> Risks on access to public facilities and emergency services may be hampered due to frequent and extreme landslide events Severe and frequent soil erosion and river siltation shall lead to more intense flooding events 	Medium-Low 2	2.8	4.8	
Typhoon	<ul style="list-style-type: none"> Increased volume of water from Bukidnon, Lanao del Norte, Lanao del Sur and ARRM during rainy season More intense monsoon rains Natural local topography 	<ul style="list-style-type: none"> Strong winds damaging to crops, houses, properties More intense flooding in urban centers Overflow of Rivers Storm Surges Suspension of classes 	<ul style="list-style-type: none"> Informal communities Houses built on light materials All barangays affected Urban Population: 555,605 Rural Population: 46,483 	<ul style="list-style-type: none"> Risks on access to public facilities and social services Residential, commercial, agricultural area flooding Reduced agricultural productivity Decreased educational performance Reduced income for private sectors and business establishments 	High 5	2.0	7.0	

ECONOMIC SECTOR								
Exposure and Sensitivity Summary							AC	Vulnerability
CC Hazard	Triggers	Primary / Secondary Impacts	Elements at Risk	Consequence (Current and Future)	Threat Level	AC Status	Relative Vulnerability	
Drought	<ul style="list-style-type: none"> Increase in average temperature Less total seasonal rainfall in summer months 	<ul style="list-style-type: none"> More frequent and longer period of droughts affecting planting and harvesting seasons and white water rafting activities Increased severity of drought events affecting production in farms and fishponds Lower crop yield and income of farmers, fishpond operators and outfitters Dried up spring wells 	<ul style="list-style-type: none"> Hinterland/rain-dependent farmers: Agriculture Sector/ Food security of City 47,594 people in farming communities & 3 irrigation Water system (booster pumps, reservoir, production wells in 5 barangays) Tourism industry 	<ul style="list-style-type: none"> Reduced agricultural production; threat to food security Insufficient water supply (low water level) affecting agricultural production/productivity and white water rafting activities Reduced profit for tourism sector (white water rafting) Salt water intrusion affecting water supply for irrigation Shortage of water for irrigation Destructive alternative livelihood of farming communities resorting to firewood gathering, charcoal-making and mining 	3	2	5	
Flooding	<ul style="list-style-type: none"> Increase in rainfall volume during rainy season coupled with monsoon rains and wave surges Sea Level Rise Influence of new developments in formerly undisturbed watershed Clogged and inadequate drainage Encroachment of ISF Agro-industrial conversion from rubber plantation to pineapple, banana and papaya in uplands 	<ul style="list-style-type: none"> Submersion and displacement of affected economic activities Disruption of business operations in CBD Damaged warehouse stocks Destruction of lifelines and low access to basic social services and public facilities Damage to crops and equipment Decrease in crop yields and productivity Impassable access roads and destroyed bridges that resulted to disruption of mobility within the CBD area and in some roads to reach other barangays Decreased water absorptive capacity due to low vegetation in uplands (conversion to high value crops) Coastal Inundation and Wave surges affecting farms and fishponds Damage to outfitter in the white water rafting sector: 4/6 affected by recent flooding costing to Php 320,000 Damage to properties: Php 2.5 million. Whitewater rafting: Mambuyaya, Cabula due to flooding. Aside from logs and soil, a lot of garbage mixed in the water during flash floods 	<ul style="list-style-type: none"> Agriculture Crop production along major river systems in the city is highly susceptible to flooding. Housing Transportation in CBD Seaports Economy (formal & informal) Commercial and Industrial Areas in CBD Inundated Tourism sector Coastal communities Fisheries sector, 91 Fisher Folks 	<ul style="list-style-type: none"> Devaluation of affected lots and increased land-banking of LGU Decrease of LGU revenue (RPT) Agriculture: Crop production seasons are affected. <ul style="list-style-type: none"> Premature/early harvest could result to low quality produce. The Fishery sector is highly vulnerable to infestation of puffer fishes and jellyfishes during drought. The Livestock sector is also vulnerable to animal diseases. Reduced agricultural production; threat to food security 1,203-1,385 ha of Rice, corn, banana, assorted vegetables and root crops (sweet potato and cassava), ornamental plants & papaya / 2,458 farmers. Risk to croplands in 24 barangays with almost 2, 417 farmers and 1,218.15 hectares amounting to 15, 808, 688 pesos Salt water intrusion affecting water supply for irrigation Commerce/Trade/Industry Sector: Business operations running parallel to both sides of the Cagayan river are at risk to flooding. <ul style="list-style-type: none"> Reduced productivity and difficulty in mobility due to flooding Almost 51% of the manufacturing industry, wholesale and retail industry and MSME with an estimated total cost of Php50 Million in 14 barangays in the city center are at risk of reduced profit due to flooding Reduced profit from the private sector (commercial, industrial and tourism) which may translate to weak economy Tourism: Embarkation and disembarkation areas (white water rafting) are highly vulnerable to flooding and typhoons. <ul style="list-style-type: none"> Resorts, restaurants and hotel facilities along the Cagayan de Oro River are highly vulnerable to flooding. Ongoing development (hotel and shopping mall) at Brgy. Macasandig will be at risk in the event of future flooding. 	5	1.8	6.8	
RIL	<ul style="list-style-type: none"> Increased rainfall volume Decreased water absorptive capacity 	<ul style="list-style-type: none"> Too much dependence on clean culture-forming in sloping areas coupled with slope failures along road cuts & quarrying activities causes heavy erosion that destroys crops in upland and lowland 	<ul style="list-style-type: none"> Hinterland/upland farmers are at risk 	<ul style="list-style-type: none"> Access to farm to market roads for transportation of goods and products may be hampered due to frequent and extreme landslide events 	2	1.7	3.7	
Typhoon	<ul style="list-style-type: none"> Increase in average rainfall volume 	<ul style="list-style-type: none"> coastal inundation and storm surges Strong winds damaging to crops More intense flooding in urban centers Work suspension 	<ul style="list-style-type: none"> Coastal Communities 21 barangays in CBD with 2370 families 	<ul style="list-style-type: none"> Risk on embarkation and disembarkation areas (white water rafting) Reduced agricultural productivity Decreased economic performance of the City due to disrupted work in CBD Reduced income for private sectors and business establishments 	5	1.3	6.3	

ENVIRONMENT SECTOR							
Exposure and Sensitivity Summary						AC	Vulnerability
CC Hazard	Triggers	Primary / Secondary Impacts	Elements at Risk	Consequence (Current and Future)	Threat Level	AC Status	Relative Vulnerability
Drought	<ul style="list-style-type: none"> Increase in average temperature for CDO Less total seasonal rainfall during summer months 	<ul style="list-style-type: none"> Tree plantation and agricultural crops growth retarded / low survival rate/low production Maintenance cost increased 	<ul style="list-style-type: none"> Agricultural Areas in Cagayan and Iponan River Highly Urbanized Areas Highland barangays 	<ul style="list-style-type: none"> Dried –up springs and creeks Reduced fresh water supply Forest fires Ground water depletion Salt water intrusion 	Medium -Low (2)	2.3	4.3
Flooding	<ul style="list-style-type: none"> Increase in rainfall volume during rainy season coupled with monsoon rains and waves Sea Level Rise Influence of new developments in formerly undisturbed watershed Clogged and inadequate drainage Encroachment of ISF to riverbanks/protected areas Inefficient Solid Waste Management System Poor compliance to envi laws / mining regulations Denuded watershed in CDO, Bukidnon, Lanao del Norte, 88% watershed out of jurisdiction Illegally quarrying and mining in Iponan River area 	<ul style="list-style-type: none"> Severe soil erosion River Siltation Inundated Areas: more than 50% of the City's Barangays Disruption of water supply due to submerged pumping stations Informal settlers in hazard prone areas washed out/ submerged Damaged natural vegetation along the river system and biodiversity loss in coastal and marine ecosystem Inundation of bathing beaches Soil salinity in agricultural areas Decreased water absorptive capacity in upland ecosystem that leads to increased surface run-off Pufferfish & Jellyfish infestations in coastal areas 	<ul style="list-style-type: none"> Coastal/Riverbank Areas Hinterland Brgys (9 Brgys) Built-up areas (65 Brgys) Biodiversity Ground water and Freshwater resources Marine ecosystem (corals) Solid waste/ sanitary landfill Population live in flood prone areas (>50% of barangays) 	<ul style="list-style-type: none"> Intrusion of salt water in ground water reservoirs and irrigation supply Coastal erosion Contamination of ground water source due to seepage of polluted water/ chemicals from pesticides used in upland agriculture Changing water course expanding the width of the river and creating deltas, boulders, and islets w/c can lead to flooding in areas not flooded before Contamination of Rivers and Coastal Water bodies due to unsustainable farming practices in farming communities at Iponan River and Cagayan River System; Risk to Forest Fires 651,000 of the population and adjacent municipalities will be affected by air pollution Risks to drinking water contamination may increase due to Salinity, TSS & BOD, and Livelihoods that depend on natural resources and the recipient eco-systems the will be negatively affected. 	High (5)	1.5	6.5
RIL	<ul style="list-style-type: none"> Destructive Mining Practices Devoid of vegetative cover on steep slope areas Increased rainfall volume within CDO watershed Decreased woody vegetation Slope failures along road cuts & quarrying activities 	<ul style="list-style-type: none"> Severe soil erosion River siltation Contamination of Surface Water Soil degradation 	<ul style="list-style-type: none"> Mineral Resource Areas Tumpagon, Pigsag-an Dansolihon, Pagalungan FS Catanico, Mambuaya, Tagpangi, Besigan, Tuburan, Tignapoloan 	<ul style="list-style-type: none"> Degradation of marine and aquatic resources Risks on access to public facilities and emergency services may be hampered due to frequent and extreme landslide events Severe and frequent soil erosion and river siltation shall lead to river backflow and more intense riverine flooding events 	Medium (3)	1.8	4.8
Typhoon	<ul style="list-style-type: none"> Increased extreme rainfall return cycle Increased volume of water from Bukidnon, Lanao del Norte, Lanao del Sur and ARRM during rainy season More intense monsoon rains Natural local topography 	<ul style="list-style-type: none"> Decreased water absorptive capacity in upland that leads to increased surface run-off Trees are easily uprooted due to destabilized soil and slope failure Overflow of Rivers in barangays along Cagayan and Iponan River Storm Surges in coastal areas 	<ul style="list-style-type: none"> Highly Urbanized and Coastal/Riverbank Areas (16 Brgys) Highland barangays (with less trees/ forest cover) 	<ul style="list-style-type: none"> Risks on degradation of land and water resources More intense storm surges affecting coastal communities More intense flooding in urban ecosystem and in CBDs as a result of excessive rainfall and reduced permeable ground/ open space Stronger winds that may affect poorly designed infrastructures and houses built on light materials Risk to coral bleaching Coastal erosion 	High (5)	1.7	6.7

INFRASTRUCTURE SECTOR								
Exposure and Sensitivity Summary							AC	Vulnerability
CC Hazard	Triggers	Primary / Secondary Impacts	Elements at Risk	Consequence (Current and Future)	Threat Level	AC Status	Relative Vulnerability	
Drought	<ul style="list-style-type: none"> Increase in average temperature for CDO Less total seasonal rainfall during summer months 	<ul style="list-style-type: none"> Insufficient water supply (low water level) affecting irrigation. Increased usage/demand of power generators Interrupted power supply 	<ul style="list-style-type: none"> irrigation systems city wide power supply system located in 2 barangays Water system (booster pumps, reservoir, production wells. 	<ul style="list-style-type: none"> Reduced water supply for drinking Reduced power generation Dried up irrigation systems at Mambuaya, Pagalungan and Taglimao 	Medium 3	2.6	5.6	
Flooding	<ul style="list-style-type: none"> Increase in rainfall volume during rainy season coupled with monsoon rains and waves Sea Level Rise Influence of new developments in formerly undisturbed watershed Clogged and inadequate drainage Encroachment of ISF to riverbanks/protected areas Inefficient Solid Waste Management System Poor compliance to envi laws / mining regulations Denuded watershed in CDO, Bukidnon, Lanao del Norte, 88% watershed out of jurisdiction Illegally quarrying and mining in Iponan River area Unregulated Land Use conversion in upland & urban Encroachment of agri-business into watershed areas 	<ul style="list-style-type: none"> Damaged Roads and Bridges Flood control system collapsed Communication towers destroyed Water supply lines, booster pumps and pumping stations destroyed. Water Systems: Flooding: in Mambuaya, Pagalungan and Taglimao, Aura, Barangay (1.2 km damaged in 2011); Ruined public buildings Clogged Drainage systems Power lines and posts damaged Interrupted power supply 	<ul style="list-style-type: none"> Waterworks Sewerage: Flood Control and Drainage System : Cagayan River near Ysalina bridge, along Acacia street and Tambo in Barangay Carmen Energy & Power Lines, Stations: Flooding: Balulang, Macasandig, Nazareth, Carmen, Consolacion, Puntod, Macabalan and urban barangays irrigation facilities in Low lying areas in Barangay Mambuaya, Pagalungan and Taglimao Roads and bridges along Cagayan and Iponan river Roads and Bridge: Bayabas, Macabalan, Kauswagan, Punto, Onsolacion, Apasan, Nazareth, (Cabula bridge, Uguiaban bridge)Landslide: Ugman, FS Catanico, Ablon Public Bldgs, city tourism hall, COA, NIA, cemetery Ports in Coastal Zone 	<ul style="list-style-type: none"> Disruption of mobility within the CBD and in coastal areas 10 bridges at risk: Cabula, Uguiaban, Pelaez, Kagay-an, Ysalina, Maharlika, Puntod-Kauswagan, Domalokdok, Pagatapat-San Simon, Bulao, Iponan, Coastal bridge along Iponan River. Power and water supply lines, utilities and facilities along flood prone areas are highly at risk which may result to reduced power generation/ supply for the City Risk to water shortage and water distribution failure/ interruption Presence of informal settlers along riverbank with poor ecological sanitation, absence of centralized waste water treatment and poor seepage management, disruption on the collection of solid waste may exacerbate the clogging of canals and drainage Risk to ground water depletion and salt water intrusion in water reservoirs due to over extraction of ground water (rampant illegally operating deep wells & poor enforcement of the Water Code) Disrupted economic activities in the coastal area including port operations. 	Medium-High 4	3	7	
RIL	<ul style="list-style-type: none"> Denuded Upland/ Forest ecosystem in the upper watershed of CDO (Bukidnon, Lanao Del Norte) Destructive Mining Practices Devoid of vegetative cover on steep slope areas Increased rainfall volume within CDO watershed Slope failures along road cuts & quarrying activities 	<ul style="list-style-type: none"> Impassable Road network Disrupted mobility Damaged infra facilities 	<ul style="list-style-type: none"> Roads and bridges 37 linear kms. of road along 14 barangays affected 	<ul style="list-style-type: none"> Risk to access of hinterland barangays / upland communities in basic services in the lowland/ urban centers/ CBD give the disruption of mobility and transport networks 	Low 1	2.5	3.5	

