NATIONAL RESILIENCE COUNCIL

LCCAP
LOCAL CLIMATE CHANGE ACTION PLAN

CY 2023-2028

CITY GOVERNMENT OF ILIGAN
ILIGAN CITY DISASTER RISK REDUCTION & MANAGEMENT OFFICE

Republika ng Pilipinas
LUNGSOD NG ILIGAN
Tanggapan ng Sangguniang Panlungsod

REGULAR SESSION HELD ON JUNE 04, 2024

PRESENT:

Bernard Y. Pacaña,	Acting City Vice Mayor, Presiding Officer
Simplicio N. Larrazabal, III,	Member
Michelle E. Sweet-Booc,	Member
Samuel P. Huertas,	Member
Providencio A. Abragan, Jr.,	Member
Jesse Ray N. Balanay,	Member
Rhandy Ryan Francis A. Ong,	Member
Marlene L. Young,	Member
Ramil C. Emborong,	Member
Betsy Maria PTV Zalsos-Uychiat,	Member
Nhicolle B. Capangpangan,	Member
Datu Kilala Lanelio T. Sangcoan,	Member
Trix Mikyla L. Caballero,	Member

ABSENT:

Marianito D. Alemania,	Acting Mayor
Rosevi Queenie C. Belmonte,	Member (On Leave)
Cesarve C. Siacor,	Member (OB)

RESOLUTION NO. 24-402

RESOLUTION ADOPTING AND APPROVING THE LOCAL CLIMATE CHANGE ADAPTATION AND MITIGATION PLAN (LCCAMAP) OF THE CITY OF ILIGAN

WHEREAS, presented for deliberation before this august body was the Iligan City Disaster Risk Reduction and Management Council (ICDRRMC) Resolution No. 11 Series of 2023, which sought for a Sangguniang Panlungsod resolution approving and adopting the Local Climate Change Adaptation and Mitigation Action Plan (LCCAMAP) of the City of Iligan;

WHEREAS, as frontline agencies, Local Government Units are mandated under Republic Act No. 9729 otherwise known as the Climate Change Act of 2009 for the formulation, planning, and implementation of climate change action plans that shall be consistent with the provisions of the Local Government Code and the National Climate Change Action Plan;

WHEREAS, the Iligan City Disaster Risk Reduction and Management Council (ICDRRMC) convened on December 20, 2023, at Sweet Mommy's Garden, Palao, Iligan City, to deliberate on measures for enhancing disaster preparedness and resilience within the jurisdiction;

WHEREAS, recognizing the imperative to address the challenges posed by climate change, the Iligan City DRRMC reviewed and approved the Local Climate Change Action Plan (LCCAP) 2023-2028 in its ICDRRMC Resolution No. 11 Series of 2023;

WHEREAS, the LCCAP outlines priority actions and interventions aimed at reducing vulnerability, enhancing adaptive capacity, and mainstreaming climate considerations into local development planning and decision-making processes;

WHEREAS, the adoption of the LCCAP is in accordance with Republic Act No. 9729, the Climate Change Act of 2009, which mandates the formulation of local climate change action plans to guide Local Government Units in addressing climate change impacts and promoting sustainable development;

WHEREAS, the LCCAP complements the initiatives outlined in the Iligan City Disaster Risk Reduction and Management Plan, contributing to the city's efforts in building resilience to climate-related hazards and disasters;

WHEREAS, this august body supports the LCCAMAP of Iligan City, the Local Climate Change Action Plan which focuses on both climate change adaptation and mitigation and describes how LGUs plan to respond to the impacts of climate change and mainstream them into local development plans (i.e. land use plan, sectoral development plan, investment program;

WHEREFORE, on motion of Member Ramil C. Emborong, duly seconded by Members Betsy Maria PTV Zalsos-Uychiat and Marlene L. Young

BE IT RESOLVED, AS IT IS HEREBY RESOLVED, by the Sangguniang Panlungsod of Iligan City to **ADOPT** and **APPROVE,** as it hereby **ADOPTS** and **APPROVES,** the Local Climate Change Adaptation and Mitigation Plan (LCCAMAP) of the City of Iligan.

CARRIED.

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The undersigned hereby attest to the adoption of the foregoing resolution as verified to by the Member-Author.

ATTY. ARTHUR LL. PADILLA
Secretary to the Sanggunian

VERIFIED:

RAMIL C. EMBORONG
Member-Author

CERTIFIED:

BERNARD Y. PACAÑA
Acting City Vice Mayor, Presiding Officer

//jonahjebalucan

Republic of the Philippines
Region X
Office of the City Mayor
City of Iligan
Iligan City Disaster Risk Reduction Management Council
Buhanginan Hills, Palao, Iligan City

ILIGAN CITY DISASTER RISK REDUCTIONA AND MANAGEMENT COUNCIL (ICDRRMC) RESOLUTION NO. 11
Series of 2023

RESOLUTION APPROVING THE CITY DISASTER RISK REDUCTION AND MANAGEMENT OFFICE (ICDRMRO) LOCAL CLIMATE CHANGE ACTION PLAN (LCCAP) 2023-2028

WHEREAS, Republic Act No. 10121, known as the "Philippine Disaster Risk Reduction and Management Act of 2010," emphasizes the importance of comprehensive risk assessment in disaster risk reduction and management planning;

WHEREAS, Republic Act No. 9729 otherwise known as Climate Change Act of 2009, mandates that Local Government Units shall be the frontline agencies in the formulation, planning and implementation of climate change action plans in their respective areas, consistent with the provision of the Local Government Code and the National Climate Change Action Plan;

WHEREAS, recognizing the increasing impact of climate change on disaster risks, the Iligan City Disaster Risk Reduction and Management Office (Iligan CDRRMO) has diligently crafted the Local Climate Change Action Plan for the years 2023-2028;

WHEREAS, to address the life-threatening risk of global warming and climate change on vulnerable areas of Iligan City, the Iligan City Disaster Risk Reduction and Management Office formulated the Local Climate Change Action Plan 2023-2028.

NOW, THEREFORE, RESOLVE, as it is hereby **RESOLVED**, to **APPROVE** the City Disaster Risk Reduction and Management Office Local Climate Change Action Plan (LCCAP) 2023-2028.

This resolution shall take effect immediately upon its approval.

Certified true and correct:

ARMIEN P. ALORRO
Executive Assistant IV
Head Secretariat

Approved by:

FREDERICK W. SIAO
City Mayor
Chairman, ICDRRM Council

ACKNOWLEDGMENT

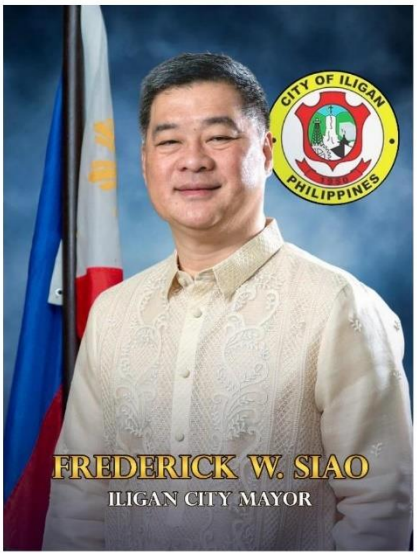
Creating this plan demands significant dedication, resources, and collaboration among various stakeholders, including City Officials, NGOs, CSOs, Barangay Officials, Government Agencies, and the LCCAP Core Team. The City Government of Iligan expresses gratitude to its staff for their contributions and acknowledges the input from all involved parties, particularly the LCCAP Core Team, in crafting the Local Climate Change Action Plan through workshops, discussions, and consultations.

The active participation of numerous individuals in consultations, including at the county level, underscores the community's commitment to enhancing Iligan City's resilience to climate change. This dedication ensures that the LCCAP addresses the city's most urgent climate challenges.

The progress achieved in Iligan City's climate change response is indebted to the unwavering support of government officials, led by Mayor Frederick W. Siao and Vice Mayor Marianito D. Alemania. The City Government remains steadfast in implementing the LCCAP and invites all partners and stakeholders to collaborate in executing prioritized actions for the city's benefit. Together, we strive to build a safer and more resilient Iligan City in the face of disasters.

Republic of the Philippines
OFFICE OF THE CITY MAYOR
City of Iligan
Iligan City Hall, Buhanginan Hills, Pala-o
Iligan City, Philippines 9200

MAYOR'S MESSAGE



In the face of escalating environmental challenges, the need for collective action has never been more urgent. Climate change poses a direct threat to our city, our economy, and the well-being of our citizens. However, it also presents us with an opportunity - an opportunity to innovate, collaborate, and build a more resilient future.

The LCCAP serves as our roadmap towards this future. Developed through extensive consultation and collaboration with stakeholders from across our community, this plan outlines strategic initiatives designed to mitigate the impacts of climate change, enhance adaptive capacity, and promote sustainable development.

As Mayor of Iligan City, I am committed to ensuring the effective implementation of the LCCAP. Together with our dedicated team of public servants, we will work tirelessly to mobilize resources, engage stakeholders, and drive meaningful progress towards our shared goals.

I would like to express my sincere gratitude to all those who contributed to the development of this plan - from government agencies and civil society organizations to businesses and residents alike. Your expertise, dedication, and passion have been instrumental in shaping the vision outlined in this document.

Let us seize this moment as an opportunity to unite, to innovate, and to lead. Let us embark on this journey with unwavering resolve and a steadfast determination to build a brighter, more sustainable future for Iligan City and all who call it home.

Asenso Iliganon!

FREDERICK W. SIAO
City Mayor

FOREWORD

We are privileged to introduce the Local Climate Change Action Plan (LCCAP) for the years 2024-2028 of Iligan City. The City Planning and Development Office and partners, the Iligan City Disaster Risk and Management Office, Aboitiz Group of Companies, Mindanao States University-Iligan Institute of Technology (MSU-IIT) and other stakeholders would like to express their great enthusiasm and a deep sense of responsibility to present this plan, which embodies the city's commitment to build a sustainable and resilient future.

The negative effect of climate change is now a global challenge that demands local solutions, and Iligan City is poised to take a proactive stance in addressing its impacts to its rich natural resources, diverse ecosystems, and vibrant communities. This LCCAP 2024-2028 of Iligan City reflects our collective efforts and vision to harness opportunities while mitigating the risks, fostering a sustainable and resilient environment for current and future generations. The plan also serves as the city's blueprint, that is carefully crafted to navigate the complex interplay between environmental protection, conservation, sustainable urban development, and well-being of the community.

In the process of formulating the plan, we have engaged with various stakeholders and experts mentioned above to ensure a comprehensive and inclusive planning approach. The inputs and insights gathered from these collaborative efforts have been instrumental in shaping the strategies and actions outlined in the plan.

As we express our heartfelt gratitude to our partners for the successful completion of this plan, we sincerely hope that this becomes a guiding light, inspiring collective action and fostering shared sense of responsibility to everyone. We therefore invite every citizen, organization, and stakeholder to actively participate in its implementation for us to be adaptive and resilient to climate change.

Together, let us shape a resilient and sustainable future for Iligan City. GOD Bless Iligan!

Enp VENERANDO O. BORDEOS
City Planning and Development Coordinator

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Acronyms

BOD	Biochemical Oxygen Demand
CC	Climate Change
CCA	Climate Change Adaptation
CCC	Climate Change Commission
CDP	Comprehensive Development Plan
CH_4	Methane Gas
CLUP	Comprehensive Land Use Plan
CO_2	Carbon Dioxide
CRM	Coastal Resource Management
DRR	Disaster Risk Reduction
DRRMC	Disaster Risk Reduction Management Council
FLUP	Forest Land Use Plan
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
LCCAP	Local Climate Change Action Plan
LGC	Local Government Code
LGU	Local Government Unit
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PAR	Philippine Area of Responsibility
PRECIS	Providing Regional Climates for Impact Studies
RA	Republic Act
UNFCCC	United Nations Framework Convention on Climate Change

Definition of Terms

Adaptation refers to adjustment to natural or human systems in responds to actual or expected climatic stimuli or their effects which moderate barns or exploits beneficial opportunities.

Adaptive Capacity is the ability of the ecological, social or economic systems to adjust climate change including climate variability and extremes to moderate or offset potential damages or to take advantage of associated opportunities with changes in climate or to cope with the consequences thereof.

Biochemical Oxygen Demand (BOD) is the amount of dissolved oxygen needed to decompose the organic matter in waste water. A high BOD indicates heavy pollution with little oxygen remaining for fish.

Climate change is a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It also refers to any change in climate over time, whether due to natural variability or as a result of human activity.

Climate Change Adaptation is managing the risks caused by climate change. It may include large-scale infrastructure such as building defences to protect against sea level rise or improving the quality of road surfaces to withstand hotter temperatures, or behavioural shifts such as farmers planting different crops and individuals using less water.

Climate Change Mitigation are interventions to avoid the risks of a changing climate by reducing the emission of greenhouse gases and preventing more severe climate change

Climate system means the totality of the atmosphere, hydrosphere, biosphere and geosphere and their interactions.

Climate Variability refers to the variations in the average state and in other statistics of the climate on all temporal and special scales beyond that of individual weather events.

Emission is the release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time. (source: UNFCCC)

Greenhouse gases (GHGs) are gaseous constituents of the atmosphere, both natural and anthropogenic, that absorbs and re-emits infrared radiation. (UNFCCC)

Laws/Policies

RA 7279	Urban Development and Housing Act of 1992
RA 8749	Philippine Clean Air Act of 1999
RA 9003	Ecological Solid Waste Management Act of 2000
RA 7160	Local Government Code of 1991
RA 10121	Disaster Risk Reduction Management Act of 2010
RA 10174	People's Survival Fund (Amending RA 9729)
RA 7160	The Local Government Code of 1991
RA 9729	Climate Change Act of 2009
PD 1067	Water Code of the Philippines

CHAPTER 1. INTRODUCTION

Climate change is a grave existential challenge ever to confront humanity. Its adverse impacts have already been seen and may intensify exponentially over time if nothing is done to reduce further emissions of greenhouse gases. Decisively dealing now with climate change is vital to ensure sustainable development, poverty eradication and safeguarding economic growth. Scientific assessments indicate that the cost of inaction now will be more costly in the future. Thus, economic development needs to shift to a low-carbon emission path.

The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992 as the basis for a global response to the adverse effects of climate change. The Philippines signed the UNFCCC on June 12, 1992 and ratified the international treaty on August 2, 1994. Presently, the Convention enjoys near-universal membership, with 194 Country Parties.

Recognizing that the climate system is a shared resource which is greatly affected by anthropogenic emissions of greenhouse gases, the UNFCCC has set out an overall framework for intergovernmental efforts to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable. Its ultimate objective is to stabilise greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system.

Countries are actively discussing and negotiating ways to deal with the climate change problem within the UNFCCC using two central approaches. The first task is to address the root cause by reducing greenhouse gas emissions from human activities. The means to achieve this is very contentious, as it will require radical changes in the way many societies are organized, especially in the use of fossil fuel, industry operations, land use, and development. Within the climate change arena, the reduction of greenhouse gas emissions is called “mitigation”.

The second task is to manage the impacts of climate change. Future impacts on the environment and society are now inevitable, owing to the amount of greenhouse gases already in the atmosphere from past decades of industrial and other human activities, and to the added amounts from continued emissions over the next few decades until mitigation policies and actions become effective. We are therefore committed to be part in addressing the impacts of climate change. Taking steps to cope with the changes in climate conditions in terms of both reducing adverse impacts and taking advantage of potential benefits is called “adaptation”.

(Source: PAGASA-DOST)

1.1 Legal Mandate

Republic Act (RA) 9729 acknowledges the Philippines’ vulnerability to climate change and the need for appropriate adaptation and mitigation actions. It creates a comprehensive framework for systematically integrating the concept of climate change, in synergy with disaster risk reduction (DRR), in various phases of policy formulation, development plans, poverty reduction strategies and other development tools and techniques (source: RA 9729 and its IRR).

The crafting of RA 9729 was anchored on Section 16 of the 1987 Philippine Constitution which states that the “State shall protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature”.

The Local Climate Change Action Plan (LCCAP) is a mandate for every LGU based on RA 9729. It is a requirement needed to access the People’s Survival Fund (RA 10174 which amended Section 18 of RA 9729). The LCCAP will be submitted to the Climate Change Commission (CCC) for evaluation and deliberation for funding of climate change adaptation actions of the LGU.

Moreover, the local government units shall consider climate change adaptation as one of its regular functions.

1.2 The National Climate Change Action Plan (NCCAP)

The National Climate Change Action Plan comprehensively addresses challenges of Climate Change. Public financing will prioritize adaptation to reduce vulnerability and risk of communities particularly the marginalized sector as well as provide a policy environment that will encourage the participation of the private sector to optimize mitigation opportunities towards sustainable development.

NCCAP identified seven strategic priorities. These include the following:

1. Food Security - This is to ensure availability, stability, accessibility, and affordability of safe and healthy food amidst climate change.

2. Water Sufficiency - In light of climate change, however, a comprehensive review and subsequent restructuring of the entire water sector governance is required. It is important as well to assess the resilience of major water resources and infrastructures, manage supply and demand, manage water quality, and promote conservation.

3. Ecological Stability - Ecosystems resiliency and environmental stability during the plan period is focused on achieving one immediate outcome; the protection and rehabilitation of critical ecosystems, and the restoration of ecological services.

4. Human Security - This is to reduce the risks of women and men to climate change and disasters.

5. Climate-Friendly Industries and Services - NCCAP prioritizes the creation of green and eco-jobs and sustainable consumption and production. It also focuses on the development of sustainable cities and municipalities.

6. Sustainable Energy - prioritizes the promotion and expansion of energy efficiency and conservation; the development of sustainable and renewable

energy; environmentally sustainable transport; and climate-proofing and rehabilitation of energy systems infrastructures.

7. Knowledge and Capacity Development - This includes enhancing knowledge on the science of climate changes; improving capacity for climate change adaptation, mitigation and disaster risk reduction at the local and community level; and establishing gender climate change knowledge management accessible to all sectors at the national and local levels.

CHAPTER 2. BACKGROUND

2.1 Rationale

Climate change increases disaster risk in several ways. It changes the magnitude and frequency of extreme events of which average climatic conditions and climate variability change, affecting underlying risk factors. It generates new threats, which a certain community may have no experience in dealing with. Hence, the Local Climate Change Action Plan is prepared to create a climate risk-resilient city, aimed to build the adaptive capacity of the communities and improving the resiliency of the natural ecosystems against the impacts of climate change, as well as provide a policy environment that will encourage the participation of the private sector and the civil society.

The Iligan City Climate Change Action Plan focused on the seven (7) strategic priorities pattern from the National Climate Change Action Plan. Each of which is a component of the development sectors of the Comprehensive Land Use Plan (CLUP) and the Comprehensive Development Plan (CDP). These are the following;

7 Strategic Priorities

1. Food Security is discussed under agriculture, livestock, and fishery sub-sectors of the economic development sector
2. Water Sufficiency (and Safety) is a component of the infrastructure development sector under the sub-sector on water
3. Ecological Stability is discussed under the environmental management sector
4. Human Security is discussed under sub-sectors of the social development
5. Climate-friendly Industries and Services – is one of the components of the economic development sub-sector

6. Sustainable Energy is a component of the infrastructure development sector

7. Knowledge and Capacity Development is one of the components of the institutional development sector

2.2 City Profile

2.2.1 Physical and Environmental Profile

2.2.1.1 Location and Geophysical Features

a. Location

Iligan is a chartered city in the Northern Mindanao Region of the Philippines. It has a population of 363,115 (2020 census data) distributed over 44 barangays. It is located in the northern coast of Mindanao facing Iligan Bay bounded by the province of Misamis Oriental, in the east by the provinces of Bukidnon and Lanao del Sur and in the south by the province of Lanao del Norte.

Iligan City is accessible by land, air and sea. Its accessibility by land transport is via the Mindanao-wide Road network. Its sea transport accessibility, through ports either of Iligan or nearby Cagayan de Oro and Ozamis Seaports. Current air transport is through the Laguindingan Airport.

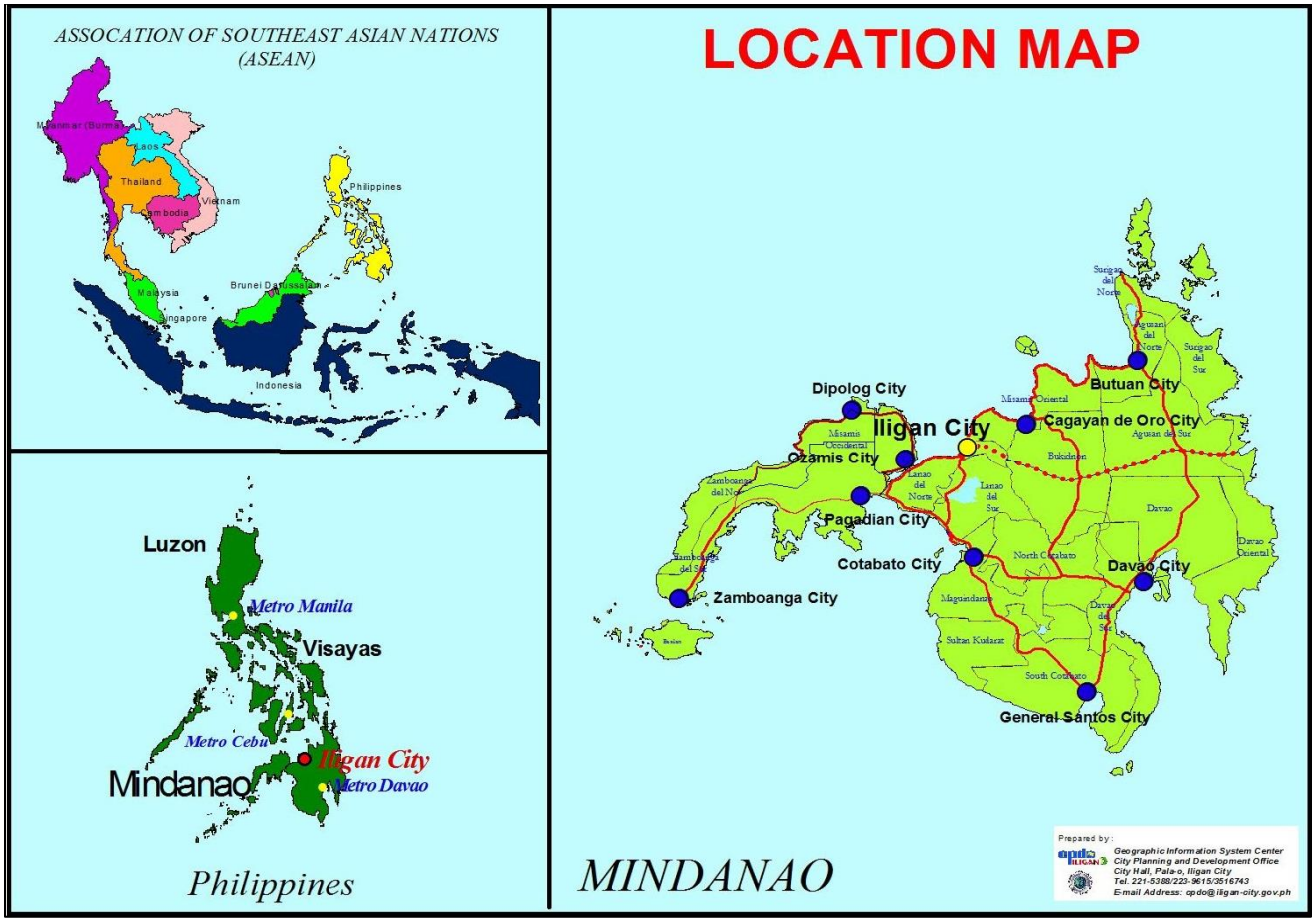


Figure 1. Location Map of Iligan City

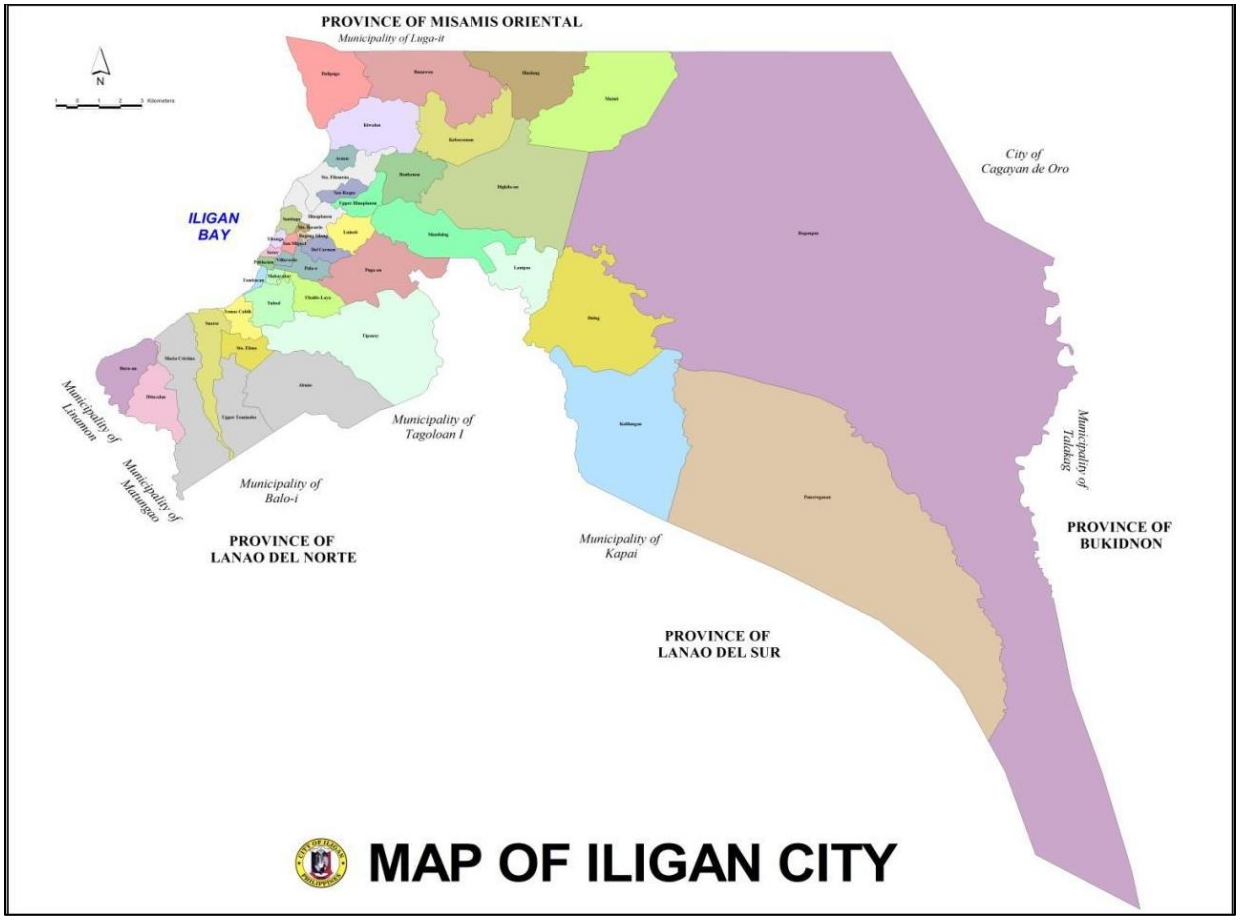


Figure 2. Administrative Map of Iligan City

b. Land Area

Iligan City consists of 44 barangays with a total land area of 81,337 hectares (**Figure 2**). This is about 25 percent of the total land area of Lanao del Norte and is 3.13 percent of the total land area of Northern Mindanao.

c. Topography and Elevation

The topography of Iligan City is characterized by a narrow coastal alluvial plain fronting Iligan Bay at the foot slopes of undulating hills and mountains. Several river valleys are found in the city with relatively steep slopes. At the mouth of Agus River, very steep slopes separate the coastline and the highland areas.

Huge portion of the land area of Iligan City is within 500 -1000 meters above mean sea level. This constitutes an area of 35,944 hectares or approximately 44% of Iligan's total land area. Land area with elevation more than 1000 meters above mean sea level covers 2,228 hectares. These are classified as warm cool highland that are suitable to forestry, wildlife sanctuary or eco-tourism

On the other hand, land area within elevation of 300-500 is 17,709 hectares or about 22% of the total land area of the city. This elevation range is classified as warm cool hilly land and suitable for agro-forestry, highland vegetables, or less steeper areas to tree crops including coconut.

The land area within elevation of 100-300 meters above mean sea level (masl) covers 16,514 hectares. This is suitable for various upland crops and tree crops including coffee, abaca, durian, pomelo and mangosteen. Whereas, land area with elevation less than 100 masl is 9,350 hectares which is roughly 11% of the total land area. Refer **Figure 3**. [Source: The Soil and Land Resources Evaluation for SAFDZ-CLUP Integration, Bureau of Soils and Water Management (BSWM) June 2003 and Iligan City FLUP]

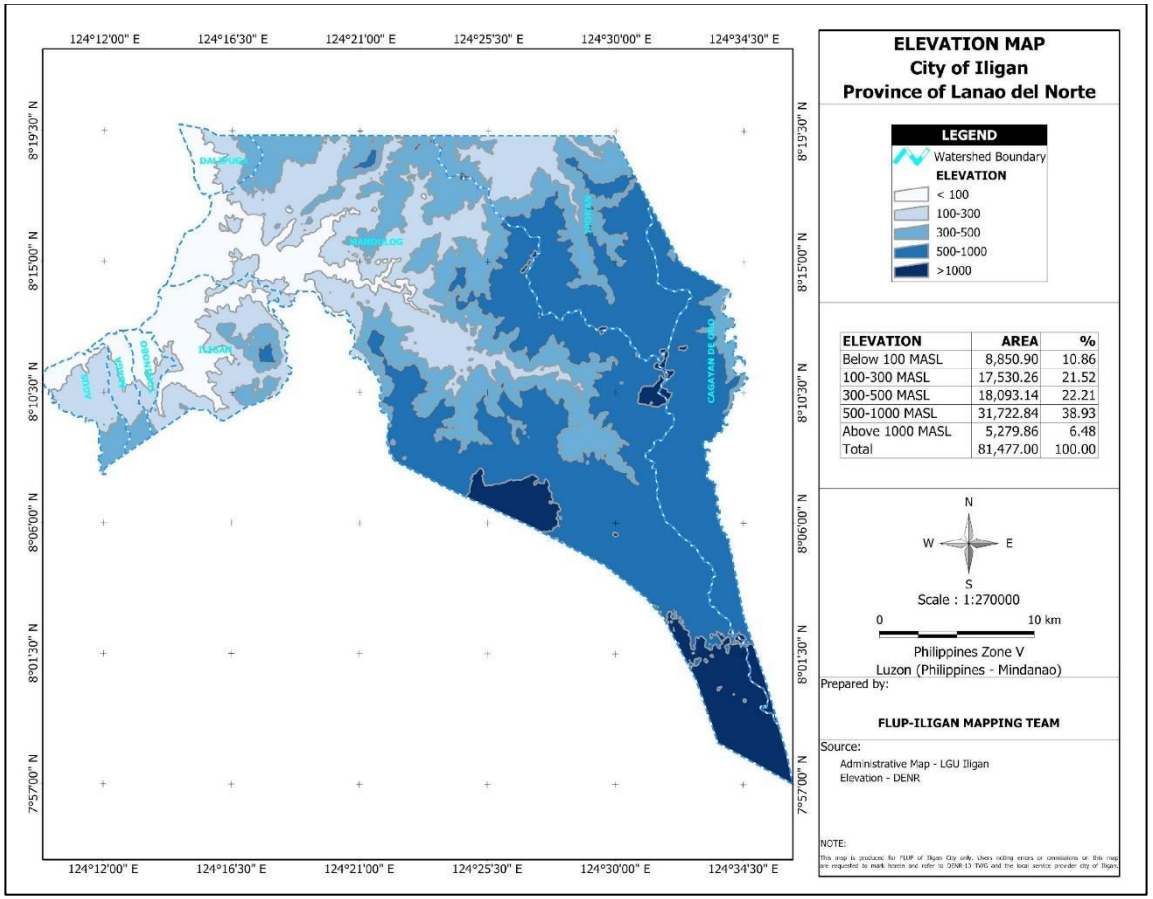


Figure 3. Map Showing Various Elevation Ranges in Iligan City

d. Slope

The slope is crucial in identifying potential areas for development. The steeper and longer the slope, the greater the velocity of run off hence, greater possibility of soil to erode.

Generally, land with slope gradient of 0-18 percent is good for farm lands. Seasonal inter-tilled crops are highly recommended.

The dominant slope category among the sub-watersheds of Iligan City is 18-30 percent which covers 18,871.26 hectares. This is rolling to moderately steep and suitable for agroforestry.

On the other hand, slope 30-50% is considered forestland but can have production function. It allows timber extraction as long as it observes a sustainable scheme plan. The production systems in this area can be based on management of existing forest vegetation or on reforestation with timber production species managed plantations. These can be done through community-based methods or by management agreement schemes.

Land area within the slope of 50% and more (18,517.83 hectares) is classified as protection forest intended for wildlife sanctuary, and for other biodiversity conservation purposes. Refer **Figure 4**. (source: Iligan City Forest Land Use Plan 2015-2020)

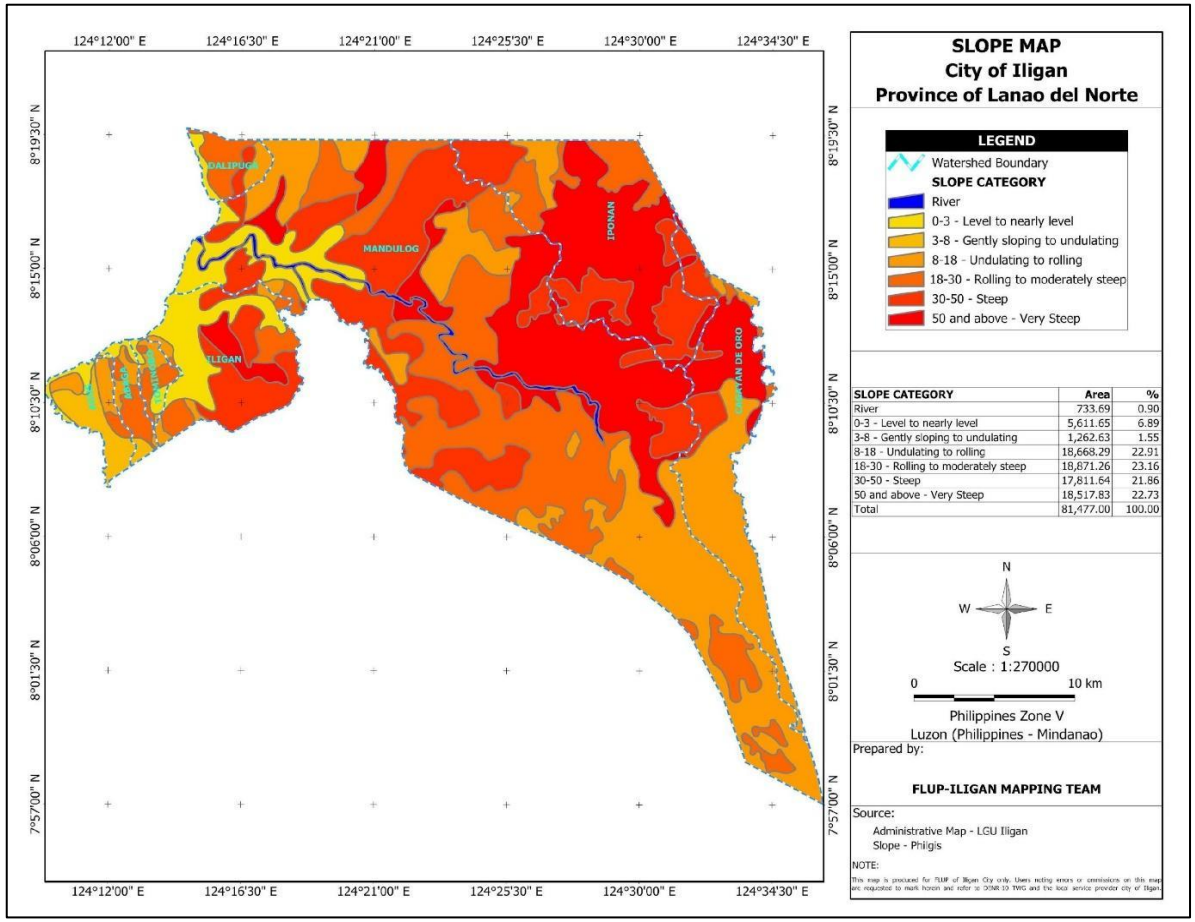


Figure 4. Slope Map

e. Land Cover

The city's dominant land cover is shrubs and wooded grassland comprising an area of 31,307.65 hectares which is 38.43% of the city's entire area. Open forest on the other hand covers an area of 19,476.44 hectares or 23.90% of its total land area. Other existing land cover include the built-up area, cultivated (crop) area, mangrove forests, open (grassland & barren), fishpond, inland water, and closed forests (**Figure 5**).

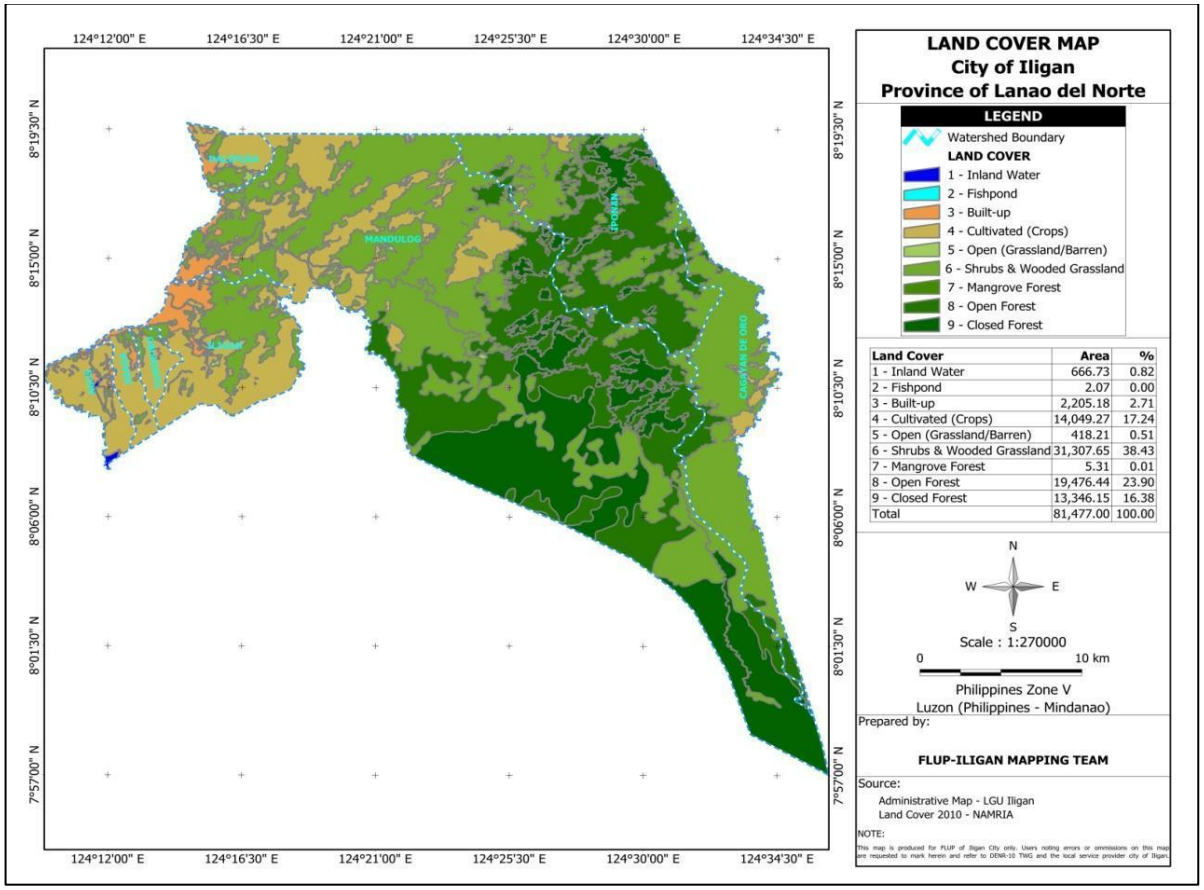


Figure 5. Land Cover Map

f. Climate

Iligan City has Type III climate. This is characterized by a short dry period of one to three months. Annual average temperature is 22.60° C. Rainfall in Iligan City is evenly distributed throughout the year. Records in 2021 and 2022 show a monthly average rainfall of 201.13 mm and 213.89 mm respectively.

g. Soil Type

Dominant soil type in cool highland covering 40,218.90 hectares or 49.19 percent. Its soil types include (1) Bolinao-Faraon Association- a shallow, well drained soils which is a residual soil from weathering of coralline limestone; (2) Jasaan-Adtuyon Association-a moderate deep to deep, well drained soils that are mainly developed from the weathering of volcanic rock materials; (3) Guimbalaon Series is a well-drained shallow to moderately sloping to steep hills and ultra basic mountains with presence of thin patchy clay cutans and highly weathered rock fragments occur in the subsoil; and (4) Kidapawan Series consists of well-drained shallow to moderately deep soils developed from igneous rocks.

The warm or cool hilly land constitutes an area of 33, 025 hectares (or 40.41%) with the following soil types; (1) Alimodan Series-consist of shallow to moderately deep, well-drained fine clayey soils occurring on rolling to highly rolling areas of residual landscape developed from the weathered products of shale and sandstone; (2) Adtuyon- consist of moderately deep to well drained fine clayey soils occurring on moderately sloping to steep hilly residual landscape, (3) Bolinao Series consists of shallow, well drained fine clayey soils developed from high limestone hills; (4) Faraon is a residual soil developed mainly from weathering of coralline limestone; (5) Guimbalaon consists of well drained shallow to moderately deep fine clayey soils occurring on gently sloping or moderately sloping to steep hills and ultra basic mountain; and (6) Camansa consists of shallow to moderately deep, well-drained soils occurring on rolling

to steep or steep to very steep slopes of the hilly residual landscape which is underlain by sandstone and shale. Other soil series in warm lowland and warm upland include Active tidal flat complex, Bongliw, Infilled/localized valley and Camiguin. (source: BSWM 2003)

h. Major Rivers

There are three (3) major rivers in Iligan City (**Figure 6**), namely; Iligan River, Mandulog River, and Agus River.