LAND USE SECTOR								
Exposure and Sensitivity Summary							AC	Vulnerability
CC Hazard	Triggers	Primary / Secondary Impacts	Elements at Risk	Consequence (Current and Future)	Threat Level	AC Status	Relative Vulnerability	
Drought	<ul style="list-style-type: none"> Increase in average temperature for CDO Less total seasonal rainfall during summer months 	<ul style="list-style-type: none"> Tree plantation and agricultural crops growth retarded / low survival rate/low production Maintenance cost increased 	<ul style="list-style-type: none"> Agricultural Areas in Cagayan and Iponan River Highly Urbanized Areas Highland barangays 	<ul style="list-style-type: none"> Risk to increased incidence of Forest fires in upland area 	Low 1	2.33	3.33	
Flooding	<ul style="list-style-type: none"> Increase in rainfall volume during rainy season coupled with monsoon rains Sea Level Rise Influence of new developments in formerly undisturbed watershed Clogged and inadequate drainage Encroachment of ISF to riverbanks/protected areas Inefficient Solid Waste Management System Poor compliance to envl laws / mining regulations Denuded watershed in CDO, Bukidnon, LDN Illegally quarrying and mining in Iponan River area Unregulated Land use conversion (agriculture to residential and forest to agriculture) 	<ul style="list-style-type: none"> Commercial areas in CBD inundated Business activities disrupted Decrease of LGU revenue (RPT) Residential areas inundated Devaluation of affected lots Residents affected relocated and provided with housing Institutional inundated (Brgy Health Center and Brgy Halls) Disruption of basic health services Agricultural areas inundated Damage in crops Parks and open spaces affected (inhabited by informal settlers) Clearing of parks and open spaces Improved aesthetic value of the affected areas Infra / Utilities / Light and Water distribution system destroyed Disruption of water/electricity distribution Coastal inundation 	<p>RESIDENTIAL AREAS:</p> <ul style="list-style-type: none"> 68 brgy; 2, 116.71 hectares 135, 133 persons <p>COMMERCIAL AREAS:</p> <ul style="list-style-type: none"> 54 barangays; 192.20 has. 17, 844 persons <p>AGRICULTURAL AREAS:</p> <ul style="list-style-type: none"> 30 barangays; 801.06 has. 15, 522 persons <p>INSTITUTIONAL</p> <ul style="list-style-type: none"> 49 barangays; 110.29 has. 10, 343 persons at risk <p>Industrial areas</p> <ul style="list-style-type: none"> 13 barangays; 76.45 has. 3400 persons <p>Parks and Open Spaces</p> <ul style="list-style-type: none"> 48 barangays; 184.73 has. 9792 persons <p>Utility Areas</p> <ul style="list-style-type: none"> 13 barangays; 15.50 has 1729 persons 	<ul style="list-style-type: none"> Clogging of drainage and presence of debris or barrier which interfere with the flow of the rivers shall lead to more destructive riverine flooding along Cagayan and Iponan Rivers More risks on dense settlements in flood-prone areas, including in floodplains, former mangrove areas, old waterways (dry riverbed) and in geologically unstable areas (such as sandbars) Rapid urbanization where permanent structures along riverbanks affects the behavior of the river systems thereby increasing the risks in nearby communities. Coastal erosion Contamination of ground water source due to seepage of polluted water/ chemicals from pesticides used in upland agriculture Changing water course expanding the width of the river and creating deltas, boulders, and islets w/c can lead to flooding in areas not flooded before Risk to 21 barangays in commercial and trade/ business district with 2370 families Risk to croplands in 24 barangays with almost 2, 417 farmers and 1,218.15 hectares amounting to 15, 808, 688 pesos 	High 5	2.33	8.33	
RIL	<ul style="list-style-type: none"> Destructive Mining Practices Devoid of vegetative cover on steep slope areas Increased rainfall volume within CDO watershed Decreased woody vegetation Slope failures along road cuts & quarrying activities 	<ul style="list-style-type: none"> Infra / Utilities / Light and Water distribution system destroyed Disruption of water/electricity distribution and supply Destruction of properties Severe soil erosion River siltation Contamination of Surface Water Soil degradation Large and fast surface run-off 	<p>RESIDENTIAL AREAS:</p> <ul style="list-style-type: none"> 27 barangays; 1,108.36 has 16, 706 persons <p>COMMERCIAL AREAS:</p> <ul style="list-style-type: none"> 2 barangays; 3.86 hectares 225 persons <p>FOREST AREAS</p> <ul style="list-style-type: none"> 12 brgys;16, 987.38 has 16, 070 persons 	<ul style="list-style-type: none"> Degradation of marine and aquatic resources Risks on access to public facilities and emergency services may be hampered due to frequent and extreme landslide events Severe and frequent soil erosion and river siltation shall lead to river backflow and more intense riverine flooding events Reduce power generation Water supply shortage 	Medium 3	2.17	5.17	
Typhoon	<ul style="list-style-type: none"> Increased extreme rainfall return cycle Increased volume of water from Bukidnon, Lanao del Norte, Lanao del Sur and ARRM during rainy season More intense monsoon rains and waves Natural local topography 	<ul style="list-style-type: none"> Decreased water absorptive capacity in upland that leads to increased surface run-off Trees are easily uprooted due to destabilized soil and slope failure Overflow of Rivers in barangays along Cagayan and Iponan River Storm Surges in coastal areas Strong winds affecting coastal brgys 	<ul style="list-style-type: none"> Agricultural Areas in Cagayan and Iponan River Highly Urbanized Areas Highland Barangays Coastal Communities (12 barangays) 	<ul style="list-style-type: none"> Risks on degradation of land and water resources More intense storm surges affecting coastal communities More intense flooding in urban ecosystem and in CBDs as a result of excessive rainfall and reduced permeable ground/ open space Risks to poorly designed infrastructures and houses built on light materials due to stronger winds Coastal erosion 	Medium-Low 2	2.33	4.33	

B. Adaptive Capacity Status

The city's inherent ability to adapt to CC and its impact has also been recognized, and became the basis for adaptive capacity assessment. The adaptive capacity of Cagayan de Oro City was assessed by listing down the adaptive capacity evidences for each development sector and categorized in six dimensions, namely: **Wealth, Technology, Institutions, Information, Infrastructure, and Social Capital**. It is perceived that the Adaptive Capacity of Cagayan de Oro City will offset the Threat (Exposure and Sensitivity).

Typhoon (1.8) scored the highest AC status (1 being the highest) while the adaptive capacity to drought has been identified as the lowest. This low score can be attributed to the lack of available scientific information that can be used to prepare and enhance resiliency to drought and the insufficient historical data about the hazard which primarily impacts the agriculture and water sector.

The guidance of national agencies on the occurrence of tropical cyclones and the massive information dissemination campaign has primarily contributed to the high score of Typhoon while the low knowledge and technology on drought is crucial as shown in its low Adaptive Capacity rating. Furthermore, the city's average adaptive capacity status of 2.24 is considered as medium-high.

The inherent ability of these sectors and systems to adjust or adapt to climate change is a vital factor in these assessment. The adaptive capacity assessment as summarized below helped determine the level or status of AC that needs to be improved in order to build more resilient communities and sectors. All ratings were identified through a large multi-level stakeholder group consultation workshop.

Table 2.4
Perceived Adaptive Capacity

Sector	Flooding	Drought	RIL	Typhoon	Ave. AC
Social	2.5	3.5	2.8	2.0	2.7
Economic	1.8	2.0	1.7	1.3	1.7
Environment	1.5	2.3	1.8	1.7	1.8
Infrastructure	3.0	2.6	2.5	-	2.7
Land Use	2.33	2.33	2.17	2.33	2.3
City Wide AC	2.23	2.55	2.2	1.8	2.24

* High – 1; Low - 5

Meanwhile, the average AC scores for each of the six Adaptive Capacity dimensions (as shown in the table below) reveal that in the context of CCA and DRRM, “Social Capital” has the highest overall rating (1.76). This is an evidence of the large and diverse network of support and assistance that the City is getting to increase their resilience to climate change. However, the assessment showed the need to improve on the infrastructure (construction /rehabilitation of protective infrastructure and promotion of sustainable and climate-resilient structural designs), which has scored the lowest (2.65).

For flooding, technology and social capital (1.6) are the highest adaptive capacity status for flooding, while wealth and infrastructure needs to be given more attention. Drought has a high AC status on institution and social capital (2) while information has the lowest rating. It is noted that very few records and studies are available for drought in the City. In RIL (1.8) and Typhoon (1.2), the technology dimension has been scored the highest due to the introduction and promotion of slope management and stabilization technologies in the upland ecosystem of Cagayan de Oro and upgraded technology that is being used in the country to determine and project the occurrence and pathways of tropical cyclones. In both CC hazards, infrastructure scored the lowest as reflected by the need to enhance resilience of this dimension in all sectors.

Table 2.5
Average Rating per Adaptive Capacity Dimension

CC Hazard	Wealth	Technology	Information	Institution	Infrastructure	Social Capital
Flooding	2.6	1.6	2.1	2.1	2.4	1.6
Drought	2.2	3	2.8	2	2.6	2
RIL	2	1.8	2.2	2.2	2.6	2
Typhoon	2	1.2	1.5	1.25	3	1.5
Ave. AC score per dimension	2.2	1.9	2.15	1.89	2.65	1.76

C. Relative Vulnerability

The relative vulnerability of Cagayan de Oro City was determined by analyzing the threat level and status of adaptive capacity. The Vulnerability and Adaptation Assessment or VAA Summary includes brief details on the threat level (exposure and sensitivity) and assessment of adaptive capacity for each of the five development sectors – **Social, Economic, Environment, Infrastructure, and Land Use** – as identified by the expanded

technical working group of Cagayan de Oro City. Below is the score guide used for the assessment.

Score Guide	
THREAT LEVEL ASSESSMENT	ADAPTIVE CAPACITY ASSESSMENT
Exposure and Sensitivity	Adaptive Capacity
High = 5 Medium High = 4 Medium = 3 Medium Low = 2 Low = 1	High = 1 Medium High = 2 Medium = 3 Medium Low = 4 Low = 5
$Relative\ Vulnerability\ (RV) = Threat\ Level\ (TL) + Adaptive\ Capacity\ (AC)$	

Based from the results of the assessment, Cagayan de Oro City is most vulnerable to flooding. Flooding and Typhoon marked the highest threat levels among the four identified climate change hazards. The rating was based on the level of threat (exposure and sensitivity) that the hazard brings and the level of the city-wide adaptive capacity (capacity of the system to cope and adjust to the changing climatic conditions) to the particular climate change impacts. Although not very low on AC rating, the level of adaptive capacity of the City as a response to these hazards can still be improved.

Table 2.6
Relative Vulnerability by Hazard

Climate Change Hazard	Threat Level (5-highest)	Adaptive Capacity (1-highest)	Relative Vulnerability Rating (10-most vulnerable)
Flooding	4.8	2.23	7.03
Typhoon	4.25	1.8	6.05
Drought	2.4	2.55	4.95
Rain Induced Landslide	2.2	2.2	4.4

Moreover, there is recognition on the existing initiatives and ongoing programs of the City government in partnership with other concerned organizations and agencies to continue building on the City's capacity towards climate change adaptation and mitigation. However, as discussed in this

assessment, there are other crucial aspects that need to be improved and prioritized in order to reduce the threat level and increase resiliency of identified highly vulnerable areas (highly dense coastal communities, poor families in barangays alongside Cagayan and Iponan River and informal settlements in its riverbanks, CBD being a floodplain, deforested and rain-dependent farming communities in the upland).

Meanwhile, the table below reveals that the social sector (6.45) is relatively the most vulnerable sector. This may be attributed to the higher risks on settlements and social services especially in the densely populated hotspot areas.

Table 2.7
Relative Vulnerability per Sector

Development Sector	Threat Level (5-highest)	Adaptive Capacity (1-highest)	Relative Vulnerability Rating (10-most vulnerable)
Social	3.75	2.70	6.45
Environment	3.75	1.83	5.58
Economic	3.75	1.70	5.45
Infrastructure	2.67	2.70	5.37
Land Use	2.75	2.29	5.04

Developmental and proactive initiatives can boost the capacity of these sectors combined with better infrastructure support and economic development policies. Nonetheless, the overall relative vulnerability of the city is between the ratings of 4 - 7, which means that the city has medium to high risks in terms of vulnerability to climate change and its impacts.

IDENTIFYING KEY ADAPTATION OPTIONS

Social Sector

OBJECTIVE: Social Sector	CC ADAPTATION OPTION(S)	OTHER OPTIONS (CC, DRR)
<p>Objective: “To implement informal settler-related laws and relocation to a safer and decent location</p> <p>Recommendation: To implement housing and urban development related laws</p> <p><i>*Informal sectors are most vulnerable to many calamities and hazards</i></p>	<ul style="list-style-type: none"> • Construction of an Evacuation Center • Improve livelihood of the households and their basic needs in the relocation sites and resettlement areas • Mobilization of additional volunteers/ manpower for rescue operations 	<ul style="list-style-type: none"> • Identification of evacuation sites in strategic places • Land Banking • Resettlement project • Relocation of the families residing within the danger zone
<p>Objective: “To promote peaceful, healthy and highly educated community”</p> <p>Recommendation: To promote peaceful, healthy, and resilient community</p> <p><i>*Healthy and highly educated people have higher adaptive capacities.</i></p>	<ul style="list-style-type: none"> • Regular health care and supplemental feeding for malnourished children • Rescue and emergency drill in communities schools, offices at risk to increase awareness • Additional trained manpower on psychosocial support services • Purchase of additional rescue equipment 	<ul style="list-style-type: none"> • Health emergency and medical services • Conduct of research and rescue training • Training in the management of the dead and missing

Economic Sector

OBJECTIVE: Economic Sector	CC ADAPTATION OPTION(S)	OTHER OPTIONS (CC, DRR)
<p>1. Objective: “To implement Sloping Agricultural Land Technology (SALT) / contour farming</p> <p>Recommendation: To promote and implement Sloping Agricultural Land Technology (SALT)/ Contour Farming</p> <p><i>*Agricultural areas of CDO are mostly located in sloping areas and therefore susceptible to erosion and landslides during rains and may result to siltation</i></p>	<ul style="list-style-type: none"> • Adjust planting (harvesting) calendar to ensure agricultural productivity • Planting of early maturing varieties (5 brgys. Around Iponan River) • Provide sustainable alternative livelihood opportunities • Prohibit firewood gathering and mining activities in the upland • Plant shrub-type crops, bamboos and trees to serve as wind breaks • Impose compulsory practice of SALT • Planting of permanent crops and root crops in sloping areas to increase vegetative cover • Planting of drought-resistant crops and varieties 	
<p>2. Objective: “To implement Tourism Development Programs”</p> <p>Recommendation: To Implement Eco-friendly Tourism Programs and Projects</p> <p><i>*The core of tourism in Cagayan de Oro lies in White Water Rafting which is vulnerable to climate change impacts.</i></p>	<ul style="list-style-type: none"> • Implementation of Rainforest development in 5 brgys. (3,000has.) • Develop high quality infra facility for tourism on proper and safe location • Create other tourism attractions and adventure • Provide sustainable alternative livelihood opportunities • Prohibit firewood gathering and mining activities in the upland 	

<p>3. Objective: “To promote favorable entrepreneurial investment opportunities”</p> <p>Recommendation: To promote eco-friendly investment opportunities to generate employment</p> <p><i>*Previously, industries and investments usually don’t consider the environment when planning.</i></p>	<ul style="list-style-type: none"> • Construct/install river protection wall in urban barangays running along the riversides 	<p>Market Study Pre-FS Packaging for PPP</p>
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Environment Sector

OBJECTIVE: Environment Management Sector	CC ADAPTATION OPTION(S)	OTHER OPTIONS (CC, DRR)
To protect maintain and enhance inland and coastal waters	<ul style="list-style-type: none"> • Establish Ecological Baseline Data and conduct river assessment particularly on Water quality, volume of river discharges, tidal variation data, extent of water pollution after flooding, actual tenure over river easement • Geological Assessment/Study of the River System • Riverbank stabilization • Shoreline Tracing / Coastal trending • Formulation of Cagayan de Oro and Iponan river rehabilitation plan • Restore water quality based on its most beneficial use / designated classification • Adoption of River Basin / Watershed approach in planning • Implementation of Water Quality Management Area (WQMA) 	
To ensure effective solid and liquid waste disposal	<ul style="list-style-type: none"> • Creation of Solid Waste Management Board • Establishment of a Sanitary Landfill • Enforce the Ecological Solid Waste Management Act (R.A. 9003) • Enact Septage Management Ordinance • Establish sewerage system • Establishment of MRF for every barangay or cluster of barangays • Conduct IEC on Solid Waste Management (SWM) 	
To arrest degradation and rehabilitate denuded forest areas	<ul style="list-style-type: none"> • Strict enforcement of sanctions on illegal cutting of trees • Establish buffer zones from settlements within the watershed areas • Review of existing policies/guidelines on issuance of tenurial instruments to timberland areas to harmonize the implementation of the IPRA law • Reforestation of degraded forest areas • Adoption of NIPAS law in critical 	

	<p>watershed areas</p> <ul style="list-style-type: none"> • Creation of Bantay Kalikasan Taskforce at barangay level • Implementation of National Greening Program in upstream Barangays 	
To promote sustainable use of mineral resources	<ul style="list-style-type: none"> • Strict implementation of mining laws • Deputization of Barangay Officials to enforce mining laws • Identification and Assessment of mining areas • Creation of the City mining regulatory board • Regular monitoring, control and surveillance (MCS) 	
To protect wildlife and vegetation and preserve biodiversity	<ul style="list-style-type: none"> • Rehabilitation of mangrove areas particularly in coastal barangays • Conduct massive assessment and inventory of abandoned fishpond and enact ordinance on conversion of the same to mangrove areas • Formulation of City Integrated Coastal management Plan • Establishment of protected areas 	
To minimize occurrence of flooding in the low lying areas and along the riverbanks and its adjoining areas	<ul style="list-style-type: none"> • Mainstreaming of DRRM plan and CCA into city government's programs and policies • Establish Protected and Conservation Areas • Preparation and adoption of Watershed Management Plan with other localities • Preparation of comprehensive drainage masterplan and implementation of drainage systems for all priority areas • Establishment of New Waterways in built-up area • Dredging of waterways and Declogging of Drainage Canals • Construction/Rehabilitation of Flood Control Dikes and Slope Protection along Cagayan and Iponan River • Adoption of climate resilient and green building technology in urban area • Adoption of Watershed Approach - 	

	<p>establishment of Retention Ponds, Reforestation and Rehabilitation of Forests</p> <ul style="list-style-type: none"> • Establish buffer zones in danger areas • Enact city ordinance to implement 20-meter legal easement on riverbanks 	
To minimize air pollution in the Urban areas	<ul style="list-style-type: none"> • Establish greenbelt in urban communities • Conduct carbon reduction initiative • Operationalize Multi sectoral CDeO Airshed Management (RA 8749 - Clean Air Act) • Intensify anti smoke belching drive • Strengthen motor vehicle inspection system (MVIS) • Intensify conduct of IEC on effects of open burning 	
To protect and conserve ground and surface water	<ul style="list-style-type: none"> • Creation of City Water Resources Board • Regulate extraction of ground water • Utilization of Existing springs for potable water supply • Harmonization of policies between LWUA, NWRB and Local water providers 	

Infrastructure Sector

OBJECTIVE: Infrastructure Sector	CC ADAPTATION OPTION(S)	OTHER OPTIONS (CC, DRR)
<p>To improve existing road network and linkages to other areas;</p> <p>To develop new road networks to hasten development in growth areas and in the hinterland barangays.</p> <p>To decongest the Central Business District</p> <p>To develop a highly elevated monorail system and other new modes of mass transportation.</p>	<ul style="list-style-type: none"> • Construction /Rehabilitation of Ugiaban Bridge and Cabula Bridge into climate resilient • Adoption of low carbon emission utility vehicles • Fast tract the implementation of the Mindanao Railway System • Promote carpooling system • Adoption of (BRT) bus rapid transit system • Construction/rehabilitation of climate resilient roads and bridges. • Formulation of a mass transport plan • Introduction of River Taxi as mode of public transportation • Provisions of pedestrian walkway, bicycle and motorcycle lane on major road network 	<p>Regulate importation of surplus vehicles.</p> <p>Strict enforcement of traffic ordinance.</p> <p>Adoption of building back better policy in rehabilitation projects.</p>
<p>To establish an efficient and sustainable power system (for power security and low carbon emission)</p>	<ul style="list-style-type: none"> • Shifting to less power consuming technology (conversion of sodium lights to LED) • Acquire additional stand-by power generators to ensure uninterrupted supply during power failures; • Development of redundant Power generation System (solar power, etc.) • Adoption of green building technology • Encourage energy conservation practices • Adoption of Disaster 	

	resilient distribution system	
To provide a safe, efficient and sustainable water supply system.	<ul style="list-style-type: none"> • Promote water conservation practices • Adoption of Rainwater Harvesting facility • Develop springs and other water bodies as sources of potable water. • Adopt climate resilient water distribution system • Increase water production capacity • Proportionately with the increase of the population and future demands 	
To expand capacities of rivers, creeks and waterways To provide an efficient drainage and sewerage system.	<ul style="list-style-type: none"> • Rehabilitation of existing drainage and canals • Construction/Rehabilitation of Flood Control Dikes and Slope Protection system along Cagayan and Iponan Rivers. • Establishment of New Waterways in built-up areas • Proper Dredging of Major Rivers • Construction of Adequate Drainage System (identified in Bulua, Kauswagan)/ Upgrade size of drainage culverts • Provision of retention and detention ponds in large scale land developments to delay surface water run-off to existing waterways and canals. 	Relocation of informal settlers from canals and creeks
To provide an efficient	<ul style="list-style-type: none"> • Establish disaster-resilient telecommunication facilities • Promotion of wireless 	

<p>and reliable telecommunication facilities and services to the entire city.</p>	<p>system technology</p> <ul style="list-style-type: none"> • Encourage other communication companies to operate in the city. • Provisions of right of way for utilities in the urban design • Expansion of telecommunication services to the hinterland barangays. 	
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Land Use Sector

<p>OBJECTIVE: Land Use Sector</p>	<p>CC ADAPTATION OPTION(S)</p>	<p>OTHER OPTIONS (CC, DRR)</p>
<p>1. Objective: “Implement informal settler-related laws and relocation to a safer and decent location”</p> <ul style="list-style-type: none"> - Informal settlers are located in high-risk areas like rivers, creeks, etc. This objective will address the impact of hazards such as typhoons and landslides. - If we can relocate settlers in high risk areas, there will be fewer casualties. 	<p>Re-Activate Local Housing Board Propose Creation of City Housing/Shelter Department/Office Strict enforcement of river easements CDRRMC approval as requirement in the Issuance of Locational Clearance/ Building Permit Prohibit settlements within the legal easement along riverbanks by strict implementation of existing laws</p>	

<p>2. Objective: “A safe, peaceful and orderly community”</p> <ul style="list-style-type: none"> - Improvement: To develop a well planned community - A “well-planned community” indicates that all factors affecting the community will be considered during flooding as well as in other hazards. - The objective also places emphasis on safety which is of prime importance. 	<p>Activate and enhance capacities of BDRRMC (identified in Balulang)</p> <p>Implementation of Early Warning System at the brgy level particularly in high risk areas (identified in Balulang)</p> <p>Info-Board not only for “Smart” Subscribers</p> <p>Implementation of all lifelines and major infrastructures</p> <p>programs/projects should be supported with geo and hydrometeorological hazard clearance from MGB and other mandated government agencies</p> <p>Mainstreaming of DRRM plan and CCA into city government’s programs and policies</p> <p>Strict enforcement of RA 9003 (Ecological Solid waste Management) up to Barangay Level (identified in Kauswagan)</p>	
<p>3. Objective: “Establish buffer zones from settlements in watershed areas”</p> <ul style="list-style-type: none"> - Improvement: To establish buffer zones from settlements in river systems areas <p>It may be best to primarily look at river systems instead of watershed areas which are bigger in coverage</p>	<p>Strict enforcement of river easements</p> <p>Prohibit settlements within the legal easement along riverbanks by strict implementation of existing laws</p> <p>Preparation and adoption of Watershed Management Plan with other localities</p> <p>Watershed Approach – Retention Ponds, Reforestation and Rehabilitation of Forest</p> <p>Establish Protected and Conservation Areas</p>	<p>Maintain/Sustain Protected and Conservation areas</p>

Table 2.8
Long List of Adaptation Options obtained from City-Wide Consultation Workshop

Hazard	Social	Economic	Environment	Infrastructure	Land Use
Flooding	<ul style="list-style-type: none"> • Construction of an Evacuation Center and equipment (identified in Brgy. Dansolihon and Mambuaya) • Additional skilled manpower for rescue operations • Purchase of additional rescue equipment • Additional trained manpower on psychosocial support services 	<ul style="list-style-type: none"> • Implementation of Proposed Rainforest Development in 5 Brgys. (3,000has.) • Develop High Quality Infra facility on tourism on proper and safe location • Adjust planting (harvesting) calendar to ensure agricultural productivity • Planting of early maturing varieties (5 barangays around Iponan River) • Create other tourism attractions and adventure like Rock Wall Climbing etc. • Provide sustainable alternative livelihood opportunities • Prohibit firewood 	<ul style="list-style-type: none"> • Establish Ecological Baseline Data and conduct river assessment particularly on Water quality, volume of river discharges, tidal variation data, extent of water pollution after flooding, actual tenure over river easement • Geological Assessment/Study of the River System • Riverbank stabilization • Communal Gardening (identified in 	<ul style="list-style-type: none"> • Construction/Rehabilitation of Flood Control Dikes and Slope Protection along Cagayan and Iponan River • Establishment of New Waterways in built-up area • Acquisition of Heavy Equipment for Desiltation of Rivers and Declogging of Drainage Canals (identified in Carmen) • Dredging of Major Rivers • Adoption of climate resilient and green building technology • Retrofitting of all bridges • Construction /Rehabilitation of Ugyaban Bridge and Cabula Bridge • Enforcement thru local ordinances of Flood-resistant housing structures (identified in Balulang) 	<ul style="list-style-type: none"> • Re-Activate Local Housing Board • Propose Creation of City Housing/Shelter Department/Office • CDRRMC approval as requirement in the Issuance of Locational Clearance/ Building Permit • Strict enforcement of NIPAS • Activate and enhance capacities of BDRRMC (identified in Balulang) • Implementation of Early Warning System at the brgy level particularly in high risk areas (identified in

	<ul style="list-style-type: none"> • Regular health care and supplemental feeding for malnourished children (identified in Brgy. FS Catanico) • Empower households in relocation sites and resettlement areas (improve livelihood systems and basic services) (identified in Kauswagan) • Flood rescue and emergency drill in communities 	<p>gathering and small scale mining particularly in upland barangays (identified also in Brgy. Mambuaya)</p> <ul style="list-style-type: none"> • Dispersal of seedling varieties (fruit trees, vegetables, etc.) and organic fertilizer • Replant more trees, esp. fruit trees (identified in Brgy. Mambuaya) 	<p>Balulang)</p> <ul style="list-style-type: none"> • Strict enforcement of sanctions on Illegal Cutting of trees (identified in Balulang, Carmen) • Rehabilitation of mangrove areas particularly in coastal barangays • Establish a sanitary landfill in a proper location • Increase awareness thru local TV stations on CC and tips on reducing pollution (identified in Carmen) • Brgy. FS Catanico: Vehicles for 	<ul style="list-style-type: none"> • Construction of Rainwater Harvesting Technology (identified in Balulang, Kauswagan) • Flood Control Dikes from Bulao to highway (identified in Balulang, Carmen) • Construction of Adequate Drainage System (identified in Bulua, Kauswagan)/ Upgrade size of drainage culverts • Complete drainage masterplans for all priority basins of CDO as basis to improve drainage system • Establish concrete farm-to-market roads for easy accessibility • Brgy. Mambuaya: Construct flood control dikes and culvert to river from Zone 2 	<p>Balulang)</p> <ul style="list-style-type: none"> • Info-Board not only for “Smart” Subscribers • Preparation and adoption of Watershed Management Plan with other localities • Watershed Approach – Retention Ponds, Reforestation and Rehabilitation of Forest • Establish Protected and Conservation Areas • Strict enforcement of river easements • Strict enforcement of RA 9003 (Ecological Solid waste Management) up to Barangay Level (identified in Kauswagan)
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	<p>(identified in Balulang, Kauswagan, Carmen), schools, offices at risk to increase awareness</p> <ul style="list-style-type: none"> • Relocation of informal settlers along Cagayan de Oro River and the river side of Brgy. FS Catanico • Brgy Mambuaya: Fully organize BDRRMC 		<p>garbage collection</p> <ul style="list-style-type: none"> • Brgy. Mambuaya: Provide more supply of potable water for the growing population. 		<ul style="list-style-type: none"> • Implementation of all lifelines and major infrastructures programs/projects should be supported with geo and hydrometeorological hazard clearance from MGB and other mandated government agencies • Strict enforcement on subdivision regulations (increase in open spaces) • Prohibit settlements w/in legal easement along riverbanks by strict implementation of existing laws
Typhoon		<ul style="list-style-type: none"> • Plant Shrub-type crops, bamboos and trees to serve as wind breaks 	<ul style="list-style-type: none"> • Shoreline Tracing/Coastal Trending 		
Rain-Induced		<ul style="list-style-type: none"> • Impose compulsory 	<ul style="list-style-type: none"> • Actual Survey of 	<ul style="list-style-type: none"> • Slope Protection thru 	

Landslide		<p>practice of SALT (Practice of multi-storey cropping)</p> <ul style="list-style-type: none"> • Planting of permanent crops and root crops in sloping areas to increase vegetative cover 	<p>Farm Lots</p> <ul style="list-style-type: none"> • Sustainable farming practices to reduce soil erosion and river siltation 	<p>construction of ripraps, gabion and revetment wall on upland areas and riverbanks (identified in Carmen)</p>	
Drought		<ul style="list-style-type: none"> • Planting of drought-resistant crops and varieties (legumes and root crops) • Rehabilitation/Repair of Irrigation System in Mambuaya 	<ul style="list-style-type: none"> • Inventory of Deep wells • Water Quality Monitoring of Deep wells (Potability Test) • Assessment of Water Aquifer 	<ul style="list-style-type: none"> • Establishment of Renewable Power Supply System (solar power) • Shifting to less power consuming technology. (Conversion of streetlights to led lights. etc.) • Promote community-based water conservation practices 	

Chapter 3 The Comprehensive Land Use Plan

3.1 Introduction

The Cagayan de Oro City 2013-2022 Comprehensive Land Use Plan was prepared pursuant to the Local Government Code of 1991 (RA 7160), which mandated the Local Government Units, to “**prepare their comprehensive land use plans and enact them through zoning ordinances**”.

The Plan is meant to guide the city physical development and to steer the city’s growth as the business and trading center of Southern Philippines. It provides a framework of goals, objectives, strategies and actions required for achievement of the city/s future “CdeO 2022”.

3.2 Vision

A city managed through good governance, empowering its citizenry to thrive in a highly competitive economy and a sustainable environment nurturing its diversity and multi-cultural heritage towards a resilient, progressive, and inclusive future.

3.3 Goals, Objectives, Strategies

Goals & Objectives

Upliftment of socio-economic condition by empowering the citizenry for a safe, healthy and secured community integrating the principles of DRR-CCA

- To promote safe, peaceful, orderly, healthy and CCA+DRR resilient community
- To improve the quality of education
- To Implement housing and urban development-related initiatives
- To promote values formation in the community
- To promote skills development and technology transfer
- To provide livelihood opportunities
- Maximize utilization of safe and secure settlement areas to accommodate demand in housing
- To improve water production capacity in order to serve other areas and for future demands
- Improved health services and minimize climate change and disaster related diseases
- Increased no. of decent and resilient housing for ISFs and formal sector in identified high risk areas in brgys
- Effective & efficient delivery of social welfare services to affected families in times of calamities

An efficient and responsive governance

- To strengthen government-private/NOGs/CSOs collaboration
- To strictly implement environmental and other laws and ordinances
- To improve efficiency in fiscal management
- To formulate and promote policies, laws and ordinances on resiliency to CC/DR impact with transparency and accountability
- To promote efficiency in fiscal management thru sufficient allocation of funds for the DRR/CCA plans and programs
- To equip city and barangay officials with capacity for effective and responsive urban environmental governance
- Increased resiliency of academic institutions to climate change and disaster related events
- Increase involvement of the private sectors and CSOs in the implementation of projects and programs
- Increase awareness and knowledge on the impacts of CCA/DRR

A sustainable development for the protection and utilization of natural resources for inclusive growth

- To preserve natural tourist attractions and cultural heritage sites
- To improve the quality of inland, coastal, surface, and ground waters according to their designated classification
- To protect and conserve the integrity of fresh water resources.
- To ensure effective solid and liquid waste disposal
- To arrest degradation and rehabilitate denuded forest areas
- Provide natural flood abatement facilities
- To promote sustainable use of mineral resources
- To protect wildlife and vegetation and preserve biodiversity
- To minimize occurrence of flooding in the low lying areas and along the riverbanks and its adjoining areas
- To reduce soil erosion and improve soil fertility
- To minimize air pollution in the urban areas
- To protect and conserve ground and surface water
- Maximize use of land in urban areas
- Increase percentage of open spaces
- To improve existing and develop road network to hasten development in new growth areas in the hinterland barangays
- To formulate a comprehensive transportation masterplan
- To protect and conserve ground and surface water
- To rehabilitate Mangrove and inter-tidal vegetation (coral reef and sea grass areas) in 5 years
- To develop and provide legislated protection to wildlife sanctuary areas
- Establish updated environment planning database
- To optimize agricultural production/productivity and sustain/increase yields by 10%:

- crops
- fishery
- livestock & poultry
- forestry
- Preserve, protect and enhance natural and heritage tourism sites and indigenous peoples' way of life

Investment Enabling City

- To maintain good peace and order condition
- To promote green and disaster resilient infrastructure
- To provide infrastructure facilities and utility support
- To organize and develop alternative livelihood system
- To provide adequate supply of potable water
- To strengthen human resources development
- To promote private-public partnership
- To ensure reliability and sustainability of power supply (power generation, power distribution thru N+1 supply mode, renewable energy program)
- To develop and enhance drainage and sewerage system
- To establish efficient and effective information and communication system
- To promote eco-friendly investment opportunities to generate employment
- To ensure unhampered business operations year-round through proper implementation of existing laws and regulations and provision for infra-support facilities.
 - Industry
 - Trade/Commerce
 - Services (e.g. tourism, ICT etc.)