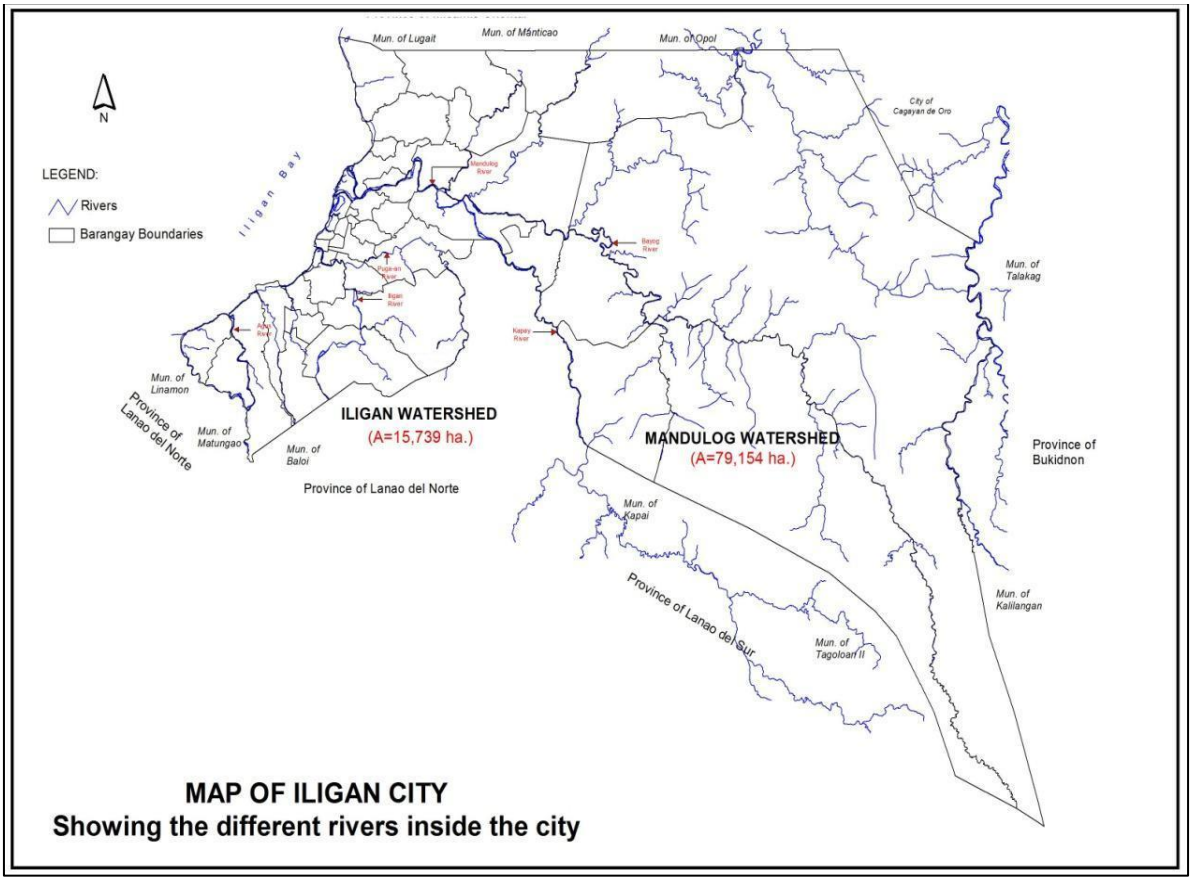


Figure 6. Map Showing Major Rivers in Iligan City

i. Watershed

The forestland of Iligan City spans to an estimate of 48, 556 hectares, and mainly situated in the eastern and southeastern hinterland areas of the city. The forestland is further classified according to its land use. The areas zoned as protection forest are designated for the preservation of watersheds, conservation of faunal and floral species, particularly those identified as endangered. The goal is to increase their populations thereby enhancing biodiversity. Additionally, areas zoned as production forest are identified for industrial and agro-industrial plantations, facilitating the sustainable utilization of resources from timberlands and forest cover while maintaining protection of slopes with gradients between 30% to 50% gradient.

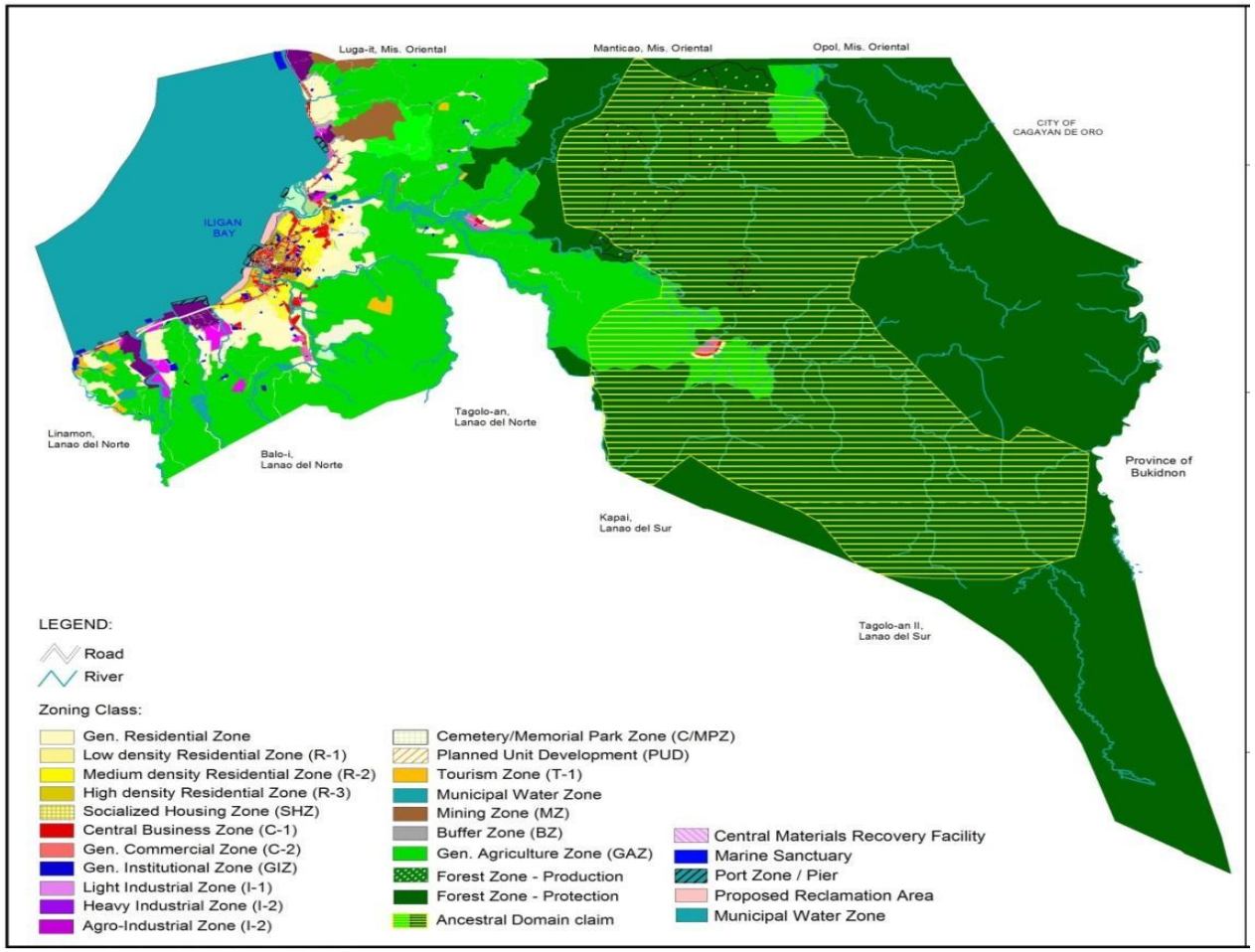


Figure 7. Land Classification and Zoning in Iligan City. From Iligan City Ecological Profile 2019

Vegetation within these forests is diverse, encompassing close canopy forests, open canopy forests, brushlands, grasslands, cultivated areas, and tree plantations. The forest zone may be designated under tenurial management schemes such as Community Based Forestry Management (CBFM), Integrated Forest Management Agreement (IFMA), and Integrated Social Forestry (ISF) schemes. These forest management schemes aim to promote sustainable land use practices, conserving biodiversity, improving socio-economic conditions of residents, enhancing forest resilience, and fostering community empowerment and stewardship of natural resources.

Of the total forest zone, roughly around 25,947 has. are tree plantations with tenurial arrangements, 10,782 has. is open canopy forest, 5,640 has. is close canopy forest, 5,384.000 has. is grassland, and 803 has. is brushland.

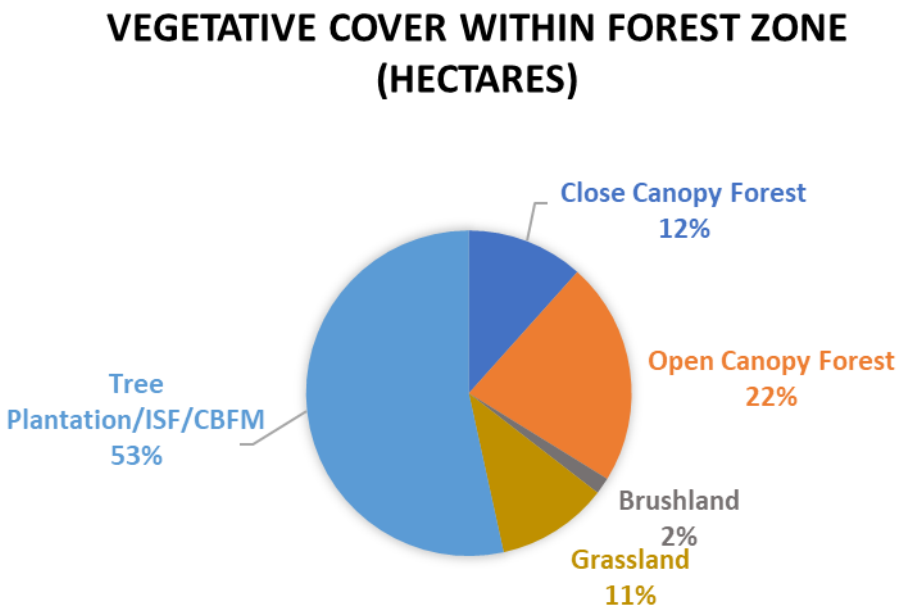


Figure 8. Percentage distribution of vegetation cover in identified forest zone. From Iligan City Ecological Profile 2019

ligan's topography is marked by varied slopes, contributing to its rich geomorphological tapestry. The diverse slope gradients across the city influence the distribution of vegetation and land use, shaping the ecological and human landscapes.

Slopes ranging from 0-8%, characterized as "level to very gently sloping," are located extensively along the coastal areas. Apart from the coastal areas, they are also identified in the southeastern of the city or in the southern part of Barangay Panoroganan and Rogongon. Approximately 27% of the land area, or equivalent to 21,298 has., exhibits slopes ranging from 18-30%, categorized as "rolling to hilly," and predominantly located in the city's hinterland barangays. Particularly observed to be dispersedly located in the hinterland barangays such as Barangay Rogongon, Dulag, Kalilangan, Panoroganan, Digkila-an, Lanipao, and portions of the southern boundary of the city. Additionally, slopes ranging from 8-18% are also found in the aforementioned barangays. However, they are predominantly identified in the northeastern or coastal part of the city. Very steepy hills and mountains, considered to have and angle greater than 50 degrees, comprise 15.46% of the city’s land area. Barangay Rogongon, Panoroganan, Kalilangan, Dulag, Tipanoy, Puga-an and Hindang are identified to have these types of slopes

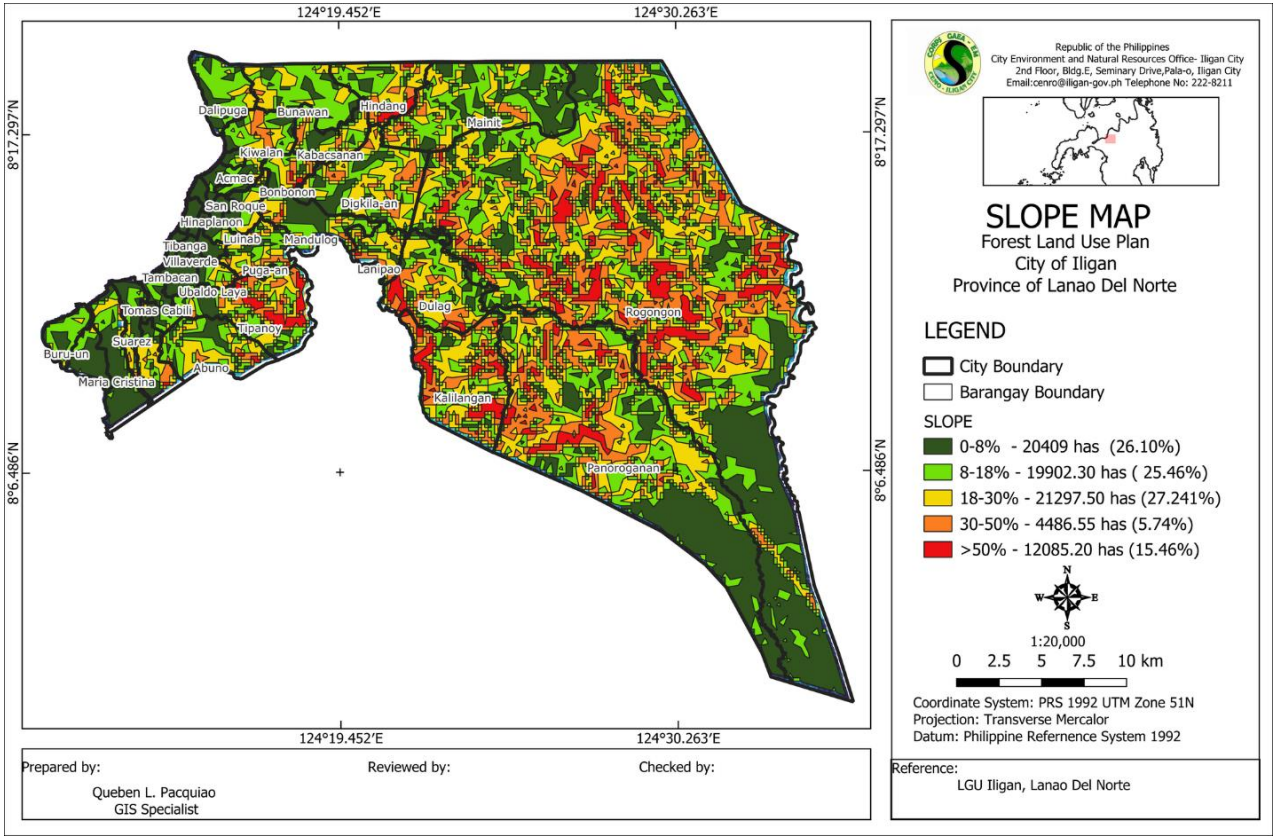


Figure 9. Land area in slope type in Iligan City[1]

[1] Note: gently sloping to undulating (0-8%), moderately sloping to rolling (8-18%), rolling to hilly (18-30%), steep hills to mountains (30-50%), very steep hills to mountains (>50%). From the "Slope Map" in the Forest Land Use Plan 2023.

The hydrological system of Iligan is anchored by eight (8) critical watersheds: Mandulog, Iponan, Cagayan de Oro River Basin, Dalipuga, Iligan, Agus River Basin, Abaga, and Tominobo. These watersheds are integral to the city's water resources, supporting a diverse ecological functions and services.

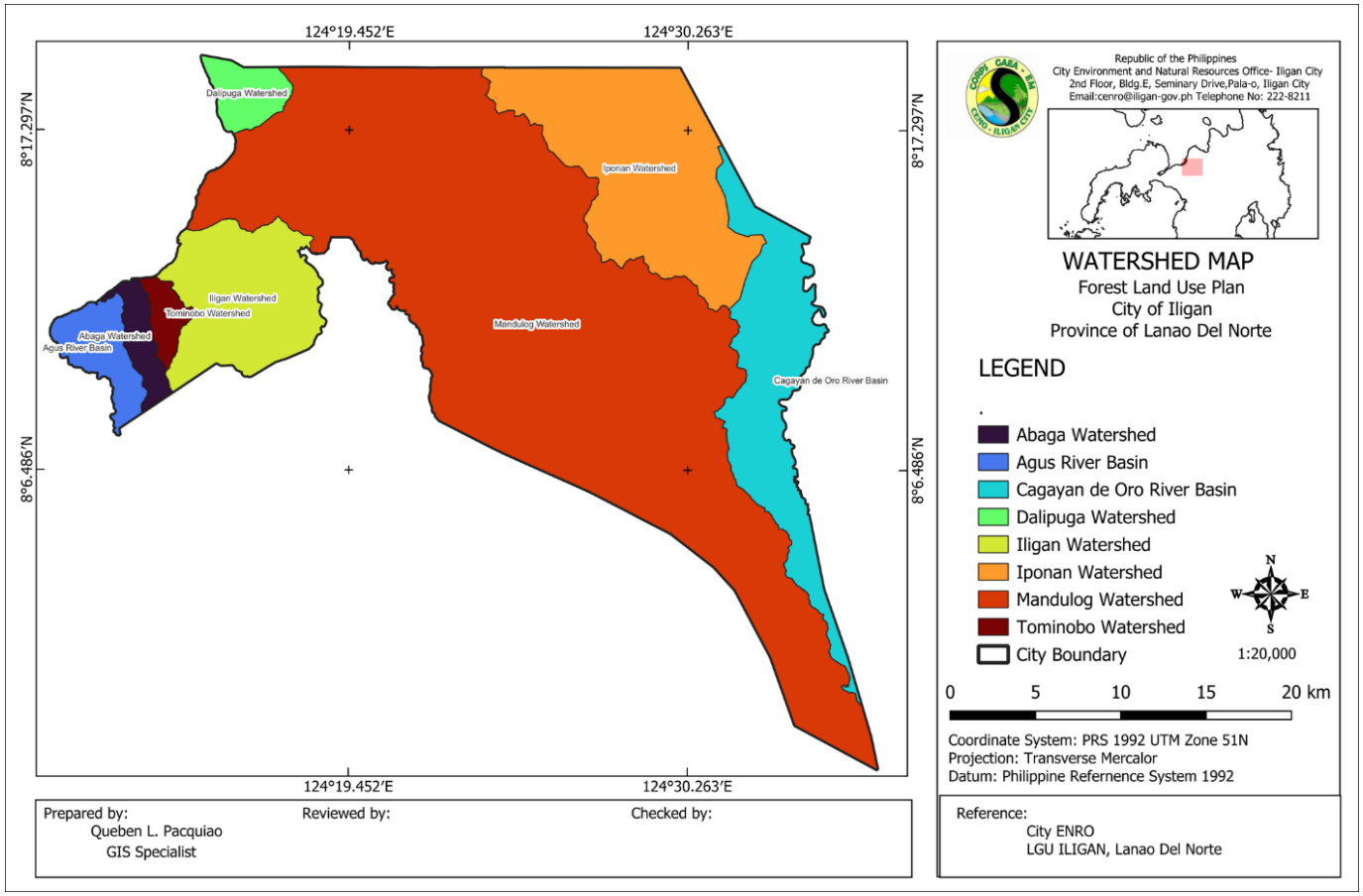


Figure 10. Watershed Map of Iligan City

The Mandulog Watershed, covering 60% of Iligan's land area or equivalent to 49,157 has., is a prime example of natural resource abundance and ecological diversity. Stretching from the southeastern boundary of the city down to the coastal areas in Barangay Hinaplanon, Acmac, and Kiwalan, this watershed drains into the Mandulog River, considered one of the major rivers in the area with the Bayog and Kapai Rivers as the river tributaries. It features a mix of steep hills and gently sloping terrains, transitioning from the hinterlands to the coastal areas. Forest cover in the hinterlands of the Mandulog watershed is mainly combination of open and close canopy forest, tree plantations and a combination of grassland, shrubs in the coastal area. Additionally, it has rich biological features having various species of trees and shrubs, ferns and allies, palms, grasses and herbs and medicinal plants. Within Iligan City, the hinterland barangays traversed by the watershed are predominantly inhabited by indigenous people, particularly the Higaonon tribe. These communities lay claim to an ancestral domain covering approximately 33,000 hectares, encompassing barangays such as Rogongon, Kalilangan, Panorogonan, and Mainit.

Similarly, the Iponan watershed is situated in the eastern portion of the city, covering an area of 11,917.438 hectares, which accounts for 15% of the total land area of Iligan. It encompasses the region drained by the Iponan River and its tributaries, stretching from its headwaters down to its mouth where it meets Macajalar Bay. With elevations ranging from 100 to 1000 meters above sea level (MASL), it shares similar geomorphological characteristics with the Mandulog watershed, featuring a combination of rolling to very steep slopes and mountains, along with portions of moderate sloping terrain. The forest cover within this watershed includes areas designated as protection forest, with smaller segments allocated for production forest purposes.

The Cagayan de Oro River basin comprises 10% or 8097.297 ha of the total land area of Iligan. It encompasses a significant portion of northern Mindanao, Philippines, particularly within the provinces of Bukidnon and Misamis Oriental. Higher elevation of this watershed has a slope characterized by very gently sloping and as it approaches to low elevation, observed to have a variety of slopes greater than 8%. Portion of the land has a forest cover identified as protected zone. This river basin plays a vital role in the region's hydrology, ecology, and socio-economic activities. It serves as a crucial source of water for irrigation, domestic use, and hydroelectric power generation. Additionally, the Cagayan de Oro River Basin supports diverse ecosystems and habitats, including forests, wetlands, and agricultural lands.

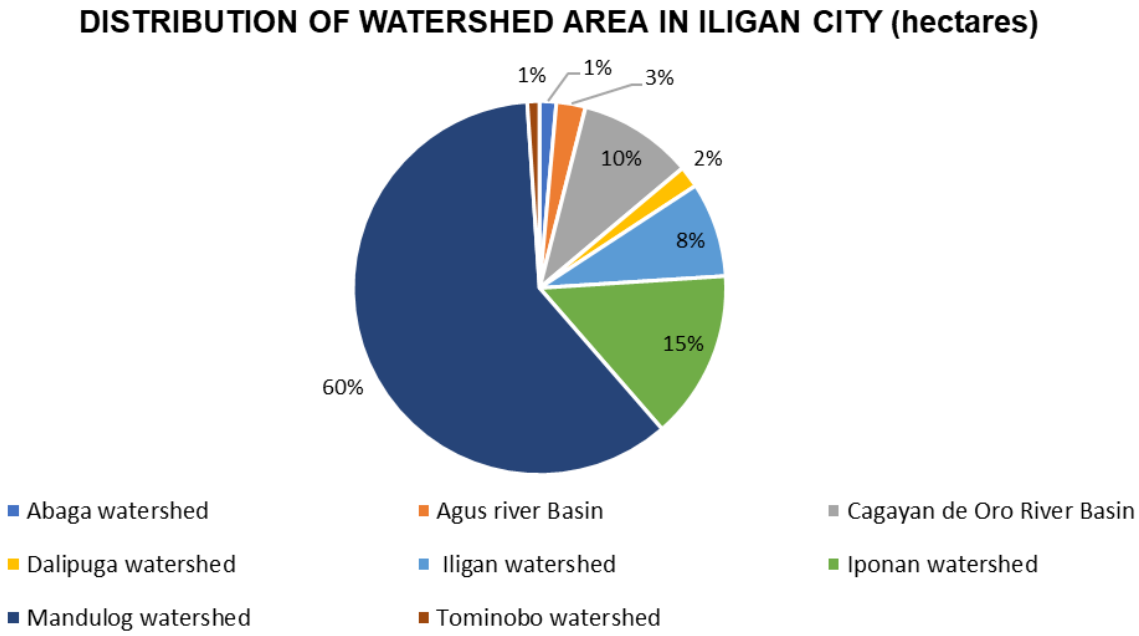


Figure 11. Land area distribution of watershed located in the Iligan City

The Iligan Watershed is centrally located within the city and encompasses a total area of 6,692 hectares, representing 8% of Iligan City's total land area. As depicted in Figure 9, the coastal areas within the watershed are primarily characterized by level and very gently sloping terrain (0-8%). This unique feature of the watershed offers numerous advantages, including the establishment of commercial, residential, and

central business zones. Part of this watershed is considered as the city proper where economic activity occurs. On the other hand, higher slopes in the watershed, such as the nearby mountainous areas, have been identified as general agricultural zones with portions of residential zones.

The Agus River Basin covers a total area of 2,054.665 hectares, representing 3% of the total land area of Iligan. It is in the southwestern part of the city and primary situated in the provinces of Lanao del Norte and Lanao del Sur. The Agus River basin plays a critical role in supporting the generation of power supply for Mindanao and local grids. This is achieved through a major hydroelectric power generation scheme operated by the National Power Corporation. The slopes of this watershed that are situated in the city range from very gently sloping to hilly (0-30%). Major land uses include general agricultural zones, residential zones, and portions of industrial zones.

The three remaining watersheds comprises the Dalipuga watershed that has an area of 1516.365 ha (2%), Abaga watershed has an area of 1178.933 ha (1%), and the Tominobo watershed that has a total area of 866.1 (1%). These watershed plays a critical role in regulating the flow of water, maintaining water quality, and supporting biodiversity within the region. It is essential for the ecological health and sustainability and its surrounding areas.

2.3 Population and Demography

2.3.1 Demographic Profile

Iligan City's land area of 81,337 hectares is spread into 44 barangays. The following data are taken from the 2015 and 2020 Census by the PSA.

2.3.2 Population Size and Growth Rate

Iligan City has a population of 363,115, with an annual growth rate of 1.23% (PSA, 2020). The population size and growth rate of Iligan City from 1903 to 2020 is presented in Table 1. Figure 12 demonstrates an increasing

growth pattern for the city's population from 1903 to 2020, with the exception of the period from 1939 to 1948, where there is a 4.33% decline in growth rate that is attributed to the impact of World War II (Philippine Statistician, 1964).

Table 1. Population Size and Growth Rate, Iligan City 1903–2020

Year	Population	Increase (Decrease)	Annual Geometric Growth Rate (%)	n
1903 March 2	2,872	-	-	-
1918 December 31	10,078	7,206	8.25	14.83
1939 January 1	28,273	18,195	5.29	20.00
1948 October 1	25,725	-2,548	(0.96)	8.74
1960 February 15	58,433	32,708	7.48	11.57
1970 May 6	104,493	46,060	5.85	9.21
1975 May 1	118,778	14,285	2.60	4.99
1980 May 1	167,358	48,580	7.10	5.00
1990 May 1	225,935	58,577	3.08	10.00
1995 Sept. 1	273,004	47,069	3.56	5.33
2000 May 1	285,061	12,057	0.93	4.66
2010 May 1	322,821	37,760	1.25	10.00
2015 August 1	342,618	19,797	1.14	5.25
2020 May 1	363,115	20,497	1.23	4.75

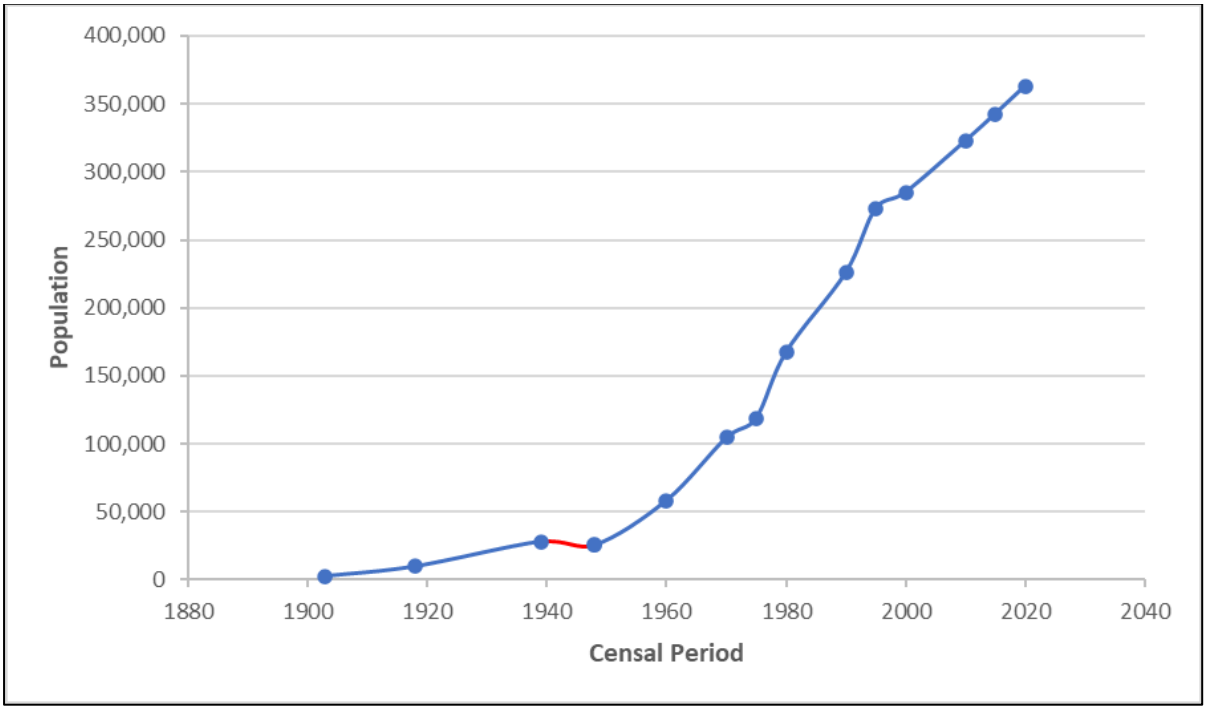


Figure 12. Historical Growth of Population

2.3.3 Tempo of Urbanization

Tempo of urbanization is an indicator to express the speed at which an area is moving toward an urban classification (Census of Population and Housing, 2010). Over a period of 45 years, a negative change is visible in the distribution of population from 2010-2020. Table 2 shows that 2015 posted a very slow growth in urbanization with negative 4.55%. This suggests that the 16 rural barangays of Iligan City have 4.55% greater population growth rate than the 28 urban barangays in 2015. Moreover, the highest urbanization rate was achieved in 1995 with 38.99%.

Table 2. Tempo of Urbanization 1970-2020

Year	Population		Geometric Growth		Tempo of Urbanization
	Urban	Rural	Urban	Rural	
1970	8,989	95,504	-	-	-
1975	10,367	108,411	2.89	2.57	0.32
1980	21,424	145,934	15.62	6.12	9.50
1990	69,087	156,848	12.42	0.72	11.70
1995	203,566	69,438	23.94	(15.05)	38.99
2000	240,943	44,118	3.43	(8.67)	12.10
2010	277,469	45,352	1.42	2.76	(1.34)
2015	284,579	58,039	0.50	5.05	(4.55)
2020	302,069	61,046	1.20	1.02	(0.18)

Source: Philippine Statistics Authority

2.3.5 Population Age- Sex Structure

In the 2020 Census of Population and Housing, Iligan City has a household population number of 362,182. The total proportion of population by sex and age group is shown in Table 3. The population by age distribution is presented in Figure 12. Figure 13 also shows that the proportion of male and females are approximately equal. The implication of a growing older population, often referred to as an aging population, can be multifaceted, touching on various aspects of society including the economy, healthcare system, social services, and more.

Table 3. Population by Age-Sex Distribution 2020

Age	Group	2020					
		Both Sexes	% to Total	Male	% to Total	Female	% to Total
All Ages		362,182	100.00	181,922	50.23	180,260	49.77
1	1 - 4	38,983	10.76	20,174	5.57	18,809	5.19
2	5 - 9	38,466	10.62	20,128	5.56	18,338	5.06
3	10 - 14	37,435	10.34	19,411	5.36	18,024	4.98
4	15 - 19	36,554	10.09	18,304	5.05	18,250	5.04
5	20 - 24	33,911	9.36	16,953	4.68	16,958	4.68
6	25 - 29	30,787	8.50	15,464	4.27	15,323	4.23
7	30 - 34	25,481	7.04	13,011	3.59	12,470	3.44
8	35 - 39	22,147	6.11	11,142	3.08	11,005	3.04

Age	Group	2020					
		Both Sexes	% to Total	Male	% to Total	Female	% to Total
9	40 - 44	20,444	5.64	10,174	2.81	10,270	2.84
10	45 - 49	18,093	5.00	8,995	2.48	9,098	2.51
11	50 - 54	16,209	4.48	7,855	2.17	8,354	2.31
12	55 - 59	14,305	3.95	6,944	1.92	7,361	2.03
13	60 - 64	11,566	3.19	5,577	1.54	5,989	1.65
14	65 - 69	8,087	2.23	3,862	1.07	4,225	1.17
15	70 - 74	4,714	1.30	2,077	0.57	2,637	0.73
16	75 - 79	2,552	0.70	1,013	0.28	1,539	0.42
17	80 & 0ver	2,448	0.68	838	0.23	1,610	0.44

Source: Philippine Statistics Authority

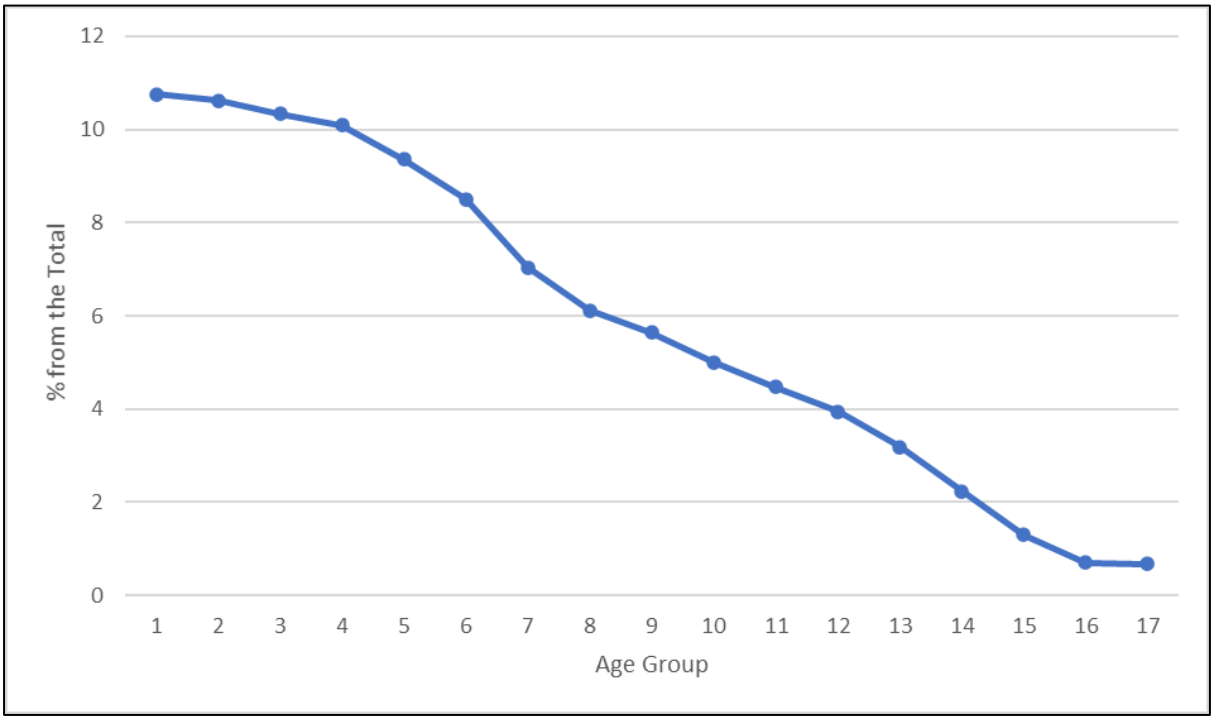


Figure 13. Population by Age Distribution

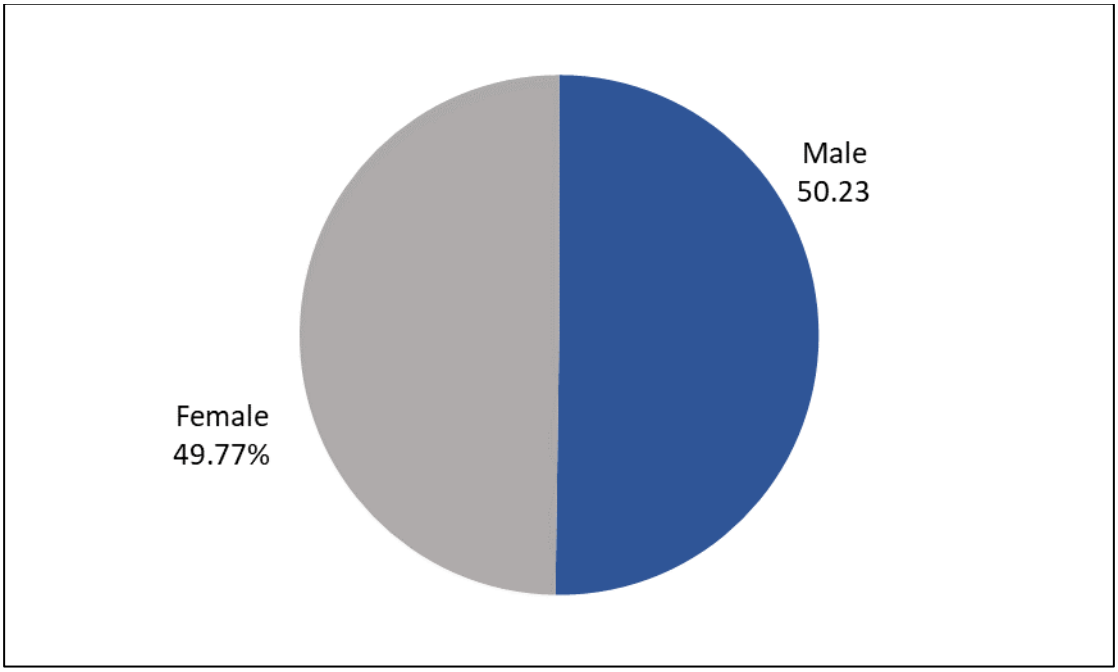


Figure 14. Population by Sex Distribution

2.3.6 Economic Dependency Ratio

Economic dependency ratio indicates that the economically active population and the overall economy faces greater burden to provide and support the social services needed by children and older person who are often economically dependent (Investopedia, 2022).

Table 4 shows that 31.72% of the population were young age dependents whereas 4.91% were old age dependents. Moreover, **Figure 15** shows that the working-age population is still dominant with 63.37% of the total population.

Table 4. Population by Broad Age Group and by Sex 2020

Age Group	Total Population			Percentage Distribution		
	Total	Male	Female	Both Sexes	Male	Female
Total	362,182	181,922	180,260	100.00	50.23	49.77
0-14	114,884	59,713	55,171	31.72	16.49	15.23
15-64	229,497	114,419	115,078	63.37	31.59	31.77
65& over	17,801	7,790	10,011	4.91	2.15	2.76

Source: National Statistics Office

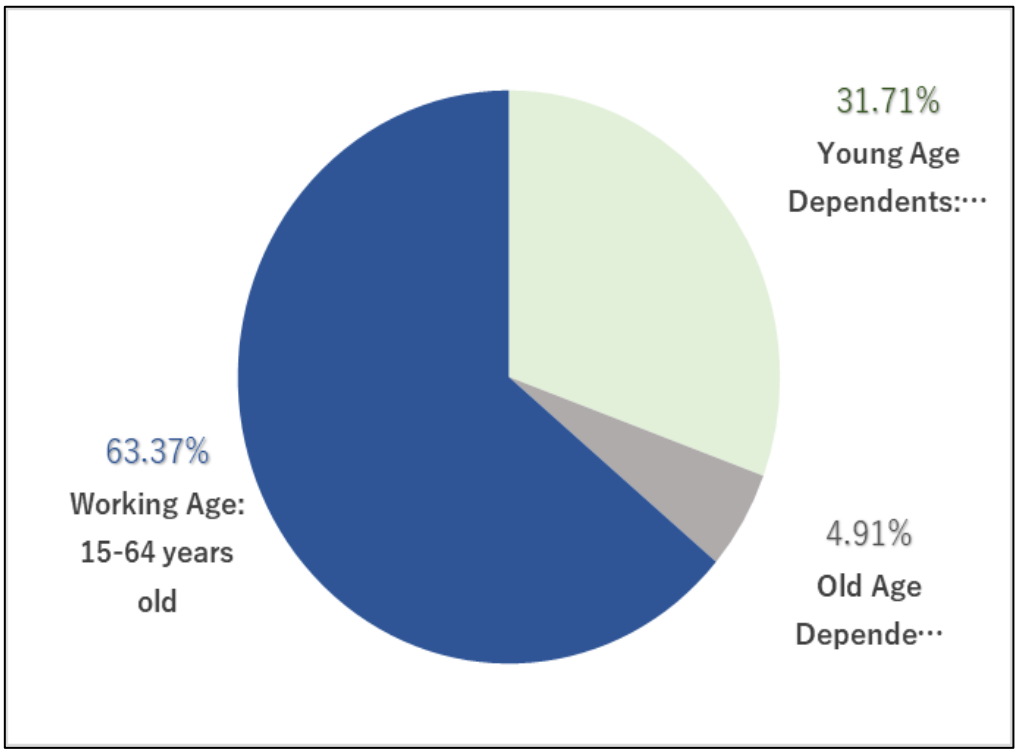


Figure 15. Population by Broad Age, 2020

2.3.7 Number of Household and Household Size

In the 2020 census, there are 87,239 total households with 4.16 average household size. Table 5 shows that from 1970 to 2020, there is an increase of approximately 70,608 households while Figure 15 shows that the average household size had declined for the last 50 years. This means the number of offspring per couple has declined in time.

Table 5. Number of Households and Household Size 1970-2020

Period Covered	Population	Number of Households	Household Size
1970	104,493	16,631	6.3
1975	113,778	19,364	6.1
1980	167,358	28,779	5.77
1990	225,935	41,791	5.41
1995	273,004	51,629	5.25
2000	285,061	57,179	4.98
2010	322,821	67,965	4.70
2015	342,618	76,593	4.4
2020	363,115	87,239	4.16

Source: National Statistics Office

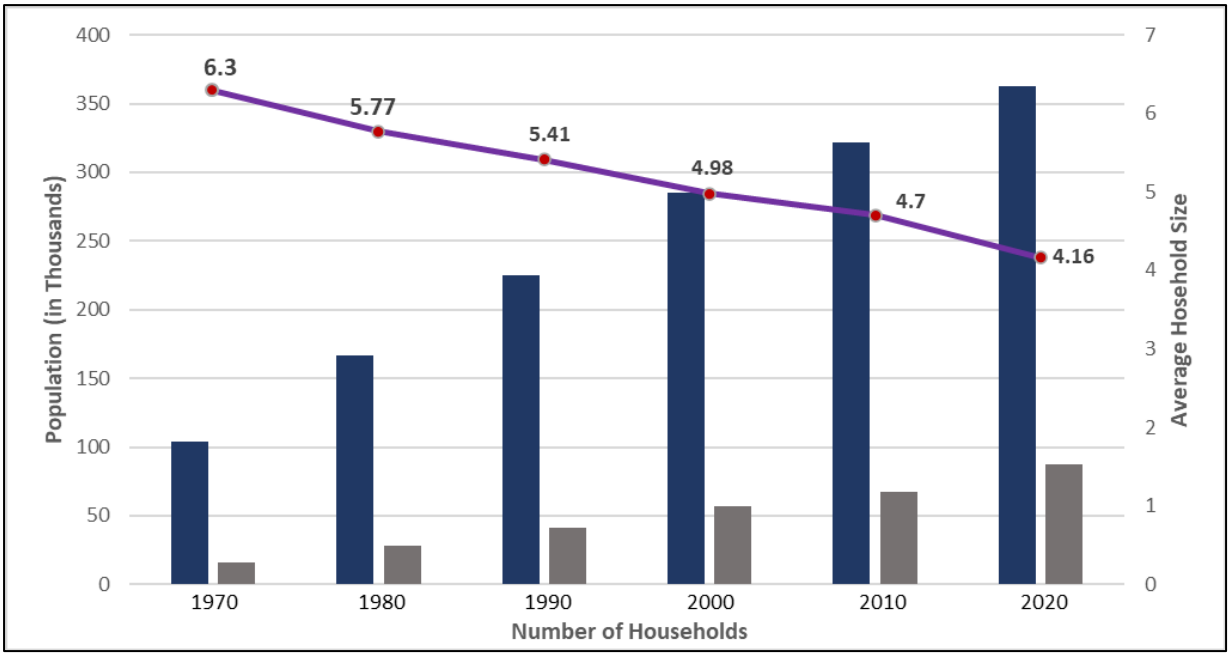


Figure 16. Household Population, Number of Households, and Average Household Size: Based on Various Census Years, Philippines

2.3.8 Spatial Distribution

2.3.8.1 Urban Rural Distribution

The urban-rural population distribution of Iligan City from 1970-2020 is presented in Table 6. The 2020 Iligan City population reached 363,115

with an annual average growth rate of 1.23%. With this growth, the estimated population of the city will further increase to 410,333 in 2030 (Philippine Statistics Authority, 2020).

The urban population in Iligan City for 2020 is 302,069, or 83.32% of the total population. It has increased by 3,260.43% from 1970 to 2020. On the other hand, the rural population had declined from 1970 to 1990 with a -36.1%. This implies that people from the rural areas had been moving to the urban areas.

Table 6. Urban-Rural Population Distribution 1970-2020

Year	Total Population	Urban	% to Total	Rural	% to Total
1970	104,493	8,989	8.6	95,504	91.4
1975	118,778	10,367	8.7	108,411	91.3
1980	167,358	21,424	12.8	145,934	87.2
1990	225,935	69,087	30.6	156,848	69.4
1995	273,004	203,566	74.6	69,438	25.4
2000	285,061	240,943	84.5	44,118	15.5
2010	322,821	277,469	86.0	45,352	14.0
2015	342,618	284,579	83.1	58,039	16.9
2020	363,115	302,069	83.2	61,046	16.8

Source: National Statistics Office

2.3.8.2 Population Density

Population density is the number of people per unit area. For Iligan city, the total population for 2020 is 363,115 while the total land area is 81,337 hectares. Hence the population density for Iligan city is 4.46 persons per hectare or 4 persons per hectare for that matter. But when the population density is disaggregated in terms of urban and rural, the population density is 33.08 or 33 people/ha and 0.80 or 1 person/ha respectively. The wide difference in terms of population density of urban and rural is that urban areas are centers for economic activity and employment. These data can all be seen in Table 7.

Table 7. Population Density by Barangay 2020

Barangay	Distance from City Proper (km)	Area (hectares)	2020	
			Population	Density (Pop./Area in has.)
1. Abuno	6.3	664.87	5,841	8.79
2. Acmac *	7.45	109.78	6,856	62.45
3. Bagong Silang*	2.25	45.83	6,104	133.19
4. Bonbonon	9.93	424.13	2,381	5.61
5. Bunawan	17.13	2,195.20	2,025	0.92
6. Buru-un*	10.2	1,000.72	16,835	16.82
7. Dalipuga*	11.38	971.06	21,470	22.11
8. Del Carmen*	2.7	163	9,662	59.28
9. Digkila-an	15.66	1,346.85	5,764	4.28
10. Ditucalan *	13.83	77.56	4,039	52.08
11. Dulag	21.43	3,000.00	1,185	0.40
12. Hinaplanon*	3.15	551.54	15,424	27.97
13. Hindang	22.18	2,275.00	953	0.42
14. Kabacsanan	15.12	594.45	2,362	3.97
15. Kalilangan	25.06	3,500.00	1,718	0.49
16 Kiwalan*	7.78	914.23	7,710	8.43
17. Lanipao	16.49	3,000.00	2,891	0.96
18. Luinab *	4.59	293.07	11,108	37.90
19. Mahayahay*	1.33	30.45	7,965	261.58
20. Mainit	30.11	7,325.00	2,700	0.37
21. Mandulog	10.54	1,002.74	4,283	4.27
22. Ma. Cristina*	6.99	675.19	11,811	17.49
23. Pala-o *	1.69	372.27	10,778	28.95
24. Panoroganan	41.67	10,500.00	1,586	0.15
25. Poblacion *	0.85	68	3,613	53.13
26. Puga-an*	4.56	1,043.47	7,555	7.24
27. Rogongon	31.79	35,555.29	7,592	0.21
28. San Miguel *	1.78	59.39	3,801	64.00
29. San Roque	4.07	131.62	5,292	40.21
30. Santiago *	3.2	110.42	9,212	83.43
31. Saray-Tibanga*	1.16	107.29	9,386	87.48
32. Sta. Elena	5.83	289.48	10,771	37.21
33. Sta. Filomena*	6.28	503.92	7,005	13.90
34. Sto. Rosario*	2.37	24.26	1,839	75.80
35. Suarez *	7.23	338.43	18,649	55.10
36. Tambacan*	1.02	48.18	19,261	399.77
37. Tibanga*	1.6	45	8,089	179.76
38. Tipanoy*	5.32	514.51	15,287	29.71

Barangay	Distance from City Proper (km)	Area (hectares)	2020	
			Population	Density (Pop./Area in has.)
39. Tomas Cabili *	3.83	264.38	9,676	36.60
40. Tubod *	2.18	320.67	33,243	103.67
41. Ubaldo Laya*	1.11	255.04	13,626	53.43
42. Upper Hinaplanon*	5.01	190.93	6,551	34.31
43. Upper Tominobo	10.19	400.53	3,702	9.24
44. Villaverde *	0.59	33.25	5,514	165.83
TOTAL		81,337.00	363,115	4.46
Urban		9,131.84	302,069	33.08
Rural		72,205.16	61,046	0.85

Source: Phil. Statistics Authority & City Assessor's Office
** Urban Barangay*

2.3.8.3 Population by Barangay

Iligan City has 44 barangays (see Table 8). The five most populated barangays based on the 2020 censal period are Tubod, Dalipuga, Tambacan, Suarez and Buru-un. Barangay Tubod has a total population of 33,243. It is consistently the barangay with the highest number of people though it increased by only 1,330 from 2015. Dalipuga and Tambacan rank second and third respectively. Suarez ranks fourth and its population increased by 1,992 from its 2015 figure of 16,657. Its proximity to the Central Business District, presence of public elementary and high school facilities and sufficient water supply could be the factors contributing to increase in population while Dalipuga is the central for Iligan's agribusiness center.

The barangays that posted an increase in population of over 1,000 from 2015 to 2020 are Hinaplanon, Luinab, Suarez, Rogongon, Dalipuga, Ubaldo Laya, Buru-un, Tambacan, Tubod, Del Carmen, Pala-o, Upper Hinaplanon, and Sta. Elena. On the other hand, there are barangays who posted negative growth in 2020. They are barangay

Dulag, Bunawan, Sto. Rosario, Saray, Bagong Silang, San Miguel, Mahayahay, Tibanga, and Panoroganan.

Table 8. Population by Barangay and By Rank 2015 & 2020

Barangay	2015			2020			Annual Average Rate of Increase or (Decrease)
	Population	% to Total	Rank	Population	% to Total	Rank	
TOTAL	342,618	100		363,115	5,296		1.20
1. Abuno	5,423	1.58	27	5,841	85.20	26	1.54
2. Acmac	6,471	1.89	22	6,856	100.00	23	1.19
3. Bagong Silang	6,978	2.04	21	6,104	89.03	25	-2.51
4. Bonbonon	1,786	0.52	41	2,381	34.73	37	6.66
5. Bunawan	2,218	0.65	38	2,025	29.54	39	-1.74
6. Buru-un	15,164	4.43	5	16,835	245.55	5	2.20
7. Dalipuga	19,721	5.76	2	21,470	313.16	2	1.77
8. Del Carmen	8,423	2.46	18	9,662	140.93	14	2.94
9. Digkila-an	5,208	1.52	28	5,764	84.07	27	2.14
10. Ditucalan	3,385	0.99	35	4,039	58.91	31	3.86
11. Dulag	1,216	0.35	43	1,185	17.28	43	-0.51
12. Hinaplanon	12,346	3.6	7	15,424	224.97	6	4.99
13. Hindang	913	0.27	44	953	13.90	44	0.88
14. Kabacsanan	2,123	0.62	40	2,362	34.45	38	2.25
15. Kalilangan	1,442	0.42	42	1,718	25.06	41	3.83
16.. Kiwalan	7,464	2.18	19	7,710	112.46	19	0.66
17. Lanipao	2,759	0.81	37	2,891	42.17	35	0.96
18. Luinab	8,603	2.51	17	11,108	162.02	10	5.82
19. Mahayahay	9,179	2.68	14	7,965	116.18	18	-2.65
20. Mainit	2,588	0.76	36	2,700	39.38	36	0.87
21. Mandulog	3,867	1.13	32	4,283	62.47	30	2.15
22. Ma. Cristina	11,383	3.32	9	11,811	172.27	9	0.75
23. Pala-o	9,600	2.8	12	10,778	157.21	11	2.45
24. Panoroganan	4,806	1.4	30	1,586	23.13	42	-13.40
25. Poblacion	3,470	1.01	33	3,613	52.70	34	0.82
26. Puga-an	7,460	2.18	20	7,555	110.20	21	0.25
27. Rogongon	5,786	1.69	24	7,592	110.74	20	6.24
28. San Miguel	4,955	1.45	29	3,801	55.44	32	-4.66
29. San Roque	4,740	1.38	31	5,292	77.19	29	2.33
30. Santiago	8,814	2.57	15	9,212	134.36	16	0.90
31. Saray	10,171	2.97	10	9,386	136.90	15	-1.54
32. Sta. Elena	9,735	2.84	11	10,771	157.10	12	2.13

Barangay	2015			2020			Annual Average Rate of Increase or (Decrease)
	Population	% to Total	Rank	Population	% to Total	Rank	
33. Sta. Filomena	6,615	1.93	23	7,005	102.17	22	1.18
34. Sto. Rosario	2,174	0.63	39	1,839	26.82	40	-3.08
35. Suarez	16,657	4.86	4	18,649	272.01	4	2.39
36. Tambacan	17,616	5.14	3	19,261	280.94	3	1.87
37. Tibanga	9,595	2.8	13	8,089	117.98	17	-3.14
38. Tipanoy	14,730	4.3	6	15,287	222.97	7	0.76
39. Tomas Cabili	8,780	2.56	16	9,676	141.13	13	2.04
40. Tubod	31,913	9.31	1	33,243	484.87	1	0.83
41. Ubaldo Laya	11,950	3.49	8	13,626	198.75	8	2.81
42. Upper Hinaplanon	5,464	1.59	26	6,551	95.55	24	3.98
43. Upper Tominobo	3,429	1	34	3,702	54.00	33	1.59
44. Villaverde	5,498	1.6	25	5,514	80.43	28	0.06

Source: Phil. Statistics Authority and CPDO

2.3.9 Population Characteristics

2.3.9.1 Religious Affiliation

There are 18 identified religious affiliations of the residents of Iligan by year 2015. Majority of the Iliganons are Roman Catholic, representing 76.6% of the total population while 11.5% belongs to the Islam as shown in Table 9 and Figure 17.

Table 9. Religion of the Population by 2015

Type of Religion	2015		
	Both Sexes	Male	Female
TOTAL	**342,618**	**171,804**	**170,814**
1. Roman Catholic	262,550	132,483	130,067
2. Islam	39,319	19,286	20,033
3. Iglesia ni Kristo	6,616	3,376	3,240
4. United Church of Christ in the Phil.	2,216	1,044	1,172
5. Seventh Day Adventist	6,031	2,909	3,122
6. Aglipay	196	97	99
7. Church of Jesus Christ of the Latter Day Saints	2,409	1,191	1,218
8. Jehovah's Witness	1,228	595	633
9. Phil Benevolent Missionaries	81	32	49
10. Evangelicals Church	9,774	4,718	5,056
11. Bible Baptist Church	3,546	1761	1785
12. United Pentecostal Church	254	114	140
13. Phil. Independent Catholic Church	78	35	43
14. Lutheran Church	184	86	98
15. Tribal Religions	2,713	1408	1305
16. Buddhist	47	21	26
17. Protestant	870	427	443
18. Other Baptist Churches	206	99	107
19. Other Religions	4,220	2,042	2,178
20. None	1	1	0
21. Not Reported	79	79	0

Source: Census of Pop. And Housing, Phil. Statistics Authority

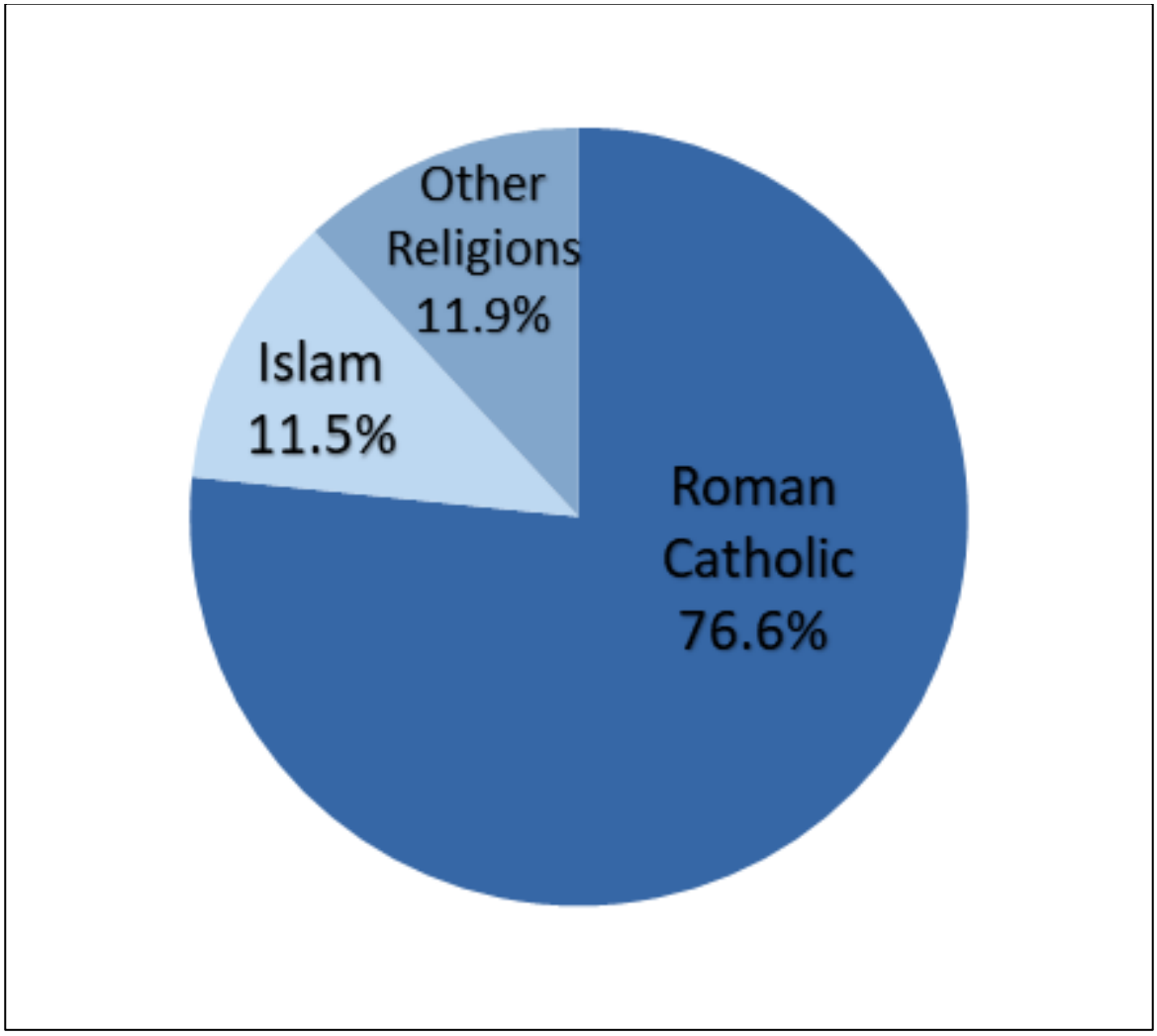


Figure 17. Religion of the Population Year 2015

2.3.9.2 Persons with Disability

The term "persons with disabilities" refers to those who have ongoing physical, mental, intellectual, or sensory impairments that, when combined with other factors, may prevent them from fully and equally participating in society. (United Nations Convention on the Rights of Persons with Disabilities, 2006). In 2022, there are 3,375 persons with disability who are five years and older. **Figure 18** illustrates that people with orthopedic disabilities have recorded the largest number which contributed 23% of the total number.

Table 10. Person with Disability 5 Years old and over by Type of Functional Difficulty and By Sex 2022

Type of Functional Difficulty and Sex	Both Sexes	2022	
		Male	Female
1. Orthopedic (Musculoskeletal) Disability	793	420	373
2. Intellectual Learning Disability	23	14	9
3. Psychological Disability	579	226	353
4. Visual Impairment	359	179	180
5. Hearing Impairment	126	60	66
6. Speech and Language Impairment	259	123	136
7. Physical Disability	447	192	255
8. Mental Disability	332	167	165
9. Chronic Illness	457	201	256
TOTAL	3,375	1,582	1,793
Source: City Social Welfare and Development Office			

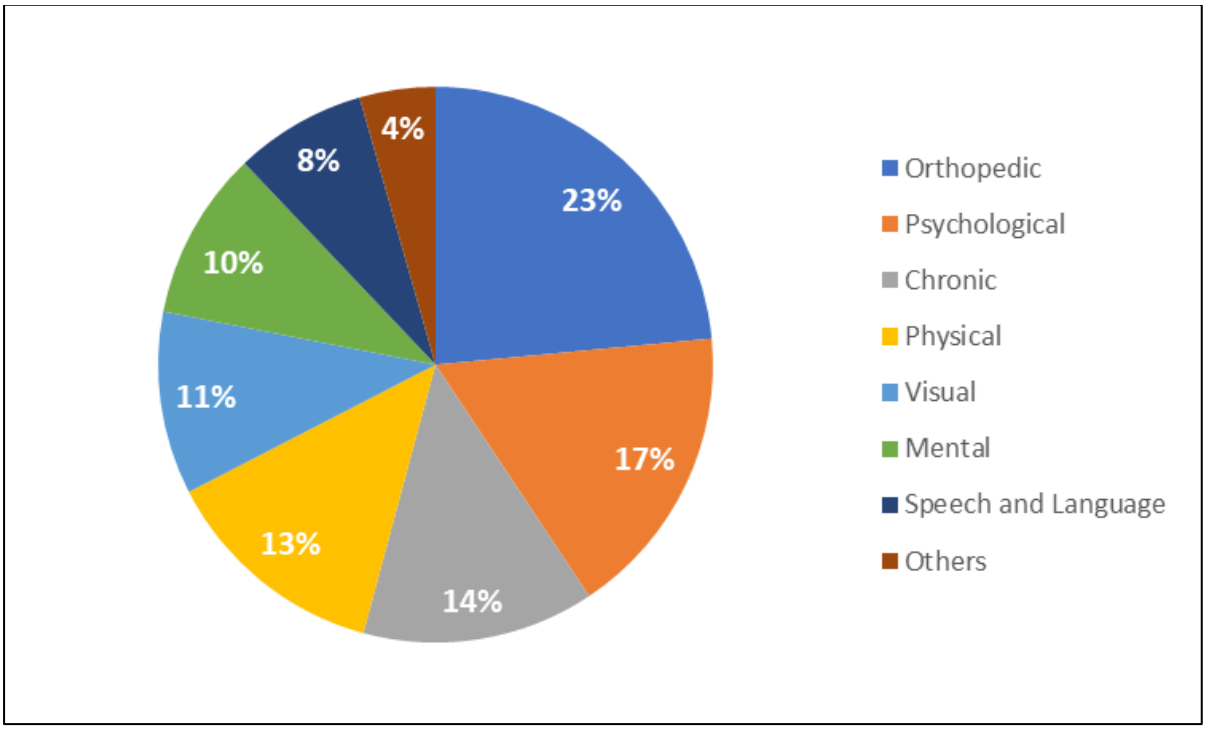


Figure 18. Person with Disability 5 Years old and over by Type of Functional Difficulty and By Sex 2022

2.3.10 Population Projection

2.3.10.1 By Barangay

Based on the 2020 Census of Population and Housing, population is projected to increase at 1.23 growth rate. The **Table 11** below shows projections up to year 2030.

Table 11. Current and Projected Population by Barangay 2010-2020

Name of Barangay	2015*	2020*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Population	342,618	363,115	367,581	372,103	376,679	381,313	386,003	390,751	395,557	400,422	405,347	410,333
1. Abuno	5,423	5,841	5,913	5,986	6,059	6,134	6,209	6,286	6,363	6,441	6,520	6,601
2. Acmac	6,471	6,856	6,940	7,026	7,112	7,200	7,288	7,378	7,469	7,560	7,653	7,748
3. Bagong Silang	6,978	6,104	6,179	6,255	6,332	6,410	6,489	6,569	6,649	6,731	6,814	6,898
4. Bonbonon	1,786	2,381	2,410	2,440	2,470	2,500	2,531	2,562	2,594	2,626	2,658	2,691
5. Bunawan	2,218	2,025	2,050	2,075	2,101	2,126	2,153	2,179	2,206	2,233	2,261	2,288
6. Buru-un	15,164	16,835	17,042	17,252	17,464	17,679	17,896	18,116	18,339	18,565	18,793	19,024
7. Dalipuga	19,721	21,470	21,734	22,001	22,272	22,546	22,823	23,104	23,388	23,676	23,967	24,262
8. Del Carmen	8,423	9,662	9,781	9,901	10,023	10,146	10,271	10,397	10,525	10,655	10,786	10,918
9. Digkila-an	5,208	5,764	5,835	5,907	5,979	6,053	6,127	6,203	6,279	6,356	6,434	6,514
10. Ditucalan	3,385	4,039	4,089	4,139	4,190	4,241	4,294	4,346	4,400	4,454	4,509	4,564
11. Dulag	1,216	1,185	1,200	1,214	1,229	1,244	1,260	1,275	1,291	1,307	1,323	1,339
12 Hinaplanon	12,346	15,424	15,614	15,806	16,000	16,197	16,396	16,598	16,802	17,009	17,218	17,430
13. Hindang	913	953	965	977	989	1,001	1,013	1,026	1,038	1,051	1,064	1,077
14 Kabacsanan	2,123	2,362	2,391	2,420	2,450	2,480	2,511	2,542	2,573	2,605	2,637	2,669
15. Kalilangan	1,442	1,718	1,739	1,761	1,782	1,804	1,826	1,849	1,871	1,895	1,918	1,941

16. Kiwalan	7,464	7,710	7,805	7,901	7,998	8,096	8,196	8,297	8,399	8,502	8,607	8,713
17. Lanipao	2,759	2,891	2,927	2,963	2,999	3,036	3,073	3,111	3,149	3,188	3,227	3,267
18. Luinab	8,603	11,108	11,245	11,383	11,523	11,665	11,808	11,953	12,100	12,249	12,400	12,552
19. Mahayahay	9,179	7,965	8,063	8,162	8,263	8,364	8,467	8,571	8,677	8,783	8,891	9,001
20. Mainit	2,588	2,700	2,733	2,767	2,801	2,835	2,870	2,905	2,941	2,977	3,014	3,051
21. Mandulog	3,867	4,283	4,336	4,389	4,443	4,498	4,553	4,609	4,666	4,723	4,781	4,840
22. Ma. Cristina	11,383	11,811	11,956	12,103	12,252	12,403	12,555	12,710	12,866	13,024	13,185	13,347
23. Pala-o	9,600	10,778	10,911	11,045	11,181	11,318	11,457	11,598	11,741	11,885	12,032	12,180
24. Panoroganan	4,806	1,586	1,606	1,625	1,645	1,665	1,686	1,707	1,728	1,749	1,770	1,792
25. Poblacion	3,470	3,613	3,657	3,702	3,748	3,794	3,841	3,888	3,936	3,984	4,033	4,083
26. Puga-an	7,460	7,555	7,648	7,742	7,837	7,934	8,031	8,130	8,230	8,331	8,434	8,537
27. Rogongon	5,786	7,592	7,685	7,780	7,876	7,972	8,071	8,170	8,270	8,372	8,475	8,579
28. San Miguel	4,955	3,801	3,848	3,895	3,943	3,991	4,041	4,090	4,141	4,192	4,243	4,295
29. San Roque	4,740	5,292	5,357	5,423	5,490	5,557	5,626	5,695	5,765	5,836	5,907	5,980
30. Santiago	8,814	9,212	9,325	9,440	9,556	9,674	9,793	9,913	10,035	10,158	10,283	10,410
31. Saray-Tibanga	10,171	9,386	9,501	9,618	9,737	9,856	9,978	10,100	10,225	10,350	10,478	10,607
32. Sta. Elena	9,735	10,771	10,903	11,038	11,173	11,311	11,450	11,591	11,733	11,878	12,024	12,172
33. Sta. Filomena	6,615	7,005	7,091	7,178	7,267	7,356	7,447	7,538	7,631	7,725	7,820	7,916
34. Sto. Rosario	2,174	1,839	1,862	1,885	1,908	1,931	1,955	1,979	2,003	2,028	2,053	2,078
35. Suarez	16,657	18,649	18,878	19,111	19,346	19,584	19,824	20,068	20,315	20,565	20,818	21,074
36. Tambacan	17,616	19,261	19,498	19,738	19,981	20,226	20,475	20,727	20,982	21,240	21,501	21,766
37. Tibanga	9,595	8,089	8,188	8,289	8,391	8,494	8,599	8,705	8,812	8,920	9,030	9,141
38. Tipanoy	14,730	15,287	15,475	15,665	15,858	16,053	16,251	16,450	16,653	16,858	17,065	17,275
39. Tomas Cabili	8,780	9,676	9,795	9,915	10,037	10,161	10,286	10,412	10,540	10,670	10,801	10,934
40. Tubod	31,913	33,243	33,652	34,066	34,485	34,909	35,338	35,773	36,213	36,658	37,109	37,566

41. Ubaldo Laya	11,950	13,626	13,794	13,963	14,135	14,309	14,485	14,663	14,843	15,026	15,211	15,398
42. Upper Hinaplanon	5,464	6,551	6,632	6,713	6,796	6,879	6,964	7,050	7,136	7,224	7,313	7,403
43. Upper Tominobo	3,429	3,702	3,748	3,794	3,840	3,888	3,935	3,984	4,033	4,082	4,133	4,183
44. Villaverde	5,498	5,514	5,582	5,650	5,720	5,790	5,862	5,934	6,007	6,081	6,155	6,231

Source: Phil. Statistics Office & CPDO (2010-2015 = 1.14% Growth rate 2020 = 1.23% Growth Rate)

2.3.10.2 By Age Group

For the next ten years (2020-2030) Iligan City's population is projected to increase by 47,097 or a total of 409,279.

Table 12. Current and Projected Population by Age Group & By Sex 2020-2030

Age Group	2015*	2020*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ALL AGES	**342,618**	**362,182**	**366,637**	**371,146**	**375,712**	**380,333**	**385,011**	**389,747**	**394,540**	**399,393**	**404,306**	**409,279**
Under 1 year	6,972	-	-	-	-	-	-	-	-	-	-	-
1 - 4	29,371	38,983	39,462	39,948	40,439	40,937	41,440	41,950	42,466	42,988	43,517	44,052
5 - 9	36,197	38,466	38,939	39,418	39,903	40,394	40,891	41,394	41,903	42,418	42,940	43,468
10 - 14	34,991	37,435	37,895	38,362	38,833	39,311	39,795	40,284	40,780	41,281	41,789	42,303
15 - 19	38,607	36,554	37,004	37,459	37,920	38,386	38,858	39,336	39,820	40,310	40,805	41,307
20 - 24	33,997	33,911	34,328	34,750	35,178	35,610	36,048	36,492	36,941	37,395	37,855	38,321
25 - 29	27,633	30,787	31,166	31,549	31,937	32,330	32,728	33,130	33,538	33,950	34,368	34,790
30 - 34	23,412	25,481	25,794	26,112	26,433	26,758	27,087	27,420	27,758	28,099	28,445	28,794
35 - 39	21,694	22,147	22,419	22,695	22,974	23,257	23,543	23,833	24,126	24,422	24,723	25,027
40 - 44	19,272	20,444	20,695	20,950	21,208	21,469	21,733	22,000	22,271	22,544	22,822	23,102

Age Group	2015*	2020*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
45 - 49	17,652	18,093	18,316	18,541	18,769	19,000	19,233	19,470	19,709	19,952	20,197	20,446
50 - 54	15,676	16,209	16,408	16,610	16,814	17,021	17,231	17,443	17,657	17,874	18,094	18,317
55 - 59	12,982	14,305	14,481	14,659	14,839	15,022	15,207	15,394	15,583	15,775	15,969	16,165
60 - 64	9,848	11,566	11,708	11,852	11,998	12,146	12,295	12,446	12,599	12,754	12,911	13,070
65 - 69	6,278	8,087	8,186	8,287	8,389	8,492	8,597	8,702	8,810	8,918	9,028	9,139
70 - 74	3,572	4,714	4,772	4,831	4,890	4,950	5,011	5,073	5,135	5,198	5,262	5,327
75 - 79	2,392	2,552	2,583	2,615	2,647	2,680	2,713	2,746	2,780	2,814	2,849	2,884
80 & over	2,072	2,448	2,478	2,509	2,539	2,571	2,602	2,634	2,667	2,700	2,733	2,766

The working male population would be approximately 122,209 in 2020; 129,912 in 2025 and 138,100 in 2030.

Male

AGE GROUP	2015*	2020*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ALL AGES	**171,804**	**181,922**	**184,160**	**186,425**	**188,718**	**191,039**	**193,389**	**195,768**	**198,175**	**200,613**	**203,081**	**205,578**
Under 1 year	3,653	-	-	-	-	-	-					
1 - 4	15,269	20,174	20,422	20,673	20,928	21,185	21,446	21,709	21,976	22,247	22,520	22,797
5 - 9	18,824	20,128	20,376	20,626	20,880	21,137	21,397	21,660	21,926	22,196	22,469	22,745
10 - 14	17,844	19,411	19,650	19,891	20,136	20,384	20,635	20,888	21,145	21,405	21,669	21,935
15 - 19	19,312	18,304	18,529	18,757	18,988	19,221	19,458	19,697	19,939	20,185	20,433	20,684
20 - 24	16,933	16,953	17,162	17,373	17,586	17,803	18,022	18,243	18,468	18,695	18,925	19,158

AGE GROUP	2015*	2020*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
25 - 29	13,923	15,464	15,654	15,847	16,042	16,239	16,439	16,641	16,846	17,053	17,263	17,475
30 - 34	11,880	13,011	13,171	13,333	13,497	13,663	13,831	14,001	14,173	14,348	14,524	14,703
35 - 39	10,921	11,142	11,279	11,418	11,558	11,700	11,844	11,990	12,137	12,287	12,438	12,591
40 - 44	9,614	10,174	10,299	10,426	10,554	10,684	10,815	10,948	11,083	11,219	11,357	11,497
45 - 49	8,626	8,995	9,106	9,218	9,331	9,446	9,562	9,680	9,799	9,919	10,041	10,165
50 - 54	7,635	7,855	7,952	8,049	8,148	8,249	8,350	8,453	8,557	8,662	8,769	8,876
55 - 59	6,434	6,944	7,029	7,116	7,203	7,292	7,382	7,472	7,564	7,657	7,752	7,847
60 - 64	4,743	5,577	5,646	5,715	5,785	5,856	5,929	6,001	6,075	6,150	6,226	6,302
65 - 69	2,987	3,862	3,910	3,958	4,006	4,056	4,105	4,156	4,207	4,259	4,311	4,364
70 - 74	1,536	2,077	2,103	2,128	2,155	2,181	2,208	2,235	2,263	2,290	2,319	2,347
75 - 79	967	1,013	1,025	1,038	1,051	1,064	1,077	1,090	1,104	1,117	1,131	1,145
80 & over	703	838	848	859	869	880	891	902	913	924	935	947

The working female population, on the other hand, would be approximately 100,515 in 2020; 132,974 in 2025 and 141,355 in 2030.

Female

AGE GROUP	2015*	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ALL AGES	**170,814**	**180,260**	**182,477**	**184,722**	**186,994**	**189,294**	**191,622**	**193,979**	**196,365**	**198,780**	**201,225**	**203,700**
Under 1 year	3,319	-	-	-	-	-	-	-	-	-	-	-
1 - 4	14,102	18,809	19,040	19,275	19,512	19,752	19,995	20,240	20,489	20,741	20,997	21,255
5 - 9	17,373	18,338	18,564	18,792	19,023	19,257	19,494	19,734	19,976	20,222	20,471	20,723

AGE GROUP	2015*	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
10 - 14	17,147	18,024	18,246	18,470	18,697	18,927	19,160	19,396	19,634	19,876	20,120	20,368
15 - 19	19,295	18,250	18,474	18,702	18,932	19,165	19,400	19,639	19,881	20,125	20,373	20,623
20 - 24	17,064	16,958	17,167	17,378	17,591	17,808	18,027	18,249	18,473	18,700	18,930	19,163
25 - 29	13,710	15,323	15,511	15,702	15,895	16,091	16,289	16,489	16,692	16,897	17,105	17,316
30 - 34	11,532	12,470	12,623	12,779	12,936	13,095	13,256	13,419	13,584	13,751	13,920	14,092
35 - 39	10,773	11,005	11,140	11,277	11,416	11,557	11,699	11,843	11,988	12,136	12,285	12,436
40 - 44	9,658	10,270	10,396	10,524	10,654	10,785	10,917	11,052	11,188	11,325	11,464	11,605
45 - 49	9,026	9,098	9,210	9,323	9,438	9,554	9,671	9,790	9,911	10,033	10,156	10,281
50 - 54	8,041	8,354	8,457	8,561	8,666	8,773	8,881	8,990	9,100	9,212	9,326	9,440
55 - 59	6,548	7,361	7,452	7,543	7,636	7,730	7,825	7,921	8,019	8,117	8,217	8,318
60 - 64	5,105	5,989	6,063	6,137	6,213	6,289	6,366	6,445	6,524	6,604	6,686	6,768
65 - 69	3,291	4,225	4,277	4,330	4,383	4,437	4,491	4,547	4,602	4,659	4,716	4,774
70 - 74	2,036	2,637	2,669	2,702	2,736	2,769	2,803	2,838	2,873	2,908	2,944	2,980
75 - 79	1,425	1,539	1,558	1,577	1,596	1,616	1,636	1,656	1,676	1,697	1,718	1,739
80 & over	1,369	1,610	1,630	1,650	1,670	1,691	1,711	1,733	1,754	1,775	1,797	1,819

Source: Phil. Statistics Office & CPDO

2.3.10.3 Current and Projected Number of Households

By 2030, projected number of households is 100,895 or an increase by 13,656 from its 2020 censal year of 87,239.

Table 13. Current and Projected Number of Households 2000 – 2023

Name of Barangay	2015*	2020*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total	**76,593**	**87,239**	**88,312**	**90,440**	**92,620**	**93,759**	**94,912**	**96,080**	**97,262**	**98,458**	**99,669**	**100,895**
1. Abuno	1,160	1,450	1,468	1,486	1,522	1,540	1,559	1,579	1,598	1,618	1,638	1,658
2. Acmac	1,362	1,706	1,727	1,748	1,790	1,812	1,835	1,857	1,880	1,903	1,927	1,950
3. Bagong Silang	1,467	1,571	1,590	1,610	1,649	1,669	1,689	1,710	1,731	1,753	1,774	1,796
4. Bonbonon	332	516	522	529	542	548	555	562	569	576	583	590
5. Bunawan	494	484	490	496	508	514	521	527	533	540	547	553
6. Buru-un	3,125	3,911	3,959	4,008	4,104	4,155	4,206	4,258	4,310	4,363	4,417	4,471
7. Dalipuga	4,560	5,338	5,404	5,470	5,602	5,671	5,741	5,811	5,883	5,955	6,028	6,102
8. Del Carmen	1,987	2,163	2,190	2,217	2,270	2,298	2,326	2,355	2,384	2,413	2,443	2,473
9. Digkila-an	979	1,331	1,347	1,364	1,397	1,414	1,431	1,449	1,467	1,485	1,503	1,522
10. Ditucalan	797	916	927	939	961	973	985	997	1,009	1,022	1,034	1,047
11. Dulag	241	269	272	276	282	286	289	293	296	300	304	308
12. Hinaplanon	3,597	3,603	3,647	3,692	3,781	3,828	3,875	3,922	3,971	4,019	4,069	4,119
13. Hindang	291	244	247	250	256	259	262	266	269	272	276	279
14. Kabacsanan	442	586	593	601	615	623	630	638	646	654	662	670
15. Kalilangan	277	339	343	347	356	360	365	369	374	378	383	388
16. Kiwalan	1,436	1,968	1,992	2,017	2,065	2,091	2,116	2,142	2,169	2,195	2,222	2,250
17. Lanipao	540	656	664	672	688	697	705	714	723	732	741	750
18. Luinab	1,943	2,447	2,477	2,508	2,568	2,600	2,632	2,664	2,697	2,730	2,763	2,797
19. Ma. Cristina	2,624	2,806	2,841	2,875	2,945	2,981	3,018	3,055	3,092	3,130	3,169	3,208
20. Mahayahay	2,105	1,911	1,935	1,958	2,005	2,030	2,055	2,080	2,106	2,132	2,158	2,185
21. Mainit	539	647	655	663	679	687	696	704	713	722	731	740
22. Mandulog	694	977	989	1,001	1,025	1,038	1,051	1,064	1,077	1,090	1,103	1,117

Name of Barangay	2015*	2020*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
23. Pala-o	2,221	2,522	2,553	2,584	2,647	2,679	2,712	2,746	2,779	2,814	2,848	2,883
24. Panoroganan	740	323	327	331	339	343	347	352	356	360	365	369
25. Poblacion	1,084	914	925	937	959	971	983	995	1,007	1,020	1,032	1,045
26. Puga-an	1,699	1,856	1,879	1,902	1,948	1,972	1,996	2,021	2,045	2,071	2,096	2,122
27. Rogongon	1,117	1,562	1,581	1,601	1,639	1,659	1,680	1,700	1,721	1,743	1,764	1,786
28. San Miguel	971	1,012	1,024	1,037	1,062	1,075	1,088	1,102	1,115	1,129	1,143	1,157
29. San Roque	987	1,274	1,290	1,306	1,337	1,353	1,370	1,387	1,404	1,421	1,439	1,456
30. Santiago	2,275	2,253	2,281	2,309	2,364	2,393	2,423	2,453	2,483	2,513	2,544	2,576
31. Saray-Tibanga	2,578	2,499	2,530	2,561	2,623	2,655	2,687	2,721	2,754	2,788	2,822	2,857
32. Sta. Elena	1,164	2,562	2,594	2,625	2,689	2,722	2,755	2,789	2,823	2,858	2,893	2,929
33. Sta. Filomena	1,800	1,663	1,683	1,704	1,745	1,767	1,788	1,810	1,833	1,855	1,878	1,901
34. Sto. Rosario	561	493	499	505	517	524	530	537	543	550	557	564
35. Suarez	4,016	4,391	4,445	4,500	4,608	4,665	4,722	4,780	4,839	4,899	4,959	5,020
36. Tambacan	3,920	4,685	4,743	4,801	4,917	4,977	5,038	5,100	5,163	5,227	5,291	5,356
37. Tibanga	2,027	2,213	2,240	2,268	2,322	2,351	2,380	2,409	2,439	2,469	2,499	2,530
38. Tipanoy	3,045	3,582	3,626	3,671	3,759	3,805	3,852	3,900	3,948	3,996	4,045	4,095
39. Tomas Cabili	2,088	2,465	2,495	2,526	2,587	2,619	2,651	2,684	2,717	2,750	2,784	2,818
40. Tubod	7,458	8,218	8,319	8,421	8,624	8,730	8,838	8,947	9,057	9,168	9,281	9,395
41. Ubaldo Laya	2,613	3,212	3,252	3,292	3,371	3,412	3,454	3,497	3,540	3,583	3,627	3,672
42. Upper Hinaplanon	1,488	1,523	1,542	1,561	1,598	1,618	1,638	1,658	1,678	1,699	1,720	1,741
43. Upper Tominobo	398	629	637	645	660	668	676	685	693	702	710	719
44. Villaverde	1,349	1,549	1,568	1,587	1,626	1,646	1,666	1,686	1,707	1,728	1,749	1,771

Source: Phil. Statistics Office & CPDO

** Censal Years 2015,2020*

Table 14. Current & Projected Population Density by Barangay 2015 - 2030

Name of Barangay	Area (hectares)	2015*	2020*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
TOTAL	**81,337.00**	**4.21**	**4.46**	**4.52**	**4.57**	**4.63**	**4.69**	**4.75**	**4.80**	**4.86**	**4.92**	**4.98**	**5.04**
1. Abuno	664.87	8.16	8.79	8.89	9.00	9.11	9.23	9.34	9.45	9.57	9.69	9.81	9.93
2. Acmac	109.78	58.95	62.45	63.22	64.00	64.79	65.58	66.39	67.21	68.03	68.87	69.72	70.57
3. Bagong Silang	45.83	152.26	133.19	134.83	136.48	138.16	139.86	141.58	143.32	145.09	146.87	148.68	150.51
4. Bonbonon	424.13	4.21	5.61	5.68	5.75	5.82	5.90	5.97	6.04	6.12	6.19	6.27	6.34
5. Bunawan	2,195.20	1.01	0.92	0.93	0.95	0.96	0.97	0.98	0.99	1.00	1.02	1.03	1.04
6. Buru-un	1,000.72	15.15	16.82	17.03	17.24	17.45	17.67	17.88	18.10	18.33	18.55	18.78	19.01
7. Dalipuga	971.06	20.31	22.11	22.38	22.66	22.94	23.22	23.50	23.79	24.09	24.38	24.68	24.98
8. Del Carmen	163.00	51.67	59.28	60.01	60.74	61.49	62.25	63.01	63.79	64.57	65.37	66.17	66.98
9. Digkila-an	1,346.85	3.87	4.28	4.33	4.39	4.44	4.49	4.55	4.61	4.66	4.72	4.78	4.84
10. Ditucalan	77.56	43.64	52.08	52.72	53.36	54.02	54.69	55.36	56.04	56.73	57.43	58.13	58.85
11. Dulag	3,000.00	0.41	0.40	0.40	0.40	0.41	0.41	0.42	0.43	0.43	0.44	0.44	0.45
12 Hinaplanon	551.54	22.38	27.97	28.31	28.66	29.01	29.37	29.73	30.09	30.46	30.84	31.22	31.60
13. Hindang	2,275.00	0.40	0.42	0.42	0.43	0.43	0.44	0.45	0.45	0.46	0.46	0.47	0.47
14 Kabacsanan	594.45	3.57	3.97	4.02	4.07	4.12	4.17	4.22	4.28	4.33	4.38	4.44	4.49
15. Kalilangan	3,500.00	0.41	0.49	0.50	0.50	0.51	0.52	0.52	0.53	0.53	0.54	0.55	0.55
16. Kiwalan	914.23	8.16	8.43	8.54	8.64	8.75	8.86	8.96	9.08	9.19	9.30	9.41	9.53
17. Lanipao	3,000.00	0.92	0.96	0.98	0.99	1.00	1.01	1.02	1.04	1.05	1.06	1.08	1.09
18. Luinab	293.07	29.35	37.90	38.37	38.84	39.32	39.80	40.29	40.79	41.29	41.80	42.31	42.83
19. Mahayahay	30.45	301.44	261.58	264.79	268.05	271.35	274.69	278.06	281.48	284.95	288.45	292.00	295.59

Name of Barangay	Area (hectares)	2015*	2020*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
20. Mainit	7,325.00	0.35	0.37	0.37	0.38	0.38	0.39	0.39	0.40	0.40	0.41	0.41	0.42
21. Mandulog	1,002.74	3.86	4.27	4.32	4.38	4.43	4.49	4.54	4.60	4.65	4.71	4.77	4.83
22. Ma. Cristina	675.19	16.86	17.49	17.71	17.93	18.15	18.37	18.60	18.82	19.06	19.29	19.53	19.77
23. Pala-o	372.27	25.79	28.95	29.31	29.67	30.03	30.40	30.78	31.16	31.54	31.93	32.32	32.72
24. Panoroganan	10,500.00	0.46	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.17	0.17	0.17
25. Poblacion	68.00	51.03	53.13	53.79	54.45	55.12	55.80	56.48	57.18	57.88	58.59	59.31	60.04
26. Puga-an	1,043.47	7.15	7.24	7.33	7.42	7.51	7.60	7.70	7.79	7.89	7.98	8.08	8.18
27. Rogongon	35,555.29	0.16	0.21	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.24	0.24	0.24
28. San Miguel	59.39	83.43	64.00	64.79	65.58	66.39	67.21	68.03	68.87	69.72	70.58	71.44	72.32
29. San Roque	131.62	36.01	40.21	40.70	41.20	41.71	42.22	42.74	43.27	43.80	44.34	44.88	45.43
30. Santiago	110.42	79.82	83.43	84.45	85.49	86.54	87.61	88.69	89.78	90.88	92.00	93.13	94.28
31. Saray-Tibanga	107.29	94.80	87.48	88.56	89.65	90.75	91.87	93.00	94.14	95.30	96.47	97.66	98.86
32. Sta. Elena	289.48	33.63	37.21	37.67	38.13	38.60	39.07	39.55	40.04	40.53	41.03	41.54	42.05
33. Sta. Filomena	503.92	13.13	13.90	14.07	14.25	14.42	14.60	14.78	14.96	15.14	15.33	15.52	15.71
34. Sto. Rosario	24.26	89.61	75.80	76.74	77.68	78.64	79.60	80.58	81.57	82.58	83.59	84.62	85.66
35. Suarez	338.43	49.22	55.10	55.78	56.47	57.16	57.87	58.58	59.30	60.03	60.77	61.51	62.27
36. Tambacan	48.18	365.63	399.77	404.69	409.67	414.71	419.81	424.97	430.20	435.49	440.85	446.27	451.76
37. Tibanga	45.00	213.22	179.76	181.97	184.20	186.47	188.76	191.09	193.44	195.82	198.22	200.66	203.13
38. Tipanoy	514.51	28.63	29.71	30.08	30.45	30.82	31.20	31.58	31.97	32.37	32.76	33.17	33.58
39. Tomas Cabili	264.38	33.21	36.60	37.05	37.50	37.97	38.43	38.91	39.38	39.87	40.36	40.86	41.36
40. Tubod	320.67	99.52	103.67	104.94	106.23	107.54	108.86	110.20	111.56	112.93	114.32	115.72	117.15
41. Ubaldo Laya	255.04	46.86	53.43	54.08	54.75	55.42	56.10	56.79	57.49	58.20	58.92	59.64	60.37
42. Upper Hinaplanon	190.93	28.62	34.31	34.73	35.16	35.59	36.03	36.47	36.92	37.38	37.84	38.30	38.77

Name of Barangay	Area (hectares)	2015*	2020*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
43. Upper Tominobo	400.53	8.56	9.24	9.36	9.47	9.59	9.71	9.83	9.95	10.07	10.19	10.32	10.44
44. Villaverde	33.25	165.35	165.83	167.87	169.94	172.03	174.15	176.29	178.46	180.65	182.87	185.12	187.40

Source: Phil. Statistics Office & CPDO
** Censal Years 2015,2020*

2.4 Planning Context

2.4.1 The Regional Physical Framework Plan (RPFP) 2004-2030

According to the RPFP 2004-2030, the region is envisioned to be “the leading industrial and trade center in Mindanao with vibrant, skilled and productive men and women enjoying equal opportunities in harnessing the potentials and resources in building a decent, harmonious, peaceful and healthful living environment.”