Strategies

Social

Employment & Livelihood

- Livelihood program (home and community-based) to augment income
- Implementation of regular training program for skills development and enhancement (entrepreneurship development program)
- Compliance with standard ration of social services

Housing & Resettlement

- Provision of funds for housing
- Relocation for dwellers within the hazard areas
- Provision of decent, affordable housing on environmentally safe areas
- Adopt community mortgage program for informal settlers
- Application of urban renewal in onsite relocation
- Encourage housing developers to participate/engage in socialized housing

Sports and Recreation

- Establishment of sports complex

Disaster Risk Reduction & Mitigation

- Establishment of evacuation center
- Introduction of alternative livelihood projects
- Conduct IEC/drills of disaster preparedness and implementation of DRRM Plan
- Organization of community disaster response team
- Regular health care and supplemental feeding for malnourished children
- Rescue and emergency drill in community, schools, offices at risk
- Disaster preparedness programs
- Proper utilization of DRRM Fund
- Construction of multi-storey schools and other public buildings in safer areas within the barangay
- Improvement of educational facilities
- Promotion of Technical/Vocational Courses
- Medical Emergency and health services
- Promote the concept of cremation
- Identify possible burial sites
- Promote multi-interment
- Improvement of jail buildings with facilities
- Construction of additional police sub-stations
- Establishment of central fire station and its facilities
- Daycare Centers in all relocation sites
- Landbanking

- Establishment of city social welfare services complex
 - Center for street children
 - Vocational and Development Center for Person/Children with Disabilities
 - Day Center for Senior Citizens
 - Center for Women
 - Center for Mentally Challenged Persons

Economic

- Expand areas for urban greening
- Streamlining business registration process and lowering business transaction costs
- Strengthen investment promotion
- Establishment of high-density commercial district in the new growth areas
- Pedestrianization of commercial districts and in cultural heritage areas
- Promotion of Agricultural Technology in selected rural areas
- Provision of alternative livelihood projects/activities
- Implementation of integrated coastal management plan (11 coastal barangays)
- Development of rural road network linking to primary farming areas
- Establishment of post-harvest facilities
- Enhancement of Agriculture and Fisheries Modernization Plan
- Development of tourism sites
- Development of comprehensive tourism programs
- Encourage farmers/fisherfolks to insure crops, livestock and fishery with PCIC
- Conservation and protection of cultural, natural sites and heritage
- Maintenance of identified natural sites for eco-tourism
- Installation of irrigation facilities (SWIS)

Infrastructure

- Provision, rehabilitation and establishment of quality infra-support (river dikes, protection wall, upgraded drainage canal)
- Formulation of Comprehensive Drainage Master Plan
- Encourage solar energy as alternative source of power
- Improvement of road network
- Establishment of by-passed roads
- Pedestrianization (Divisoria)
- Establishment of bicycle lanes
- Tap alternative sources of potable water

- Establishment of sewerage system
- Promote water conservation practices
- Modify water supply facilities to be hazard resilient
- Dredging of rivers
- Implement/enforce Clean Water Act and other pertinent laws and regulations
- Retrofitting of bridges
- Adoption/integration CCA-DRR plan into urban development.
- Adopt disaster-resilient telecommunication facilities/system.
- Adopt Shift Improve and Avoid policy
- Formulation/development of a Comprehensive Transport Plan
- Promote carpooling and use of public utility vehicles
- Discourage importation of surplus vehicles
- Introduction of rain-harvesting system and other water impounding facilities in big business establishments
- Provision of retaining walls/flood control dikes
- Improvement of river channel
- Shift/influence development from hazard prone to hazard free areas
- Adoption of Geo hazards Consideration in planning and construction.
-Encourage structures on stilts
- Modification of public offices/buildings to be disaster resilient

Land Use and Environment

- Promotion of urban gardening
- Passage of ordinance for no build zone areas
- Strict implementation of traffic rules and regulation
- Strict implementation of legal easement as provided by law
- Implementation of project NOAH/warning system in coordination with DOST
- Adoption of River Basin/Watershed Approach in Planning
- Implementation of DRR Management Plan
- Implementation of river basin planning system approach
- Establishment of buffer zones in danger areas
- Implementation of National Greening Program (upstream brgys)
- Utilization of existing springs for potable water supply
- Harmonization of policies between LWUA, NWRB and Local Water Providers
- Regulation of the extraction of underground water
- Implementation of septage management ordinance (short term solution)
- Implementation of Water Quality Management Area
- Regulate Mining Activities
- Strict implementation of RA 9003

- Strict implementation of the Water Code, particularly on easement as provided by law
- Rehabilitation of denuded areas
- Landbanking
- Urban Greening Projects
- Greenbelt Establishments
- Strict enforcement of mining and other environmental laws
- Strengthening of Task Force Iponan River
- Identification of mining areas
- Involvement / deputation of Barangay Officials in the enforcement of mining and other environmental laws
- Creation of the City Mining Regulatory Board
- Regular monitoring, control, and surveillance (MCS)
- Empowering the local residents in safeguarding the environment
- Strict implementation of the ordinance regarding internet cafes
- Establish warning system devices in every school

3.4 The Concept/Structure Plan

The structure plan of the City of Cagayan de Oro focuses on the priority development for the next ten years. This includes the following:

- Conservation and preservation area in Barangays Macahambus, Mambuaya, F.S. Catanico, Malasag, Dansolihon, Bayanga, Cugman, Agusan, Indahag, Balubal
- Heritage Sites in Barangays Poblacion, Divisoria, and Taguanao
- Urban Greening Area in Barangays Poblacion, Isla de Oro and along riverbanks
- Reforestation Area in Barangays Bayanga, Lumbia, Agusan, Baikingon, Besigan, Camaman-an, Canitoan, Carmen, Taglimao, Pigsag-an, Balulang, Tignapoloan and Dansolihon
- Light-Medium Industrial Area in Barangays Tablon, Cugman, Agusan, Bugo, Puerto and Lumbia
- Mangrove Reforestation in the coastal barangays of Bayabas, Bonbon, Agusan, Tablon, Cugman, Bugo, Puerto, Bulua
- Agricultural and Forest Areas in the southernmost barangays of the city
- Western Urban Development in Barangays Bulua, Patag, Kauswagan, Bonbon and Bayabas
- West Uptown Development in Upper Carmen, Canitoan, Lumbia and Pagatpat
- East Uptown Development in Gusa, Indahag, Macasandig and Camaman-an
- Eastern Urban Development in Upper and Lower Puerto, Bugo, Agusan, Balubal, and Tablon
- Downtown Development in Poblacion (CBD), Carmen, Lapasan, Puntod and Macabalan

3.4.1 Preferred Development Thrust

Commercial and Light-Medium Industrial Development

The City opted for commercial and light-medium industrial development. The chosen thrust was evaluated through Goal Achievement Matrix (GAM) Analysis. GAM results are presented in Annex A.

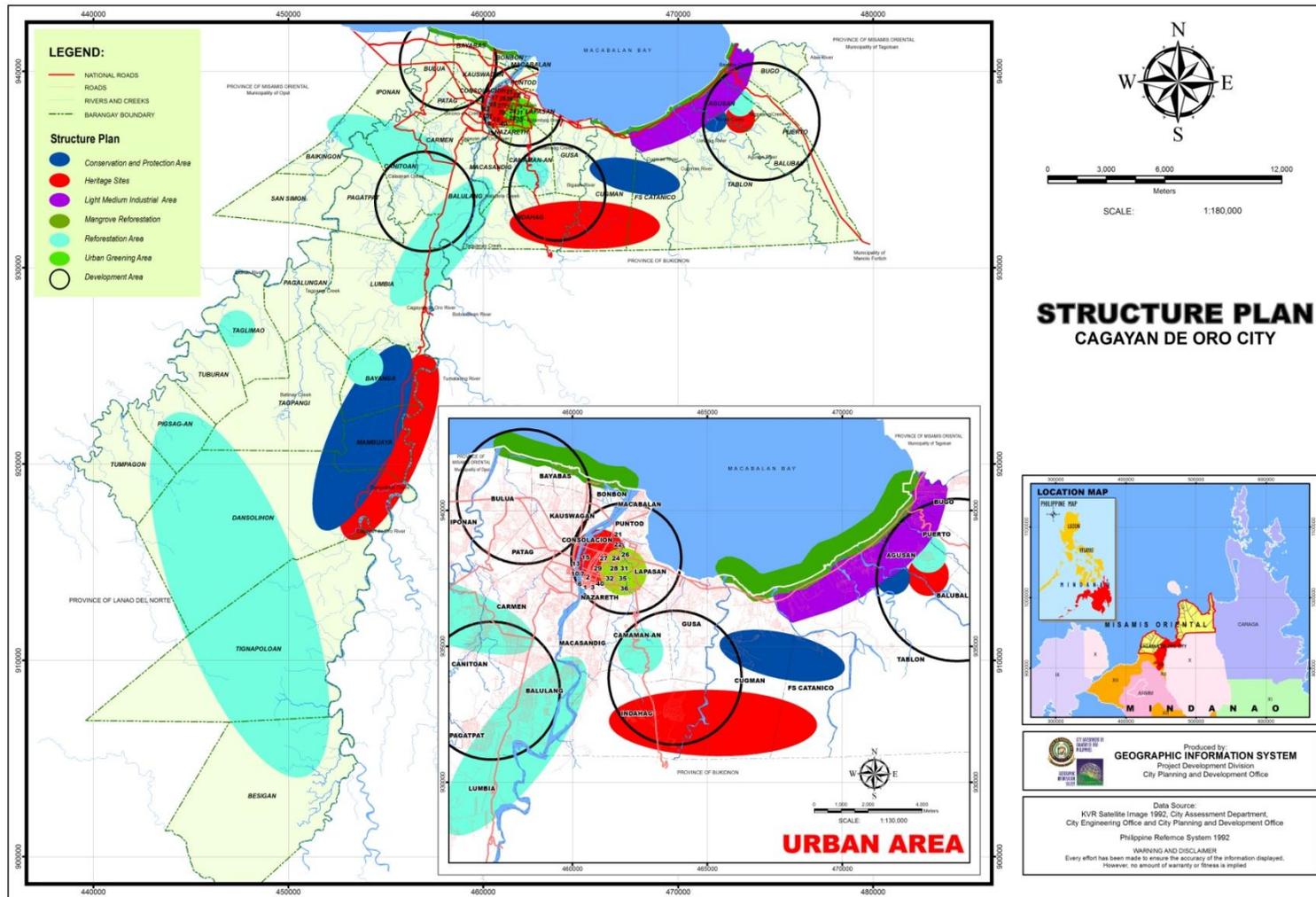
3.4.2 Major Spatial Development Strategies

1. Entice development in identified growth areas through the provision of basic and excellent facilities (west uptown-Carmen, Canitoan and Lumbia; downtown-Divisoria, Cogon, Carmen, Lapasan, Macabalan, Puntod and Poblacion CBD; western urban-Bulua, Patag, Kauswagan, Bonbon, Bayabas (BULPATKABONBAY); east uptown-Gusa, Indahag, Macasandig and Camaman-an; eastern urban development-Puerto, Bugo, Agusan, Balubal and Tablon)
2. Conservation and protection of natural sites and heritage i.e. gorges landscape, critical habitat, wetlands and river system (Macahambus, Mambuaya, FS Catanico, Malasag, Dansolihon, Bayanga, Cugman, Agusan, Indahag, Balubal)
3. Incorporate provisions of pedestrian (walkways, bicycle lane) on proposed road right- of- way (Divisoria, Poblacion)
4. Identify and legally declare built heritage sites in Divisoria, Taguanao and Poblacion and regulate building heights, architecture and color for historical-cultural tourism
5. Intensify and sustain urban greening in Poblacion, Isla de Oro and along riverbanks
6. Establish new sanitary landfill in Pagatpat/other suitable alternative site
7. Enforce the setback requirements along public roads for yield points/loading-unloading bay
8. Intensify greening and fruit tree growing in sloping areas of Barangays Bayanga, Lumbia, Agusan, Baikingon, Besigan, Camaman-an, Canitoan, Carmen, Taglimao, Pigsag-an, Balulang, Tignapoloan, and Dansolihon
9. Light-Medium Industrial Areas – Tablon, Cugman, Agusan, Bugo, Puerto, Lumbia

10. Mangrove reforestation - Bayabas, Bonbon, Agusan, Tablon, Cugman, Bugo, Puerto, Bulua
11. Provision of structural mitigation measures (special land use planning) for hazard prone areas
12. Provision of housing for settlers in blighted areas

3.4.3 The Structure Plan

**Figure 3.1
Structure Plan
Cagayan de Oro City**



3.5 The Land Use Plan

3.5.1 Urban Land Demand

The projected urban land requirement is based on the current land uses and the population trends. The different sizes of lots used as basis for computation was taken from prevalent size of lot in the city and which are considerably acceptable. For residential projections, a minimum lot size of 80 square meters per housing unit was used for computation.

3.5.2 Land Supply

Identification of land available was taken from the result of thematic mapping. Land available are those potential growth areas which are the remaining areas after deducting all development constraints.

3.5.3 Proposed General Land and Water Uses

3.5.3.1 Agriculture

The Strategic Agriculture and Fishery Development Zone (SAFDZ) and Comprehensive Agrarian Reform (CARP) areas shall serve as the development framework for agriculture. Areas devoted to crops, i.e. corn, bananas, fruits & nuts and vegetables will be retained in the rural barangays while crop production and productivity will be intensified.

For livestock and poultry, backyard production specifically for swine, goats and cattle will be regulated in the hinterland barangays.

Sustenance fishing (inland) shall be developed to augment fishery productivity in potential areas where there are rivers, lakes and fishponds.

Proposed agricultural areas within the planning period summed up to 14,759.63 hectares.

3.5.3.2 Forest

The forest areas in the hinterland barangays on the south abutting the provincial boundary of Bukidnon and Lanao del Norte, i.e. Cugman, FS Catanico, Tablon and Balubal will be retained/conserved. Premium and introduced species will be used in the reforestation of these identified barangays.

To sustain the National Greening Program, tree growing for reforestation at the barangays shall be constantly enforced requiring NSTP to facilitate such activity.

Open grassland will be devoted to fruit trees so as to protect the area from further erosion.

Proposed forest areas within the planning period summed up to 27,730.32 hectares.

3.5.3.3 Tourism

The current development thrust for the City of Cagayan de Oro identified Eco-tourism as a priority. It has identified the development of Cluster 1 which includes the Calabera Cave located in Indahag and Huluga Cave in Taguanao, this City. It covers approximately 175 hectares comprising the Macahambus Cave and Gorge as well as Historical Heritage sites located in Barangays Lumbia and Bayanga. Total tourism area proposed within the planning period summed up to 1,167.34 hectares.

3.5.3.4 Urban Land Use

For the planning period, proposed total urban land use of the city summed up to 12,123.47 hectares.

3.5.3.5 Water Use

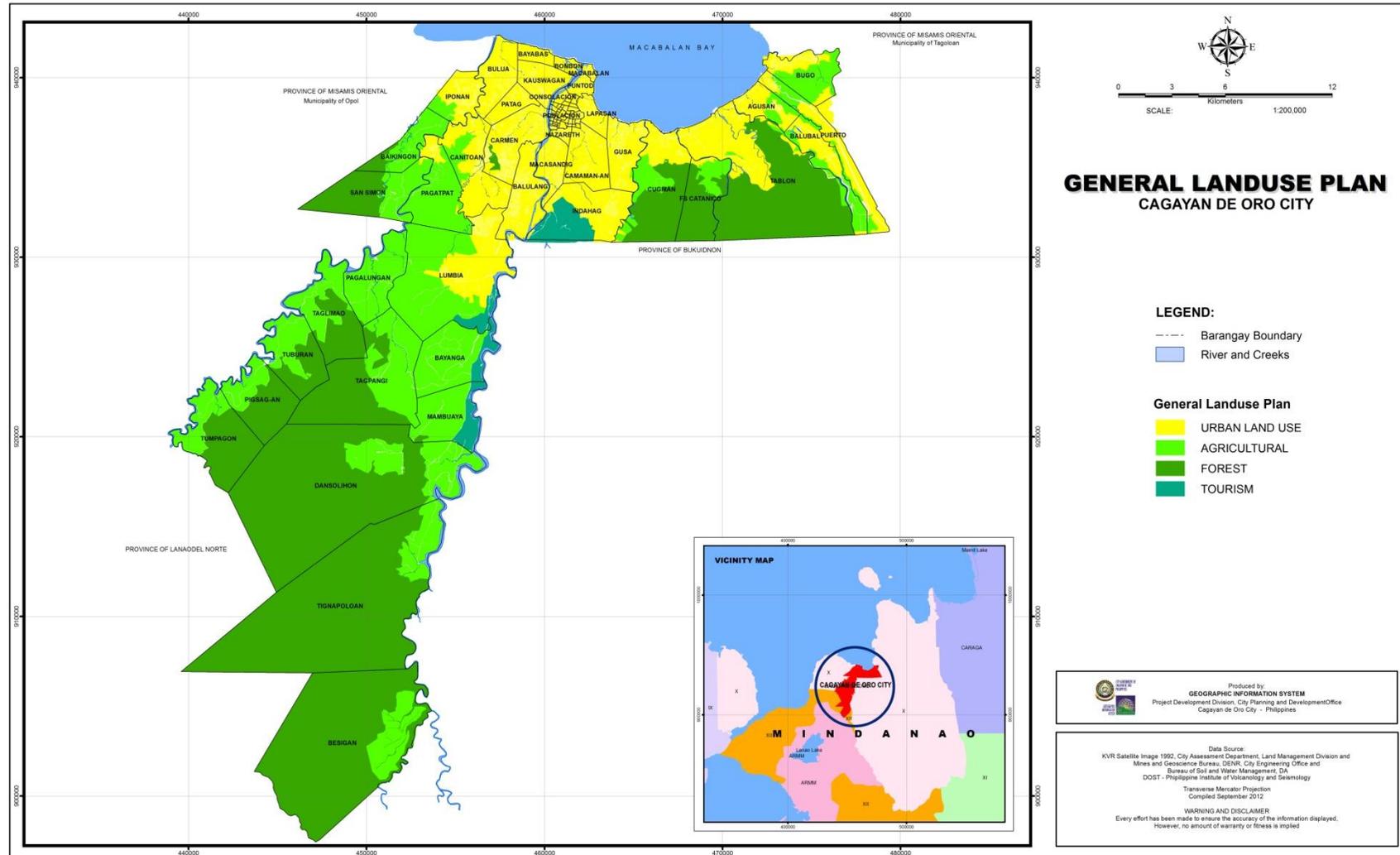
Appropriate Coastal Use Zone shall be identified and delineated (e.g. recreational areas, mariculture areas, marine protected areas, marine parks, marine reserves, navigational lanes, fishing grounds, eco-tourism destination sites, docking areas).

The following table shows the proposed general land and water use of the City within the planning period.

Table 3.1
Proposed General Land and Water Use
Cagayan de Oro City

Land Use Categories	Area (hectares)	% to total
Agricultural	14,759.63	25.51
Forest	27,730.32	47.93
Tourism	1,167.34	2.02
Urban Land Use	12,123.47	20.96
Roads, Rivers and Creeks	2,070.24	3.58
Total	57,851.00	100.00

**Figure 3.2
General Land Use Plan
Cagayan de Oro City**



3.5.4 Proposed Urban Land and Water Uses

Settlement

The proposed settlement areas are the major and sub-nodes sited along east-west stretch of the city towards the southern escarpment areas. There will be strong linkages of these nodes to the CBD.