In the medium term, the region will be positioned as a major transhipment hub taking full advantage of its strategic location as the gateway to the island of Mindanao, and shall emerge as a major trading center.

Specifically, and in consonance with the national directions, the region aims to achieve the desired spatial arrangement of land and resource using activities in the region in order to:

a. Effect the desired level and distribution of regional population;
b. Facilitate access and improve availment of basic services by everyone in the region;
c. Ensure optimum and sustained use of natural and human-made resources; and
d. Safeguard, as well as, protect the integrity of the physical environment in order to obtain the maximum possible social and economic benefits for the people in the region.

2.4.2 Expanded Cagayan de Oro-Iligan Corridor Area Plan

The Expanded Cagayan de Oro-Iligan Corridor (CIC) is one of the four development clusters in Region 10. The Expanded CIC being classified as the Strategic Development Area 1 (SDA 1) in the Regional Development Agenda shall serve as industrial and trade core in the region. As defined in the plan, its

influenced area extends from the town of Jasaan in the eastern side of Misamis Oriental to Lanao del Norte's capital town of Tubod and six adjacent municipalities and three cities. The corridor is envisioned to host higher level and more value-adding processing and manufacturing activities and as an industrial supplier of industrial supplier of industrial product worldwide complemented by globally competitive enterprises in agribusiness, trade, tourism and services. The new airport is nearer to Iligan and will give more advantage to its economic development. Similar corridor expansion is expected to be developed within the Iligan-Bukidnon Corridor. (Source: Iligan City CLUP 2013-2022)

Iligan City serves as the industrial center and sub-regional trade center of Region 10 as it has strong industrial export base and adequate land and sea transport linkage with the regional center and other urban centers in the region and neighboring regions, as well as to Visayas and Luzon. (See **Figure 19**).

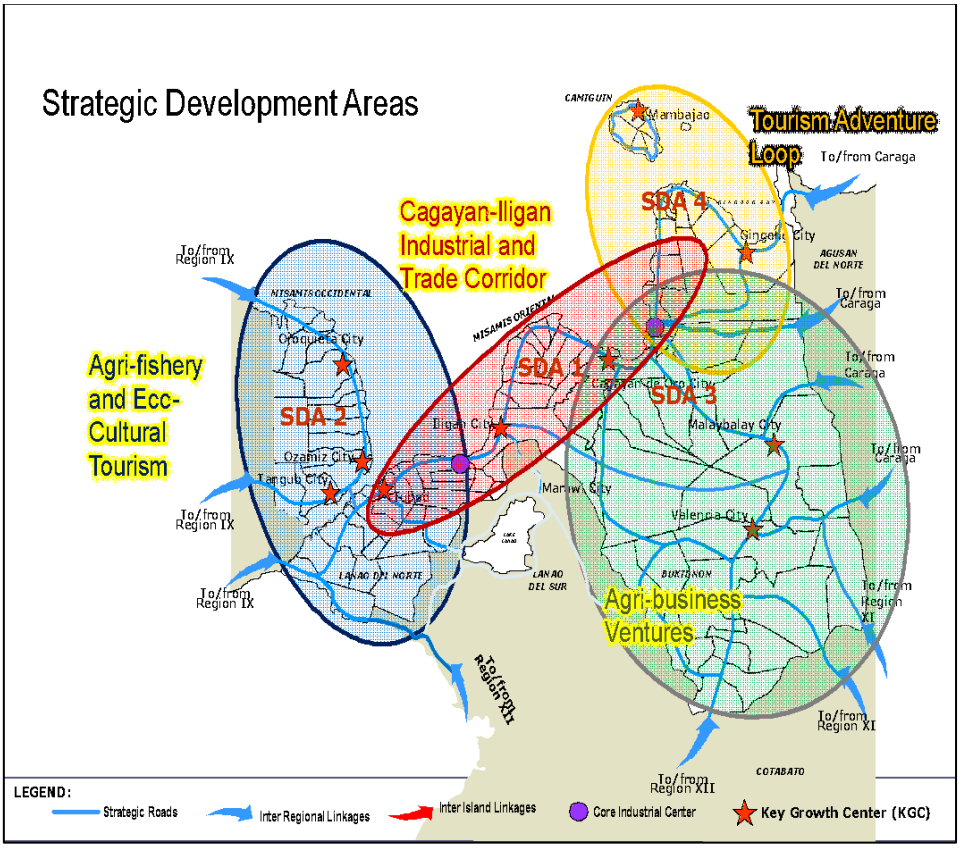


Figure 19. Strategic Development Areas in Region 10

2.4.3 Metro-Iligan Regional Agri-Industrial Center (MIRAIC)

The Metro-Iligan development concept covers five municipalities of Lanao del Norte and four municipalities of Misamis Oriental. The Municipality of Linamon of Lanao del Norte, one of those included in the metropolitanization, is the site of the proposed MIRAIC. Offsite infrastructure support of MIRAIC such as the Tagoloan-Baloi-Linamon road of the Lanao del Norte Interior Circumferential Road is almost complete. This road is linked to Iligan's Alcuizar Road (Tubod-Tipanoy-Abuno Road). It is a component of the Iligan-Lanao del Norte Diversion Road, also called the Lanao del Norte Interior Circumferential Road. As embodied in MTPDP 2000, MIRAIC is one of the 19 identified growth areas nationwide serving as vehicle for industrialization and economic development. This 344-hectare agri-industrial complex is large manufacturing

industries in Iligan and agricultural products processing from the Lanao del Norte areas. (source: Iligan City CLUP 2013-2022)

2.4.4 Iligan City DRR-CCA Enhanced Comprehensive Land Use Plan 2013-2022

The DRR-CCA Enhanced Comprehensive Land Use Plan is a long-term plan which set the overall direction of the city in 10 years. The comparative advantages of the city in relation to its neighboring areas are herein outlined to generate feasible alternative strategies which will be used for implementation. Key development issues and concerns are identified so that realistic solutions can be provided in responds to the needs of the population.

In the CLUP, the City's Vision is laid out with the statement 'Iligan City envisioned to become a beautiful and dynamic industrial and disaster-resilient metropolitan city where God-loving, healthy and culturally diverse people excel globally, governed with transparency, live in harmony with nature and adaptive to climate change.

To realize the Vision, the following Missions must be accomplished;

1. To make the culturally diverse people of Iligan City a healthy, God-loving and globally competitive individuals living in a just society;
2. To sustain Iligan as an industrial and commercial city and advance its potentials on agriculture, tourism and information and communications technology;
3. To properly manage the resources of the city and promote ecological consciousness among the people;
4. To carry out transparent and accountable governance characterized by a simple and efficient systems and procedures known and understandable by the general public;

5. To build the resiliency of the city through capacity building and institutionalization of disaster risk reduction and climate change adaptation and management in all levels of governance.

2.5 Local Climate Change Action Planning Framework

The LCCA Planning activities started with the review of the existing CLUP & the CDP, as well as the draft FLUP, Gender Plan, CDRRM Plan, and CRM Plan (as climate lenses).

The climate-related hazards were identified and different sectors were assessed according to their vulnerability and level of exposure to risks. The formulation of the goals, objectives, and strategies was based on the previous workshop outputs, the CLUP and CDP.

Climate change adaptation and mitigation actions were identified to address climate change related issues and concerns. The draft LCCAP-Framework and Strategies was presented to the DRRMC for approval afterwhich, it was endorsed to the Sangguniang Panlungsod for deliberation, approval and adoption. Copy of approved LCCAP-Framework and Strategies will be submitted to the Climate Change Commission for evaluation of which the identified priority climate change actions may be funded from the People's Survival Fund. (See **Figure 20**).

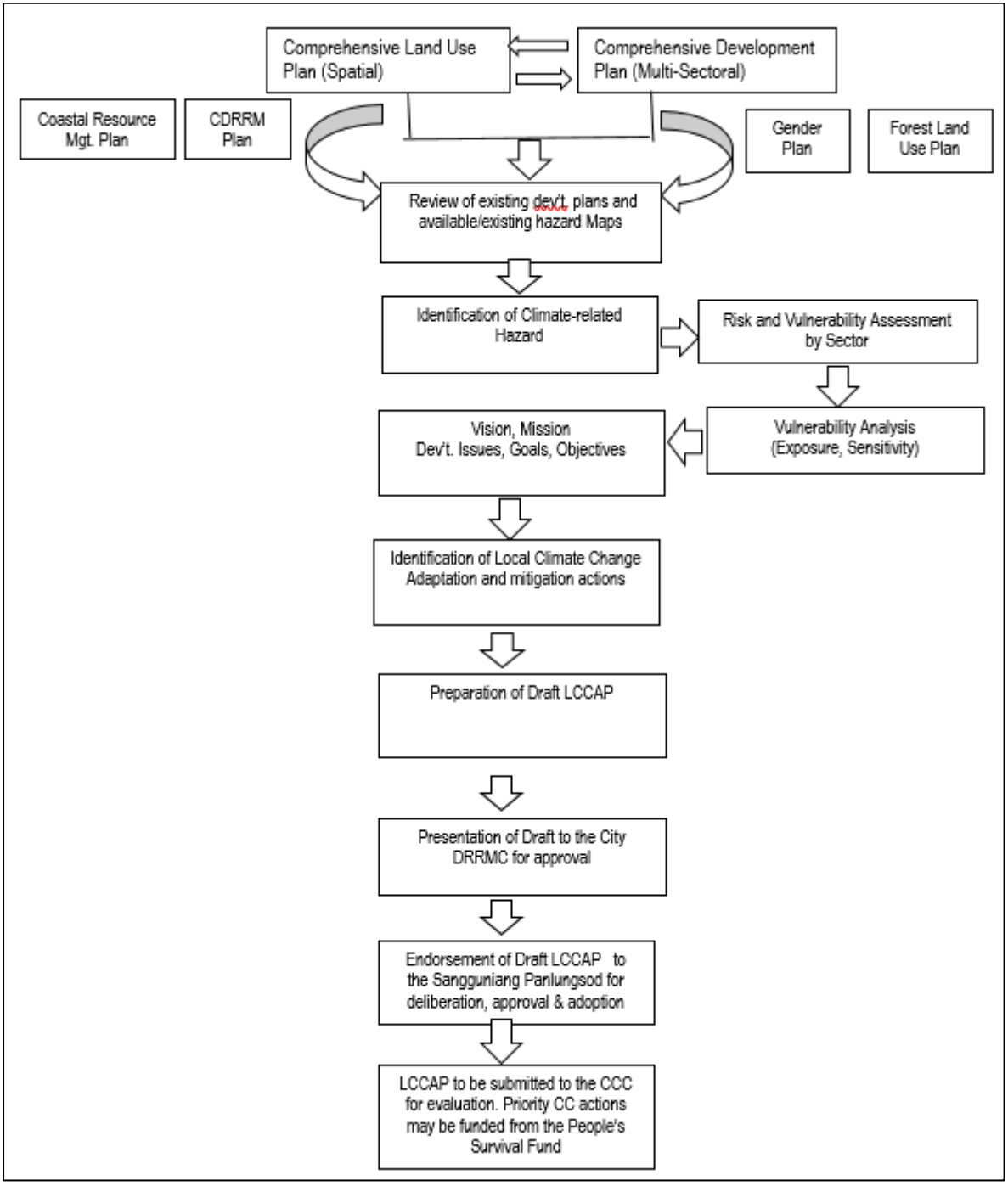


Figure 20. LCCA Planning Framework

CHAPTER 3. VULNERABILITY ASSESSMENT

This part discusses the findings of the city's Vulnerability Assessment. This assessment focuses on the impacts of climate changes to the five sectors (economic, environment, social, institutional, and infrastructure). The climate projections and patterns are based from PAGASA projections as well as actual local experience. Data from the Climate and Disaster Risk Assessment (CDRA), such as historical disaster damage and loss data, summary of barangay level hazard inventory matrix, exposure and sensitivity database, exposure hazard maps, and other essential information for formulating climate change interventions, were also integrated into the results.

3.1 Local Climate Change Projections

The Philippine Atmospheric, Geophysical and Astronomical Services Administration of the Department of Science and Technology (DOST-PAGASA) provides the local climate change projection in their 2018 report titled "Observed Climate Trends and Projected Climate Change in the Philippines." In 2020, PAGASA, the Manila Observatory, and Ateneo de Manila University collaborated to formulate and create a second series of climate patterns and predicted climate extremes. The "Philippine Climate Extremes Report 2020: Examining and Forecasting Climate Extremes in the Philippines to Facilitate Informed Choices Regarding Climate Change Adaptation and Risk Mitigation" was a useful report and offered insightful information. As a reference for potential future climate change in the region, both of these reports are crucial. The report from Iligan City's climate disaster risk assessment will also serve as a guide for future climate change, with a focus on the province of Lanao del Norte.

The Philippines, like most parts of the globe, has also exhibited increasing temperatures as shown in **Figure 21** below. The graph of observed mean temperature anomalies (or departures from the 1971-2000 normal values) during the period 1951 to 2010 indicate an increase of 0.648 C or an average of 0.0108 C per year-increase.

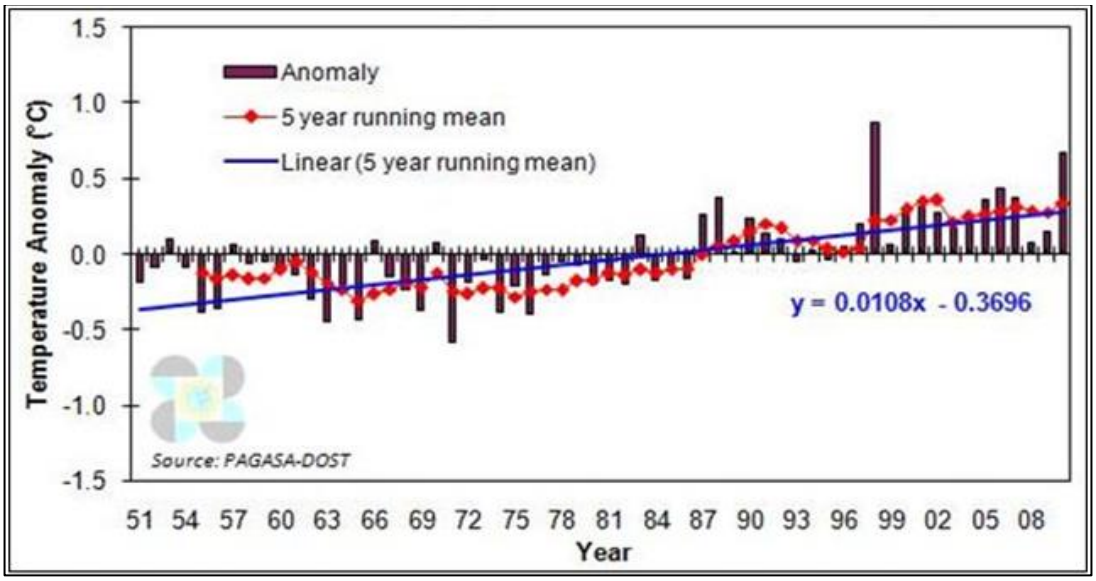


Figure 21. Observed annual mean temperature anomalies (1951-2010) in the Philippines based on 1971-2000 normal values.

The increase in maximum (or daytime) temperatures and minimum (or night time) temperatures are shown in **Figure 22** and **Figure 23**. During the last 60 years, maximum and minimum temperatures are seen to have increased by 0.36 ºC and 1.0ºC, respectively.

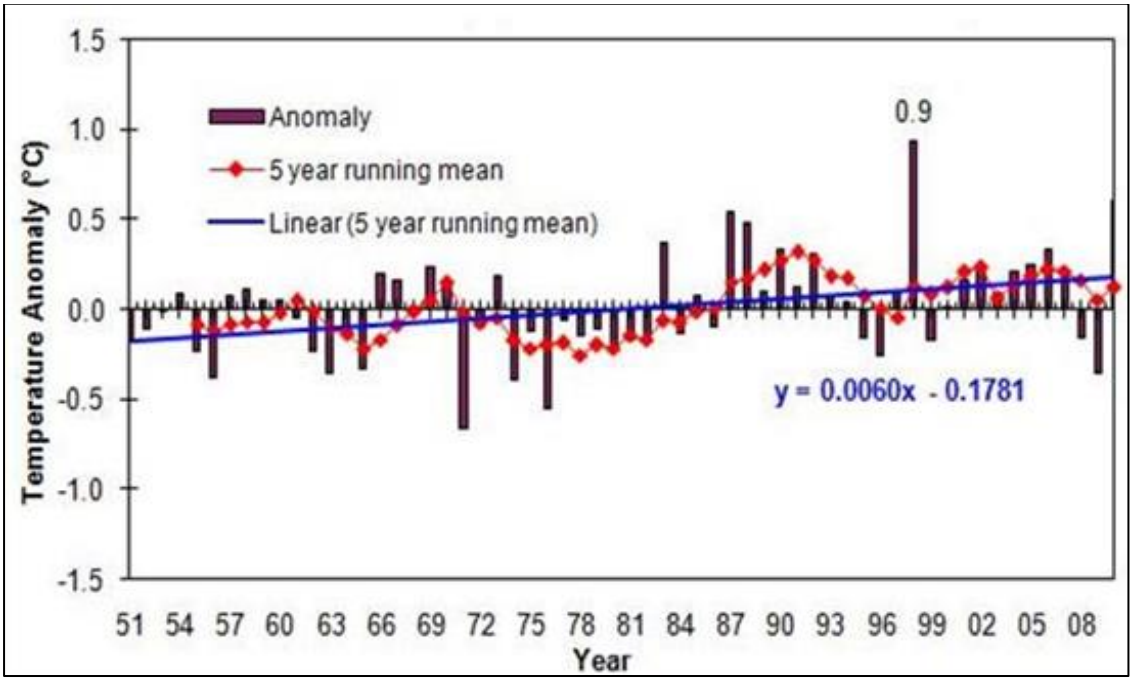


Figure 22. Observed mean annual maximum temperature anomalies in the Philippines during the 1951-2010 period (compared with 1971-2000 normal values)

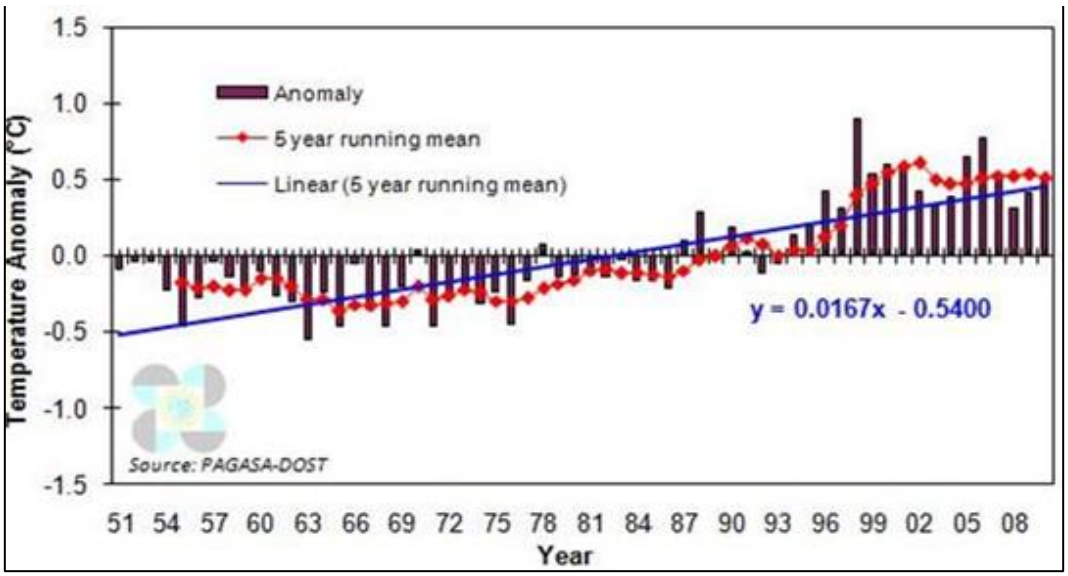


Figure 23. Observed mean annual minimum temperature anomalies in the Philippines

Analysis of trends of tropical cyclone occurrence or passage within the so-called Philippine Area of Responsibility (PAR) show that an average of 20 tropical cyclones form and/or cross the PAR per year. The trend shows a high variability over

the decades but there is no indication of increase in the frequency. However, there is a very slight increase in the number of tropical cyclones with maximum sustained winds of greater than 150kph and above (typhoon category) being exhibited during El Nino event (See **Figure 24**).

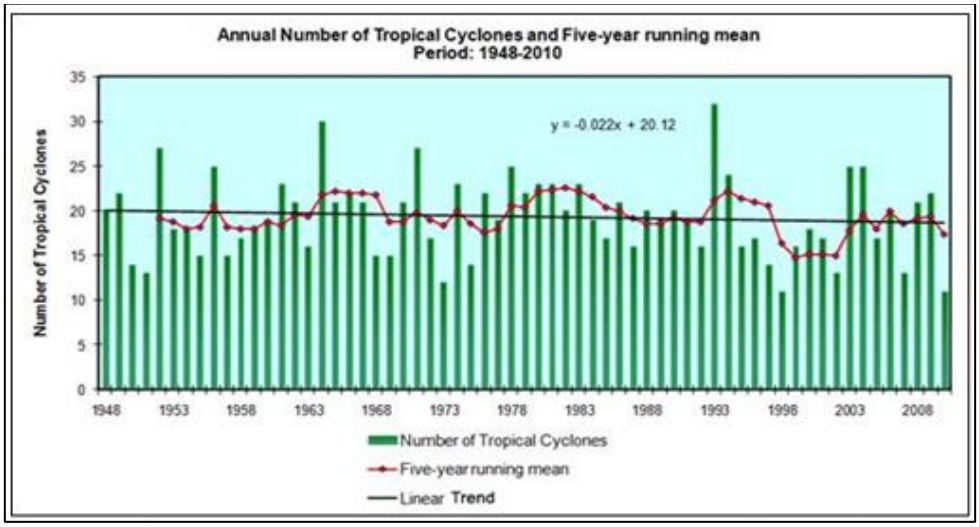


Figure 24. Tropical cyclone occurrence/passage within the Philippine Area of Responsibility during the 1948-2010 period

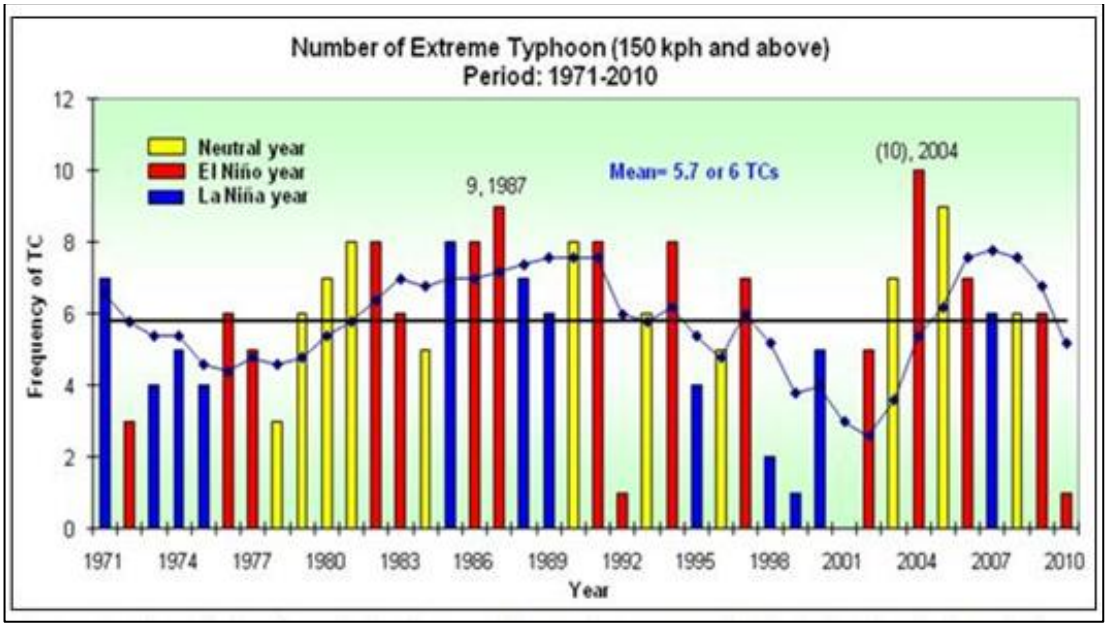


Figure 25. Trend analysis of tropical cyclone with maximum sustained winds of 150kph

Moreover, the analysis on tropical cyclone passage over the three main islands (Luzon, Visayas and Mindanao), the 30-year running means show that there has been a slight increase in the Visayas during the 1971 to 2000 as compared with the 1951 to 1980 and 1960-1990 periods (See **Figure 26**).

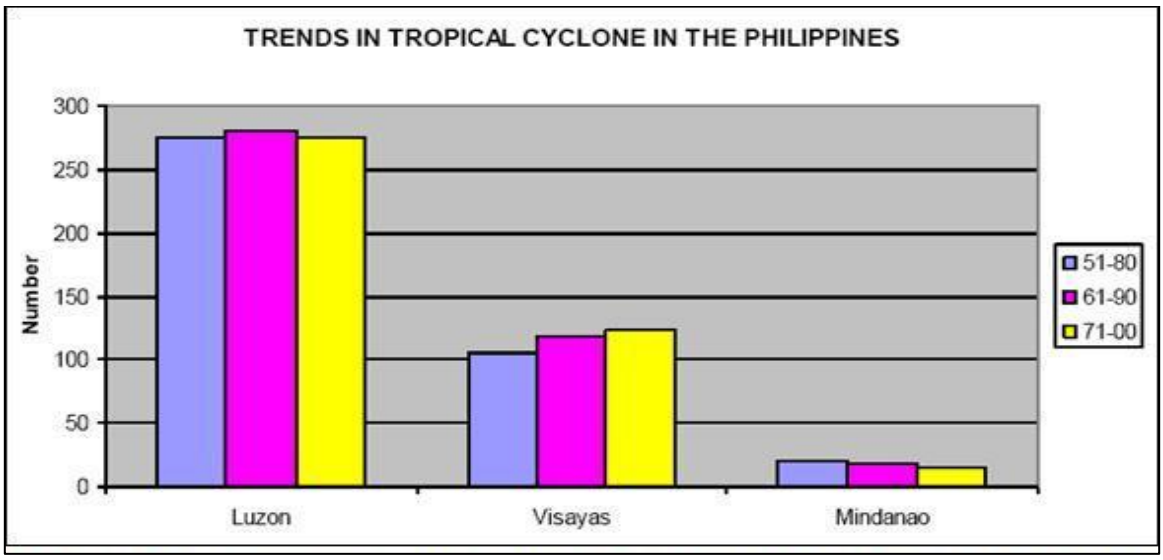


Figure 26. Decadal changes in intense tropical cyclone occurrence in the three main Islands in the Philippines (1951-2000)

3.1.1 Hot Days and Cold Nights

To detect trends in extreme daily events, indices had been developed and used. Analysis of extreme daily maximum and minimum temperatures (hot-days index and cold-nights index, respectively) show there are statistically significant increasing number of hot days but decreasing number of cool nights (as shown in **Figure 27** and **Figure 28**).

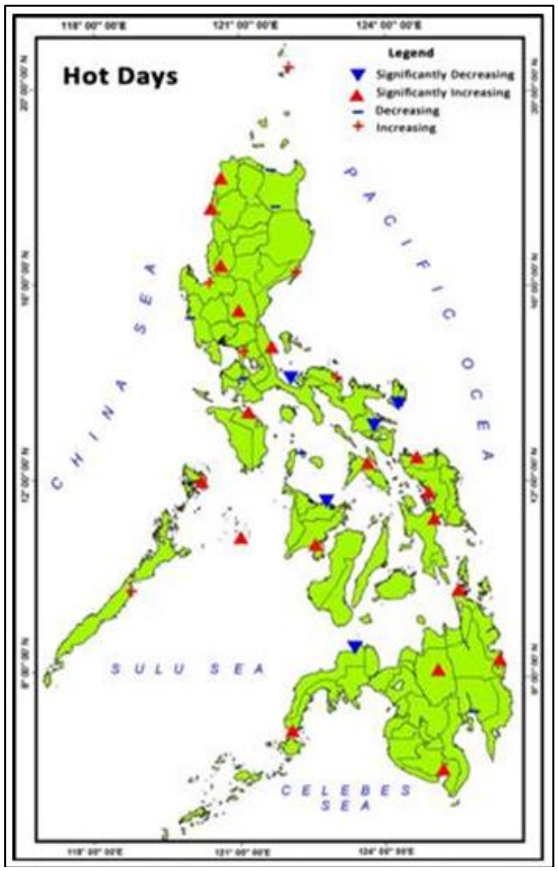


Figure 27. Trends in the frequency of days with maximum temperature above the 1971-2000 mean 99th percentile

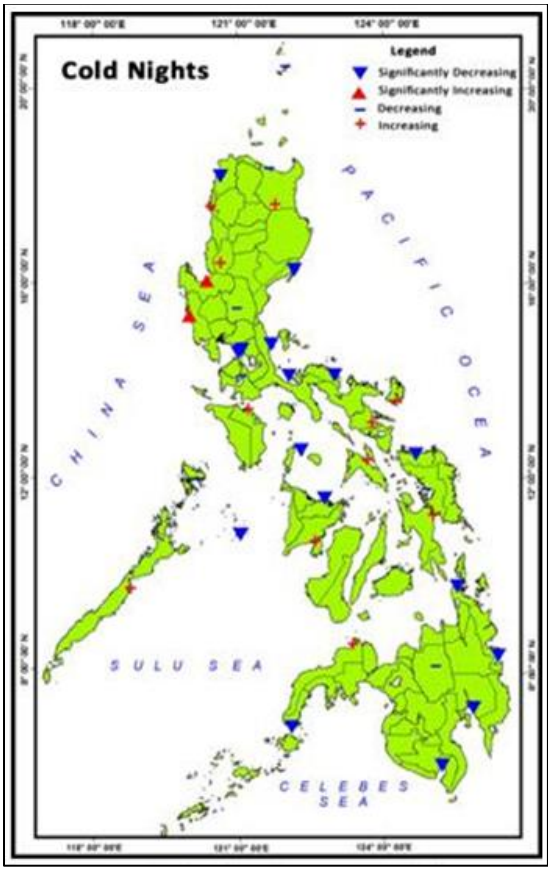


Figure 28. Trends in the frequency of days with maximum temperature below the 1971-2000 mean 1st percentile

However, the trends of increases or decreases in extreme daily rainfall are not statistically significant; although, there have been changes in extreme rain events in certain areas in the Philippines. For instance, intensity of extreme daily rainfall is already being experienced in most parts of the country, but not statistically significant (see in Fig. 29). Likewise, the frequency has exhibited an increasing trend, also, not statistically significant (as shown in Fig. 30).

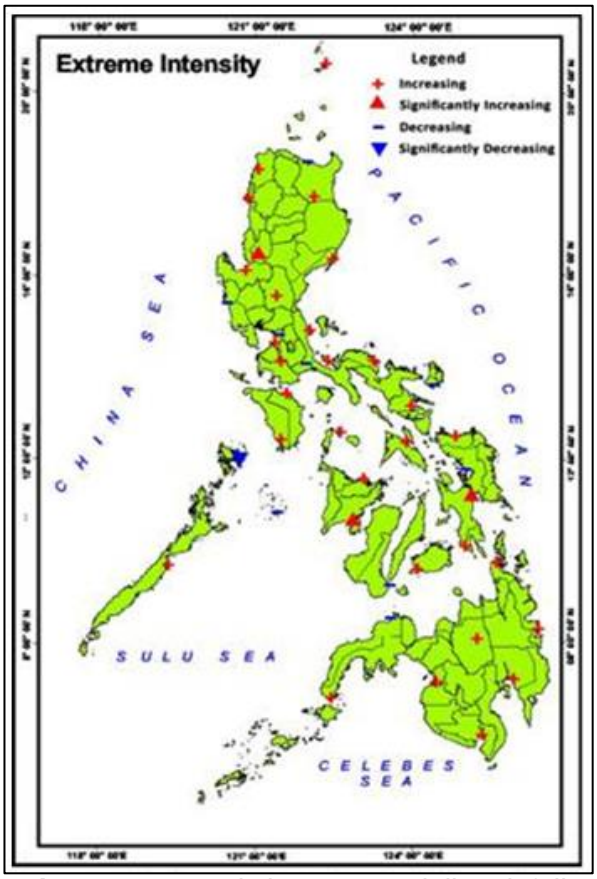


Figure 29. Trends in extreme daily rainfall intensity in the Philippines (1951-2008) Compared with the 1971-2000 mean value Index used is the amount of rainfall exceeding the top four events during the year

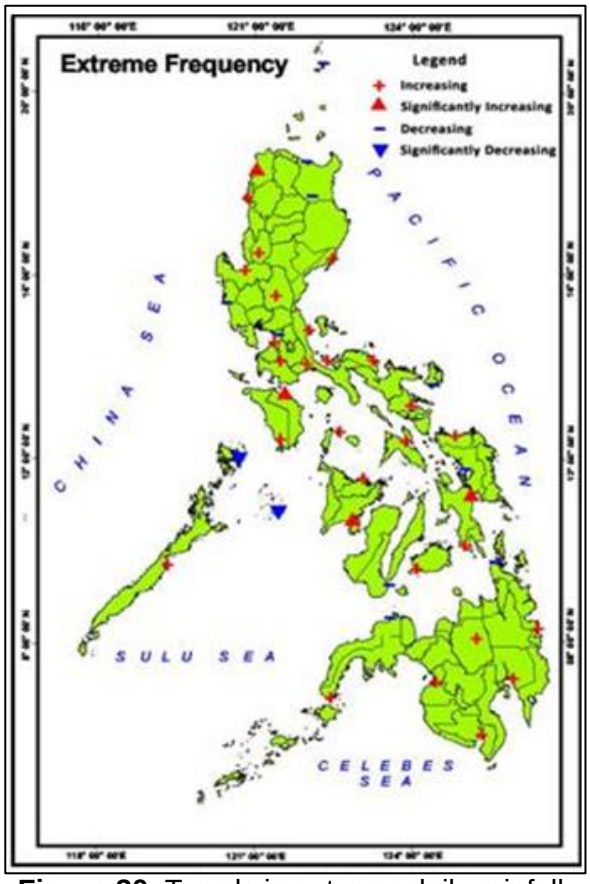


Figure 30. Trends in extreme daily rainfall frequency in the Philippines (1951-2008) Compared with the 1971-2000 mean value Index used is the amount of rainfall exceeding the top four events during the year

The climate change projection is an important tool in understanding the complex climate. These show how local climate could change dramatically should the global community fail to act towards effective reduction of greenhouse gas emissions. [PAGASA used the PRECIS model only in climate projections for the three emission scenarios (due to several constraints and limitations) in two-time frames; 2020 and 2050].

Table 15, **Table 16** and **Table 17** show the projected seasonal temperature increase, seasonal rainfall change, and frequency of extreme events respectively in 2020 and 2050 under the medium-range emission scenario in the provinces in Region

10. It is to be noted that all the projected changes are relative to the baseline (1971-2000) climate.

Table 15. Seasonal temperature increases (in °C) in 2020 and 2050 under medium-range emission scenario in provinces of Region 10

	OBSERVED BASELINE (1971-2000) mm				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Region 10												
Bukidnon	25.1	26.5	25.8	25.7	1.0	1.2	1.2	1.0	1.9	2.3	2.4	2.1
Lanao del Norte	24.4	25.5	25.4	25.2	1.0	1.1	1.0	1.0	1.9	2.2	2.1	1.9
Misamis Occidental	25.6	26.7	26.6	26.4	1.0	1.1	1.1	1.0	1.9	2.2	2.2	1.9
Misamis Oriental	25.4	26.8	26.9	26.5	1.0	1.2	1.2	1.0	1.9	2.3	2.4	2.0

Table 16. Seasonal rainfall change (in %) in 2020 and 2050 under medium-range emission scenario in provinces of Region 10

	OBSERVED BASELINE (1971-2000) mm				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Region 10												
Bukidnon	329.7	335.6	653.8	559.5	2.9	-10.3	-4.4	-0.3	-5.1	-13.0	-9.7	-5.8
Lanao del Norte	337.5	350.3	662.5	621.1	9.6	-0.6	-2.2	6.9	2.5	-1.9	1.4	7.1
Misamis Occidental	392.1	323.4	633.1	728.3	9.1	1.4	-6.1	6.1	5.2	0.3	-5.1	4.6
Misamis Oriental	442.5	296.0	615.7	581.1	4.6	-10.4	-3.7	2.9	1.8	-17.8	-5.2	-0.1

Table 17. Frequency of extreme events in 2020 and 2050 under medium-range emission scenario in provinces of Region 10

Provinces	Station	No. of Days w/ Tmax >35 °C			No. of Dry Days			No. of Days w/ Rainfall >150mm		
		OBS (1971-2000)	2020	2050	OBS	2020	2050	OBS	2020	2050
Bukidnon	Malaybalay	26	477	1441	6537	3977	4461	4	9	9
Lanao del Norte	Dipolog	217	2155	4007	7481	5384	5470	3	6	1
Misamis Oriental	Cag. De Oro	383	4539	6180	8251	6413	7060	10	13	9
	Lumbia	106	2012	3759	6495	6290	6580	3	6	1

The projected values from the figures are crucial for determining prevention and mitigation programs for the region or city as a whole. Iligan City is an urban city with such dense population. The existence of factories and other industrial infrastructures suggests that the city contributes significantly to greenhouse gas emissions.

3.2 Climate-related Hazards and Impacts

3.2.1 Flood

There are three major rivers in Iligan City namely Mandulog River, Iligan River, and Agus River. During extreme tidal surges accompanied by excessive rains, the floodplains of Mandulog River, and Iligan River including their deltas are flooded. Houses along these rivers were inundated, and economic activities of the community were hampered. Scouring of river banks was observed and infrastructure facilities were damaged. **Figure 31** reveals the extent of flooding during the occurrence of TS Sendong. Also, **Figure 32**, shows flood depth and risk exposure of different urban barangays of the city based on the 1 in 100 Year Rainfall Return Period Simulation Study under the Project Climate Twin Phoenix of the Climate Change Commission.