Major linkages in the east are the Agusan-Balubal Road and the national highway. The J.R. Borja Road will be extended up to Agusan traversing Cugman and Tablon. The Eastern Coastal Highway shall be completed to decongest traffic along Iligan-Cagayan-Butuan Highway.

For the western nodes, Western Coastal Highway will be fast tracked for completion.

Major linkage in the southern portion is the Iligan-Bukidnon Lateral Highway.

3.5.4.1 Residential Areas

Within the planning period, residential areas remain the highest allocation estimated at 9,183.19 hectares of the total urban land area of Cagayan de Oro. This would dominate the land uses. Significant areas are the relocation sites in Indahag, Calaanan, Camaman-an, Canitoan, Balubal and Pagatpat. Medium-rise residential buildings are expected to be adopted for the lack of space vis-à-vis the increase of households. Residential areas are planned to be pedestrian-friendly.

3.5.4.2 Commercial Areas

Mixed uses of commercial areas will be established in Poblacion, Carmen, Lapasan and Gusa that would cater to offices, malls, and shopping/retail/trading services.

New growth/expansion areas will be developed as follows:

- Western Urban Development (covering BULPATKABONBAY)
- West-Uptown Development Area (Barangays Carmen, Canitoan, and Lumbia)
- East-Uptown Development Area (Barangays Gusa, Indahag, Macasandig and Camaman-an)
- Eastern Urban Development Area (Upper Puerto, Lower Puerto and Bugo, Agusan and Balubal, and Tablon)
- Downtown Development Area – Poblacion (CBD), Carmen, Lapasan, Puntod and Macabalan

Infrastructure support facilities and amenities such as ample parking areas, upgraded drainage system, developed sewerage system, and improved telecommunication network facilities will be provided in these growth areas

Commercial area within the planning period is estimated at 688.96 hectares.

3.5.4.3. Industrial

Areas along Tablon would be processing of agricultural products while this would be mixed to wood-based industries.

Lumbia Airport will be converted into Industrial Economic Zone.

Agro-industrial development will take place at Upper Puerto.

Light-medium industries will be developed at Lower Puerto, Bugo and Tablon.

Tourism Infrastructure and Economic Zone will be established at Cugman, along with development/expansion of industrial warehousing facilities.

Cashew and Cashew Nuts Production at Lumbia will be intensified for cashew industry development, as well as product Innovation and promotion.

Proposed industrial areas within the planning period summed up to 284.81 hectares.

3.5.4.4 Institutional

Barangay centers, schools, churches and government centers are the institutional uses with location dispersed throughout the locality.

Youth centers will be constructed in four strategic areas, namely: Lumbia, Carmen, Nazareth and Lapasan.

A sports complex equipped with world-class facilities will be constructed at Barangay Lumbia.

Within the planning period, proposed institutional areas summed up to 372.53 hectares.

3.5.4.5. Agro/Eco-Tourism/Heritage Area

Natural/heritage sites such as gorges, caves, wetlands as well as the river systems shall be rehabilitated, conserved and protected. These are located in Barangays Lumbia, FS Catanico, Cugman, Agusan, Bayanga, Mambuaya, Dansolihon, Macasandig, Agusan and Bonbon.

Built heritage sites are located in Divisoria and the area stretching to St. Augustine Cathedral. Building heights, architecture and color shall be regulated for historical/cultural tourism. Approved cultural heritage sites shall be preserved and enhanced.

Agro-Tourism will be developed at Palalan, Tablon with piped irrigation system for farm lots watering. Other Barangays identified are Lumbia, Pagalungan, Bayanga, Mambuaya, Dansolihon, Taglimao, Tagpangi, Tignapoloan, Tuburan, Tumpagon, Pigsag-an, Besigan

Downtown check-in lounge and shuttle shall be established to ferry airport passengers from Cagayan de Oro to Laguindingan Airport and vice versa. An alternative fast craft ferry system to Laguindingan Airport will be established.

Regular Maintenance and Enhancement of existing historical landmarks in the city will be done.

3.5.4.6 Parks and Open Space

Salient feature is the proposed Isla de Oro River Walk with the urban renewal activity in Burgos Area. It features low-impact development and landscaping. Beautification and urban greening in major thoroughfares will be implemented and maintained.

Escarpment areas are for tree planting/growing and greening Cagayan de Oro River.

Green-belt areas and forest parks in various islets in Cagayan de Oro River will be identified and established.

Additional parks and playgrounds shall be developed while the existing shall be improved.

The City Amphitheater will be re-developed as modern public amusement and recreational center with basement parking area.

Areas for parks and open spaces summed up to 325 hectares within the planning period.

3.5.4.7 Mangroves

Mangroves in the city are located in the coastal floodplains of Bulua, Bayabas, Bonbon, Lapasan, Agusan, Bugo, Puerto, Tablon and along the riverbank of Kauswagan. These are the same areas currently subjected to mangrove reforestation activities of the city government in partnership with the fisherfolks associations of respective barangays.

Table 3.2 shows the proposed urban land and water use of the City within the planning period.

Table 3.2
Proposed Urban Land and Water Use
Cagayan de Oro City

Land Use Categories	Area (hectares)	% to total
Agro-Industrial	1,189.11	9.81
Commercial	688.96	5.68
Industrial	284.81	3.07
Institutional	372.53	2.35
Open Space/Vacant Land	325.00	2.68
Residential	9,183.19	75.75
Swamp/Marshland	79.87	0.66
Total	12,123.47	100.00

Figure 3.3
Urban Land Use Plan
Cagayan de Oro City

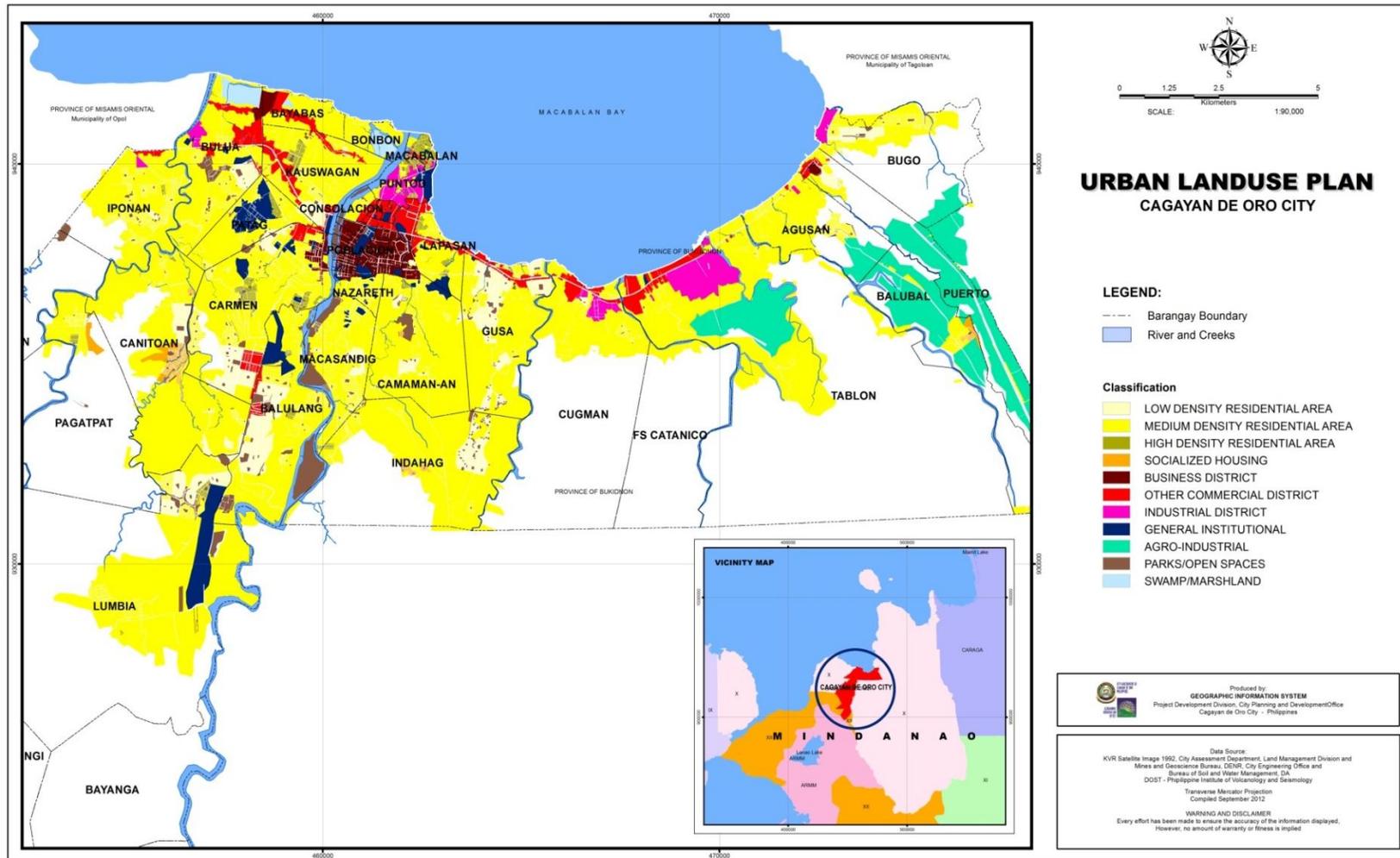
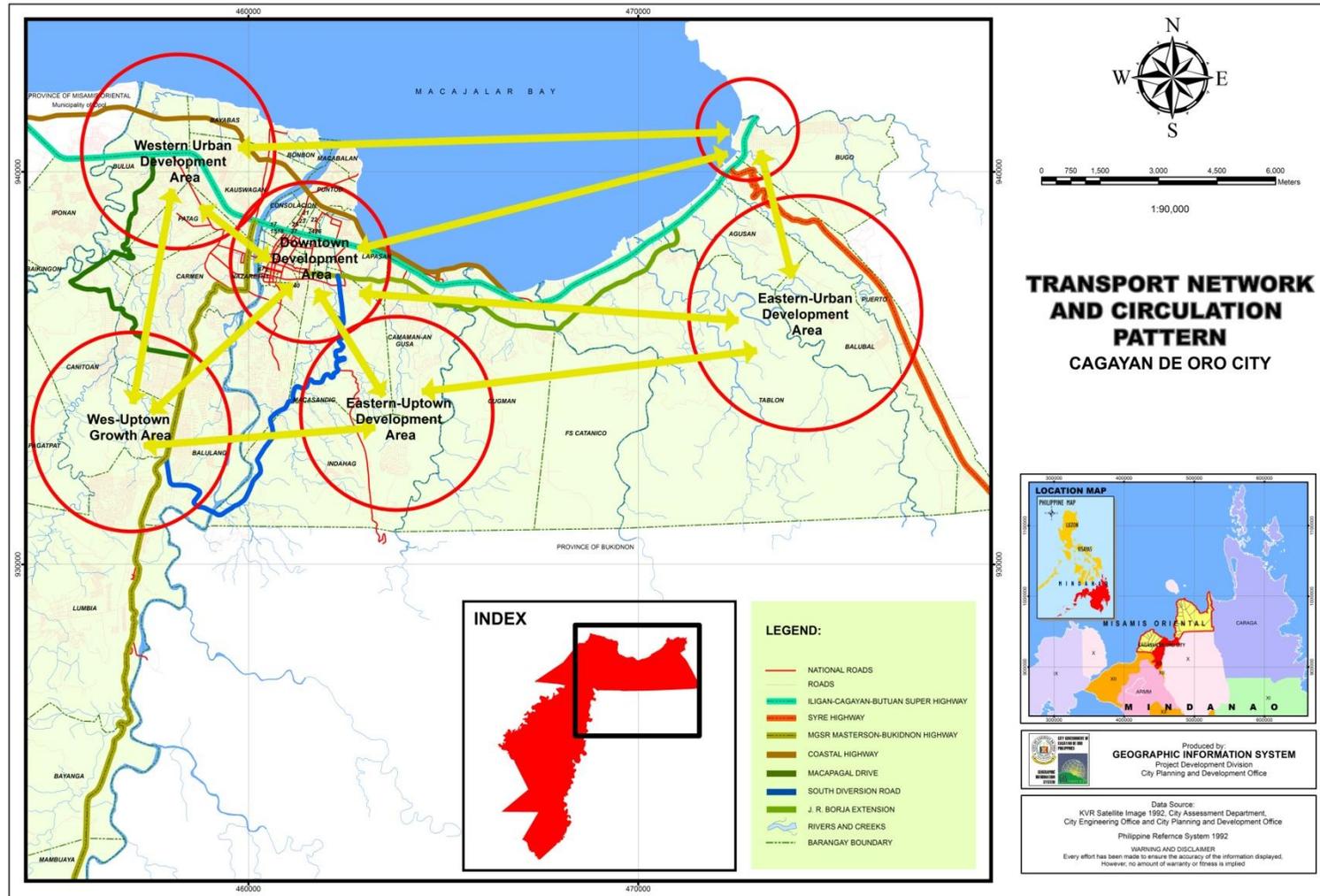


Figure 3.4
Transport Network and Circulation Pattern
Cagayan de Oro City



3.5.5 Development Directions/Guidelines/Policies

3.5.5.1 Urban Development-Growth Areas

3.5.5.1.1 Urban Expansion Area # 1

(Western Urban Development Area)

Western Urban Development covers Barangay Bulua, Patag, Kauswagan, Bonbon and Bayabas.

This growth node serves as the entry and exit points from and to Laguindingan Airport and other parts of the country. This also serves as the major convergence point for people, goods and products, as well as transport service to and from other parts of the region.

➤ Existing Facilities

1. Integrated Bus and Jeepney Terminal
2. Fish and vegetable landing
3. Coastal road passing through barangays Gusa, Lapasan, Kauswagan, Bayabas, Bulua and Iponan

➤ Proposed Development

1. Commercial mixed use medium to high density pedestrian friendly center for Cagayan de Oro City.
2. Commercial areas along Western Coastal Highway-Kauswagan, Bayabas, Bulua
3. Completion and widening of western coastal highway
4. Establish/construct main drain (canal)
5. Waste water treatment for subdivisions
6. Preservation and expansion of wetlands in Bulua, Bonbon and Bayabas
7. Provision of multi-purpose and socio-economic centers (reading centers, parks, and the like)

3.5.5.1.2 Urban Expansion Area #2

(West-Uptown Development Area)

Covering Barangays Carmen, Canitoan, Lumbia and Pagatpat. This will be a medium to high-density, mixed-use pedestrian friendly center with high end, low-density type of development for residential and commercial uses. This area will decongest the present major urban center/city core and shall provide more opportunities for socio-economic activities.

The Lumbia Airport shall be converted into an industrial area/economic zone which shall then become a major provider of employment for the people in the city.

➤ Existing Facilities

1. Macapagal Highway Extension connecting to the western coastal highway.
2. An established residential and commercial areas and neighborhood centers such as; Pueblo de Oro Township, Camella and Xavier Estate.
3. SM Shopping Mall
4. Xavier University IT Park

➤ Proposed Development

1. Development Master and Urban Design Plan
2. Road Network Development
3. Establishment of green belt areas
4. Establishment of parks and open spaces
5. Establishment of tree parks in subdivisions
6. Strict implementation of tree planting strips in major thoroughfare including subdivision major roads
7. Establish main drain from airport going to Calaan Creek (canal)
8. Waste water treatment for subdivisions
9. Establishment of retention basins
10. Rain harvesting for commercial establishments and residential buildings
11. Establishment of retirement community
12. Provision of multi-purpose and socio-economic centers (reading centers, parks, and the like)

3.5.5.1.3 Urban Expansion #3

(East-Uptown Development Area)

Located in Barangays Gusa, Indahag, Macasandig and Camaman-an. This area will have the same function as that of the West-Uptown Development Area with the presence of high-end subdivisions like the Fil-Estate Subdivision and Alegria Hills.

This area is linked to the other major urban centers through the Pelaez Highway that also connects to the West-Uptown Development Area.

➤ Existing Facilities:

1. Convention Center(on-going construction)

2. Camp site for Boys Scouts of the Philippines
3. High end residential subdivisions
4. Heritage area (Huluga Cave in Indahag)
5. City relocation site (Indahag)
6. Private Schools

➤ Proposed Development

1. Slope protection/regulated development
2. Establishment of green belt areas
3. Establishment of tree parks in subdivisions
4. Strict implementation of tree planting strips in subdivisions
5. Establishment of retention facilities
6. Waste water treatment for subdivisions
7. Rain harvesting for commercial establishments and residential buildings
8. Provision of multi-purpose and socio-economic centers (reading centers, parks, and the like)

3.5.5.1.4 Urban Expansion #4

(Eastern Urban Development Area)

This area is composed of the following sub-nodes, namely: Upper Puerto, which is identified as an Agro- Industrial Area; Lower Puerto and Bugo which are existing industrial and residential areas; Agusan and Balubal, which are hosts to high-end subdivisions; Tablon, which is an existing industrial area; and, Palalan, Tablon, which is identified for Agro-Tourism.

➤ Existing Facilities:

1. Sayre Highway which has recently been upgraded with a fly-over to ease traffic congestion at the intersection provides linkage to the Provinces of Bukidnon and Cotabato
2. Iligan-Cagayan-Butuan Super Highway links the area to the Provinces of Davao, Agusan, Surigao and Sarangani
3. Puerto Public Market serves as trading center for goods and other products from adjoining areas.

➤ Proposed Development

1. JR Borja Extension shall be connected to Agusan, Balubal and Puerto
2. Concreting from Agusan to Manolo Fortich Highway
3. Waste water treatment for subdivisions
4. Establishment of green belt areas for subdivisions with slope 18deg and up
5. Establishment of tree parks in subdivisions
6. Strict implementation of tree planting strips in subdivisions

7. Rain harvesting for commercial establishments and residential buildings
8. Slope protection/regulated development
9. Regulate/Limit industrial land use along coastal area at Tablon
10. Harmonize the various land uses in Tablon and enhance the ecology (mangrove reforestation)
11. Livelihood improvement for the marginal fisherfolks affected at the same time retain the industrial base
12. Provision of multi-purpose and socio-economic centers (reading centers, parks, and the like)
13. Agro-Tourism development at Sitio Palalan in Tablon (piped irrigation system for farm lots watering)
14. Secondary Road (20m) Network for Sitio Palalan in Tablon

3.5.5.1.5 Urban Expansion Area #5

Downtown Development Area – Poblacion (CBD), Carmen, Lapasan, Puntod and Macabalan

This Downtown Development Area is going to be a high density commercial district comprised of the Poblacion or CBD and Barangays Carmen, Lapasan, Puntod and Macabalan.

➤ Existing Commercial and Residential Areas

1. Presence of big business establishments like Limketkai Mall, Gaisano City Mall, Pure Gold and Centrio Mall and Tower
2. Macabalan Port
3. Integrated Bus and Jeepney Terminal (Agora, Lapasan)
4. Public Markets (Cogon, Carmen and Agora)
5. Recreational Sports Facilities (Sports Center)
6. Institutional Facilities (Academic and Government)

➤ Proposed Development

1. Develop an expanded downtown master plan
2. Provision of new Transportation Master Plan with the introduction of new traffic scheme
3. Downtown check-in and shuttle for airport passengers from Cagayan de Oro to Laguindingan Airport (Fast craft or utility vehicles)
4. Provision of sidewalks and pedestrian lanes
5. Establishment of interceptors from city hall to Isla Bugnaw
6. Establishment of green belt areas at Islas de Oro, Bugnaw, Baksan
7. Installation of rain harvesting facility for commercial establishments and residential buildings
8. Establishment of tree parks in subdivisions

9. Strict implementation of tree planting strips in subdivisions
 10. DEWATS (Waste water treatment facility) baffled with planted gravel filter.
 11. Waste water treatment for subdivisions
 12. Urban renewal for blighted areas
 13. River front development project
 14. Urban greening of Divisoria
 15. Provision of vertical parking space
 16. Provision of multi-purpose and socio-economic centers (reading centers, parks, and the like)
- 3.5.5.2 Conservation and protection of natural sites and heritage i.e. gorges caves, wetlands and river systems. (Barangays Lumbia, FS Catanico, Cugman, Agusan, Bayanga, Mambuaya, Dansolihon, Macasandig, Agusan and Bonbon.)
- 3.5.5.2.1 Dansolihon/Bayanga/Mambuaya–Cave System
 Bayanga/Lumbia - Macahambus Cave & Gorge (Natural sites and heritage)
 Malasag, Cugman - Protection of natural sites for forest reserves;
 Taguanao, Indahag -Natural sites and heritage
- Clarification of the status of land ownership (DENR declaration as Forestal Area)
 - Regulate/ limit settlement in the area to preserve its natural site
 - Non issuance of land title/tax declaration
- 3.5.5.2.2 Mambuaya-River system for tourism particularly river rafting; Cugman-River system; Agusan- River system; Cagayan de Oro River – protected area
- Prohibit settlements within the legal easement along the riverbanks by strict implementation of existing national & local laws.
 - No build zone and restriction of development along the area
- 3.5.5.2.3 FS Catanico- Natural sites for tourism;
- Development and improvement of the identified natural sites for tourism

3.5.5.3 Incorporate provisions of pedestrian network (walkways, bicycle lane) on proposed road right-of-way (Divisoria, Poblacion)

3.5.5.3.1 Divisoria

- Provide 1.20 m. width both sides for bicycle parking
- Amendment of existing City Ordinance pertaining parking areas at Divisoria

3.5.5.3.2 Poblacion

- Propose bicycle lane of 1.20m width at the left side of the road
- Identify specific locations of ramp for compliance of BP 344
- Sidewalks alignment for safety

3.5.5.4 Identify and legally declare built heritage sites in Divisoria, Taguanao and Poblacion and regulate building heights, architecture and color for historical-cultural tourism

3.5.5.4.1 For 16m wide road allow construction of 4 store building. For 32m wide road allow construction of 8storey building.

- Strict implementation on the provisions of the NBC and Zoning Ordinance of the city
- Adaptation of the framework plan

3.5.5.5 Intensify and sustain urban greening in Poblacion, Isla de Oro and along riverbanks

3.5.5.5.1 Poblacion

Identified greenbelt area/urban greening at Poblacion: Capistrano St., Velez St., Corrales Ave., JR Borja St., Osmeña St., Gaabucayan St. with total area of 13.5 hectares

- Establishment of greenbelt areas/urban greening
- Maintenance of existing planted trees
- Additional areas to be planted with ornamental plants in planter boxes

3.5.5.5.2 Isla de Oro (8.85 has.), Isla Bugnaw (4.1 has.), Isla Baksan (2.3 has.) with total area of 15.25 has.

- Develop forest park specially in no build zone identified areas

- Establish river protection dikes and planting of bamboo trees, talisay trees, lambago trees and pagatpat trees along the riverbanks
- Planting of endemic/hardwood trees for future seedbank and tree repository

3.5.5.5.3 Riverbanks- Cagayan de Oro River, Iponan River, Umalag River, Bigaan River, Tablon River, Agusan River, Puerto River, Besigan River, Tignapoloan River, and Cugman River with a total area of 225 linear kilometers

- Strict implementation of the National Greening Program
- Adoption of watershed characterization and management plan
- Require NSTP to facilitate tree growing for all freshmen students
- Intensify rehabilitation and establishment of riverbank vegetative measure

3.5.5.6 Development of Pagatpat Sanitary Landfill (area: 41 has.)

1. Land use conversion from CBFM to Sanitary Landfill (for conversion to special land use)
 - Continue the re-compensation of the improvements of the surface claimant/affected areas (City Ordinance)
2. Conduct Hydro Geologic and Geotechnical studies of the area to determine its feasibility
3. Preparation of site development plan
 - Actual zoning/allocation of area as to waste segregation, waste special waste, reuse, recycle and research
4. Contain tributaries creeks within the subject area and provide peripheral canal/drainage
5. Provide monitoring wells in strategic location to monitor the possible leachate seepage and percolation

3.5.5.7 Enforce the setback requirements along public roads for yield points/loading-unloading bay-nodal growth areas

- Enforcement of the NBC and the RTA regulation
- Define road width, type of occupancy, historical sites

- Assign overseer on the growth areas depending on the development concern of each growth center
 - West Urban Center - 30 m. RROW
 - West Uptown Urban - 30m. RROW
 - East Uptown Urban Center -15m. RROW
 - Urban Center J.R Borja - 12m. RROW
 - East Urban Center - 12m. RROW

3.5.5.8 Intensify greening and tree growing in sloping areas of Barangays Bayanga, Lumbia, Agusan, Baikington, Besigan, Camaman-an, Canitoan, Carmen, Taglimao, Pigsag-an, Balulang, Tignapoloan, Dansolihon

- Implement reforestation (premium and introduced species) for domestic use in the identified areas
- Require NSTP to facilitate tree growing for all freshmen students

3.5.5.9 Light-Medium Industrial Areas – Tablon, Cugman, Agusan, Bugo, Puerto, Lumbia

3.5.5.9.1 Allocate industrial zone area for future expansion, new plants and possible relocation of industries inappropriate to their existing location (within residential areas) area: 100 hectares within Tablon to Palalan

- Relocation on light-medium industries within the residential area(e.g. Barangay Cugman)
- Strict monitoring of industrial plants in compliance to environmental requirement (e.g. ECC)
- Industrial Zone area for relocation/transfer
- Improvement of private ports and open the facilities for other industries to cater shipments of products and raw materials
- Existing light to medium industries along the coastal areas will be required to plant mangroves

3.5.5.9.2 Light-Medium industrial area at Lumbia

- Enhance/improve cashew nuts production.
- Establish backyard-type cashew plantation.
- Conduct capability enhancement program related to cashew production.

3.5.5.10 Mangrove reforestation - Bayabas, Bonbon, Agusan, Tablon, Cugman, Bugo, Puerto, Bulua

- Inventory/Assessment and reversion of abandoned fishpond areas to mangrove (RA 8550)
- Rehabilitation of mangrove areas
- Preservation of wetland areas
- Strict implementation of the Wild Life Conservation Program pursuant to RA 9147 (Wild Life Act)
- Inventory and enhancement of flora and fauna
- Identification, protection and conservation of critical habitats (caves, wetlands, river systems, natural and built heritage areas)
- Enforcement of beach rehabilitation program pursuant to EO 533
- Adaptation and implementation of the City Integrated Coastal Management (ICM) Plan pursuant to EO 533
- Implementation of water easements (3m in urban, 20m agro areas as per Water Code 1067)
- Declaration and management of marine protected areas
- Enactment of Local Fishery Code in conformity with RA 8550
- Enactment of Coastal Zoning Ordinance and integration to CLUP

3.5.5.11 Provision of structural mitigation measures (special land use planning) for hazard prone areas

3.5.5.11.1 Establishment of Retention Basins at (strategic areas similar to MMDA)

- Conduct study to determine appropriate area for retention basin. (Gaisano Mall, KetKai, and MUST)
- Require the industries /establishments to maintain retention basins

3.5.5.11.2 Dredging of rivers, creeks waterways

3.5.5.11.3 Adopt the 20m easement of no build-zone and utilize it for research and forestry development, agriculture, fishery, plantation, and sanctuaries

- Strict implementation of guidelines for sand and gravel extraction and provide protection measures along the banks of the area applied
- Contribute to the long term plan in establishing dikes for systematic quarry operations

- Formulate guidelines/with penalties for strict implementation on the maximum depth/allowable for sand and gravel extraction which is more or less 2.00 meters and succeeding extraction will be based on replenishment capacity of the river.
 - Quarry permits/operators that fall at meandered sections of the river shall be directed to include straightening of the river and shall form part of their development plan.
- 3.5.5.11.4 Straightening/Rechanneling of severely meandered sections of Iponan River and other areas to increase the discharge capacity since obstruction are already minimal
- Coordination of the government agency as to the private lots that maybe affected by said rechanneling/straightening
- 3.5.5.11.5 Formulation of drainage master plan
- 3.5.5.11.6 Enact an ordinance requiring land developments to provide retention basins to delay discharge of surface run off to existing waterways.
- Strict implementation of guidelines for drainage system of land developments/subdivisions.
- 3.5.5.11.7 Area declared as no build zone (from shoreline to Pagatpat more or less 90 has., from shoreline to Balulang more or less 50 has., more or less 15.25 hectares comprising Isla de Oro, Bugnaw, Baksan) shall be utilized for plantation, propagation of premium trees, research for forestry, agriculture, fisheries and wild life and recreation.
- Establish the perimeters and boundaries of the No Build Zone area in accordance with the existing city ordinance.

3.6 Land Use Sector Policy Options

Issues/Concerns	Implications	Policy Options/Recommendations			
		Adaptation		Mitigation	
		Structural	Non-structural	Structural	Non-structural
Difficulty in implementing the no build zone policy due to lack of implementing guidelines	Residents returning to their former residences identified as hazard areas New occupants/informal settlers on hazard areas		Enactment of city ordinance to implement the no build zone policy in geohazard areas and heritage areas Implementation of Early Warning system at the Brgy level	Delineate no build zones Development of forest park particularly in no build zone identified areas	
Encroachment of private claims in Legal Easements along coastal, deltas and riverbanks	Increase frequency Flooding/Obstruction of waterways and reduction of absorption capacity of beaches and shores		Enactment of city ordinance to implement legal easement	Removal/relocation of informal settlers. Demolition of illegal structure after due	Enforcement of pertinent local and national laws on illegal structures

	<p>Potential risk to lives and properties in case of flooding, storm surge and fire</p> <p>Prevent public access</p>			process	<p>Strict monitoring and coordination among RLAs and law enforcers</p>
<p>Non preservation of old identity/structure of the city's cultural/heritage structure</p>	<p>Lose identity of the city</p>		<p>Identification, survey and evaluation of existing old structure and heritage site both natural and built with historical accounts</p> <p>Implementation of heritage act pursuant to RA 1601</p> <p>Integration to the strategy of the Tourism program of the city</p>	<p>Preservation and enhancement of approved cultural heritage sites and structures</p>	
<p>Lack of consistencies in the implementation</p>	<p>Non compliance of requirements</p>				

of IPRA law and existing policy on tenured timberland areas	<p>Duplication of claims of awarded ancestral domains</p> <p>Arising tribal wars</p>	<p>Review of existing policies/guidelines on issuance of tenurial instruments to timberland areas and submit findings and recommendation to harmonize the implementation of the IPRA law. (Adaptation-Non structural)</p>
Degraded coastal areas	<p>Loss of fish habitat</p> <p>Low productivity of coastal/marine resources</p> <p>Reduction of income of fisher folks and business people</p> <p>Loss of natural protective covers of shoreline areas and loss biodiversity</p>	<p>Adoption and implementation of the city integrated coastal management (ICM) plan pursuant to EO 533</p> <p>Enactment of local fishery code in conformity with ra8550</p>

Conflicting uses of coastal use zone	Loss of recreational areas/mangroves/ maricultures	Implementation of legal easement on coastal areas
	Loss of biodiversity	Identification and designation of appropriate Use Zone (ex. Recreational, mariculture areas, marine protected areas, marine parks, marine reserves, navigational lanes, fishing grounds, eco-tourism destination sites, docking areas) and formulate coastal use management plan to be integrated in the CLUP
	No designated docking areas for fishermen	Implementation of coastal use management plan integrated in the CLUP
	Reduction of fishing grounds	Reversion of abandoned fishpond areas to mangrove rehabilitation areas

Degradation of watershed areas	<p>Flooding downstream</p> <p>Siltation of rivers due to agriculture and mining activities</p>		<p>Preparation and adoption of Watershed Management Plan</p> <p>Adoption of NIPAS law in critical watershed areas</p> <p>Restore water quality based on its most beneficial use/designated classification</p> <p>Formulation of CdeO and Iponan</p> <p>River Rehabilitation Plan</p>	<p>Reforestation/protection in watershed areas to improve vegetative cover</p> <p>Establishment of protected areas</p>	<p>Coordination with LGUs within the watershed areas</p>
Loss of wetland areas due to continued urban	Reduced fish catch		Conduct massive assessment and inventory of abandoned fishpond and enact ordinance on	Mangrove reforestation	

development	Loss of bio diversity Loss of grain production areas (rice fields)		conversion of the same to mangrove area		
Presence of illegal mining operations	Siltation due to illegal mining activity		Strict Implementation of mining laws Creation of Bantay Kalikasan task force at Brgy level		
Denuded forest due to illegal mining activity	Extreme flooding in urban and rural areas		Reforestation and rehabilitation of denuded forest areas	Establishment of greenbelt areas	Enforcement of mining laws
Timber poaching in the hinterland barangays	Denuded forest	Provisions of livelihood project in the upland barangays Tree planting and growing			
Conversion of prime agri-lands to	Reduced agricultural	Strict implementation of			

residential purpose	production and productivity	RA 8435			
Pollutive discharges from agricultural, residential, commercial and industrial establishments.	<p>Contamination of water bodies</p> <p>Decrease productivity of marine and aquatic resources</p> <p>Potential risk to health</p>		<p>Enactment of septage management ordinance.</p> <p>Strict enforcement of PD 1096 and other related laws that require all hotels, malls, hospitals, and similar commercial and industrial establishments to put up their own sewerage treatment as a requirement in building permit issuance</p> <p>Require plantations and individual farms to implement best management practices</p>	<p>Require all hotels, malls, hospitals, and similar commercial establishments to put up their own sewerage treatment (as a requirement in building permit issuance).</p> <p>Provision of septage management facility (interim) to cater individual residential houses and commercial establishments.</p> <p>Provision of city sewerage treatment system</p>	

			Strict regulation on pesticide use Promotion of organic farming		
Absence of sanitary facilities (open defecation)	Bacterial contamination and pollution of water bodies		Strict enforcement of sanitation code (thru barangay enforcement)	Relocation of informal settlers	
Disposal of animal wastes in water bodies	Bacterial contamination and pollution of water bodies		Strict enforcement of sanitation code (thru barangay enforcement)	Owners to provide septic tanks for animal wastes	
Unregulated extraction of ground water	Depletion of ground water, salt water contamination (salinity intrusion), and ground subsidence	Creation of city water resources board to look into deep wells	Strict regulation in putting up of deep wells (NWRB permit)	Require owners of deep wells to plug abandoned wells in order to prevent further contamination of neighboring deep wells.	Monitoring of deep wells
Unregulated mining and quarrying activities in rivers of	Siltation and contamination of rivers		Strict enforcement of mining laws by LGU and MGB Deputize barangay officials		

Cagayan de Oro			to enforce mining laws.		
Indiscriminate disposal of solid waste and hazardous waste	Contamination of groundwater and health risk	Establishment of MRF for every barangay or cluster of barangays to include hazardous wastes (busted lamps, used cellphone batteries, etc) .	Strict enforcement of Ecological Solid Waste Management Ordinance IEC on SWM Create Solid-Waste Management Board		Improve collection of garbage Enforce waste segregation at source (no segregation, no collection policy)
Open burning of garbage	Increased carbon emission Increased potential risk to health		Passage of an ordinance in accordance with RA 9003 and enforcement of ordinance at the barangay level.		Enforce open burning Intensify the conduct of IEC on effects of open burning

Proliferation of smoke belching vehicles	Increased carbon emission Increased potential risk to health		Intensify anti smoke belching drive to be undertaken by LGU (by entering into a MOA with LTO). Operationalize multi-sectoral CdeO Airshed Management (RA 8749-Clean Air Act) Conduct Carbon Reduction Initiative		Strengthen motor vehicle inspection system (MVIS) thru LTO to check vehicle condition prior to registration. Collaboration of LTO and LGU in monitoring smoke belchers
Lack of area for public burial sites	Congested and flood prone burial site High cost of private burial sites Poor sanitation	Multi-storey or multi-level entombment		Establish public crematorium and columbarium Identify additional burial sites not prone to flooding	

<p>Lack of parks and playgrounds, sports, camping grounds and other recreational facilities</p>	<p>Low performance on basic education indicators</p> <p>High incidence of life-style diseases</p>	<p>Improvement of existing facilities</p>		<p>Development of additional facilities</p>	<p>Identify area for the construction of sports dome and its facilities</p>
<p>Inadequate area for the construction of protective and social welfare services buildings and facilities</p>	<p>Congestion results to sickness/illness of inmates</p> <p>Low efficiency rate in providing police services</p> <p>Delayed response to emergency call</p> <p>Deprivation of senior citizen's need for socialization and active community involvement</p> <p>Lack of technical skills</p>				<p>Identify appropriate areas for protective and social welfare services</p>

Absence of Health Center in some poblacion barangays and relocation area	<p>Inadequate/poor health services rendered</p> <p>Poor health ambitions and vulnerability to diseases</p> <p>Inaccessible health services</p>			<p>Establish health center within the area of city health office</p> <p>Establish health center in all relocation sites</p>	
Absence of Youth Center	Deprivation of out of school youth to acquire knowledge and opportunities for self advancement			Identify areas for youth centers in four (4) strategic areas; lumbia, carmen, nazareth, lapasan.	