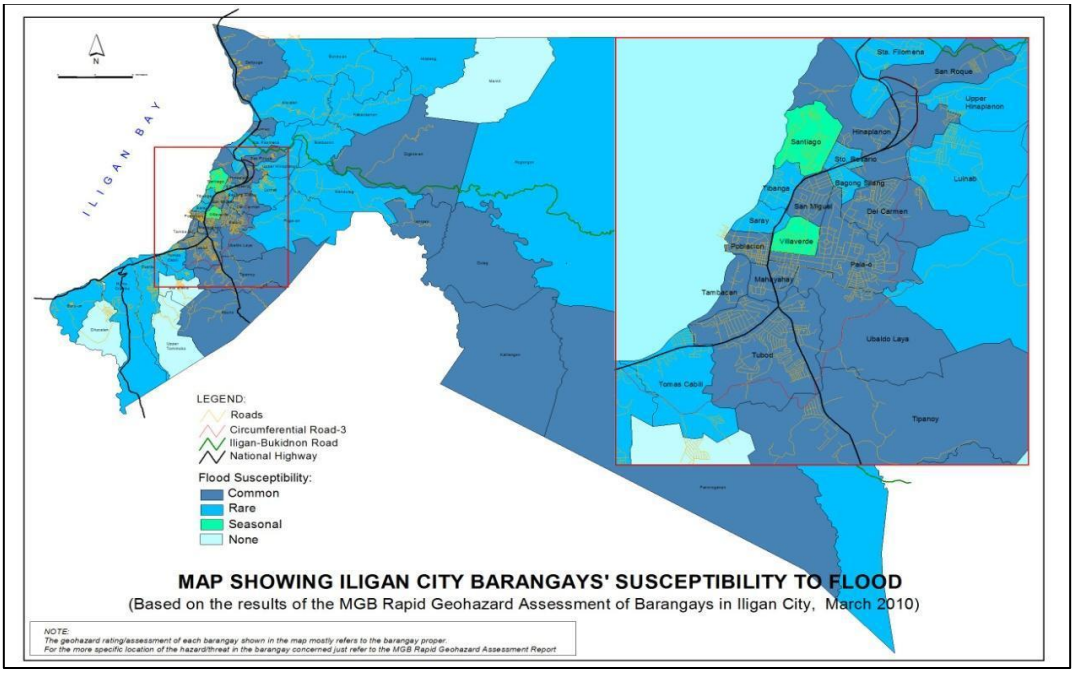


Figure 31. Extent of Flooding during TS Sendong

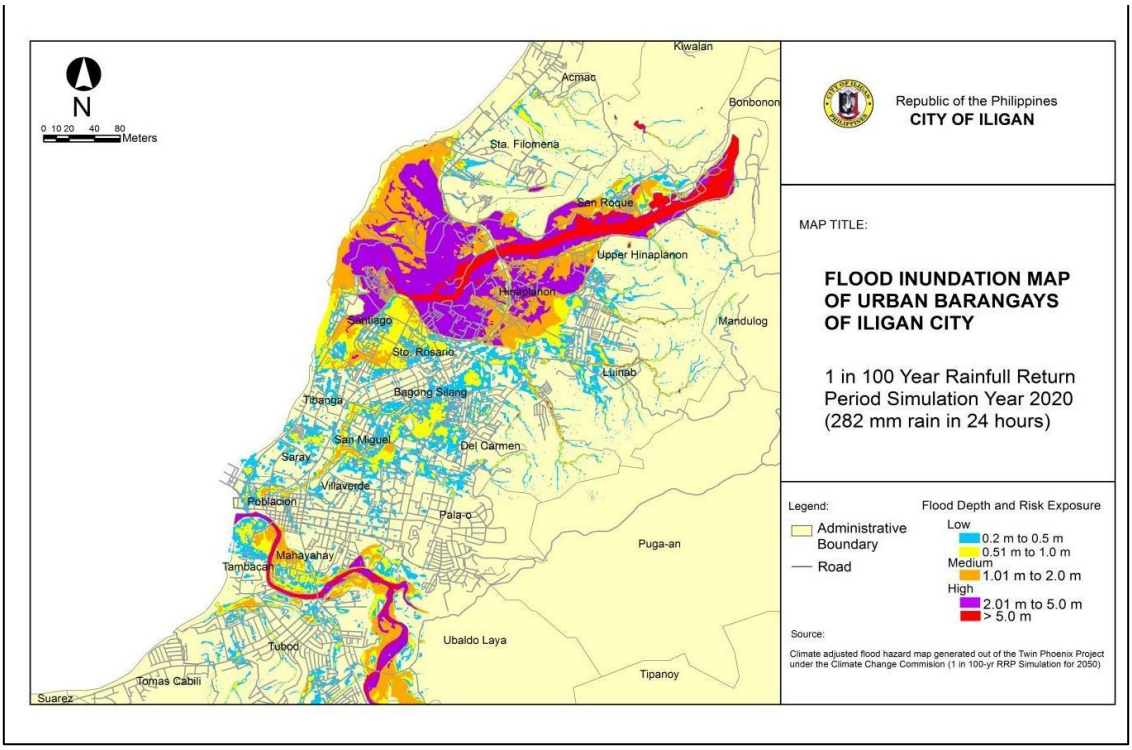


Figure 32. Flood Inundation Map of Urban Barangays in Iligan City

3.2.2 Landslide

A landslide is the gravity-driven mass movement of rock, soil, and debris down a slope. It happens when the driving force goes above the resisting force. It is a natural occurrence on steep slopes. The movement can be slow at first and then increases in speed. It can have an impact on locations both near and far from the source. Landslides are driven by two factors: earthquake, for which it is then called earthquake-induced landslide (EIL), and rain – rain-induced landslide (RIL). EIL can also occur in wet and dry season hence there is a separate investigation for this.

Source: PHIVOLCS

Majority of slope failures/landslides occur during times of heavy rain. An unclassified downslope movement reportedly occurred in 1995 in Sitio Mibolo, Barangay Tipanoy. In this event, about 75 hectares of land experienced subsidence and creep due to intense water saturation in the course of a heavy rainfall.

On the Rapid Geohazard Assessment Report of MGB-Region 10 shows barangays that are highly and moderately susceptible to landslide. Barangays that are highly susceptible to landslide include Bonbonon, Buru-un, Panoroganan, Rogongon, Suarez, Tomas Cabili, Upper Tominobo and parts of Barangays Digkilaan, Luinab, Pala-o, Puga-an, Tipanoy and Tubod. On the other hand, Barangay Mainit has moderate to high susceptibility to landslide.

Barangays Abuno, Acmac, Dalipuga, Del Carmen, Dulag, Hindang, Kiwalan, Maria Cristina, Pugaan and San Roque have moderate landslide susceptibility as well as parts of Barangay Santa Elena, Ubaldo Laya and Santa Filomena while Barangays Kalilangan and Lanipao have low to moderate landslide susceptibility. The rest of the barangays have none to low landslide susceptibility.

In most cases, residential structures in high-slope areas were mostly affected during the occurrences of landslides in the past years (2008, 2009). In 2009, two hectares of forest in Purok Kitaw-an, Barangay Panoroganan slumped down to Budacanan Creek. In Barangay Suarez, tension cracks/landslide was observed in Zones Saturn, Hillside, Matinabago, Pisces, Aries II, Begonia, and Mauswagon. A number of residential subdivisions in Iligan were found to have tension cracks like Scions Subdivision.

3.2.3 Typhoon/Tropical Storm

For decades, it is believed that Iligan is a storm-free city until on the night of December 16, 2011 when tropical storm Washi, or locally known as Sendong, made landfall in Surigao del Sur, traveling inland of Mindanao and in just ten (10) hours, torrential rainfall led to catastrophic flooding in Iligan City and other provinces of Mindanao.

Tropical Storm Sendong, caused flash flood as the rains fell on areas where natural forests had been illegally logged. Heavy rains were able to run off quickly on the relatively barren soils and create devastating flash floods. Water and debris from the mountains overflowed and took not just the course of Iligan and Mandulog Rivers but spilled over its flood plains affecting about 29,000 families. Most deaths reported was due to the sudden rise of flood waters on the rivers wherein mudflows, uprooted trees of various kinds and logs were carried away by the strong water current. Based on the DPWH data from staff gages installed on bridges in major rivers, there have been drastic increases in water levels on December 17, 2011. (Source: Consolidated Strategic Action Plan, NEDA 10).

3.2.4 Accelerated Erosion Hazards

Three types of erosion are identified of which two (river and coastal) were assessed by the Mines and Geosciences Bureau (MGB)-Regional

Office10, Dept. of Environment & Natural Resources (DENR). These include soil erosion, river erosion, and coastal erosion.

3.2.4.1 Soil Erosion

Soil erosion is a natural process. It will only become a problem when human activities cause it to occur much faster than its natural conditions. The loss of forest cover, unsustainable farming practices, and inappropriate land use are among the factors of soil erosion.

Iligan City has critical slopes that are subject to rainfall impact which make it vulnerable to erosion. Data from the Bureau of Soil and Water Management (2003) reveal huge portion of the city's land area that comprises 36,193.7 hectares or roughly 44 percent of its entirety is under moderate erosion. This significantly reduces productivity of forest and agricultural areas, cause sedimentation and siltation of lower areas specifically the rivers and seas. Area under severe erosion covers 5,355 hectares or 6.55 percent of its entirety. On the other hand, slightly eroded area covers 24,782.3 hectares or approximately 30 percent while area with no apparent erosion covers 11,558 hectares or about 14 percent of the city's entire area. Area not categorized or classified as to what erosion classes it belongs totalled to 3,856 hectares.

3.2.4.2 River Erosion

The increased stream velocity will scour and erode the banks of the rivers in magnitudes way above normal. In all of these areas, agricultural lands will be heavily damaged. Likewise, the carrying capacities and discharges of flooded rivers, which are many times the low water flow, will make them capable of transporting the formidable bouldery bed load to lower elevations and flat grounds. In times of flood, the numerous huge boulders that currently line the major rivers,

Nunucan River, Abaga River, Tinago Falls, Mimbalot Falls and the other smaller water bodies can have the potential to damage anything in their paths. (Quoted from the MGB-10 Report)

3.2.4.3 Coastal Erosion

Coastal erosion as defined from the report of the Mines & Geosciences Bureau (MGB) is the wearing away of land and the removal of beach or dune sediments by wave action, tidal currents, wave currents, or drainage.

The coastal area of Iligan is characterized by alternating deposition and erosion beaches. Considering that the coastal areas in Iligan City are not spared from typhoons and have relatively fair wave energy, they are highly prone to coastal erosion. Erosion beaches include the beach coast of Bayug; from the groin in Tambacan to about three kilometers southward where erosion is severe; from the MCCI pier to Purok 11 in Brgy. Buru-un and the shorelines in Brgy. Santiago. Erosion usually occurs on the downdrift side of man-made coastal structures such as seawalls, jetties and grains.

The recent Report of Marine Geological Survey Division, MGB-Region 10 on the results of the initial assessment relevant to coastal geohazard and impacts of climate change study of Iligan City shows that susceptibility to coastal erosion is either low, low to moderate or moderate.

It is recommended that the existing natural defences in the coastal area such as the rocky coralline platform and the foreshore sand bar/flats efforts should be preserved and extra efforts shall be made for its maintenance. Also, coastal stabilization measures involving vegetative techniques or coastal engineering remedies shall be

implemented to protect Barangay Hinaplanon from coastal erosion since this barangay is prone to coastal erosion especially during the months of December and January and in times of heavy rains. (Quoted from the MGB-10 Report)

3.2.5 Storm Surge

A storm surge is a rise above normal water level on the open coast due to the action of wind on the water surface or due to atmospheric pressure reduction. It is also known as storm wave, storm tide, and surge.

The occurrence of storm surge in Iligan has affected Barangays Buru-un, Maria Cristina, Poblacion, Santiago, Saray, Tambacan, Tibanga, and Tomas Cabili. Available data on 2009, 2008 & 2007 storm surge events show 168 affected families, 138 houses partially-damaged, and 20 houses totally-damaged. There is no available data on the total number of families affected in 2008 and 2007 occurrences of storm surges however, number of houses affected were recorded as follows; four (4) houses were damaged in 2008 and 291 were destroyed in 2007. **Figure 33** shows coastal barangays that are susceptible to storm surge.

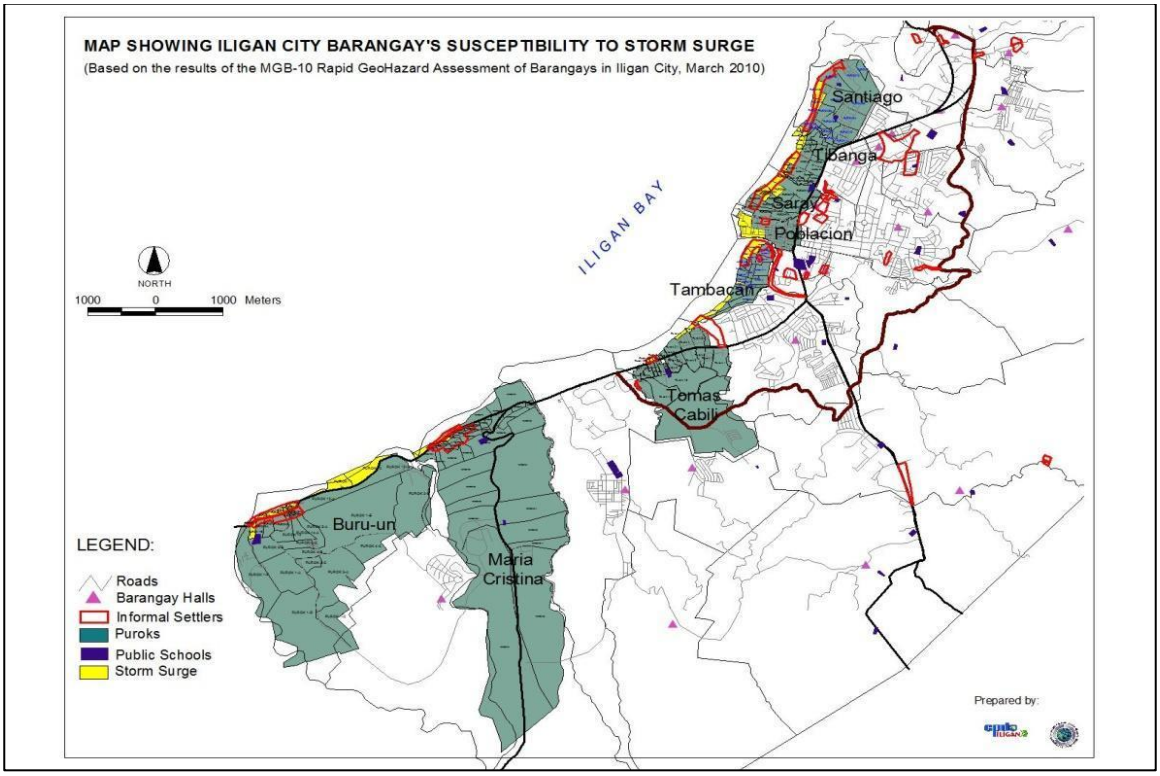


Figure 33. Barangays Susceptible to Storm Surge

3.2.6 Sea Level Rise

Sea level rise is an increase in volume of water in the world's ocean resulting in the increase in global mean sea level. It is usually attributed to global climate change by thermal expansion of the water in the ocean and by melting of ice sheets and glaciers on land (Wikipedia, May 24, 2017).

Among the coastal barangays in Iligan City that are most likely be affected by a 1-meter sea level rise are Dalipuga, Hinaplanon, Santiago, Tibanga, Saray, Tambacan, and Maria Cristina (**Figure 34**). The total land area of these barangays is 2,428.76 hectares and the estimated land area that will be affected by the 1-meter sea level rise covers 145.23 hectares or 5.79 percent of its entire land area. This is approximately 0.18 percent of the total land area of Iligan.

Table 18. Barangay and Land Area Affected by 1-meter Sea Level Rise

Barangay	Total Land Area (hectares)	Land Area affected by 1-m sea level rise (hectares)	Ratio (land area affected/ total land area
1. Dalipuga	971.06	45.82	4.72
2. Hinaplanon	551.54	42.82	7.76
3. Maria Cristina	675.19	10.62	1.57
4. Santiago	110.42	10.70	9.69
5. Saray	107.29	22.01	20.51
6. Tambacan	48.18	2.90	6.02
7. Tibanga	45.00	10.36	23.02
Total	**2,508.68**	**145.23**	**5.79**
Total Land Area of Iligan City	**81,337.00**	**145.23**	**0.18**

Source: PIKM Division, CPDO

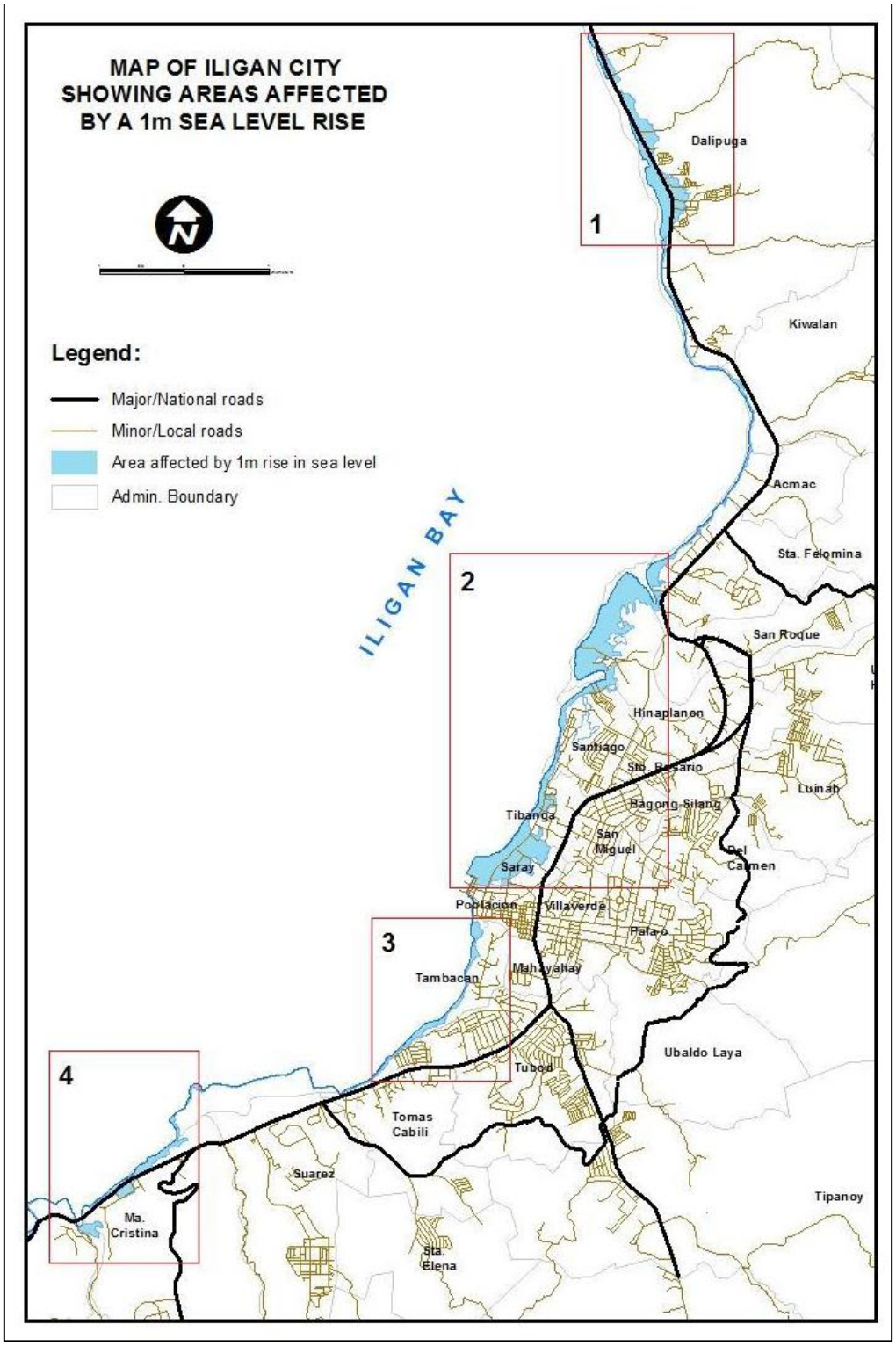


Figure 34. Map of Iligan City Showing Areas Affected by a 1m Sea Level Rise

3.2.7 Drought

Drought originates from a deficiency of precipitation over an extended period of time, resulting to water shortage. Other climatic factors such as high temperature, high wind, and low relative humidity are often associated with drought in many regions and can significantly affect its severity.

The occurrence of drought in 2000, though there is no available data to establish the extent of damages but this phenomenon brought about some adverse effects on the agricultural productivity of farmers in the hinterland of Iligan City as well as the operations of hydro-power plants, the manufacturing industries and other economic activities.

The Damage Assessment Report of the latest drought that happened in 2015 shows that the agriculture sector has suffered due to damage crops and losses in livestock. Hence, Iligan City through the Sangguniang Panlungsod declared under state of calamity.

3.3 Historical Disaster Damage and Loss Data

The historical disaster damage and loss data for Iligan City is shown in this section, spanning from 2011 (the year of Tropical Storm Sendong) to 2017 up to present.

Based on information obtained from the City Engineers Office, the figure below shows the number of families impacted by the devastation caused by Tropical Storm "Sendong" across 32 barangays. Based on 3,052 recorded data points, Barangay Hinaplanon families were the most affected. Beside it were Barangays Tambacan, Tubod, Santiago, Mahayahay, San Roque, and Bagong Silang, indicating over a thousand families that had been officially reported as affected. Barangays Ubaldo Laya, Upper Hinaplanon, Pala-o, Mandulog, and Sta., on the other hand, had less than 1,000 but still 500 affected families. Filomena and Rogongon. In conclusion, Barangays Luinab, Bonbonon, Digkilaan, Tibanga, San Miguel, and Sto. Barangays

with fewer than 500 affected families are Rosario, Kalilangan, Lanipao, Dulag, Mainit, Hindang, Panoroganan, Del Carmen, Puga-an, Villaverde, Tipanoy, Abuno, Dalipuga, and Bunawan.

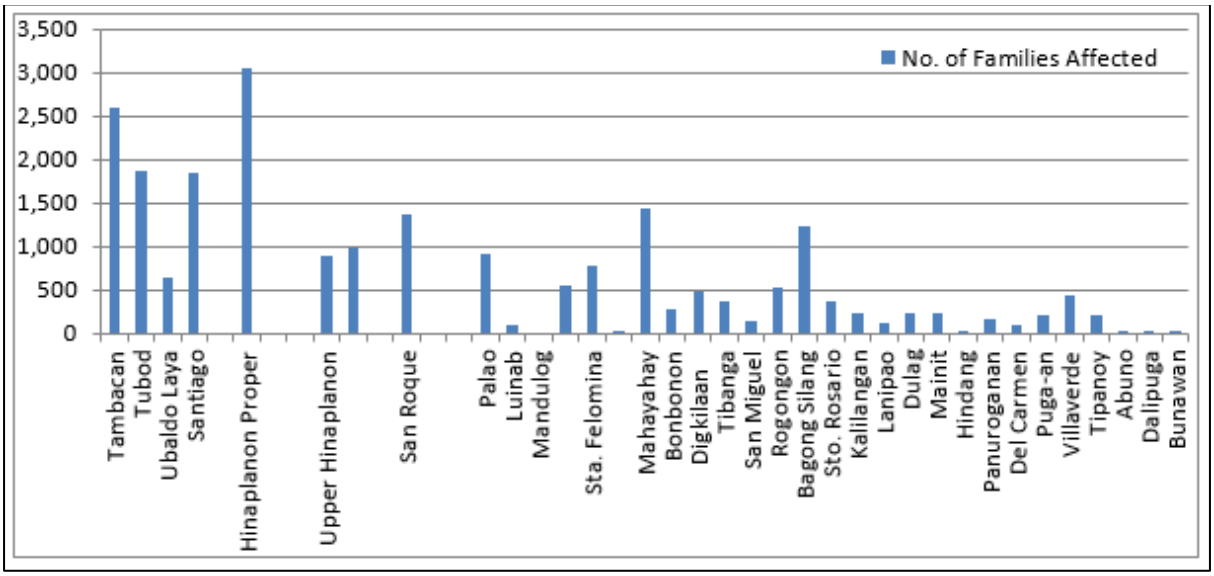


Figure 35. 2011 Sendong Affected Families

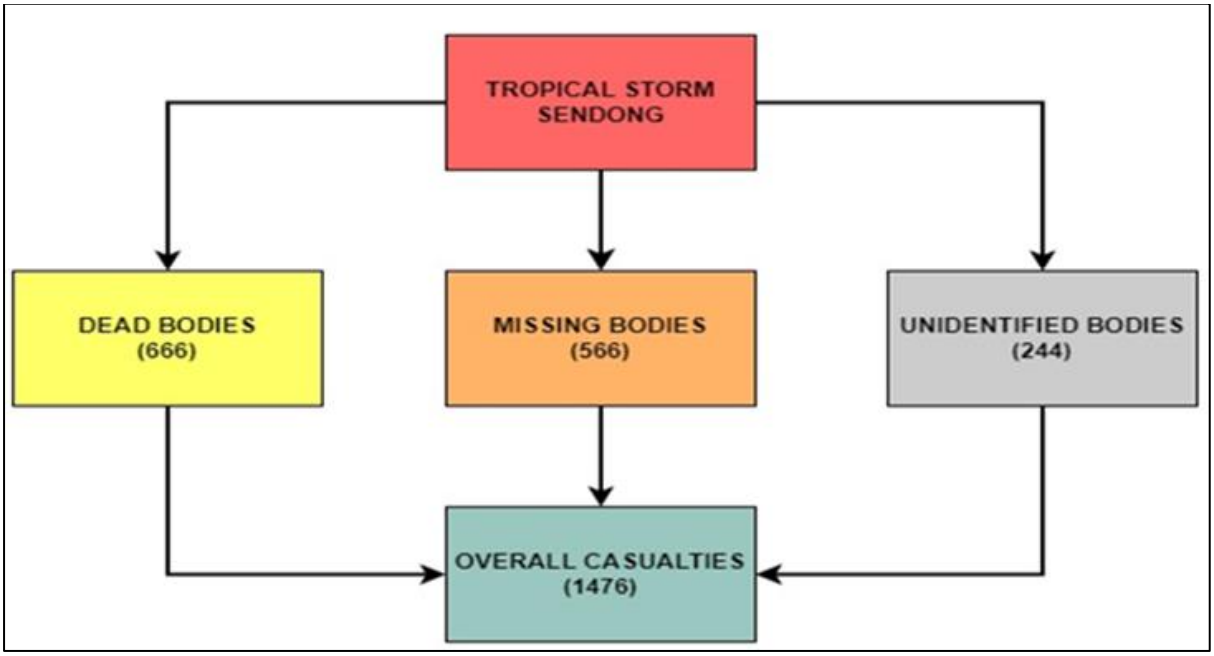


Figure 36. 2011 Sendong Total Casualties

Figure 36 depicts the entire impact of Tropical Storm Sendong on the city. One of the strongest tropical storms ever to hit the city, it severely damaged it. Following the devastation, the severely damaged 32 barangays report a total of 1,476 casualties in Iligan City, including 666 dead bodies, 566 missing bodies, and 244 unidentified dead bodies.

The graphic below illustrates the various catastrophe event kinds and their overall impact on households, people, and property from 2017 to April 2023. Typhoon Vinta in 2019 (affecting 3,294 families, 15,512 individuals, 282 partially damaged, and 24 totally damaged houses) and Typhoon Odette in 2021 (affecting 2,479 families, 14,618 individuals, 13 partially damaged houses, and 8 totally damaged houses) appear to be the most significant disaster event from these periods.

Over the course of these years, the disaster event fire had an impact on 1,245 families, 4,465 individuals, 162 partially damaged houses, and 517 completely damaged houses. To reduce the likelihood of such a catastrophe, it is crucial to follow the fire drills and preventive measures recommended by the city's Bureau of Fire

Protection (BFP). The disruption of the city's peace and order is also a result of armed conflicts, particularly for the 2,428 affected people at Brgy. Rogongon last April 2023.

Heavy rain which results to flood and landslides are two frequent disasters present in Iligan City as well.

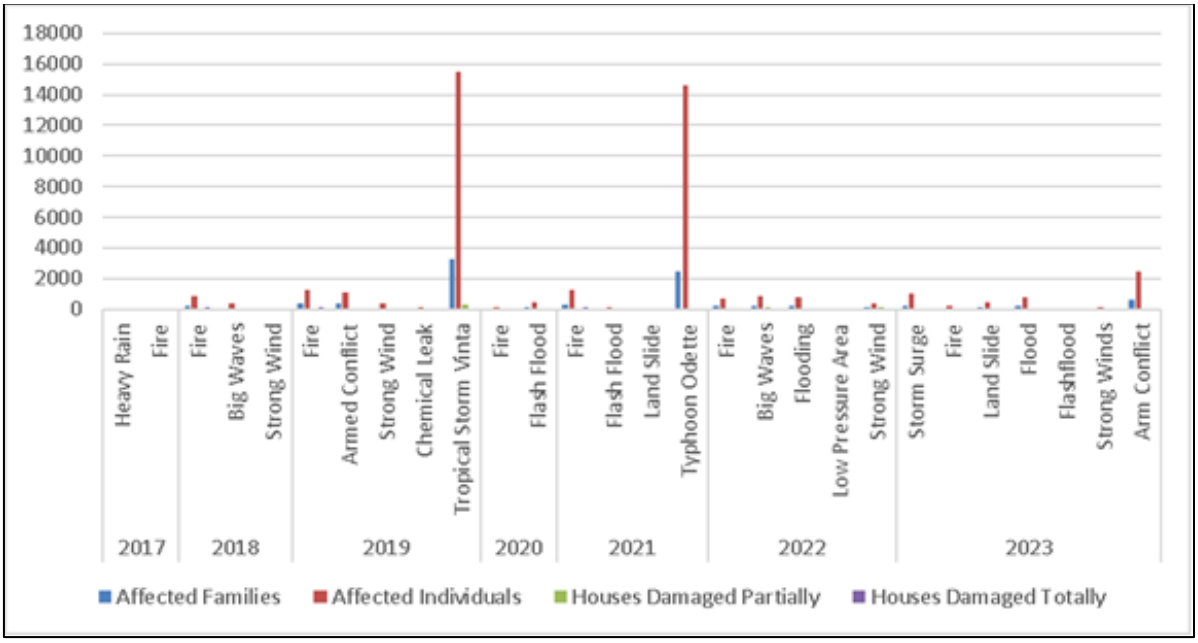


Figure 37. Historical data of hazards and total affected families, individuals, houses, damaged partially, and houses damaged totally

Furthermore, CPDO presented a summary of resolutions addressing drought, specifically highlighting nineteen (19) inland barangays that faced negative consequences during the extended drought in 1992, namely:

1. Rogongon
2. Mainit
3. Digkilaan
4. Bonbonon
5. Dulag
6. Lanipao
7. Bunawan
8. Kabacsanan
9. Upper Dalipuga
10. Upper Kiwalan
11. Upper Sta. Filomena
12. Mandulog
13. Dalamas/ Rurwanga areas
14. Taluntunan
15. Upper Mibolo
16. Mibala
17. Abuno
18. Upper Sta. Elena
19. Upper Tominobo

The aforementioned barangays received approval through the City Mayor's 3rd endorsement dated June 8, 1992, endorsing the City Agriculturist's request for an emergency fund of P190,000.00. This amount was intended for the acquisition of enhanced corn seed varieties, with distribution slated for the farmer beneficiaries within the nineteen (19) barangays, as specified in Resolution No. 292, series of 1992.

In 2016, Iligan City declared a state of calamity due to the impact of the El Niño Phenomenon, following the recommendation of the Iligan City Disaster Risk Reduction and Management Council (ICDRRMC) through Resolution No. 005 S. 2016. However, there was no allocation of funds until the ICDRRMC could submit a validated and accurate report specifying the required amount and providing a comprehensive list of eligible recipients for calamity assistance.

Recipients of the aid provided by the Iligan City Government for those impacted by the El Niño Phenomenon included:

1. Presence of dozens of residents;
2. Portion of the thousands of farmers;
3. Fishermen.

Moreover, the prolonged period of dry weather, known as the Long Dry Spell, has had an impact on 6,103 farmers and 937 fisherfolk. A proposal was made to declare the city in a State of Calamity and allocate P16,042,992.00 from the city's calamity fund, drawn from the 30% quick response allocation.

On June 2, 2016, Barangay Maria Cristina's Barangay Captain, Jesse Ray N. Balanay, forwarded Resolution No. 06405, series of 2016, to the Sangguniang Panlungsod of Iligan. The resolution requested the declaration of a State of Calamity due to extensive damages caused by the El Niño Phenomenon. This resolution has been endorsed to the City Agriculturist's Office for appropriate action regarding allocation.

3.4 Hazard Inventory

The hazard inventory matrix below shows the hazards present in each barangay of Santa Fe which includes flood, rain-induced landslide, storm surge, tsunami, and sea level rise.

SUMMARY BARANGAY LEVEL HAZARD INVENTORY INDEX						
BARANGAY	FLOOD	EARTHQUAKE LANDSLIDE (EIL)		RAIN INDUCED LANDSLIDE (RIL)	STORM SURGE	SEA LEVEL RISE
		DRY	WET			
Abuno	High	Low	Medium	High		
Acmac	High	Normal	Low	Medium	Affected	Affected
Bagong Silang	Very High	Normal	Normal	Normal		
Bonbonon	Very High	Low	Low	High		
Bunawan	High	Normal	Low	Medium		
Buru-un	High	Normal	Low	Low	Affected	Affected
Dalipuga	High	Normal	Low	Medium	Affected	Affected
Del Carmen	High	Normal	Medium	Low		
Digkilaan	High	Low	Low	High		
Ditucalan	High	Normal	Low	High	Affected	Normal
Dulag	High	Low	Low	Medium	Normal	Normal
Hinaplanon	Very High	Normal	Normal	Low	Affected	Affected
Hindang	High	Normal	Low	Medium	Normal	Normal
Kabacsanan	High	Normal	Low	High	Normal	Normal
Kalilangan	High	Low	Medium	High	Normal	Normal
Kiwalan	High	Normal	Low	Medium	Affected	Affected

SUMMARY BARANGAY LEVEL HAZARD INVENTORY INDEX						
BARANGAY	FLOOD	EARTHQUAKE LANDSLIDE (EIL)		RAIN INDUCED LANDSLIDE (RIL)	STORM SURGE	SEA LEVEL RISE
		DRY	WET			
Lanipao	High	Low	Low	Medium	Normal	Normal
Luinab	Very High	Low	Medium	Low	Normal	Normal
Mahayahay	Very High	Low	Normal	Normal	Affected	Normal
Mainit	High	Normal	Low	Medium	Normal	Normal
Mandulog	Very High	Low	Medium	Medium	Normal	Normal
Maria Cristina	High	Normal	Low	Low	Affected	Affected
Palao	High	Normal	Medium	Low	Affected	Normal
Panoroganan	High	Low	Low	Medium	Normal	Normal
Poblacion	Very High	Normal	Normal	Normal	Affected	Affected
Puga-an	Medium	Normal	Medium	High	Normal	Normal
Rogongon	High	Low	Low	Normal	Normal	Normal
San Miguel	Very High	Normal	Normal	Normal	Affected	Normal
San Roque	Very High	Normal	Low	Medium	Affected	Normal
Sta. Elena	Very High	Normal	Medium	High	Normal	Normal
Sta. Filomena	Very High	Normal	Low	Medium	Affected	Normal
Santiago	High	Normal	Normal	Low	Affected	Affected
Sto. Rosario	Very High	Normal	Normal	Normal	Normal	Normal
Saray	Very High	Normal	Normal	Normal	Affected	Affected
Suarez	High	Normal	Low	Normal	Affected	Normal
Tambacan	High	Normal	Normal	Low	Affected	Affected
Tibanga	Very High	Normal	Normal	Low	Affected	Affected
Tipanoy	High	Low	Medium	High	Normal	Normal

SUMMARY BARANGAY LEVEL HAZARD INVENTORY INDEX						
BARANGAY	FLOOD	EARTHQUAKE LANDSLIDE (EIL)		RAIN INDUCED LANDSLIDE (RIL)	STORM SURGE	SEA LEVEL RISE
		DRY	WET			
Tomas L. Cabili	High	Normal	Medium	Low	Affected	Affected
Tubod	Medium	Low	Medium	Low	Affected	Affected
Ubaldo Laya	Very High	Low	Medium	High	Affected	Normal
Upper Hinaplanon	Very High	Normal	Medium	Low	Affected	Normal
Upper Tominobo	High	Normal	Low	High	Normal	Normal
Villa Verde	Medium	Normal	Normal	Low	Affected	Normal

Source: CDRA, Iligan City

Color Legend (Flood, EIL, and RIL)

VERY HIGH
HIGH
MEDIUM
LOW
NORMAL

Color Legend (Storm Surge and Sea Level Rise)

AFFECTED
NORMAL

3.5 Exposure Database

To assess how vulnerable different sectors are to various climate-related dangers, it's important to evaluate which specific aspects within each sector are exposed to these hazards. This includes understanding the sensitivities or vulnerabilities of the exposed elements and determining their ability to adapt to the climate-related challenges they may encounter.

This assessment centers on specific sectors: social, economic, infrastructure, environment and institutional. This exposure database provides the baseline information about how these sectors are affected by recognized hazards in the city, which also pose threats linked to climate change. The data on sector exposure comes from the Climate and Disaster Risk Assessment (CDRA).

3.5.1 Attribute Information on Exposure, Sensitivity, and Adaptive Capacity of Various Units per Sector

This portion conducts a thorough analysis of the key factors at risk from the existing hazards in Iligan City. The discussion will extensively explore these factors, organized by sector, considering both climate-related and non-climate-related hazard factors. Each element exposed to risk will undergo a comprehensive evaluation, taking into consideration its vulnerability, sensitivity, and ability to adapt when facing disasters. It's important to highlight that the information in this section stems from the comprehensive Climate and Disaster Risk Assessment (CDRA) workshop, providing a unified viewpoint on the city's ability to withstand and prepare for a variety of hazards.

3.5.1.1 Social Sector

Human health is one of the most vital sectors that will be severely affected by climate change. Incremental increases in temperature and rainfall could trigger a number of adverse impacts such as the outbreak

and spread of water-borne and air-borne diseases leading to high incidence of morbidity and mortality.

As to the impact of climate change like flood, Barangays Bagong Silang, Bonbonon, Hinaplanon, Mahayahay, Mandulog, San Roque, Santiago and Upper Hinaplanon are at high risk to flooding. A frequent occurrence of flood in these barangays may result to significant damage in the social infrastructure located in the area such as day care centers, barangay health stations, school facilities, etc. Fatality or loss of life due to the occurrence of a flood hazard event will also be very imminent in these barangays especially young children, elderly, persons with disabilities, among others.

Risk to storm surge hazard event is generally low for the twelve coastal barangays identified within the city. This means that an occasional storm surge event will result to minimal damage to the existing social infrastructure and to people living in these barangays

In terms of exposure, sensitivity, and adaptive capacity of human, property and critical facilities to flood: Eight (8) barangays are identified at high risk. These include the barangays of Bagong Silang. Bonbonon, Hinaplanon, Mahayahay, Mandulog, San Roque, Santiago, and Upper Hinaplanon. The rest of the barangays (36 brgys) of Iligan City are considered medium risk to flooding.

Risk to landslide is moderate in almost all barangays in the city. Mitigating and/or adaptations measures must be implemented against the occurrence of landslide since frequent landslide that results to moderate damage/impact, when left without intervention, will be costly in the long term. (source: Disaster Risk Assessment Report-Iligan City)

Table 19. Social Sector Climatic Exposure Database

CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
Intense Heat	Vulnerable groups (co-morbid, Pregnant & lactating women, obese, children, elderly PWD, Ips)	**Sensitivity to Exposed Elements (humans/flora and fauna):** Illness, weak/low immune system, vulnerable health status, degenerative health, sensory impairments, lack adaptability. **Adaptive Capacity of Exposed Elements:** **Immediate Influence on Exposed Elements:** The worsening of an illness makes an individual more susceptible to other diseases or health implications.
Flooding	Residents of 44 barangays spanning all age groups	**Sensitivity to Exposed Elements (humans/flora and fauna):** Unaware of pre-emptive evacuation procedures. Consequently, they may be evacuating to undesignated evacuation sites where they will be vulnerable to diseases and are lacking basic commodities. In such situations, it's crucial to establish clear and effective communication channels to inform residents about evacuation plans, designated safe locations, and to ensure they have access to necessary supplies and medical care during evacuations. **Adaptive Capacity of Exposed Elements:** Awareness through IEC is essential for preventing and controlling diseases related to environmental sanitation and the construction of proper drainage. It's important to encourage early consultations with health centers when feeling unwell and to request necessary medicines. Additionally, ensuring access to basic commodities such as food, water, clothes, blankets, and health services at evacuation sites is crucial. **Immediate Influence on Exposed Elements:** Individuals who have contracted the dengue virus, leptospirosis, and other water-borne diseases like HEPA A, C, D, and E, as well as amebiasis, are at risk of experiencing exacerbated health issues. Additionally, those with co-morbid health conditions may see a deterioration in their overall health. IDPs are also vulnerable to worsening health due to the non-conducive living conditions they may be experiencing.

Source: CDRA, Iligan City

Table 20. Social Sector Non-Climatic Exposure Database

NON-CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
Armed Conflict resulted in population	All population affected residing in urban areas in Iligan City including transient individuals	**Sensitivity to Exposed Elements (humans/flora and fauna):** Limited land area with large population which resulted in inefficient education, medical and social services, food insecurity and affect safety and security. **Adaptive Capacity of Exposed Elements:** Urbanization outside urban areas **Immediate Influence on Exposed Elements:** Inefficient education system, medical, and social services, food insecurity and affect safety and security.
Emerging and re-emerging infectious diseases (for example COVID-19 pandemic)	All population affected residing in Iligan City including transient individuals	**Sensitivity to Exposed Elements (humans/flora and fauna):** The absence of vaccination or a decrease in vaccination coverage among the eligible population has led to a decline in herd immunity. This situation is compounded by a lack of awareness and limited access to health programs and activities, making it even more challenging to protect the community from vaccine-preventable diseases. **Adaptive Capacity of Exposed Elements:** Educational status, access to health programs/activities, economic status **Immediate Influence on Exposed Elements:** Widespread infection of infectious diseases at community level.

Source: CDRA, Iligan City

3.5.1.2 Economic Sector

Barangay Hinaplanon has consistently been assessed to be at high risk to flooding event for all sub-sectors. Agriculture, forestry and fisheries is widely at risk to flooding with almost all barangays assessed to be at varying risk of low, moderate and high. Frequent flooding in Barangay Digkilaan and Hinaplanon will be marked by significant damage in terms of value of crops, fishing paraphernalia, fish pond and severe disruption of economic activities

Similarly, commercial and trading activities are particularly at high risk to flooding for the barangays of Hinaplanon, Mahayahay, Poblacion, San Miguel, Santiago and Sto. Rosario. Many small and medium enterprises located in these barangays will be adversely affected by the flood.