3.6 Integrated Land Use and Environment Priority Programs and Projects

3.6.1 Land Use Sector

- Delineation of 20-m legal easement along riverbanks
- Increase bulk density regulation
- Increase open space requirements in complex subdivisions
- Establishment of green belt areas
- Delineation of "No Build Zone" areas
- Intensification of the city's land banking program
- Initiate updating of the Land Classification Map of the city

3.6.2 Environment Sector

City Forest Resources and Flood Control Facilities Development Program

- Hinterland Barangays Reforestation Project (including the implementation of the Forest Land Use Plan)
- Industrial Tree Plantation Project
- Forest Communities Livelihood Support Project (livestock production, handicrafts, gardening, seedling, and indigenous industries development)
- Agro-Forestry Development Projects (nursery establishment, rattan and bamboo plantation, tree orchards, and botanical park development)
- Implementation / Integration of CDORBMC Programs and Projects into the city CLUP PPAs
- City Flood Dissipators / retention/ abatement Projects

City Coastal and Marine Resources Development Program

- CDO Riverine Barangays Wildlife Sanctuary and Mangrove Reforestation Project (including all no-build-zones within JICA/WB /CDO Project delineation)
- Coastal Mangrove Reforestation Project
- Establishment of Aquatic Conservation Nursery Centers
- Enactment of City Ordinance converting all no- build zone areas along rivers, and creeks into Barangay Ecotourism and Protected Wildlife Sanctuary Areas
- Enactment of Ordinance addressing conversion of abandoned fishpond areas to mangrove areas

Environmental Governance Capability Building Program

- Enactment of ordinance providing Off-campus Environmental Management Training Courses for all City and Barangay Officials¹
- Formal off-campus Capability-Building for all City, and Barangay Officials for Environmental Management Courses (Voluntary Basis)
- IEC on urban greening along the riverbanks and coastline areas, green belt areas, tree parks and green strip in subdivisions and all open public places.

Planning Research and Development Program

- Establish Database for Shoreline Tracing / Coastal trending
- Establish Ecological Baseline Data, and conduct river assessment particularly on water quality, volume of river discharges, tidal variation data, and extent of water pollution after flooding.

Urban Fresh Water Resources Management Program

- Installation of rainwater harvesting facility and water impounding system
- Metering of Ground Water Project

City Liquid Waste Management Program

- Enactment of Septage Management Ordinance (for both urban and rural barangays)
- Establishment of Septage Treatment and Disposal Facility for city barangays
- Enactment of Integrated Urban Drainage and Combined Septage-Sewerage Master Plan
- Enactment of Ordinance for Waste Water/Septage Treatment and Disposal facilities among subdivisions (1% of project area taken from the 5% of the open space)
- Enactment of City Ordinance establishing the City Sewerage System
- Sewerage Treatment and Disposal System Project
- Liquid Waste Monitoring and Disposal Capability- Building / Training Project

City Solid Waste Management Program

- IEC on Solid Waste Management (SWM)
- Strengthening of City Solid Waste Management Board
- Establishment of Sanitary Landfill
- Transfer Station /MRF Project

City Air Quality Management Program

- Enactment of local ordinances implementing Clean Air Act in the city
- Enactment of local ordinances implementing Clean Air Act in the city
- Air Quality Monitoring Capability- Building /Training Project
- Air Quality Monitoring and Testing Facility Project

Annexes

Annex A

Goal Achievement Matrix (FINAL RANKING)

VISION/GOALS			ALTERNATIVE DEVELOPMENT STRATEGIES		
ELEMENTS	DESCRIPTOR	WEIGHT (100%)	1 Commercial and Light-Medium Industrial Development	2 Agri-Commercial Development	3 Commercial with Tourism Development
People (as individual and as society)		25	0.75	0.75	0.75
	Empowered				
	Multi-cultural				
	Diverse				
	Resilient				
	Inclusive				
	Progressive				
Local Economy		15	0.45	0.3	0.45
	Highly competitive				
	Progressive				
	Inclusive				
	Diverse				
	Resilient				
Natural Environment		15	0.3	0.3	0.3
	Sustainable				
	Diverse				
	Multi-cultural Heritage				

	Resilient				
Built Environment		15	0.3	0.3	0.45
	Sustainable				
	Diverse				
	Resilient				
	Progressive				
Local Governance		30	0.9	0.9	0.6
	Good				
	Resilient				
	Progressive				
TOTAL		100	2.7	2.55	2.55
RANK			1 CHOSEN STRATEGY	tie	tie

Annex B

Assessing Single Actions for DRR – Land Use and Environment Sector

Action	reduced exposure/risk to life	reduced exposure/risk to property	Urgency of DRR Action	Negative Consequence of No Action	Impact to Preferred Development	Land Use Changes Needed	Ease of Implementation	Resource Needed	Policy Adjustments Needed	Mngt of Actions Needed	Efficiency of Action	Total Score
	-1.1	-1.2	-1.3	-2.1	-2.2	-2.3	-3.1	-3.2	-3.3	-3.4	-3.5	
1. Enactment of city ordinance to implement the no build zone policy in geohazard areas and heritage areas												
	5	5	5	5	3	1	1	5	5	5	5	45
Implementation of Early Warning system at the Brgy level												
	5	3	5	5	3	1	5	2	2	3	5	39
Delineate no build zones												
	5	5	5	5	3	1	1	5	5	5	5	45
Enactment of city ordinance to implement 20-meter legal easement												
	3	3	3	3	5	3	1	5	5	5	5	41

Removal/relocation of informal settlers.												
	5	5	5	3	2	1	2	2	2	2	4	33
Demolition of illegal structure after due process												
	3	3	3	3	5	3	1	5	5	5	5	41
Identification, survey and evaluation of existing old structure and heritage site both natural and built with historical accounts												
	1	1	3	1	2	3	1	1	1	3	3	20
Implementation of heritage act pursuant to RA 1601												
	1	1	3	1	2	3	1	1	1	3	3	20
Integration to the strategy of the Tourism program of the city												
	1	1	3	1	2	3	1	1	1	3	3	20
Preservation and enhancement of approved cultural heritage sites and structures												
	1	1	3	1	2	3	1	1	1	3	3	20

Review of existing policies/guidelines on issuance of tenurial instruments to timberland areas and submit findings and recommendation to harmonize the implementation of the IPRA law. (Adaptation-Non structural)												
	1	1	1	3	4	4	2	2	2	2	4	26
Formulation of the city Integrated Coastal Management (ICM) Plan pursuant to EO 533												
	5	5	5	5	5	1	2	4	2	4	5	43
Enactment of local fishery code in conformity with RA 8550												
	1	1	1	1	1	1	3	2	3	3	3	20

Identification and designation of appropriate Use Zone (ex. Recreational, mariculture areas, marine protected areas, marine parks, marine reserves, navigational lanes, fishing grounds, eco-tourism destination sites, docking areas) and formulate coastal use management plan to be integrated in the CLUP												
	3	3	2	2	3	2	3	2	2	2	3	27
Implementation of coastal use management plan												
	5	5	5	5	5	1	2	4	2	4	5	43
Conduct massive assessment and inventory of abandoned fishpond and enact ordinance on conversion of the same to mangrove area												
	2	2	3	3	4	3	3	3	2	4	5	34

Reversion of abandoned fishpond areas to mangrove rehabilitation areas												
	4	4	4	4	4	2	4	3	5	5	5	44
Preparation and adoption of watershed management plan												
	5	5	5	5	5	4	2	4	4	5	5	49
Restore water quality based on its most beneficial use/designated classification												
	5	1	1	5	5	1	2	4	4	5	5	38
Formulation of CdeO and Iponan River Rehabilitation Plan												
	5	5	5	5	5	1	4	4	4	3	5	46
Reforestation/protection in watershed areas to improve vegetative cover												
	5	5	5	5	5	4	3	4	3	4	5	48
Establishment of protected areas												
	5	5	4	4	4	4	2	4	4	4	5	45

Adoption of NIPAS law in critical watershed areas													
	5	5	4	4	4	4	2	4	4	4	5	45	
Strict implementation of mining law													
	5	5	5	5	5	4	3	4	2	4	5	47	
Creation of Bantay Kalikasan task force at Brgy level													
	5	5	5	5	5	1	5	2	2	3	5	43	
Establishment of greenbelt areas													
	5	5	5	5	5	5	4	4	4	4	5	51	
Reforestation and rehabilitation of denuded forest areas													
	5	5	5	5	5	5	4	4	4	4	5	51	
Provisions of livelihood project in the upland barangays													
	3	3	3	4	5	1	3	4	2	3	5	36	
Enactment of septage management ordinance.													
	4	3	4	5	3	2	2	1	1	4	5	34	

Provision of area for septage management facility				Potential to health hazard									
	2	2	4	4	5	1	3	2	2	4	5	34	
Strict enforcement of PD 1096 and other related laws that require all hotels, malls, hospitals, and similar commercial and industrial establishments to put up their own sewerage treatment as a requirement in building permit issuance													
	4	3	4	5	5	1	5	1	1	1	5	35	
Require plantations and individual farms to implement best management practices													
	3	1	3	3	3	1	4	2	2	2	4	28	
Strict regulation on pesticide use													
	4	1	4	4	4	1	4	4	2	2	4	34	

Promotion of organic farming												
	4	1	4	3	4	1	4	3	3	3	4	34
Strict enforcement of sanitation code (thru barangay enforcement)												
	5	1	5	5	4	1	4	3	3	3	5	39
Creation of City Water Resources Board to look into surface and ground water extraction												
	4	4	4	4	4	2	4	2	3	3	5	39
Strict implementation on rules and regulations on surface and ground water extraction												
	4	4	4	4	4	3	2	2	3	3	5	38
Strict enforcement of mining laws by LGU and MGB												
	5	5	5	5	5	4	2	4	3	3	5	46
Deputize barangay officials to enforce mining laws.												
	5	5	5	5	5	4	2	4	3	3	5	46

Establishment of MRF for every barangay or cluster of barangays to include hazardous wastes (busted lamps, used cellphone batteries, etc.).												
	4	2	4	4	4	2	3	4	3	3	4	37
IEC on SWM												
	4	2	4	4	4	2	3	4	3	3	4	37
Strict enforcement of Ecological Solid Waste Management Act/City Segregation Ordinance												
	4	2	4	4	4	2	3	4	3	3	4	37
Improve collection of garbage												
	4	2	4	4	4	2	3	4	3	3	4	37
Enforce waste segregation at source (no segregation, no collection policy)												
	4	2	4	4	4	2	3	4	3	3	4	37

Create solid waste management board													
	4	2	4	4	4	2	3	4	3	3	4	37	
Passage of an ordinance in accordance with RA 9003 and enforcement of ordinance at the barangay level.													
	4	2	4	4	4	2	3	4	3	3	4	37	
Ban open burning													
	3	2	3	3	3	1	4	3	3	3	4	32	
Intensify the conduct of IEC on effects of open burning													
	3	2	3	3	3	1	4	3	3	3	4	32	
Intensify anti smoke belching drive to be undertaken by LGU (by entering into a MOA with LTO).													
	3	2	3	3	3	1	4	3	3	3	4	32	

Operationalize multisectoral CDO airshed management (RA 8749- clean air act)													
	3	2	3	3	3	1	4	3	3	3	3	4	32
Conduct Carbon Reduction Initiative													
	3	2	3	3	3	1	4	3	3	3	3	4	32
Strengthen motor vehicle inspection system (MVIS) thru LTO to check vehicle condition prior to registration.													
	3	2	3	3	3	1	4	3	3	3	3	4	32
Collaboration of LTO and LGU in monitoring smoke belchers													
	3	2	3	3	3	1	4	3	3	3	3	4	32
Adopt multi-storey or multi-level entombment													
	3	2	3	3	3	3	3	3	3	3	3	4	33

Establish public crematorium and columbarium												
	3	2	3	3	3	3	2	5	3	3	3	33
Identify additional burial sites not prone to flooding												
	3	2	3	4	3	4	2	4	4	4	4	37
Improvement of existing facilities (parks and playgrounds)												
	2	2	2	4	4	3	4	3	3	3	4	34
Development of additional facilities (parks and playgrounds)												
	2	2	2	4	4	3	4	3	3	3	4	34
Identify area for the construction of sports dome and its facilities												
	2	2	2	4	4	3	2	5	4	4	4	36
Identify appropriate areas for the construction of protective and social welfare services facilities												
	2	2	2	4	4	3	3	4	4	4	5	37

Identify areas for youth centers in four (4) strategic areas; Lumbia, Carmen, Nazareth, Lapasan.													
	2	2	2	4	4	3	3	4	4	4	5	37	

Annex C

Disaster Risk Assessment Report

Historical Occurrence of Hazards, Cagayan de Oro City, 1916-2012

Hazard	Date	Estimated No. of Casualties/Injured/Missing	Estimated Cost of Damage to Properties (PhP'000)
Typhoon/Flooding	December 4, 2012 (Pablo)	0 casualties and 0 missing Few roads were blocked by fallen trees/branches and power posts Uguiaban bridge (link from Cdeo to Talakag, Bukidnon) collapsed	Agriculture – Php 12 Million (801 hectares); Infrastructure - Php 6.5 Million (Schools, health centers and brgys halls and powerlines)
Typhoon/Flooding	December 16-17, 2011	333 deaths, 225 injured;409 missing	4,908,000.0*
	January 11, 2009	13,918 seriously affected persons 4,526 families affected 131 totally damaged houses 1,291 partially damaged houses	350,000.0
	1986	No available data	No available data
	Sept. 22, 1993	No available data	No available data
	May 16, 2003	No available data	No available data
	June 30, 1991	No available data	No available data
	1988	No available data	No available data
	1952	No available data	No available data
	December 1916	No available data	No available data
RIL	No available data	No available data	No available data
Drought	1977–1978 1982-1983	No available data (severely hit were Central Luzon, Southern Tagalog,	total loss of rice and corn production;

	1992-1993 1997-1998	Northern Visayas and Western Mindanao) No available data	drought damage to rice and corn cost more than P700 million; 450,000 hectares of land were affected
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Source: MGB and CPDO-CDO, DSWD-10, PhilVolcs, CdeO DRRMO, PJD 2009

Annex D

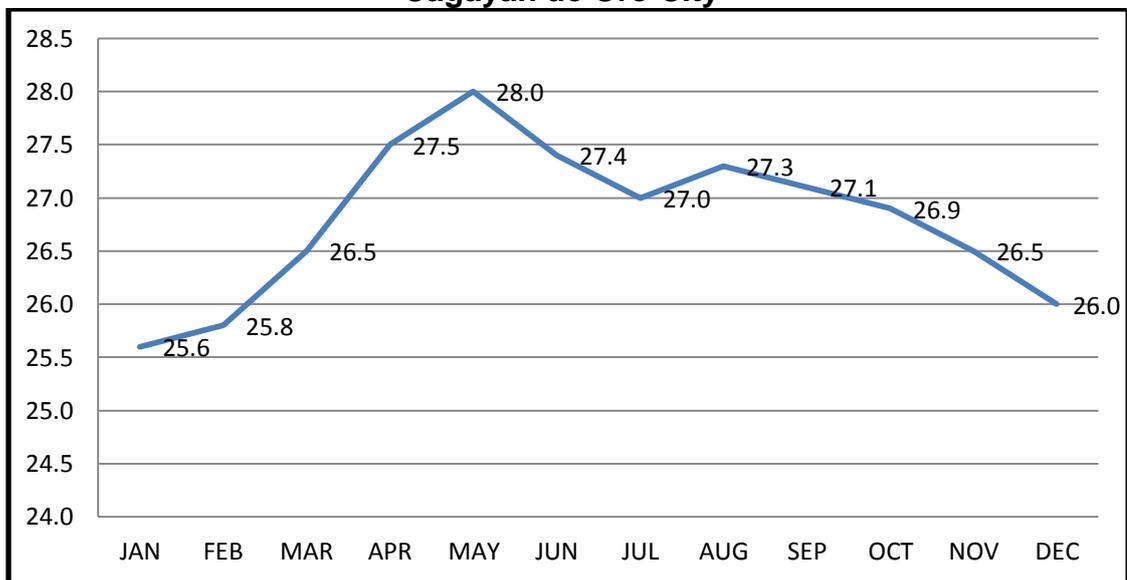
Vulnerability and Adaptation Assessment Report

A. Historical Trends and Observed Changes

Temperature

From 1981 to 2010, the City has an annual mean temperature of 26.8 °C while the average relative humidity is 81%. Figure 4 shows the average temperature for each month in CDO. The hottest months are April, May, and June while the coldest months are December, January, and February. The data was obtained from the PAGASA station in Lumbia Airport.