Flooding will also have severe impact on tourism firms and other tourism-related activities in Barangays Hinaplanon and San Miguel.

Table 21. Economic Sector Climatic Exposure Database

CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
Heavy Rainfall	Market, businesses, stalls, housing, and subdivisions & Agricultural Industries	**Sensitivity to Exposed Elements (humans/flora and fauna):** The roads suffered from inadequate development due to poor planning and insufficient drainage system. Also, for agricultural industries, there is no storage facility for crops, limited flood mitigation, and no agricultural insurance. **Adaptive Capacity of Exposed Elements:** There are insured establishments, adhering to geohazard risk compliance and zoning ordinances. As for agricultural sector, there is crop insurance and advanced crop technology. **Immediate Influence on Exposed Elements:** There will be damaged market roads and even highways that would delay business operations.
Drought	Water Supply System, Irrigation/Farming, Markets, and Agricultural Production	**Sensitivity to Exposed Elements (humans/flora and fauna):** The absence of water in the upland areas, coupled with a lack of adequate water distribution infrastructure and limited budget for developing water sources. **Adaptive Capacity of Exposed Elements:** Can get water source from springs, and water provision from firetruck. **Immediate Influence on Exposed Elements:** Low livestock production, coupled with reduced agricultural product yields, will lead to high prices for crops.

Source: CDRA, Iligan City

Table 22. Economic Sector Non-Climatic Exposure Database

NON-CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
Illegal Quarrying	Livestock	**Sensitivity to Exposed Elements (humans/flora and fauna):** Limited grazing area and soil quality **Adaptive Capacity of Exposed Elements:** Regulated by CENRO with existing Local Ordinances. **Immediate Influence on Exposed Elements:** The higher incidence of diseases among livestock can lead to low production and, subsequently, reduced income for farmers. Disease outbreaks can cause illness, decreased growth, and even mortality among the animals, negatively impacting both the quantity and quality of livestock products. This, in turn, affects the economic well-being of farmers who rely on the income generated from their livestock. Proper animal health management practices and disease prevention are crucial for sustaining livestock production and the livelihoods of farmers.
	Fish Pen	**Sensitivity to Exposed Elements (humans/flora and fauna):** Limited location for fish pen, limited capacity of farmers to relocate fish pen **Adaptive Capacity of Exposed Elements:** **Immediate Influence on Exposed Elements (and humans):** A higher incidence of diseases among fish can lead to lower fish production, which, in turn, can result in reduced income for fish farmers. Disease outbreaks can have significant economic impacts on aquaculture operations.
Non-Segregation of Garbage	Tourist, Industry	**Sensitivity to Exposed Elements (humans/flora and fauna):** Proximity to sanitary landfill and construction of sanitary landfill not fully operational (leachate treatment plant) **Adaptive Capacity of Exposed Elements:** Regulated by CENRO, having an existing local ordinance for segregation, central facilities **Immediate Influence on Exposed Elements:**

NON-CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
		A decrease in the water quality of tourist spots can result in a lower number of tourists visiting the area. Poor water quality can deter tourists and harm the reputation of the destination, leading to economic losses in the local tourism industry. Maintaining water quality is essential for the sustainability of tourist spots.
Emerging, Reemerging and transboundering animal disease	Tourist Spots	**Sensitivity to Exposed Elements (humans/flora and fauna):** Limited support to the management and development of the tourist spot (not managed by the city government). **Adaptive Capacity of Exposed Elements:** Regulated by CENRO **Immediate Influence on Exposed Elements:** A lower number of tourists visiting a tourist spot can limit the city's capacity to develop and manage the area, as it may reduce the revenue generated for improvements and maintenance. Additionally, a decrease in tourists can have economic impacts on local businesses and the community as a whole. Furthermore, a decrease in the number of tourists can also affect the spread of diseases in the area, as tourists may be exposed to diseases more easily in less crowded environments. Maintaining a balance between tourism and public health is crucial.

Source: CDRA, Iligan City

3.5.1.3 Infrastructure Sector

Barangays Bonbonon, Digkilaan, Hinaplanon, and Mandulog are at high risk to flooding hazard event. This means that an occurrence of a frequent flood event will result to substantive structural damage to lifelines in the city that includes roads and bridges, communication, water supply and power facilities. However, it must be noted that although Barangay Lanipao, Pugaan, Rogongon, Santiago, Ubaldo Laya and Upper Hinaplanon only have moderate risk to flooding, interruption of lifelines is at high risk which indicates that moderate impact to lifelines located in these barangays can result to severe disruption in the provision of critical services to these areas.

A total of 22 barangays are determined to be at moderate risk to landslide hazard event with corresponding moderate interruption to lifelines, Although, adverse impact to lifeline is moderate, appropriate solutions to this risk must be implemented since damages and negative impact for a frequent landslide hazard event will be costly in the long term.

Also, in areas where rainfall is projected to decrease, there will be water stress (both in quantity and quality), which in turn, will most likely cascade into more adverse impacts, particularly on forestry, agriculture and livelihood, health, and human settlement. Large decreases in rainfall and longer drier periods will affect the amount of water in watersheds and dams which provide irrigation services to farmers, especially those in rain fed areas, thereby, limiting agricultural production. Likewise, energy production from dams could also be rendered insufficient in those areas where rainfall is projected to decrease, and thus, could largely affect the energy sufficiency program of the country. Design of infrastructure, particularly of dams, will need to be re-visited to ensure

that these will not be severely affected by the projected longer drier periods. (source: PAGASA-DOST)

There are eight (8) coastal barangays that are at risk to storm surge hazard event. The risk is high for Barangay Santiago, Tambacan and Saray. The rest of the barangays are at moderate risk to storm surge hazard event.

On the other hand, the assumption of a 1-meter sea level rise will affect the existing national road that traverses along the coastal areas of Iligan City. Livelihood and other economic undertakings will be disrupted if sea level increase. With this, realignment of roads will be taken into consideration so as not to hamper social and economic activities

Table 23. Infrastructure Sector Climatic Exposure Database

CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
Flooding (Surface Overflow)	Low Rise Buildings, Roads, Bridges, Drainages, Flood Controls	**Sensitivity to Exposed Elements (humans/flora and fauna):** Substandard/Inappropriate materials, poor planning, and design (no. of storey), poor infrastructure maintenance, constructed using light materials, year of construction (some buildings are built beyond operating life) **Adaptive Capacity of Exposed Elements:** Strict implementation of no-build zones, efficient IEC thru socmed, availability of Early Warning System, availability of high-quality construction materials **Immediate Influence on Exposed Elements:** Slowdown of transportation due to road blockage, hampered the delivery of goods and services, slow down emergency responses
Rain-Induced Landslide	Roads, Residential Buildings, Drainages	**Sensitivity to Exposed Elements (humans/flora and fauna):** Lack/insufficient slope protection, poor drainage system **Adaptive Capacity of Exposed Elements:** Strict implementation of no-build zones, constant monitoring of road networks and drainages **Immediate Influence on Exposed Elements:** Slow down of transportation due to road blockage, hampered the delivery of goods and services, slow down emergency responses, clogging of drainages

Source: CDRA, Iligan City

Table 24. Infrastructure Sector Non-Climatic Exposure Database

NON-CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
EARTHQUAKE Ground Shaking	High Rise Buildings, Roads, Bridges, Drainages, Flood Controls	**Sensitivity to Exposed Elements (humans/flora and fauna):** Poor planning and design for high-magnitude earthquake **Adaptive Capacity of Exposed Elements:** Regular monitoring of structural integrity, access to latest building standards **Immediate Influence on Exposed Elements:** Slowdown of transportation due to road blockage, hampered the delivery of goods and services, slow down emergency responses
Industrial Hazard	Boilers, Buildings, Utilities, Kilns	**Sensitivity to Exposed Elements (humans/flora and fauna):** Poor safety protocols and standards, unsafe practices and conditions, delayed safety validation **Adaptive Capacity of Exposed Elements:** Compliant to DOLE standard and safety, required employees to take BOSH/COSH/LCM, monitoring of safety manhours **Immediate Influence on Exposed Elements:** Hampered operation, water power and communication interruption
Arm Conflict	Utilities, Buildings, Bridges	**Sensitivity to Exposed Elements (humans/flora and fauna):** Lack of security **Adaptive Capacity of Exposed Elements:** Trained personnel/bomb squads and K9 units, trained responders, in placed fire suppression system **Immediate Influence on Exposed Elements:** Hampered the delivery of goods and services, slow down emergency responses, water power and communication interruption.

3.5.1.4 Environmental Sector

Changes in rainfall patterns resulting to increase/decrease in water use and temperature increases could lead to a change in the forests ecosystem, particularly in areas where rain is limited, and can no longer provide favourable conditions for certain highly sensitive species. The occurrence of El Niño may trigger forest fire which could be a threat to communities that economically depend on forest resources. Upland communities including the IPs have to plan for climate-resilient alternative livelihood and this must be sustained to prevent further forest/land degradation.

The combined effects of continued temperature increases, changes in rainfall patterns, increases in sea level rise, and storm surges occurrences would expose coastal communities to high risks. Food security is threatened as well their houses and lifelines. Adaptation measures shall be in place (physical structures such as sea walls that are cost effective) including strict implementation of the zoning ordinance, installation of early warning systems that can be used during severe weather events, and identification/development of sustainable livelihood.

Table 25. Environmental Sector Climatic Exposure Database

CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
Heavy rainfall	Forest Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** The forest's vulnerability, along with its rich flora and fauna, is defined by the presence of very steep slopes and the precarious nature of loose and weathered rocks and soil. **Adaptive Capacity of Exposed Elements:** The tropical rainforest's resilience is owed to its multi-layered structure, soil macropores created by burrowing creatures, abundant organic matter from substantial litter fall, and an extensive root system. **Immediate Influence on Exposed Elements:** Deforestation, irresponsible mining, land conversion, armed conflict, unregulated wildlife hunting, and unsustainable slash-and-burn practices have an immediate and detrimental impact on both the forest ecosystem and human communities.
	Coastal Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** Low salinity levels can greatly affect the sensitivity of certain aquatic species, impede the photosynthetic production of coastal plants, and increase the vulnerability of young mangrove seedlings to dislodgment by wave action. **Adaptive Capacity of Exposed Elements:** Mangroves provide a crucial filtering effect, defend against coastal flooding, and stabilize sediments, serving as a vital natural barrier along the shoreline. **Immediate Influence on Exposed Elements (and humans):** Overharvesting for ruminant feeding and fuelwood, displacement due to coastal infrastructure development, waste dumping, dynamite and cyanide fishing, and coral destruction for the aquarium trade.
	Marine Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** Low salinity levels, leading to reduced photosynthetic production in phytoplankton, can affect the delicate balance of aquatic ecosystems. **Adaptive Capacity of Exposed Elements:** Wave action serves to uniformly distribute salt throughout the entire sea profile.

		Immediate Influence on Exposed Elements (and humans): The intrusion of foreign and local fishing vessels equipped with advanced fishing technology leads to the overharvesting of fish resources.
Drought	Forest Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** Tropical rainforests necessitate consistently distributed, moderate rainfall, substantial water for transpiration, combustible forest litterfall, open stomates for gas exchange during water vapor uptake, and predominantly non-deciduous trees. **Adaptive Capacity of Exposed Elements:** Multi-story structures and heavy forest litter decrease evapotranspiration, while rich soil organic matter retains soil moisture, burrowing animals can move to lower ground to cool themselves, and they can partially close their stomata during water stress. **Immediate Influence on Exposed Elements:** Deforestation, irresponsible mining, land conversion, armed conflict, and unsustainable slash-and-burn practices have an immediate and detrimental impact on both the forest ecosystem and human communities.
	Coastal Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** The biotic communities in coastal ecosystems rely on a delicate balance between salt and freshwater, as excessive salinity can disrupt their physiological processes, impacting productivity and survival, while also necessitating specific temperature conditions for their optimal functioning. **Adaptive Capacity of Exposed Elements:** Biotic communities have higher water retention In the soils, and can close their stomates during water stress up to certain levels. **Immediate Influence on Exposed Elements:** Coastal ecosystem biotic communities depend on a delicate equilibrium between salt and freshwater to sustain their physiological functioning, with excessive salinity affecting productivity and life, while also necessitating specific temperature conditions for optimal functionality.
	Marine Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):**

		Marine ecosystem biotic communities require a delicate balance between salt and freshwater; and requires a certain temperature for optimal functioning of biotic communities of the marine ecosystem. **Adaptive Capacity of Exposed Elements:** Wave action to bring colder and oxygen rich water from the deep layers to replace warmer and oxygen depleted waters on the deeper layer. **Immediate Influence on Exposed Elements:** The intrusion of foreign and local fishing vessels equipped with advanced fishing technology leads to the overharvesting of fish resources.
Earthquake	Forest Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** Has karst landscape, steep slopes, and highly weathered loose rocks. **Adaptive Capacity of Exposed Elements:** Extensive root system holds the soil and rocks from erosion and landslide. **Immediate Influence on Exposed Elements:** Deforestation, irresponsible mining, armed conflict, and unsustainable slash-and-burn practices have an immediate and detrimental impact on both the forest ecosystem and human communities.
	Coastal Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** There is a highly liquefaction area and karst landscapes. **Adaptive Capacity of Exposed Elements:** Mangrove trees have extensive root system that helps them stabilize from the ground/earth shaking. **Immediate Influence on Exposed Elements:** Overharvesting for ruminant feeding and fuelwood, displacement due to coastal infrastructure development, waste dumping, dynamite and cyanide fishing, and coral destruction for the aquarium trade.
	Marine Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):**

		Adaptive Capacity of Exposed Elements: **Immediate Influence on Exposed Elements:** The intrusion of foreign and local fishing vessels equipped with advanced fishing technology leads to the overharvesting of fish resources.

Source: CDRA, Iligan City

Table 26. Environmental Sector Non-Climatic Exposure Database

NON-CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
Deforestation	Forest Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** The forest's vulnerability, along with its rich flora and fauna, is defined by the presence of very steep slopes and the precarious nature of loose and weathered rocks and soil. **Adaptive Capacity of Exposed Elements:** The tropical rainforest's resilience is owed to its multi-layered structure, soil macropores created by burrowing creatures, abundant organic matter from substantial litter fall, and an extensive root system. **Immediate Influence on Exposed Elements:** Conventional farming, pasture grazing and tree plantation
	Coastal Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** Mangrove seedlings in the early stages of planting can easily be dislodged by wave action. Additionally, naturally occurring faunal species in mangrove areas are sensitive to habitat changes, such as mangrove tree removal, which can result in a decrease in their population. Moreover, corals are highly sensitive to increases in water temperature. **Adaptive Capacity of Exposed Elements:**

		Mangroves provide a crucial filtering effect, defend against coastal flooding, and stabilize sediments, serving as a vital natural barrier along the shoreline. **Immediate Influence on Exposed Elements (and humans):** Land conversion such as establishment of coastal roads;
Uncontrollable Waste Disposal	Forest Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** Inability to biodegrade plastic waste. **Adaptive Capacity of Exposed Elements:** Rich in microorganisms that degrade biodegradable waste, it can serve as a source of food for forest fauna. **Immediate Influence on Exposed Elements:** Forest seedlings covered with macro plastics may lead to the entry of microplastics into the food web chain.
	Coastal Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** Inability to biodegrade plastic waste. **Adaptive Capacity of Exposed Elements:** Rich in microorganisms that degrade biodegradable waste, it can serve as a source of food for coastal fauna. **Immediate Influence on Exposed Elements:** The conversion of a coastal area into a sanitary landfill has resulted in the deposition of plastic waste, which in turn has led to seagrasses and corals becoming covered with macro plastics. As a consequence, microplastics have entered the coastal food chain.

	Marine Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** Inability to biodegrade plastic waste. **Adaptive Capacity of Exposed Elements:** Biodegradable waste can be a source of food to marine fauna. **Immediate Influence on Exposed Elements:** High solar exposure can lead to photodegradation, which in turn results in the generation of microplastics.
Earthquake	Forest Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** The area possesses a karst landscape characterized by steep slopes and highly weathered loose rocks. **Adaptive Capacity of Exposed Elements:** Extensive root system helps holds the soil and rocks from erosion and landslide. **Immediate Influence on Exposed Elements:** Deforestation, irresponsible mining, armed conflict, and unsustainable slash-and-burn practices have an immediate and detrimental impact on both the forest ecosystem and human communities.
	Coastal Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** There is a highly liquefaction area and karst landscapes. **Adaptive Capacity of Exposed Elements:** Mangrove trees have extensive root system that helps them stabilize from the ground/earth shaking. **Immediate Influence on Exposed Elements:** Overharvesting for ruminant feeding and fuelwood, displacement due to coastal infrastructure development, waste dumping, dynamite and cyanide fishing, and coral destruction for the aquarium trade.
	Marine Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** None. **Adaptive Capacity of Exposed Elements:** **Immediate Influence on Exposed Elements:**

		The intrusion of foreign and local fishing vessels equipped with advanced fishing technology leads to the overharvesting of fish resources.
Mining	Forest Ecosystem	**Sensitivity to Exposed Elements (humans/flora and fauna):** The forest's vulnerability, along with its rich flora and fauna, is defined by the presence of very steep slopes and the precarious nature of loose and weathered rocks and soil. **Adaptive Capacity of Exposed Elements:** Karst landscape allows infiltrated water to percolate for groundwater replenishment and thereby increases the time for soils to be super saturated with water **Immediate Influence on Exposed Elements:** Altered geomorphology

Source: CDRA, Iligan City

3.5.1.5 Institutional Sector

Impact of heavy rainfall resulting in damages or loss of properties and lives is a significant hazard for institutions. This impact is exacerbated by a lack of knowledge regarding the impact of climate change and disaster risk reduction (DRR) within the institution. The Barangay Local Government Units (BLGUs) may not be fully aware of the importance of Climate Change Action in the context of the DRRM framework, leading to inadequate preparedness and response measures.

Insufficient dissemination of Information, Education, and Communication (IEC) materials further contributes to the problem. Although some IEC materials are provided, they are not enough to cover all barangays due to limited IEC programs. This lack of awareness hinders the community's ability to effectively respond to and mitigate the impacts of heavy rainfall.

The morbidity of floodwaters poses a health risk, as employees and students may become stranded and face potential health problems due to slow action on work and class suspension, often with gaps in protocols. This delay in response further exacerbates the collaterals and damages caused by the heavy rainfall.

Furthermore, an imbalanced allocation of assets for emergency response and inefficient use of resources can be attributed to an outdated incident command system manual or operating manual. This outdated system leads to delays and confusion in emergency response efforts.

The lack of a unified emergency response system also contributes to increased collaterals and damages, as well as delays in

responding to emergencies. Without a coordinated and unified approach, response efforts may be fragmented and less effective. (Source: CDRA, Iligan City)

Table 27. Institutional Sector Climatic Exposure Database

CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
Heavy rainfall	BLGUs, Students, Men and Women, Marginalized Sector, Businesses, Schools, Residentials, Transport Groups	**Sensitivity to Exposed Elements (humans/flora and fauna):** LGUs are facing a range of challenges in disaster preparedness and response. These include a lack of full awareness among BLGUs regarding the impact of CCA and the context of the DRRM Framework, as well as insufficient IEC programs. Furthermore, there are issues related to slow response in making decisions about work and class suspensions, the use of outdated Incident Command System Manuals and Operating Manuals, and a lack of a unified emergency response system. Lastly, the limited capacities of the BDRRM teams in conducting emergency response and preparedness activities pose additional challenges for effective disaster management. **Adaptive Capacity of Exposed Elements:** BLGUs have taken proactive steps by establishing BDRRMCs to enhance local disaster preparedness. While IEC materials have been supplied, there remains a challenge in ensuring their availability across all barangays. Public advisories and declarations from the LCE are effectively disseminated during states of emergency, contributing to community awareness. The development of a standardized emergency response system is in progress, facilitating better coordination from the BDRRMCs at the barangay level to the city-level LGU. There's a collaborative effort towards optimizing the utilization and allocation of DRRM funds to bolster disaster resilience and response capabilities. **Immediate Influence on Exposed Elements:** A lack of knowledge regarding the implications of climate change and disaster risk management has led to various challenges. This includes the predicament of stranded employees during emergencies, which exposes them to potential health issues. Additionally, there have been delays and lapses in responding to emergencies, leading to an inefficient use of resources.

Source: CDRA, Iligan City

Table 28. Institutional Sector Non-Climatic Exposure Database

NON-CLIMATE DRIVERS (HAZARD)	EXPOSED ELEMENTS	EXPOSURE DATABASE
Non-Alignment of Iligan City DRRM Plan and its priority PPAs to the NDRRM Framework	Inefficiency of fund utilization intended for PPAs (CCA-DRRM) of Iligan City	**Sensitivity to Exposed Elements (humans/flora and fauna):** Poor utilization of LDRRM fund **Adaptive Capacity of Exposed Elements:** The existing priority PPAs of the Iligan DRRM Plan are actively discussed during City Development Council meetings, where the DRRM team participates in endorsing these vital initiatives, ensuring that all CCA-DRRM projects are meticulously documented and reflected in the Climate Change Expenditure Tagging (CCET) system for transparency and accountability. **Immediate Influence on Exposed Elements:** The change of administration has brought about a shift in priority projects, with a focus on accommodating the preferences of various stakeholders and addressing sectoral concerns. However, it is important to note that some of the existing projects may not be aligned with the success indicators outlined in the National Disaster Risk Reduction and Management (DRRM) Framework.
Outdated CLUP	Non-responsive PPAs of the City and funding from the National Government	**Sensitivity to Exposed Elements (humans/flora and fauna):** The nonavailability of certain data poses a challenge for the Comprehensive Land Use Plan (CLUP) update. **Adaptive Capacity of Exposed Elements:** The ongoing Comprehensive Land Use Plan (CLUP) updates are being carried out in full compliance with existing ordinances, laws, policies, standards, and rules and regulations. **Immediate Influence on Exposed Elements:** The non-issuance of zoning certification and delays in processing building permit applications are causing significant challenges in the development process.

Source: CDRA, Iligan City

3.5.2 Exposure Hazard Maps

As previously mentioned, every sector in Iligan City faces the risk of diverse hazards, which could lead to disruptions necessitating a recovery period to resume regular activities.

The land utilization in urban areas involves structures utilized by residents and institutions, including educational facilities, businesses, government establishments, places of worship, industrial complexes, hospitals, residential zones, and unspecified structures.

Natural resources, crucial for meeting human needs and desires, consist of soil, ores, timber, and water resources. Iligan City predominantly features a topography of mountains and hills, with only 20% of the land designated as urban. In this evaluation, natural resources are divided into agricultural land and forest land, with agricultural land playing a crucial role in the city's raw material production and forest land covering hinterlands and mountainous areas.

Lifeline utilities encompass vital infrastructure like communication satellites, power stations, water sources, and groundwater reservoirs. Protecting these utilities during disasters is essential to ensure the uninterrupted provision of critical services.

Critical point facilities encompass both public and private institutions that deliver resources, programs, and services essential for preserving lives, protecting property, and safeguarding the environment during emergencies. This category includes hospitals, fire stations, police stations, government offices, transportation systems, public markets, and industrial facilities.

By thoroughly grasping the characteristics and vulnerabilities of these sectors, this evaluation seeks to provide valuable perspectives on strategies for reducing and managing disaster risks in Iligan City. The ultimate goal is to

bolster the community's resilience and enhance its ability to respond adeptly to a range of hazards.

3.5.2.1 Flood Exposure Maps in Iligan City

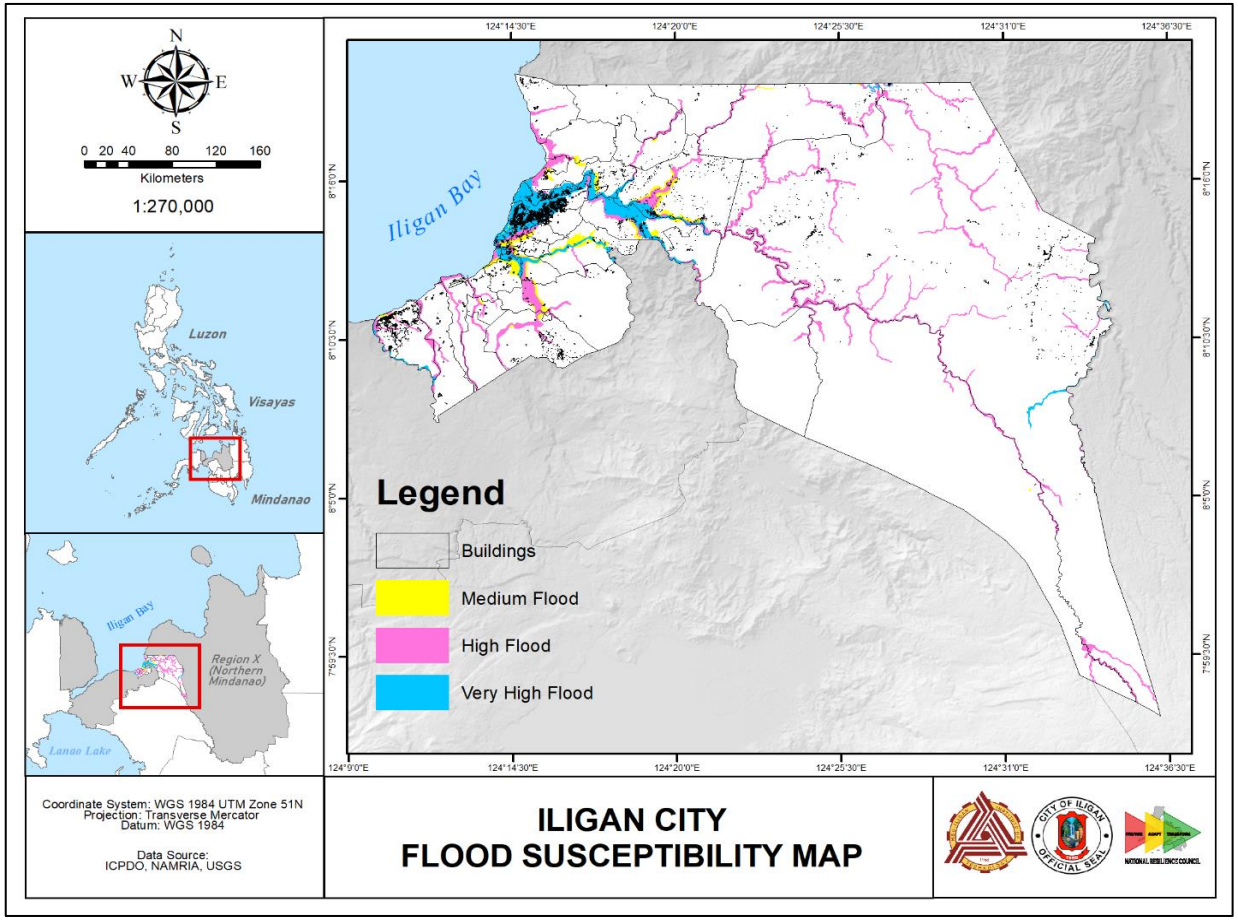


Figure 38. Flood Susceptibility on Urban Use Areas in Iligan City

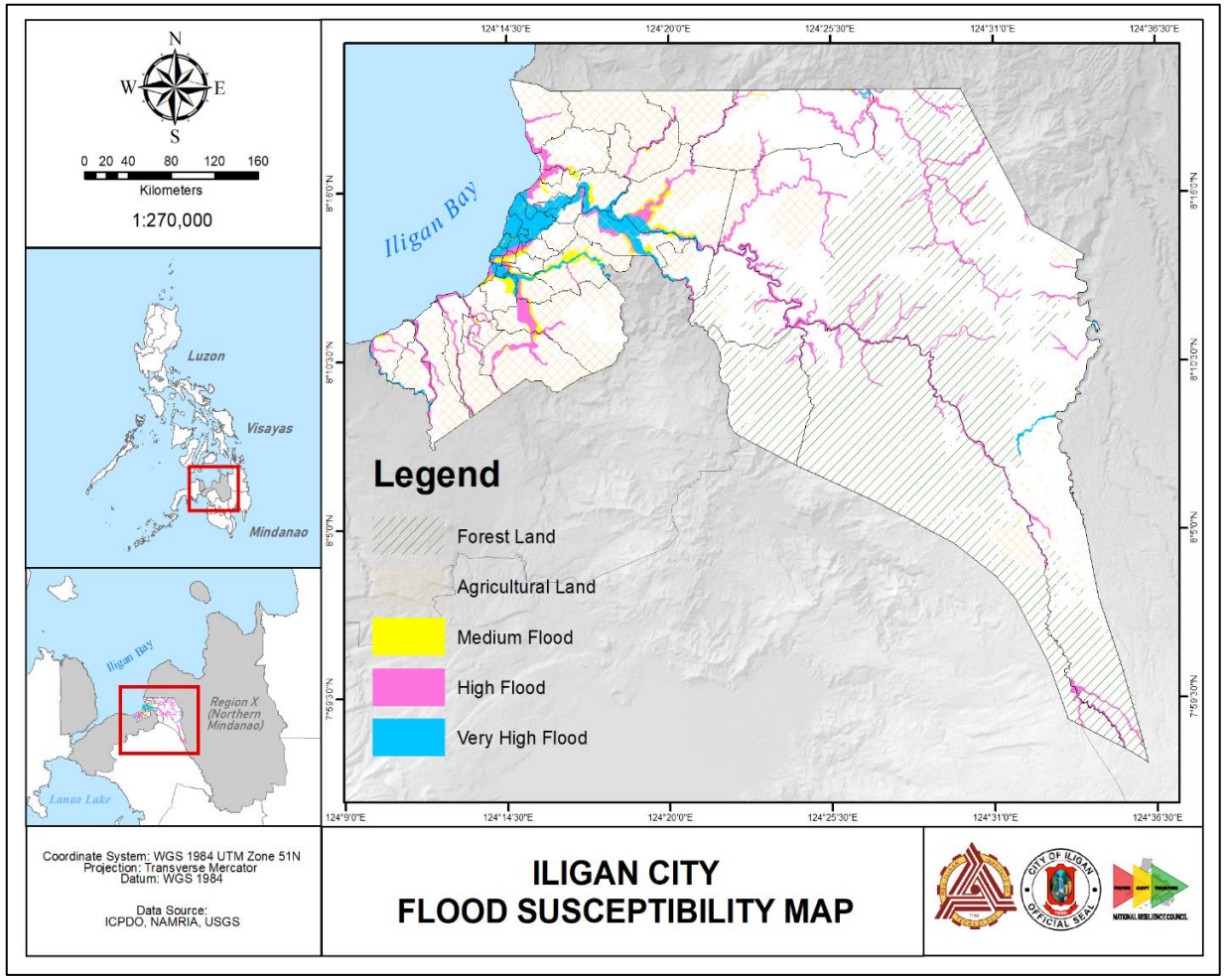


Figure 39. Flood Susceptibility on Natural Resources in Iligan City

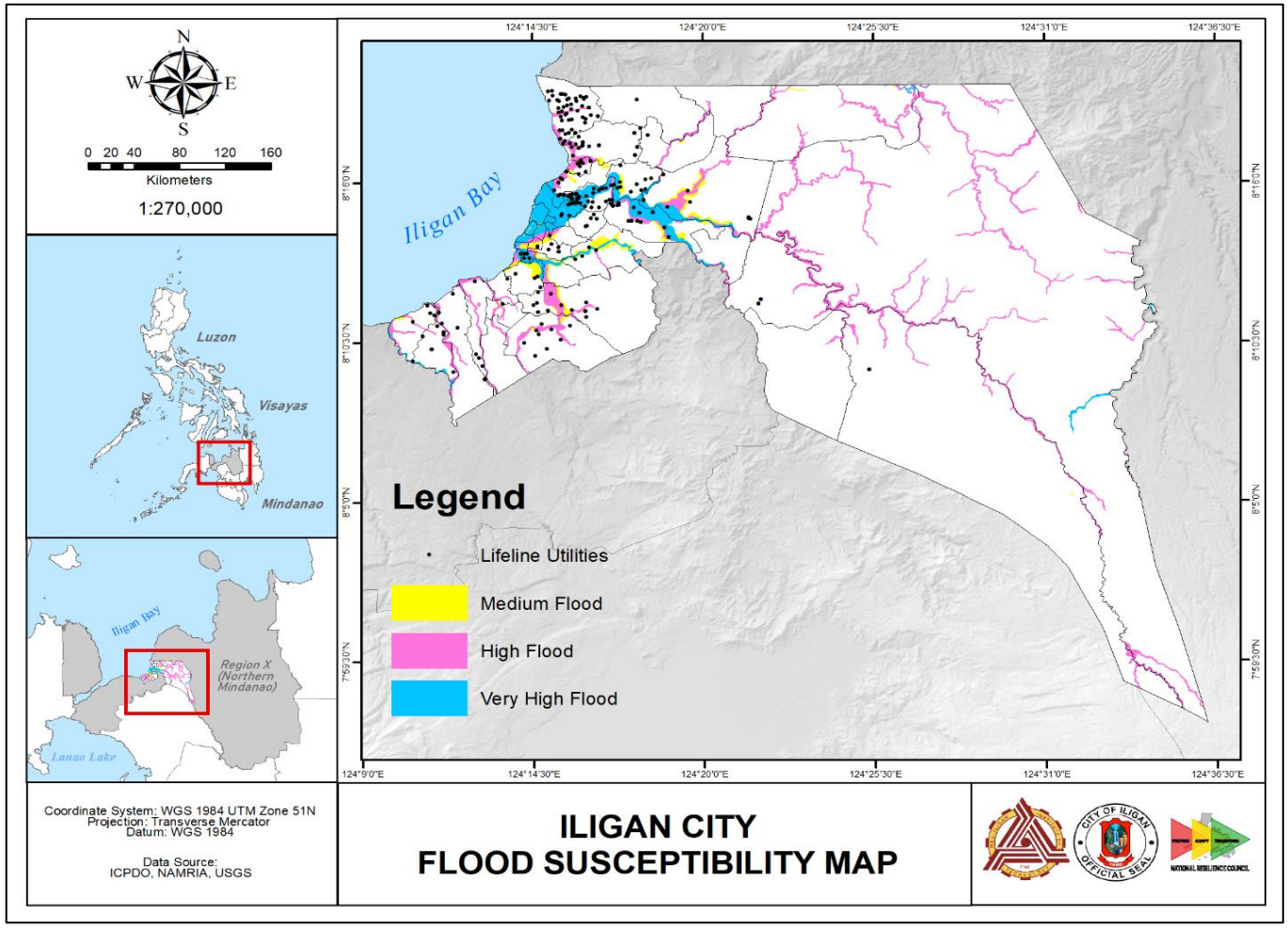


Figure 40. Flood Susceptibility on Lifeline Utilities in Iligan City

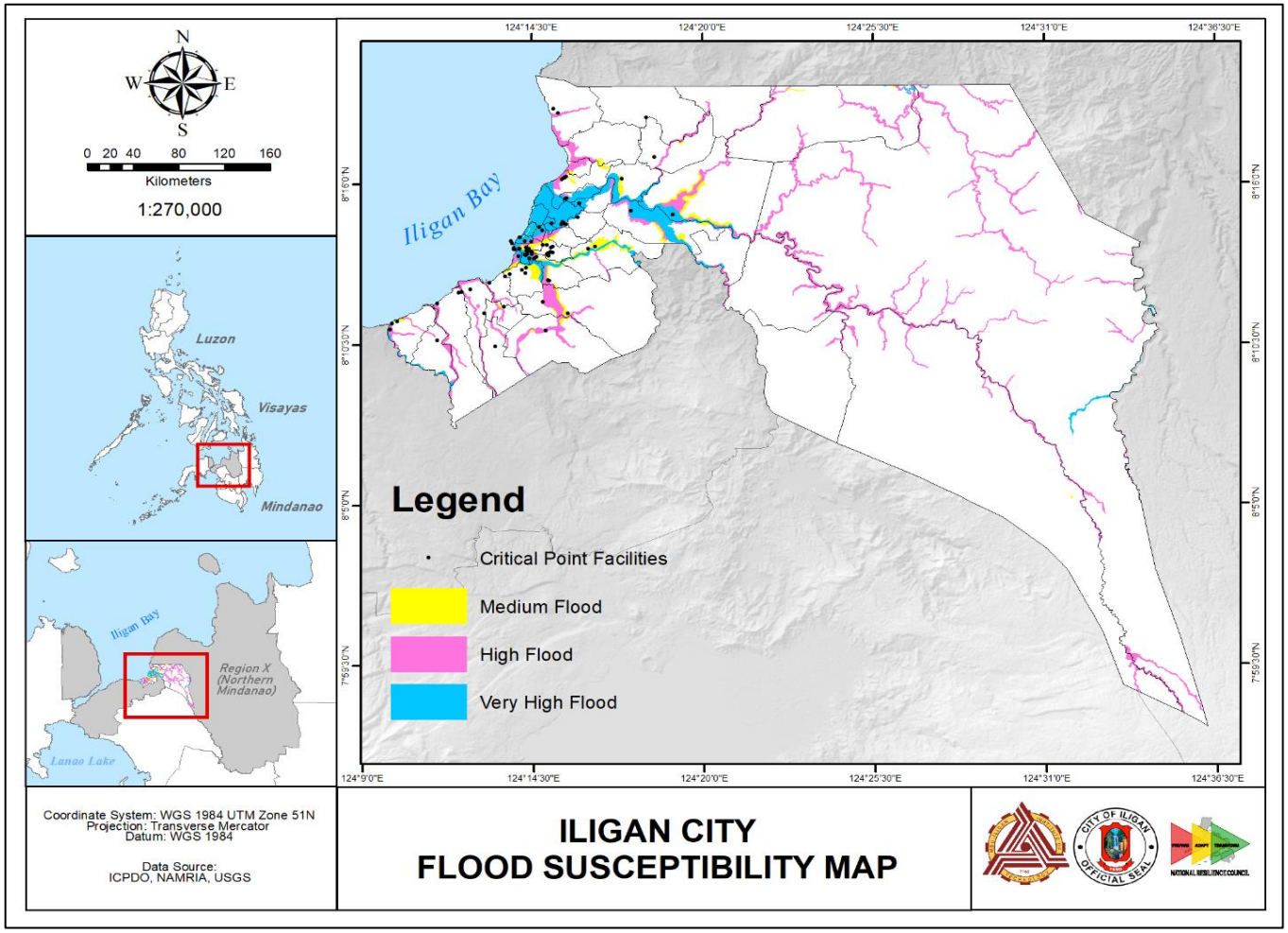


Figure 41. Flood Susceptibility on Critical Point Facilities in Iligan City

Iligan City frequently experiences flooding, a recurring disaster attributed to its proximity to numerous rivers. In times of heavy rainfall and tropical storms, the risk of river overflow increases, leading to significant flooding in neighboring barangays.

A considerable number of barangays in Iligan City face vulnerability to flooding, as depicted in the map above. The severity of flooding in each barangay is indicated through color-coded labels: yellow for medium flood-prone areas, pink for high flood-prone areas, and blue for very high flood-prone areas. Exposure data for buildings, natural resources, lifeline utilities, and critical point facilities are conveniently located in the lower left of each map for easy identification.

Medium flood-prone areas suggest susceptibility to flooding, but the severity is not extreme. The following barangays fall into this category: Kabacsanan, Digkilaan, Bonbonon, Mandulog, Sto. Rosario, San Miguel, Del Carmen, Pala-o, Villaverde, Mahayahay, Ubaldo Laya, Sta. Elena, Sta. Filomena, Santiago, Tibanga, Poblacion, Saray, Tomas Cabili, Buru-un, Tubod, Tamacan, Puga-an, Tipanoy, Abuno, Mainit, Kiwalan, Acmac, Panoroganan, Rogongon, Tipanoy, and Abuno.

High flood-prone areas indicate susceptibility to floods causing moderate damage to infrastructure and other sectors. Barangays falling into this category include Kabacsanan, Digkilaan, Bonbonon, Upper Hinaplanon, San Roque, Mandulog, Bagong Silang, San Miguel, Del Carmen, Lanipao, Palao-o, Villaverde, Mahayahay, Ubaldo Laya, Sta. Elana, Ditucalan, Upper Tominobo, Dulag, Sta. Filomena, Hinaplanon, Poblacion, Saray, Tomas Cabili, Buru-un, Tubod, Tambacan, Puga-an, Dalipuga, Kalilangan, Tipanoy, Abuno, Bunawan, Maria Cristina, Mainit, Kiwalan, Suarez, Panoroganan, Rogongon, and Dulag.

Finally, very high flood-prone areas are those causing major damage to all sectors, potentially impacting the entire city. Barangays prone to very high flooding include Digkilaan, Bonbonon, Upper Hinaplanon, San Roque, Mandulog, Luinab, Sto. Rosario, Bagong Silang, San Miguel, Del Carmen, Lanipao, Pala-o, Mahayahay, Ubaldo Laya, Ditucalan, Sta. Filomena, Hinaplanon, Santiago, Tibanga, Poblacion, Saray, Buru-un, Tubod, Tambacan, Puga-an, Tipanoy, Maria Cristina, Mainit, and Rogongon.

The data is organized according to flood susceptibility levels and specific barangays. Barangay Hinaplanon exhibits the highest susceptibility to floods, closely followed by San Roque and Saray. These three barangays notably rank as the top three in Iligan City, showcasing the highest vulnerability to extremely severe flooding.

3.5.2.2 Landslide Exposure Maps of Iligan City

This section shows the exposed areas affected by landslides in Iligan City. Take note that landslides are classified into two types: (1) earthquake induced landslide (EIL) in both wet and dry seasons, and (2) rain-induced landslides (RIL).

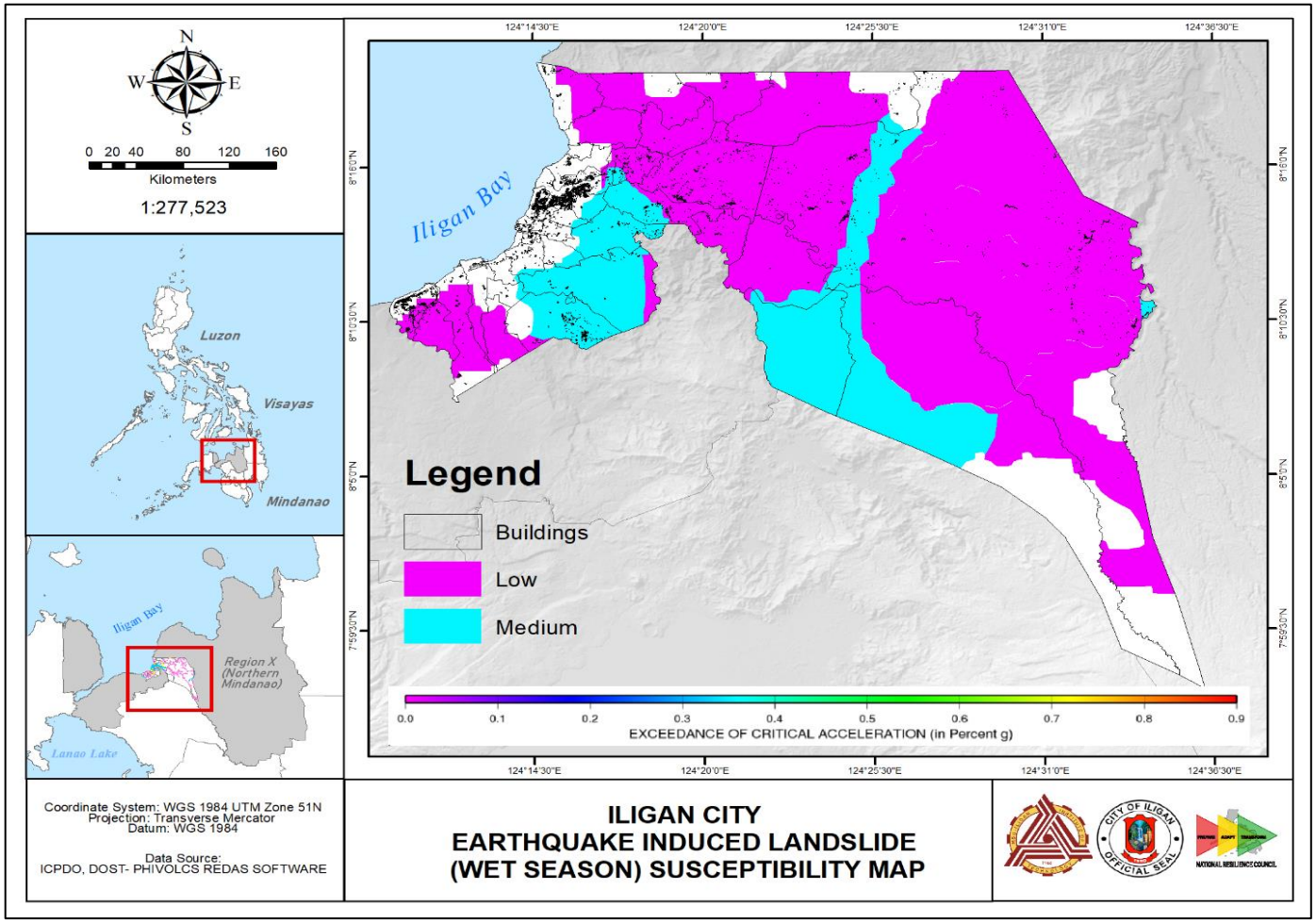


Figure 42. Earthquake Induced Landslide Wet Season Susceptibility

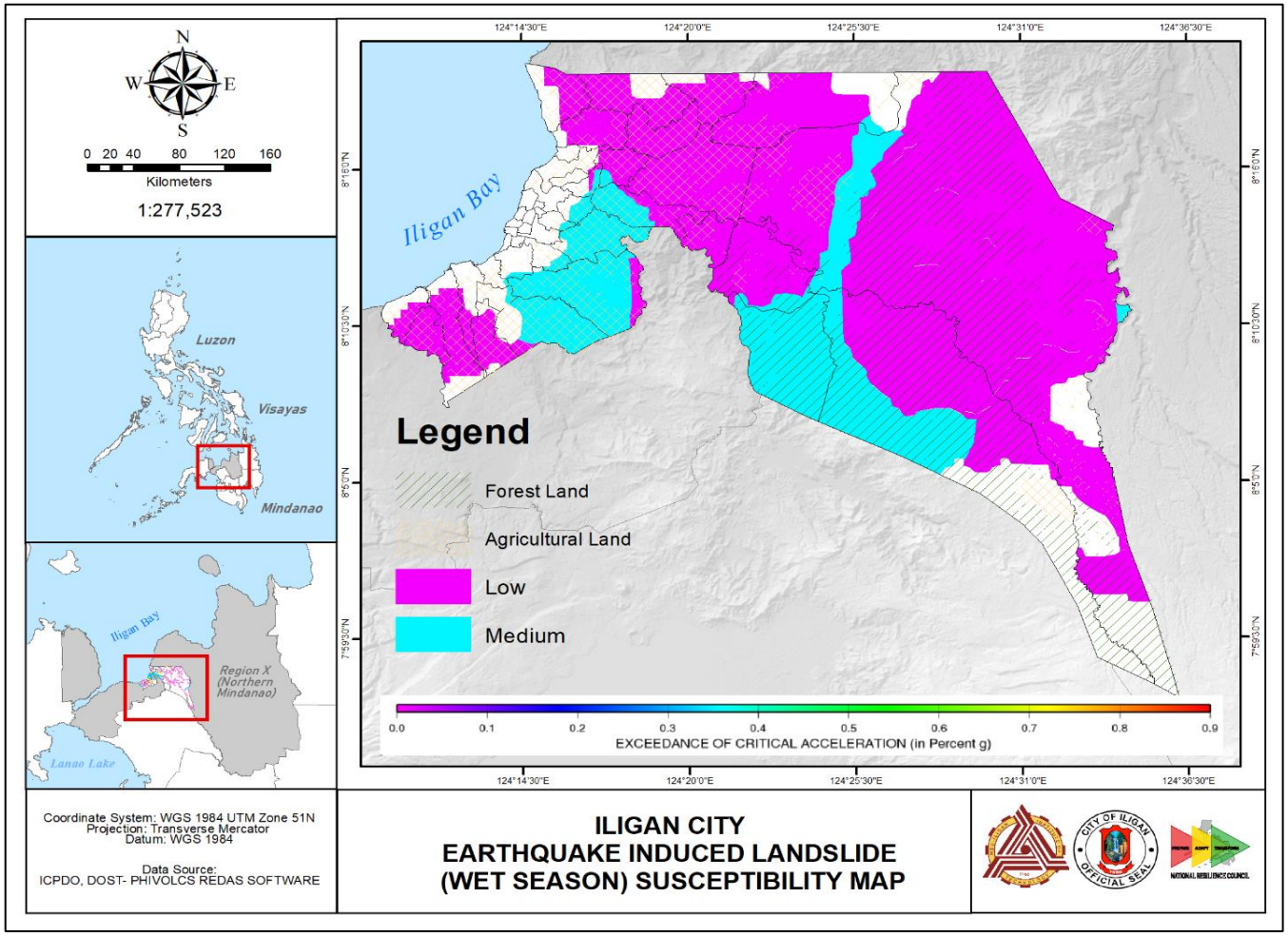


Figure 43. Earthquake Induced Landslide Wet Season Susceptibility on Urban Use Areas in Iligan City

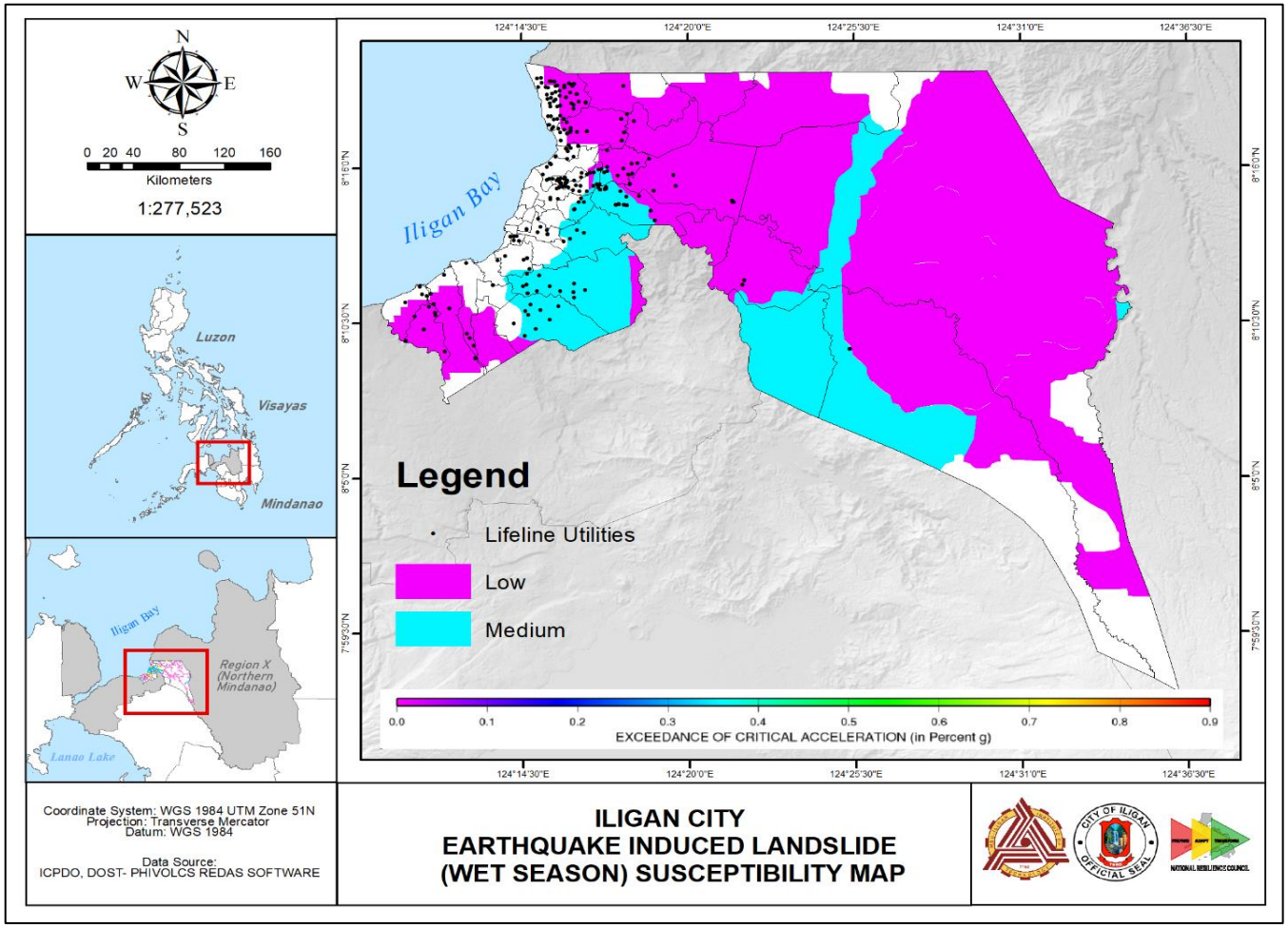


Figure 44. Earthquake Induced Landslide Wet Season Susceptibility

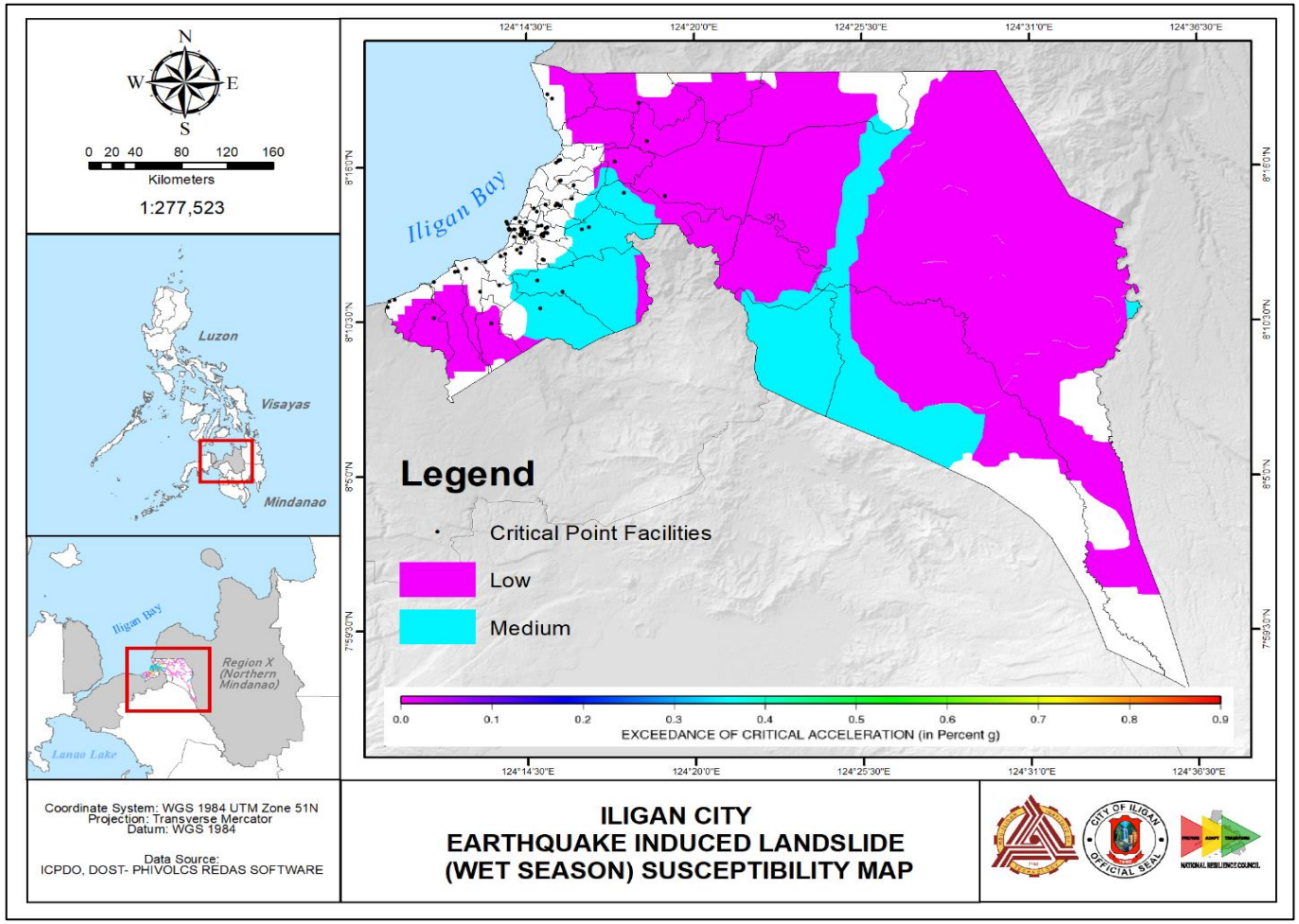


Figure 45. Earthquake Induced Landslide Wet Season Susceptibility

Landslides pose a threat in Iligan City which is categorized into two types (earthquake-induced and rain-induced). The maps displayed depict the areas primarily at risk of earthquake-induced landslides (EIL), especially during the wet season.

Figure 46 illustrates the barangays affected by their susceptibility levels, categorized as low (represented in purple) and medium (represented in blue). A substantial portion of Iligan City, totaling 51,685 hectares, is impacted by earthquake-induced landslides (EIL) during the wet season. This comprises 36,478 hectares with a low susceptibility level, while a significant section of the city's map, encompassing 15,207 hectares, indicates areas with a medium susceptibility level.

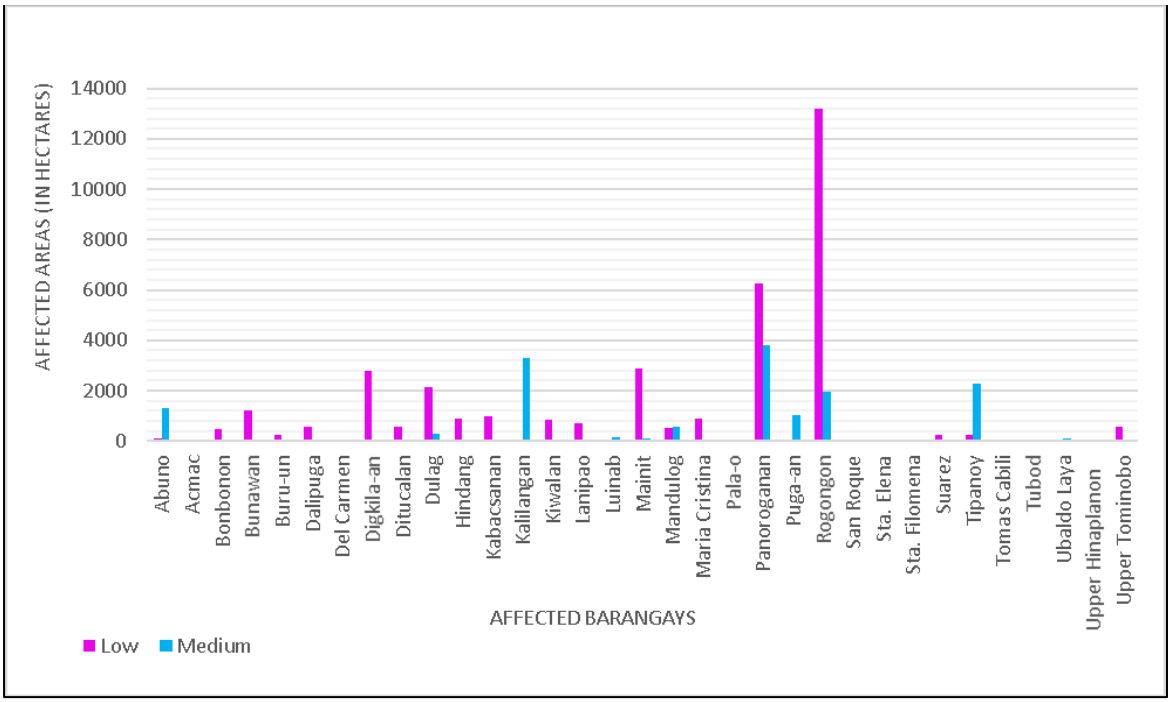


Figure 46. Affected Area to EIL Wet Season

Clearly, Barangay Rogongon, Panoroganan, Mainit, Digkilaan, Dulag, Bunawan, Kabacsanan, Hindang, Maria Cristina, Kiwalan, Lanipao, Upper Tominobo, Ditucalan, and Mandulog have a low susceptibility level, and the

affected areas in these barangays range from over 500 hectares but do not exceed 14,000 hectares. In contrast, Barangay Panoroganan, Kalilangan, Tipanoy, Rogongon, Abuno, Puga-an, and Mandulog exhibit a medium susceptibility level, with affected areas ranging from over 500 hectares but not exceeding 4,000 hectares.

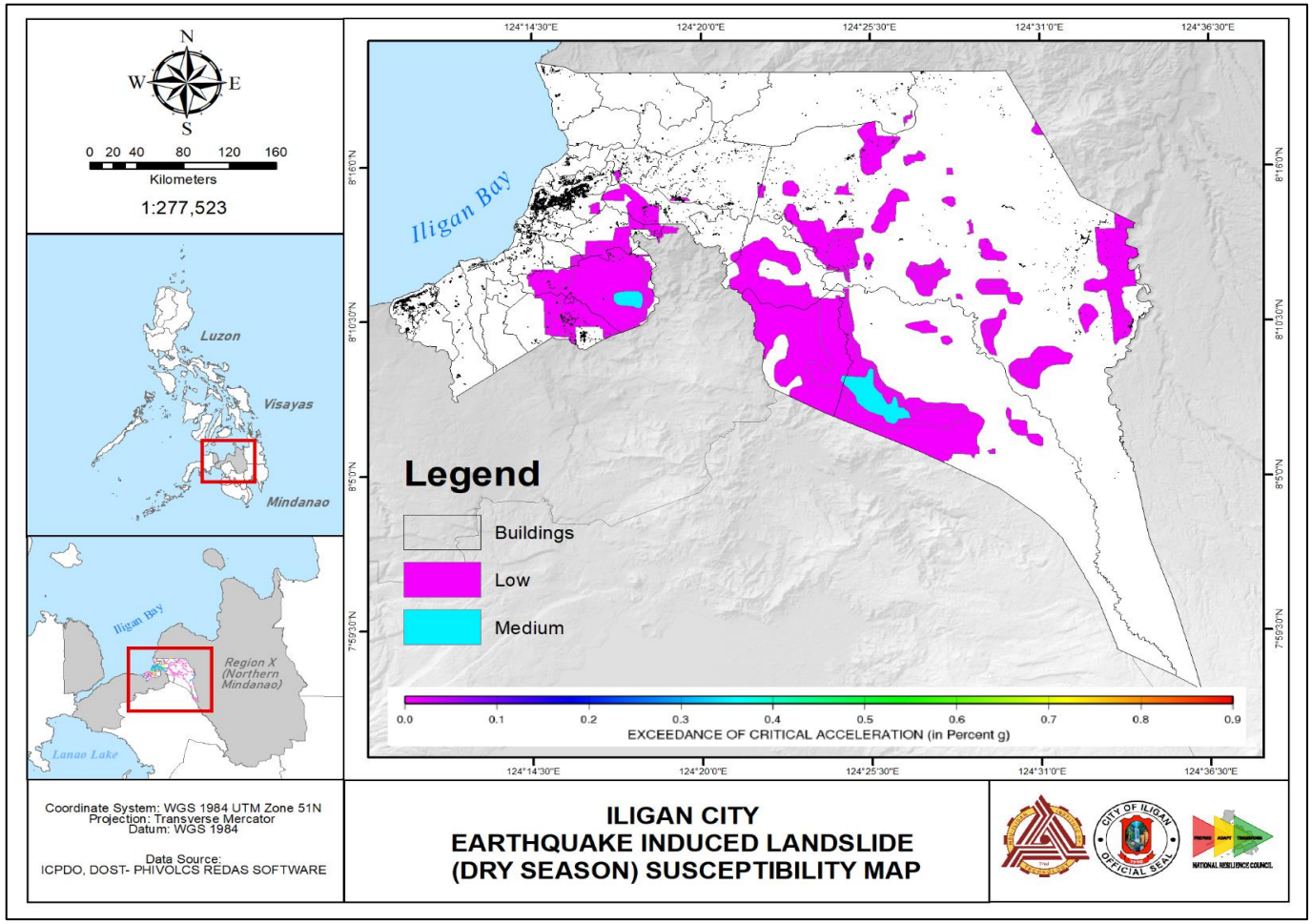


Figure 47. Earthquake Induced Landslide Dry Season Susceptibility

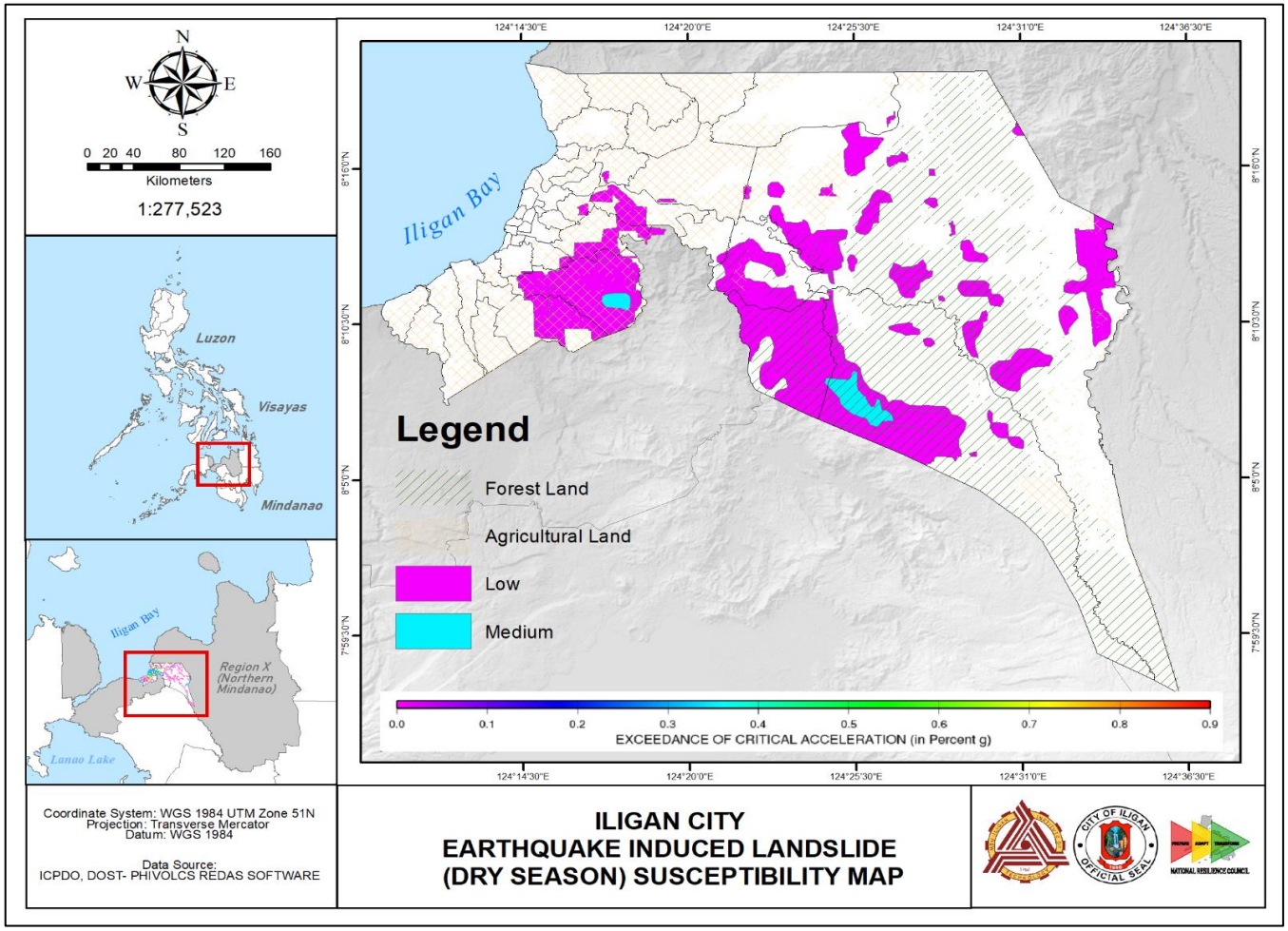


Figure 48. Earthquake Induced Landslide Dry Season Susceptibility

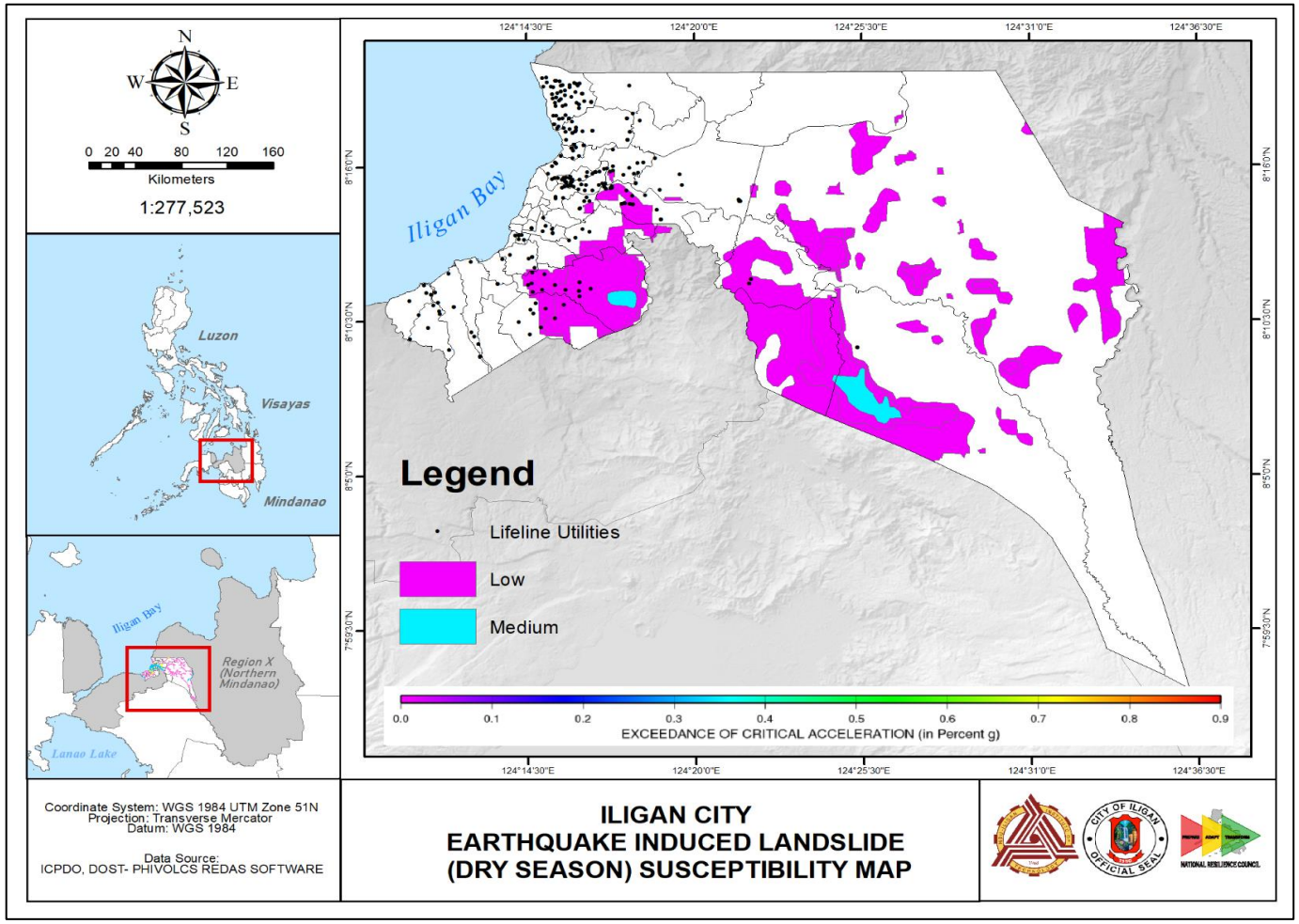


Figure 49. Earthquake Induced Landslide Dry Season Susceptibility

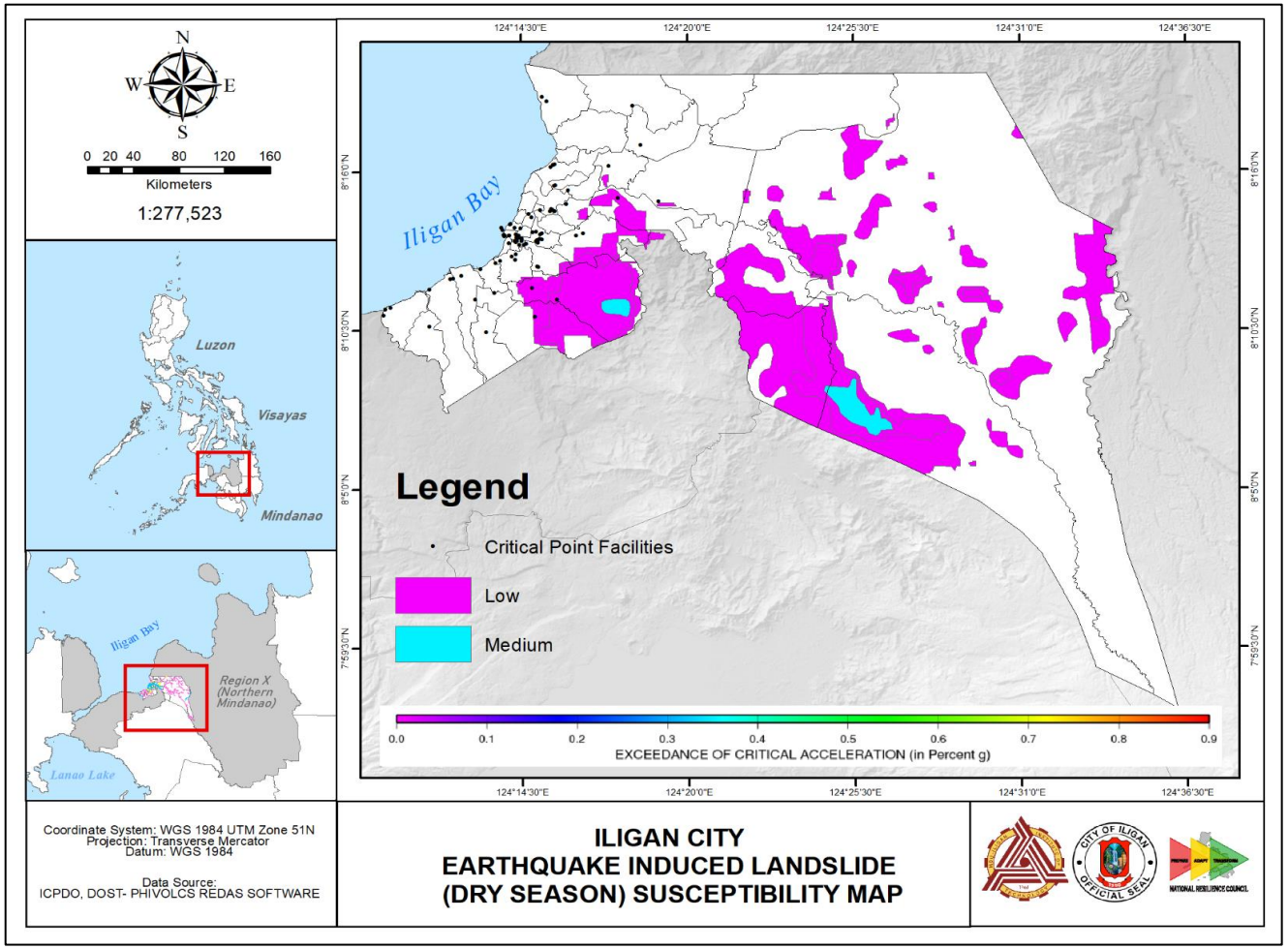


Figure 50. Earthquake Induced Landslide Dry Season Susceptibility

Figures 47 to **50** represent maps illustrating the susceptibility of areas to earthquake-induced landslides during the dry season. These maps reveal a relative reduction in affected areas compared to earthquake-induced landslides during the wet season. If the total affected area during the wet season is 51,685 hectares, the extent of earthquake-induced landslides during the dry season is only 16,900 hectares, comprising 16,182 hectares with a low susceptibility level and 718 hectares with a medium susceptibility level. The low susceptibility level is still represented in purple, while the medium susceptibility level is indicated in blue.

The chart below illustrates vulnerable barangays. Barangay Rogongon and Panoroganan are particularly impacted at the low susceptibility level, with affected areas spanning 4,982 hectares and 3,034 hectares, respectively. Following closely are Kalilangan, Tipanoy, Dulag, and Abuno, with affected areas of 2,910 hectares, 2,154 hectares, 1,252 hectares, and 808 hectares, respectively. In terms of the medium susceptibility level, only Barangay Panoroganan exhibits a relatively high affected area of 552 hectares, followed by Tipanoy with 158 hectares, and Kalilangan with 8 hectares of affected areas.

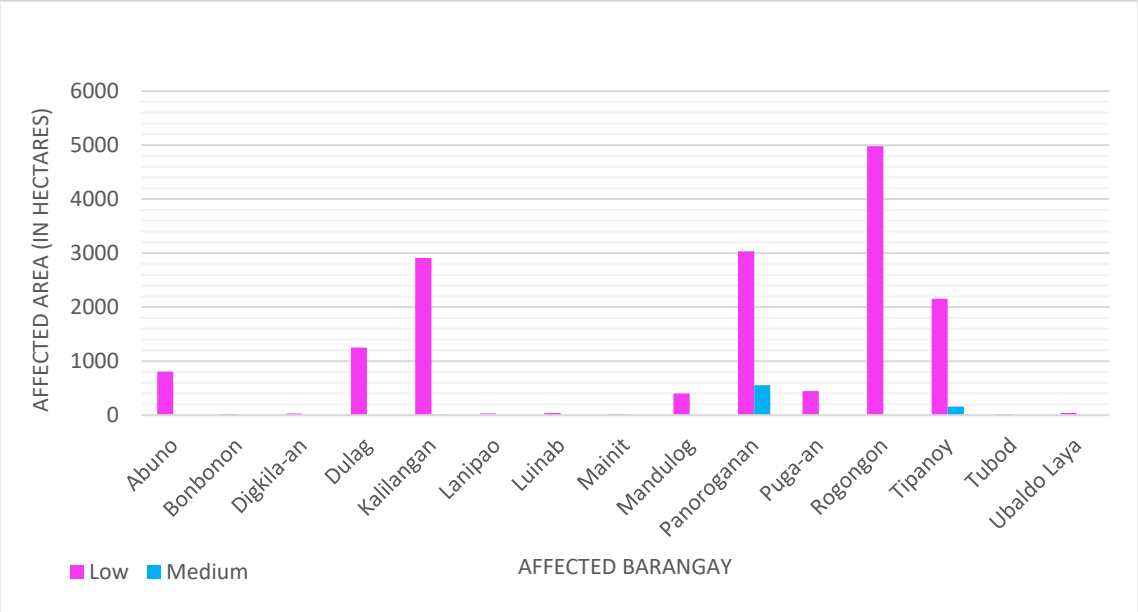


Figure 51. Affected Area to EIL Dry Season

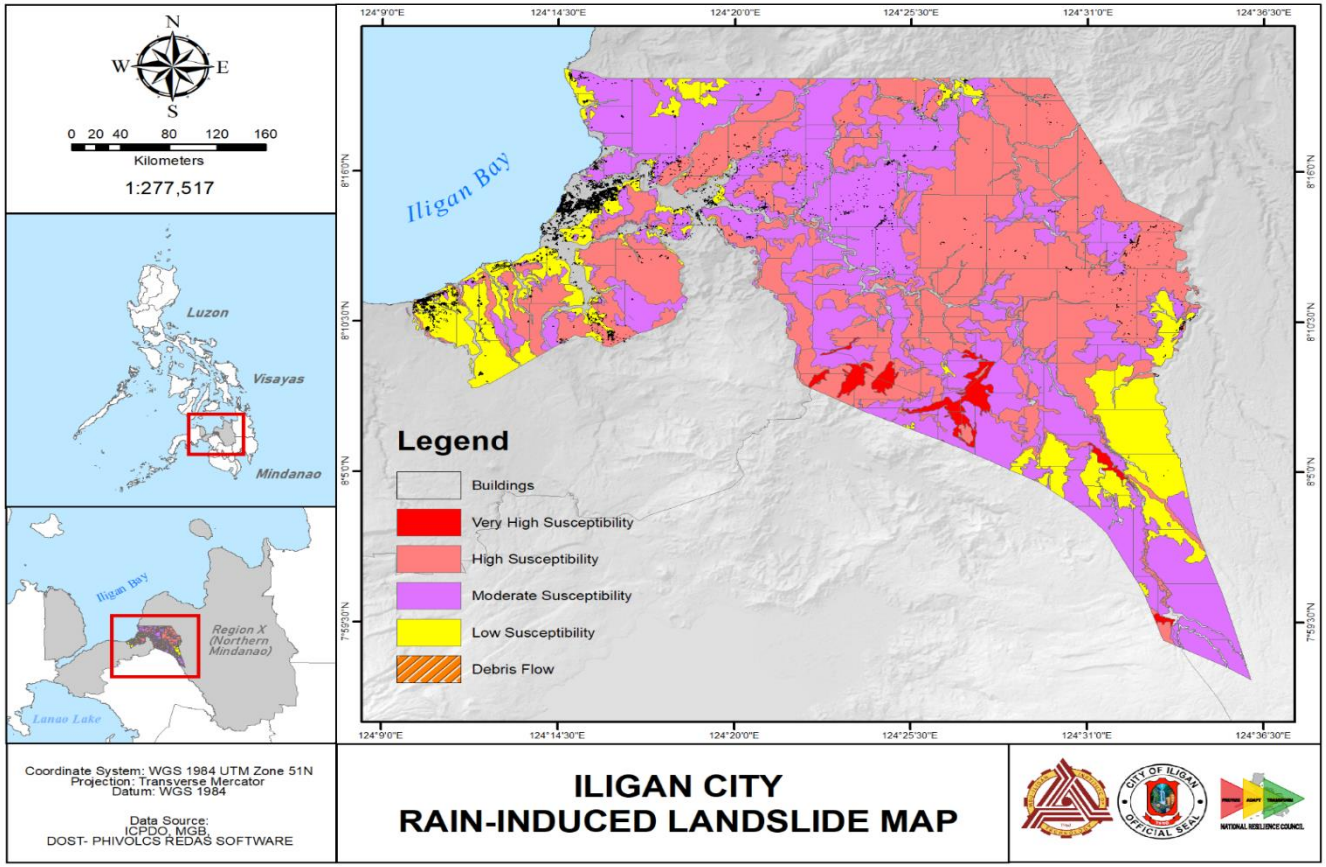


Figure 52. Rain-Induced Landslide Susceptibility on Urban Use Areas in Iligan City

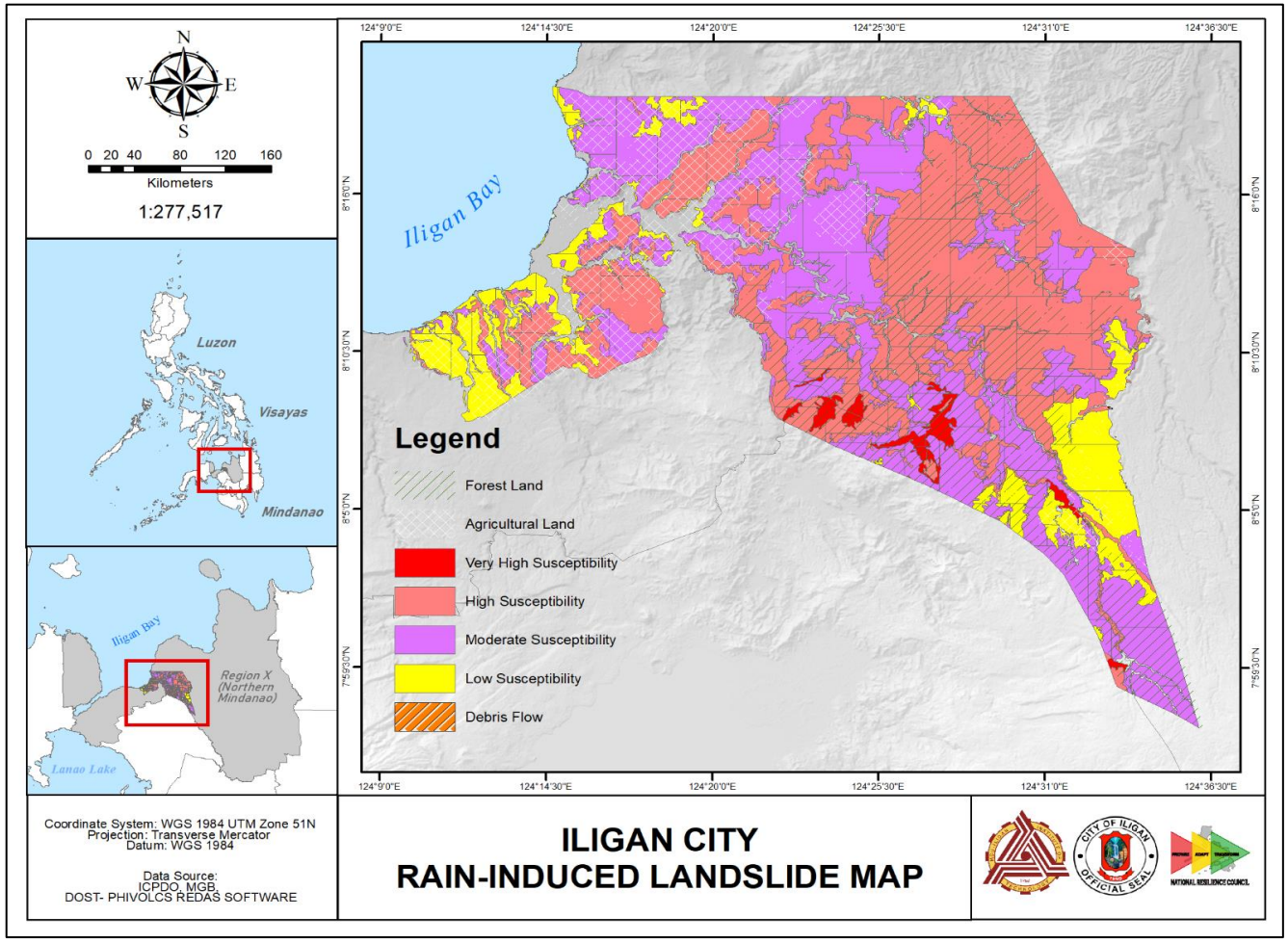


Figure 53. Rain-Induced Landslide Susceptibility on Natural Resources in Iligan City