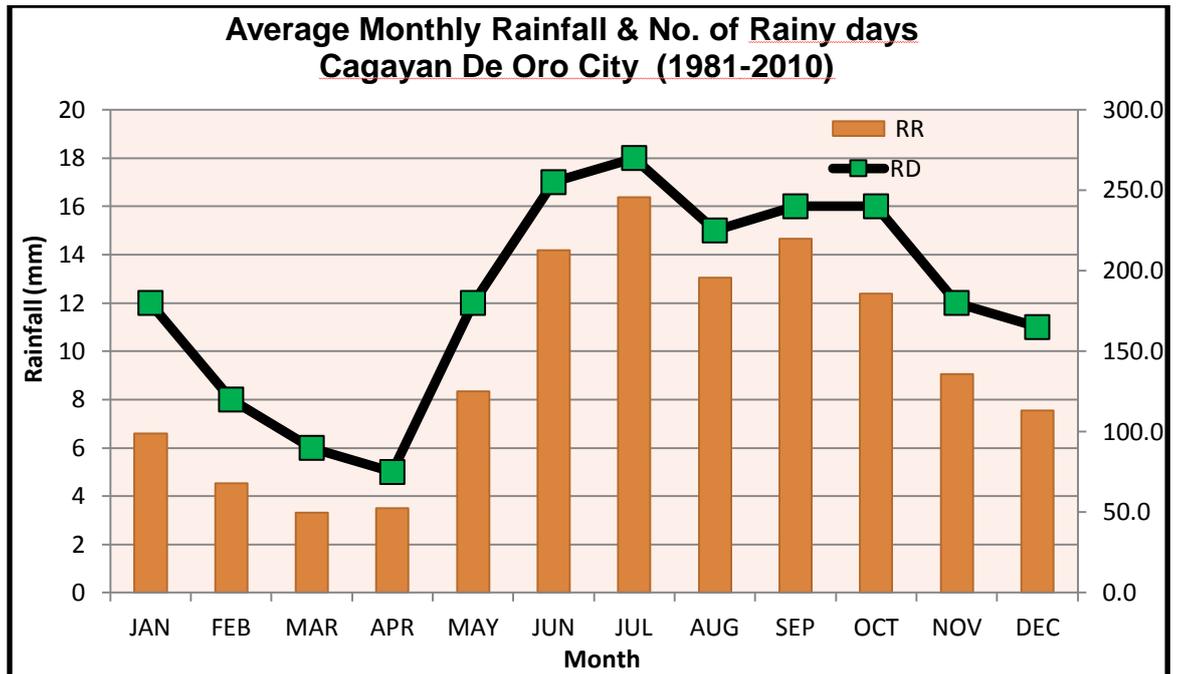
**Monthly Average Temperature (1981-2010)
Cagayan de Oro City**



Source: PAGASA

Rainfall

The figure below shows the average monthly rainfall and the average number of rainy days in Cagayan de Oro City from 1981-2010.



Source: PAGASA

PAGASA data shows that total annual average rainfall in Cagayan De Oro from 1981-2010 is 1,703.3 mm. Further, PAGASA reveals that from June to November which is rainy season, the average rainfall per month is 184.43 mm. From December to May which is dry season, the average rainfall per month is 95.66 mm.

CDO usually experiences rainfall that would last for about two hours followed by moderate to rains. MGB's rainfall record in the upstream section of Cagayan River is 140 mm annually while average annual precipitation computed from monthly average for a ten-year period (2001-2011) is 1,540.98 mm of which 72 % falls during June to November and the remainder during the dry period December to May.

Extreme Events

Every year the country experiences an average of 20 typhoons and most of which pass through Visayas and Luzon. Situated close to what could be the southernmost rim of the Philippine typhoon belt, the city received 11 typhoon hits over a 20-year period. More than typhoon hits, it is floodwater from extreme rainfall flowing down the rivers and running off the slopes, from the uplands of Misamis Oriental and Bukidnon that Cagayan De Oro will have to learn how to cope with. The floods of 2009 and 2011 have already provided a tragic illustration of what can happen. While Cagayan de Oro is free from the direct effects of tropical cyclone, its weather, particularly manifestation of rainfall may be affected by tropical cyclones passing close to the northeastern tip of Mindanao.

Total Annual Number of Typhoons in Cagayan de Oro City

Year	Tropical Cyclone	Period		Duration (days)
		Begin Date	End Date	
1949	TY 4917	10/30/1949	11/3/1949	4
1949	TY 4918	11/4/1949	11/8/1949	5
1949	TS RENA	11/10/1949	11/13/1949	4
1949	TY BETTY	12/3/1949	12/7/1949	5
1950	TY DELILAH	11/19/1950	11/22/1950	4
1952	TS TS5227	12/27/1952	12/29/1952	3
1954	TS TS5401	3/1/1954	3/5/1954	5
1954	TY ELSIE	5/4/1954	5/9/1954	6
1954	TS TS5418	12/23/1954	12/27/1954	5
1954	TS TS5418	12/23/1954	12/27/1954	5
1955	TS VIOLET	1/2/1955	1/6/1955	5
1958	TD TD5815	11/19/1958	2/14/7261	6
1960	TY KAREN	4/19/1960	4/26/1960	8
1962	TY LUCY	11/25/1962	11/28/1962	4
1963	TS SISANG	12/9/1963	12/14/1963	6
1964	TY INING	11/16/1964	11/21/1964	6
1965	TD ATRING	1/16/1965	1/16/1965	1
1967	TY YAYANG	11/6/1967	11/8/1967	3
1968	TY REMING	11/13/1968	11/21/1968	9
1970	TD ANING	11/24/1970	11/24/1970	1
1970	TY TITANG	10/18/1970	10/22/1970	5
1971	TD ISING	5/28/1971	5/30/1971	3
1971	TY GOYING	10/19/1971	10/22/1971	4
1972	TY UNDANG	12/2/1972	12/8/1972	7
1975	TY AURING	1/22/1975	1/25/1975	4
1976	TD KAYANG	12/29/1976	12/30/1976	2
1979	TS KARING	5/10/1979	5/16/1979	7
1980	TD ASIANG	2/12/1980	2/13/1980	2
1982	TS AKANG	3/18/1982	3/22/1982	5
1984	TY NITANG	8/31/1984	9/4/1984	5
1986	TY ANING	12/20/1986	12/24/1986	5
1991	TS BEBENG	4/23/1991	4/26/1991	4
1993	TD BINING	4/12/1993	4/13/1993	2
1993	TY PURING	12/24/1993	12/29/1993	6
1996	TD TOYANG	11/4/1996	11/13/1996	10
2002	TD CALOY	3/20/2002	3/23/2002	4
2003	TD ZIGZAG	12/24/2003	12/27/2003	4
2004	TD PABLO	9/15/2004	9/17/2004	3
2007	TY LANDO	11/19/2007	11/28/2007	10
2008	TS AMBO	4/14/2008	4/15/2008	2
2008	TD ROLLY	11/8/2008	11/9/2008	2
2008	TD TONYO	11/13/2008	11/16/2008	4
2011	TS SENDONG	12/16/2011	12/17/2011	2
2012	TY PABLO	12/4/2012	12/4/2012	1

Source: WWF-BPI Business Risk Assessment

Projected Climate Change in Cagayan de Oro City

PAGASA-DOST projected the climate changes using a mid-range emission scenario (A1B) developed by the Intergovernmental Panel on Climate Change (IPCC). The A1 scenarios considered rapid economic growth, global population that rose to 9 billion then gradually declines quick spread of new and efficient technologies, and extensive social and cultural interactions worldwide. The A1B has a balanced emphasis on all energy sources both fossil and non-fossil fuels. Based on projections, CDO will be affected by 3 climate change drivers: increasing temperature, changes in rainfall in various seasons, and increasing occurrences of extreme events in 2020 and 2050.

B.1 Projected Change in the Means

Increase in Temperature

Climate projections of PAGASA reveal that the City will experience an increase in the average temperature between 1.0 to 1.2°C by 2020 and 1.9°C to 2.4 °C in 2050. This is approximately 27.5°C and 28.55°C in 2020 and 2050, respectively. Days are becoming hotter as observed by many throughout the city. Projections on seasonal temperature change are presented in the table below.

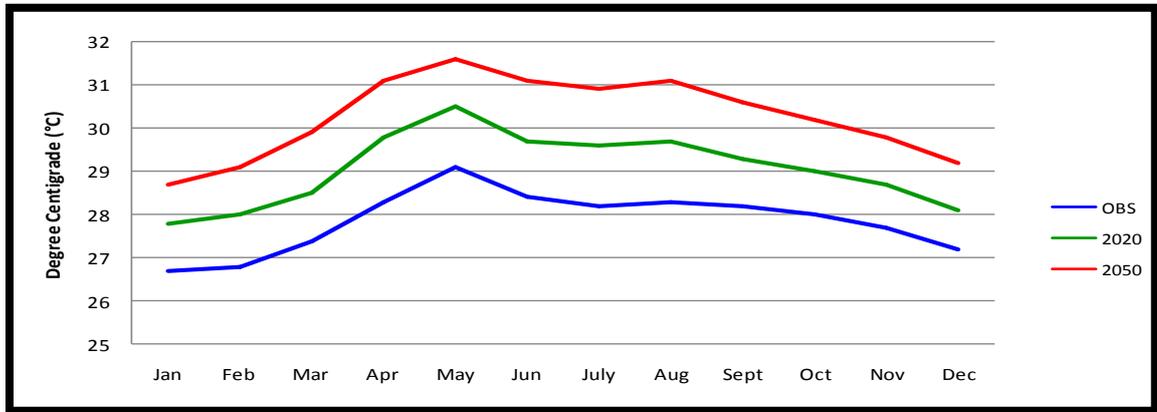
Seasonal temperature change (°C) in 2020 and 2050 under medium range emission scenario for Cagayan de Oro City

SEASON	OBSERVED (°C)	PROJECTED CHANGE (°C)		PROJECTED MEAN TEMPERATURE(°C)	
	(1971- 2000)	(2006- 2035)	(2036- 2065)	(2006- 2035)	(2036- 2065)
Dec-Jan-Feb (DJF)	25.4	1.0	1.9	26.4	27.3
Mar-Apr-May (MAM)	26.8	1.2	2.3	28.0	29.1
Jun-Jul-Aug (JJA)	26.9	1.2	2.4	28.1	29.3
Sep-Oct-Nov (SON)	26.5	1.0	2.0	27.5	28.5

Source: PAGASA

Meanwhile, the figure below shows an increasing trend in the City's monthly average temperature per projections of PAGASA. This data is depicting a hotter and warmer summer season which may have negative implications primarily in the planting and harvesting activities of farming communities.

Projected Change in Monthly Average Temperature Cagayan de Oro City



Source: PAGASA

Changes in Seasonal Rainfall

Projections on seasonal rainfall change in the City using the mid-range scenario are presented in the table below. Generally, there is a reduction in rainfall volume in the City during summer (MAM) season while a rainfall increase is likely during northeast monsoon (DJF) and (SON) season.

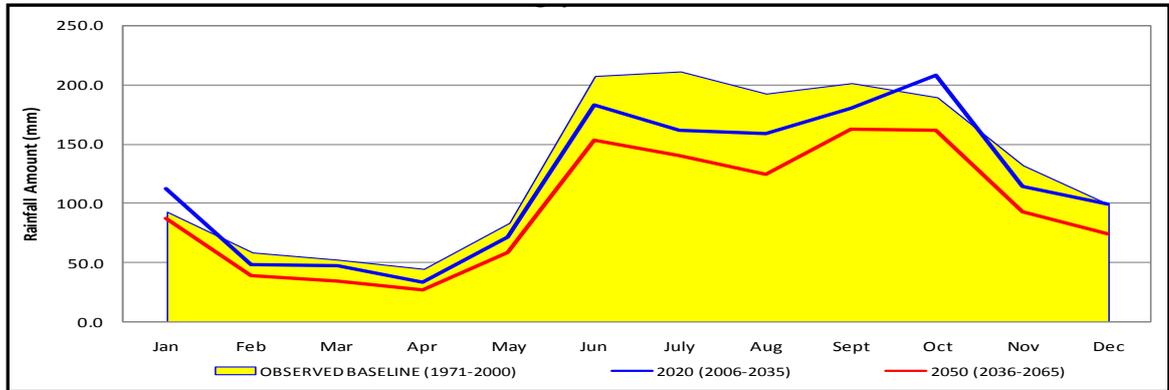
Seasonal rainfall change (in %) in 2020 and 2050 under medium-range emission scenario for Cagayan de Oro City

SEASON	OBSERVED (mm)	PROJECTED CHANGE (%)		PROJECTED RR AMOUNT(mm)	
	(1971-2000)	(2006-2035)	(2036-2065)	(2006-2035)	(2036-2065)
Dec-Jan-Feb (DJF)	442.5	4.6	1.8	422.145	450.5
Mar-Apr-May (MAM)	296	-10.4	-17.8	265.216	243.3
Jun-Jul-Aug (JJA)	615.7	-3.7	-5.2	592.9191	583.7
Sep-Oct-Nov (SON)	581.1	2.9	-0.1	597.9519	580.5

Source: PAGASA

Despite the 3.7% projected decrease in rainfall for (JJA) season, its normal rainfall amount has been considerably high (615.7 mm). The projections for average monthly rainfall volume are highest during the months of June to October as shown in the figure below. These can be associated with the southwest monsoon, locally known as “Habagat”, which is characterized by strong southwest breeze that is responsible for bringing significant rainfall in the Philippines. It is a predominant weather pattern from late May through early October.

Projected Change in Monthly Average Rainfall for 2020 and 2050 Cagayan de Oro City



Source: PAGASA

The decreasing trend in rainfall is not only projected for Cagayan de Oro City but the whole of Mindanao.

Increase in Frequency of Extreme Events

Aside from the observed rainfall changes, the increasing trend in the frequency of occurrence of extreme events, including the episodes of El Nino and La Nina phenomenon, poses threat in the City. PAGASA projections revealed that the number of days with maximum temperature greater than 35 °C will increase to 4539 days and 6180 days in 2020 and 2050, respectively. Further, the current observation of dry days for the same time period has reached 8521 while the projected figure is 6413 days in 2020 and is expected to increase to 7060 days in 2050. Further, the projected number of days that will pour a rainfall amounting to more than 150 mm will be 13 days in 2020 and 9 days in 2050. Projections on change in temperature and total frequency of extreme events are presented in the table below.

Frequency of extreme events in 2020 and 2050 under medium-range emission scenario in provinces in Region 10

Stations	No. of Days w/ Tmax>35 °C			No. of Dry Days			No. of Days w/ Rainfall >150mm		
	OBS (1971-2000)	2020	2050	OB S	2020	2050	OB S	2020	2050
Cagayan De Oro	383	4539	6180	8251	6413	7060	10	13	9

Source: PAGASA

<i>Changes in Means and Extreme Events</i>	<i>Increase/ Decrease (2020 projections)</i>
<i>Average Temperature</i>	+1.0 DJF +1.2 MAM +1.2 JJA +1.0 SON
<i>Average Rainfall</i>	+ 4.6% DJF - 10.4% MAM - 3.7% JJA +2.9% SON
<i>No. of days with rainfall > 150 mm</i>	<i>Increase from 10 to 13 days</i>
<i>No. of dry days</i>	<i>Decrease from 8521 to 6413</i>
<i>No. of days w/ Tmax>35 °C</i>	<i>Increase from 383 to 4539</i>

Source: PAGASA

Annex E

Workshop Pictures