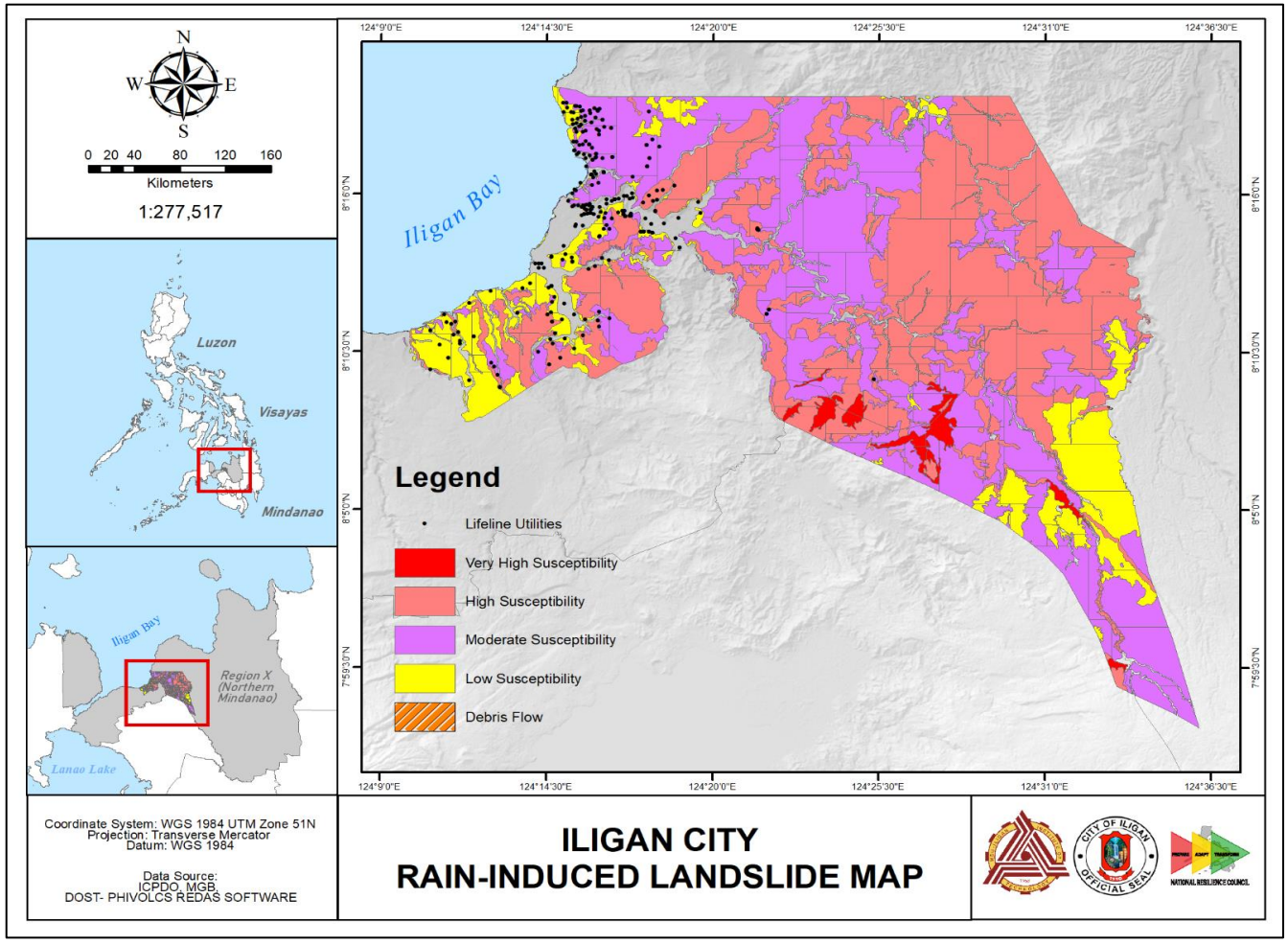


Figure 54. Rain-Induced Landslide Susceptibility on Lifeline Utilities in Iligan City

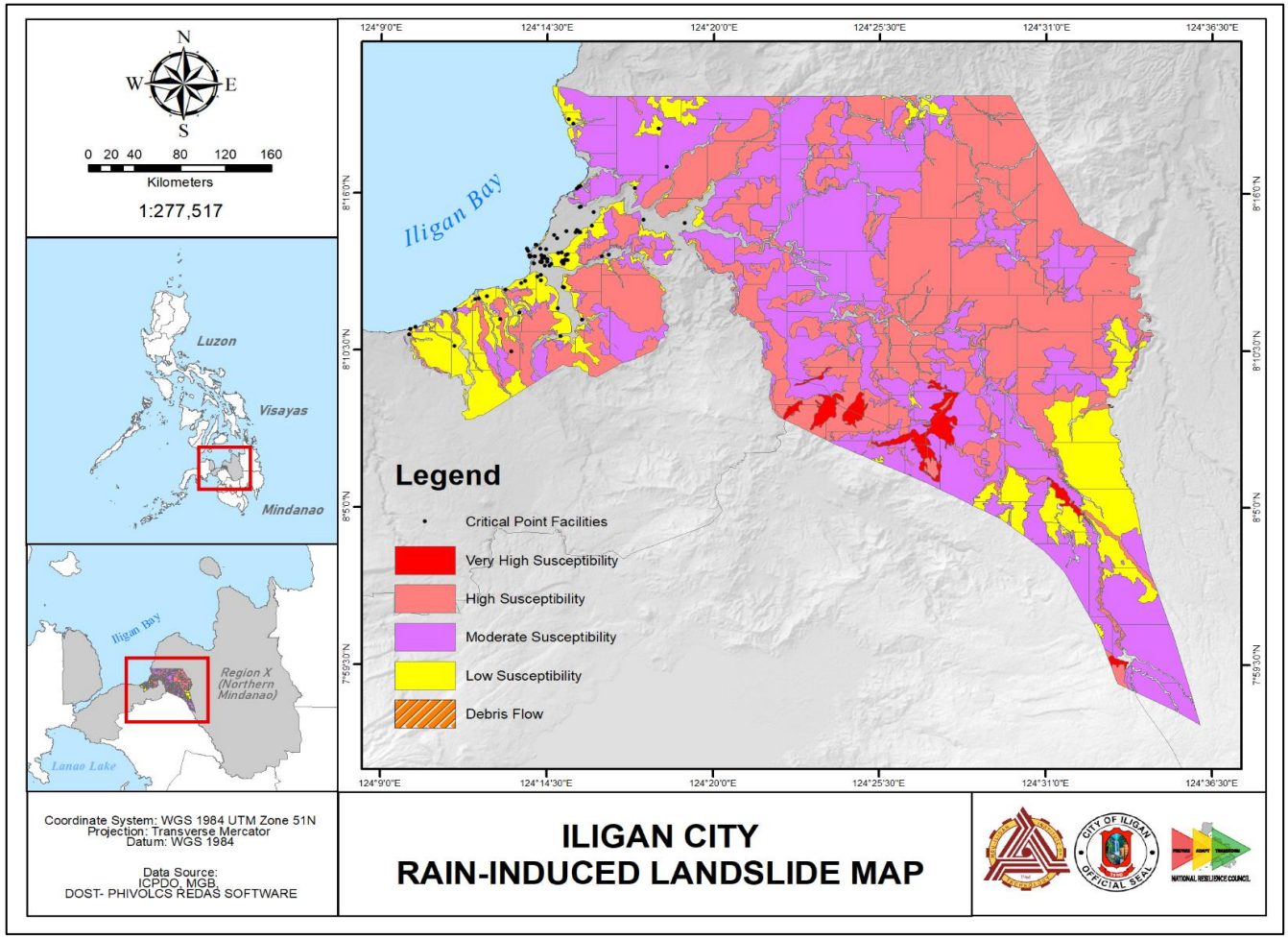


Figure 55. Rain-Induced Landslide Susceptibility on Critical Point Facilities in Iligan City

Landslides triggered by rainfall, known as Rain-induced landslides (RIL), constitute a climate-induced hazard. The presented maps illustrate areas prone to susceptibility, encompassing natural resources, essential utilities, and critical facilities. The legend denotes susceptibility levels categorized as very high (depicted in red), high (in pink), moderate (in purple), and low (in yellow). Additionally, a debris flow is represented by an orange slant line.

The chart provided below outlines the areas impacted by Rain-induced landslides (RIL), identifying a total of 39,727 hectares as susceptible to RIL. This overall figure is subdivided into three susceptibility categories: 5,972 hectares with low susceptibility, 19,394 hectares at a moderate susceptibility level, and 14,361 hectares facing a high susceptibility level.

Within the low susceptibility classification, Barangay Panoroganan emerges as notably prone to Rain-induced landslides (RIL), impacting 1,249 hectares, closely trailed by Maria Cristina with 988 hectares.

In the category of moderate susceptibility, Barangay Panoroganan experiences the greatest impact, affecting 7,233 hectares of land. Subsequently, several other barangays, namely Mainit, Dulag, Bunawan, and Kalilangan, each have affected areas surpassing 1,000 hectares.

Moreover, in the high susceptibility tier, Barangay Panoroganan remains the most exposed barangay to Rain-induced landslides (RIL), impacting a significant expanse of land. Other barangays, including Kalilangan, Tipanoy, Mainit, Digkilaan, Dulag, Abuno, and Puga-an, also exhibit high susceptibility, with affected areas measuring at least 500 hectares.

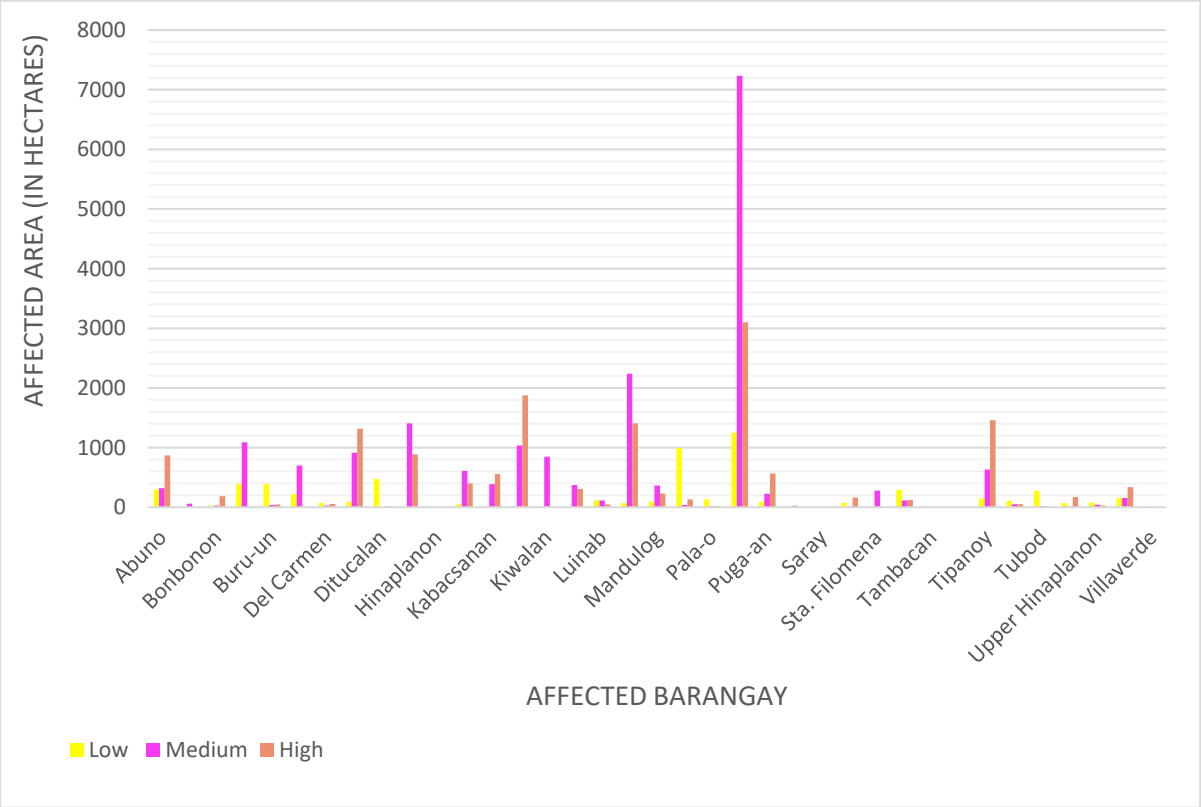


Figure 56. Affected Areas to RIL

3.5.2.3 Ground Shaking Exposure Maps in Iligan City

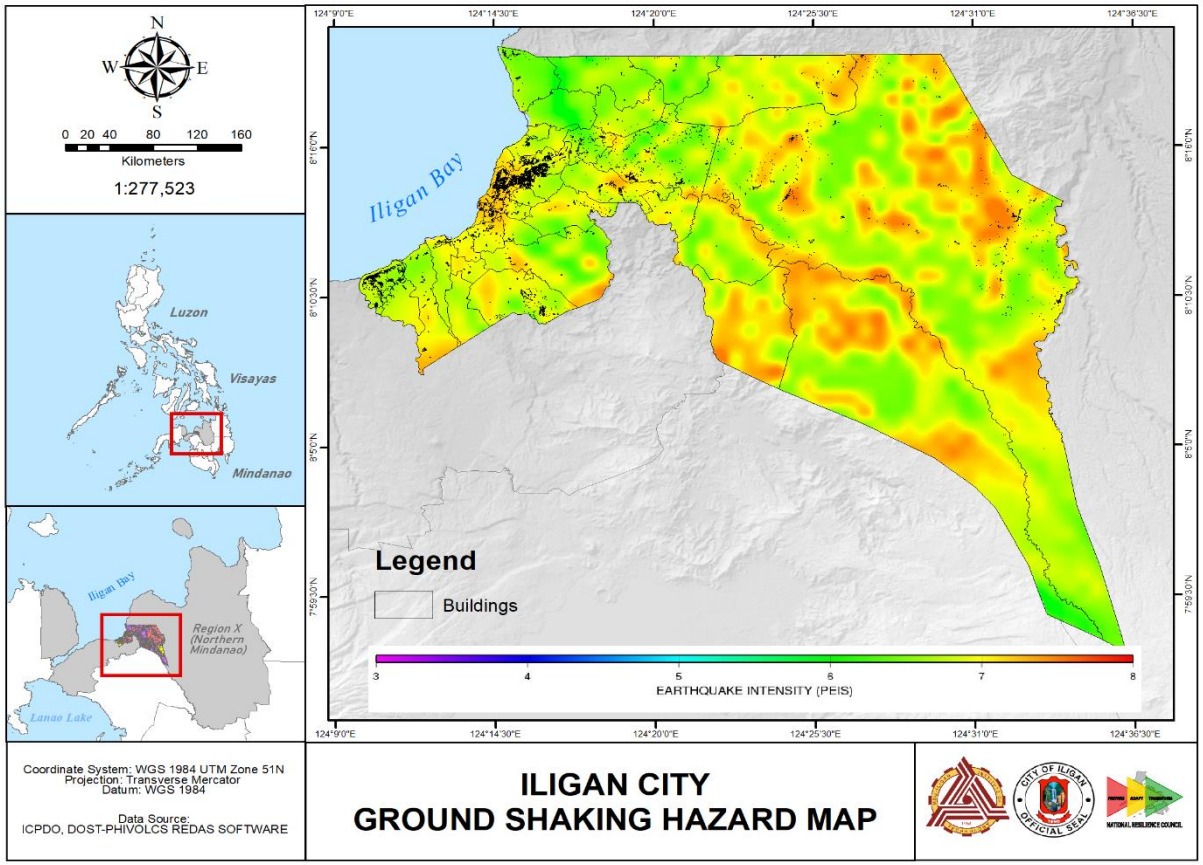


Figure 57. Ground Shaking Susceptibility on Urban Use Areas in Iligan City

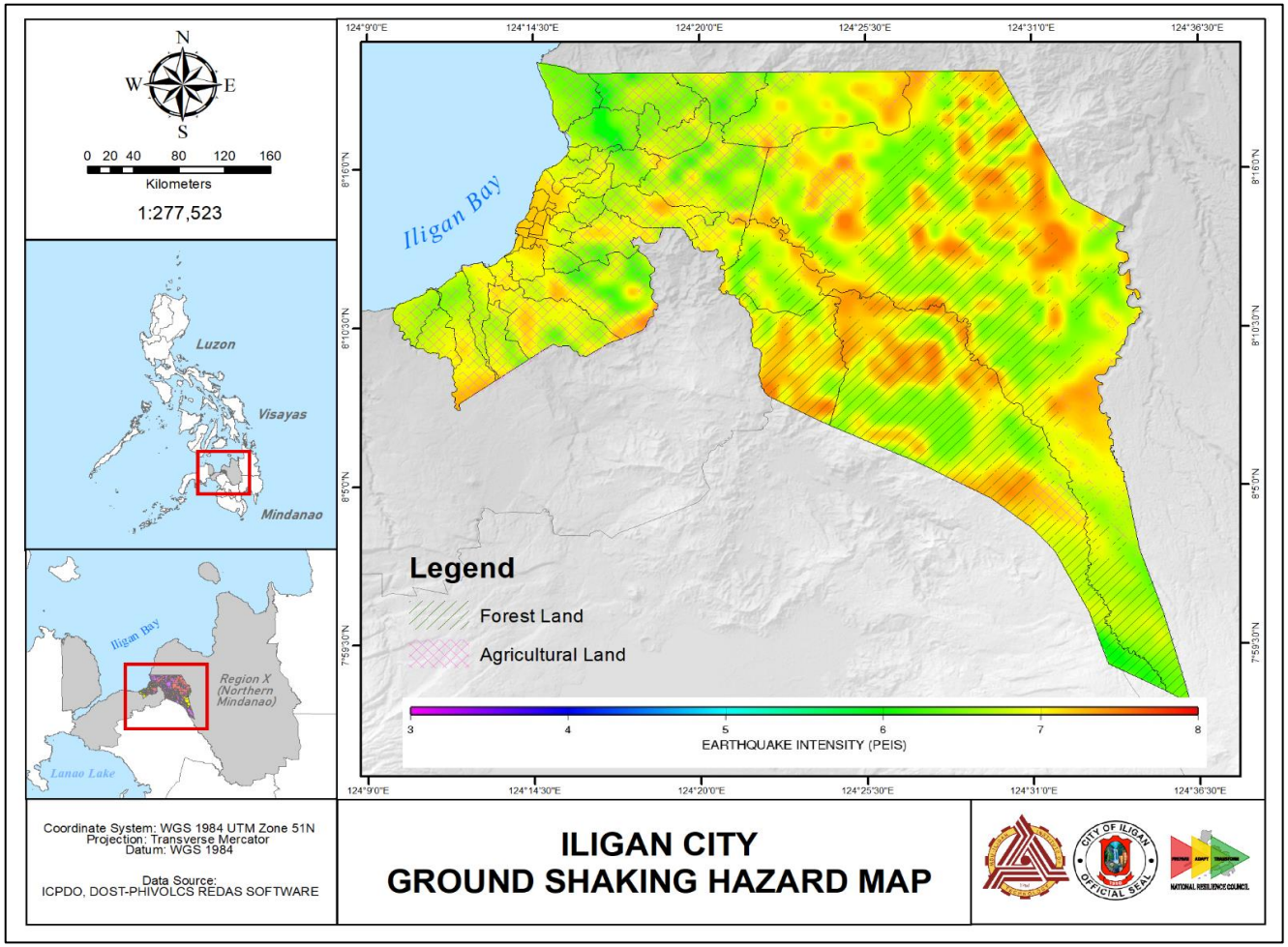


Figure 58. Ground Shaking Susceptibility on Natural Resources in Iligan City

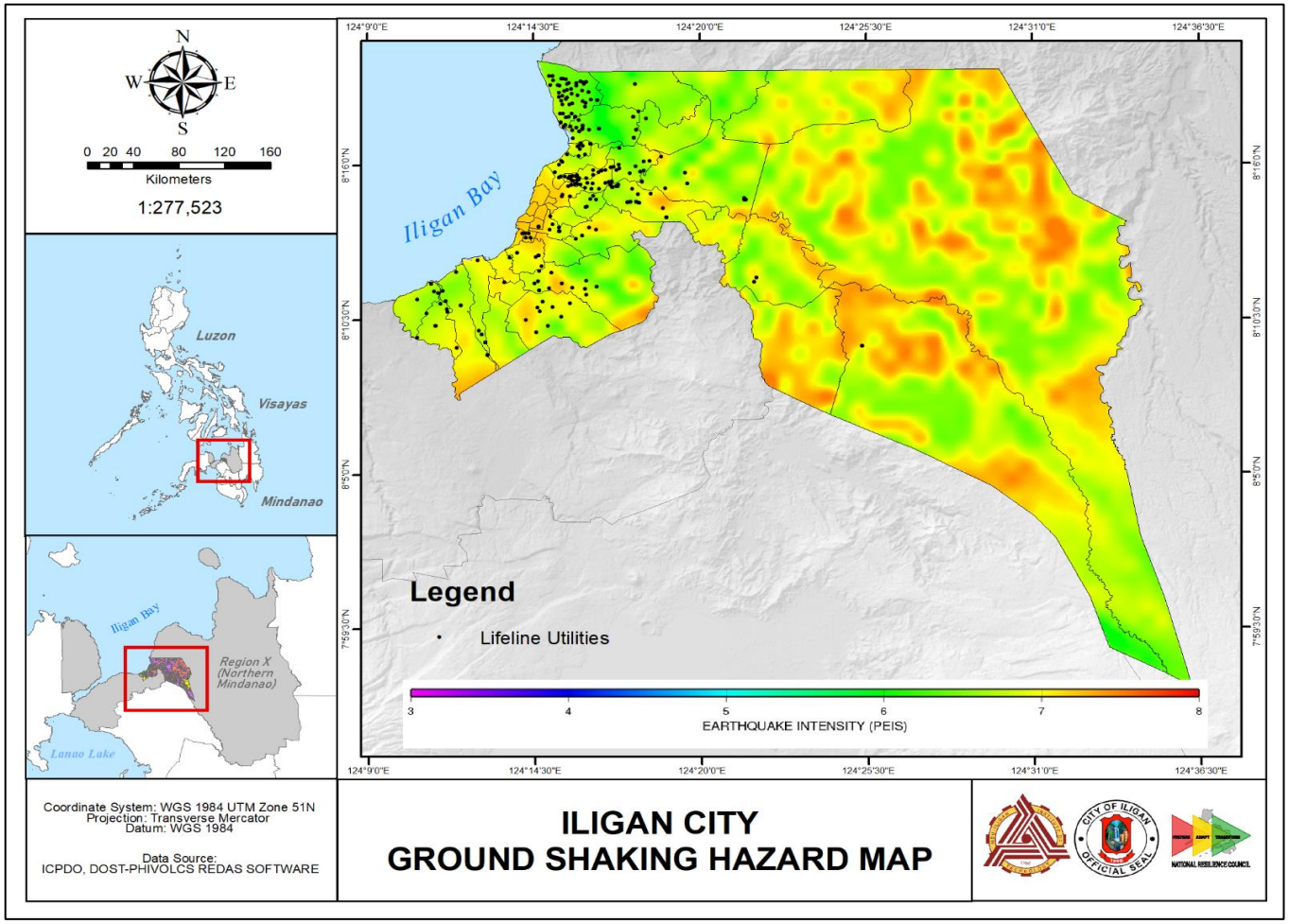


Figure 59. Ground Shaking Susceptibility on Lifeline Utilities in Iligan City

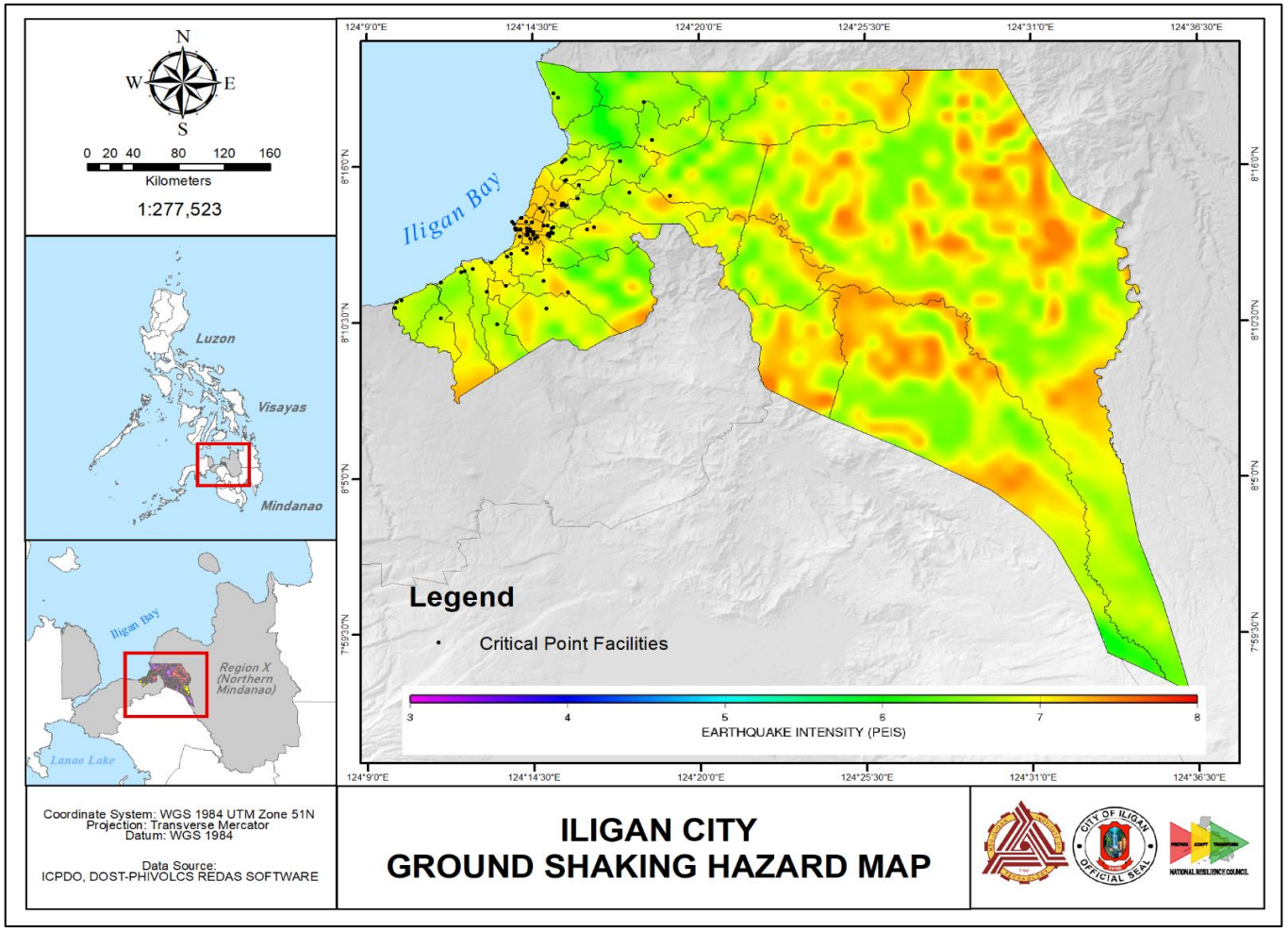


Figure 60. Ground Shaking Susceptibility on Critical Point Facilities in Iligan City

The maps presented above depict ground shaking hazards observed in the City of Iligan, with several instances of small-magnitude earthquakes that typically result in minor consequences. The exception to this pattern is the earthquake recorded in 1955, which caused extensive damage in Northern Mindanao, including Iligan City. These exposure maps serve as a guide for policymakers, land use planners, and engineers in devising strategies to mitigate the impacts of earthquakes. The legend utilizes the PHIVOLCS Earthquake Intensity Scale (PEIS), measuring intensity based on shaking. The intensity experienced in Iligan, as indicated by the map, falls within the range of 6 to 7, signifying a level of shaking from very strong to destructive.

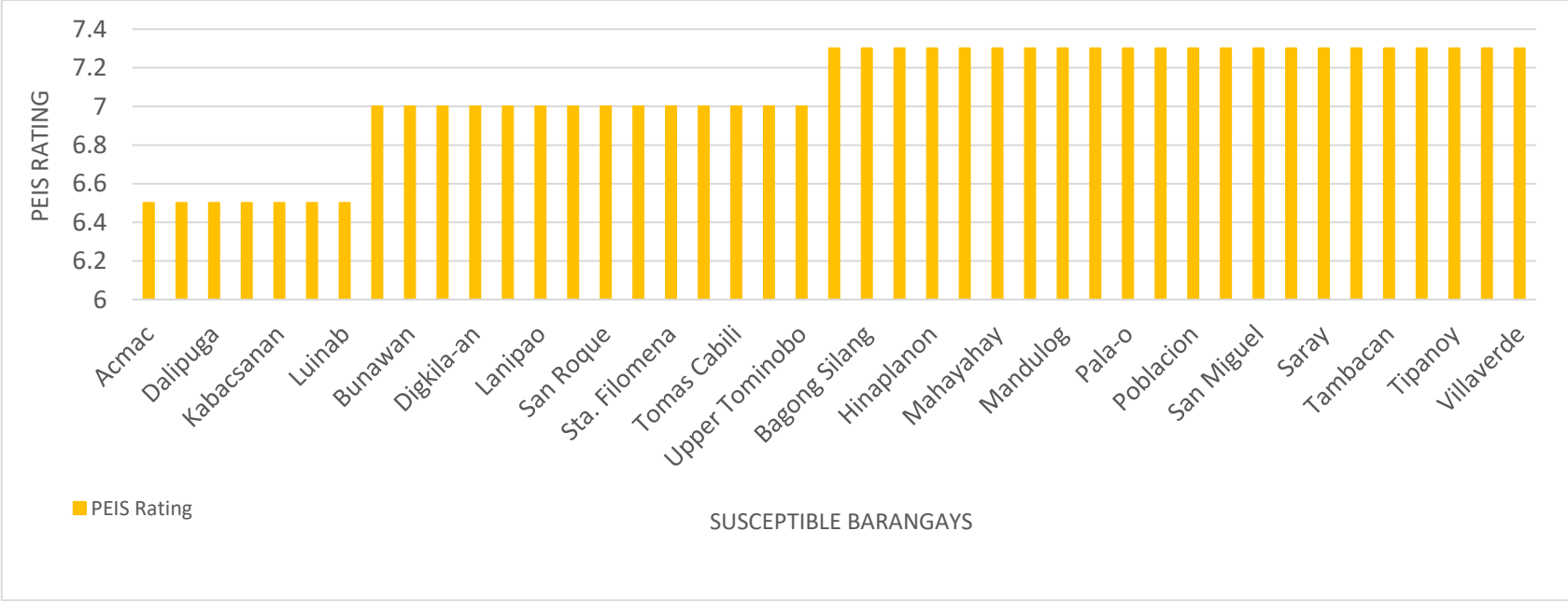


Figure 61. PEIS Rating on Susceptible Barangays to Ground Shaking

The chart above illustrates barangays that are vulnerable, along with their respective PEIS ratings. Out of the 44 barangays, 22 have a PEIS rating of 7.3, 14 barangays are rated at 7 PEIS, and 7 barangays have a PEIS rating of 6.5.

3.5.2.4 Liquefaction Exposure Maps in Iligan City

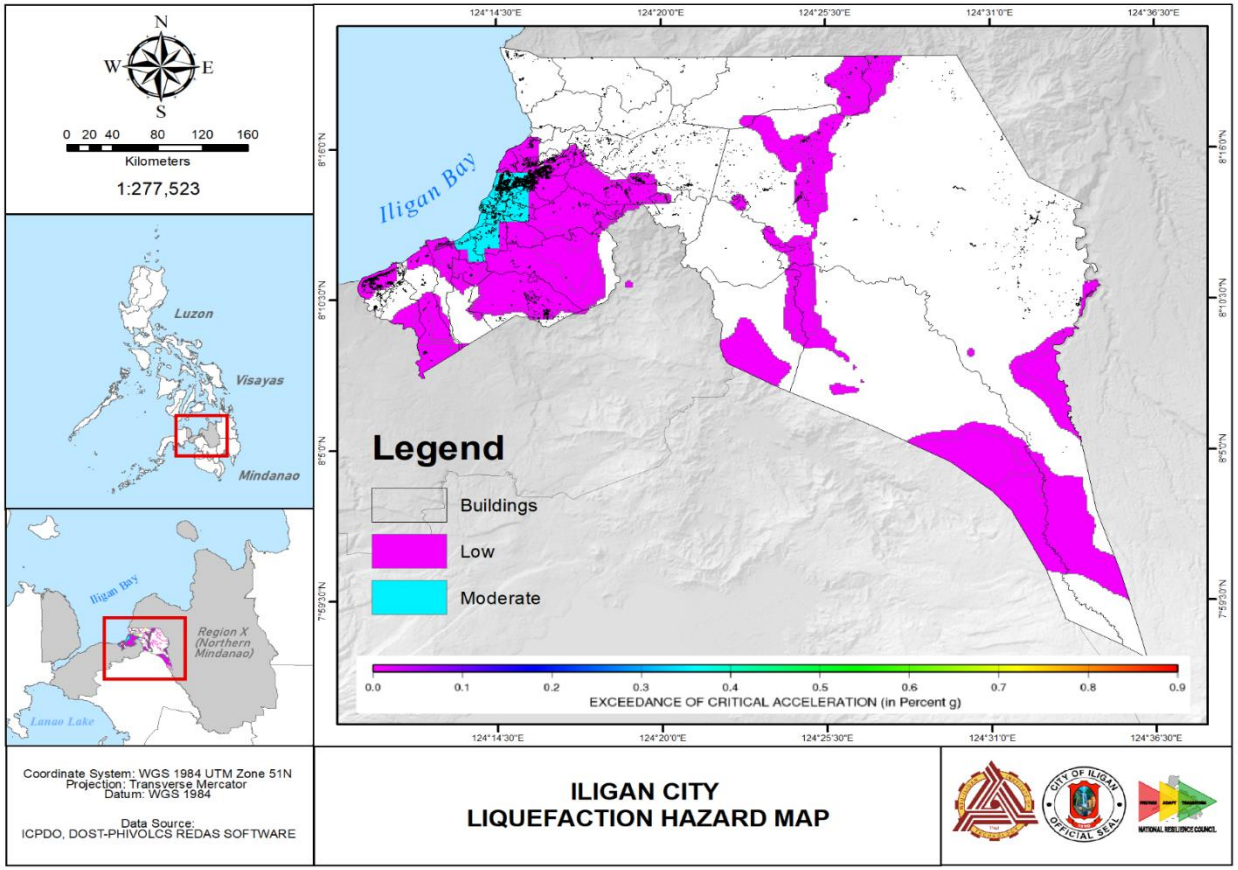


Figure 62. Liquefaction Susceptibility on Urban Use Areas in Iligan City

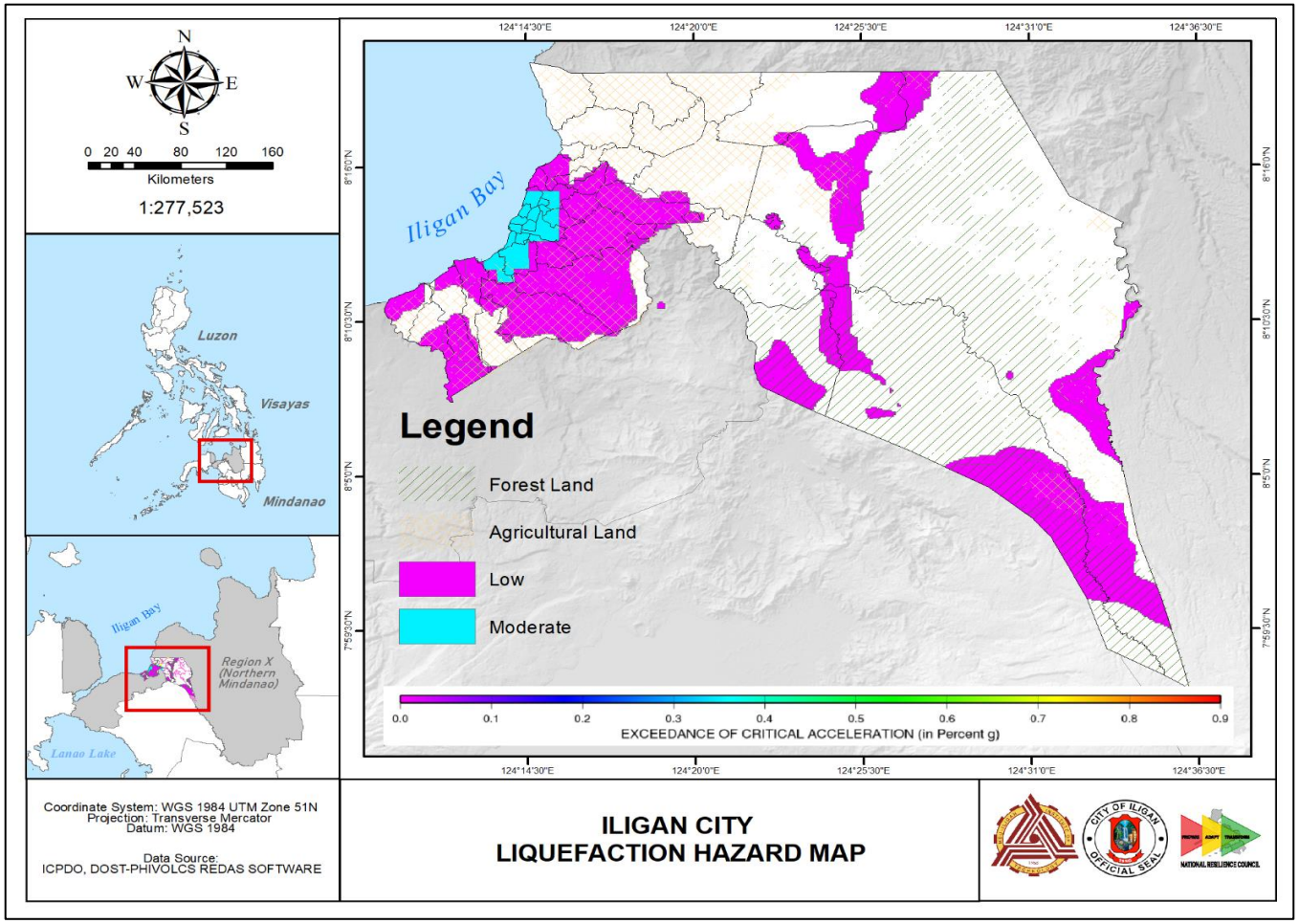


Figure 63. Liquefaction Susceptibility on Natural Resources in Iligan City

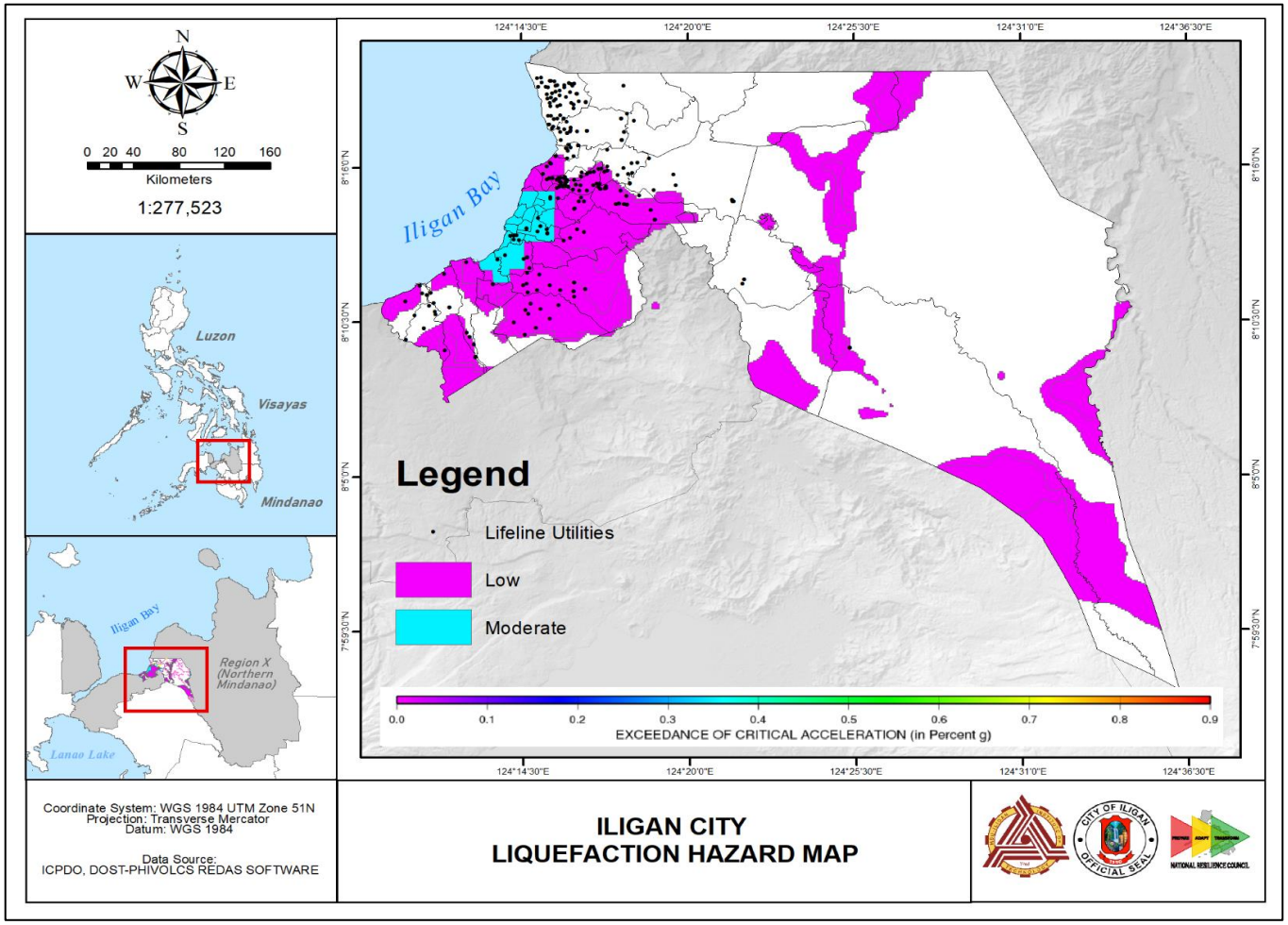


Figure 64. Liquefaction Susceptibility on Lifeline Utilities in Iligan City

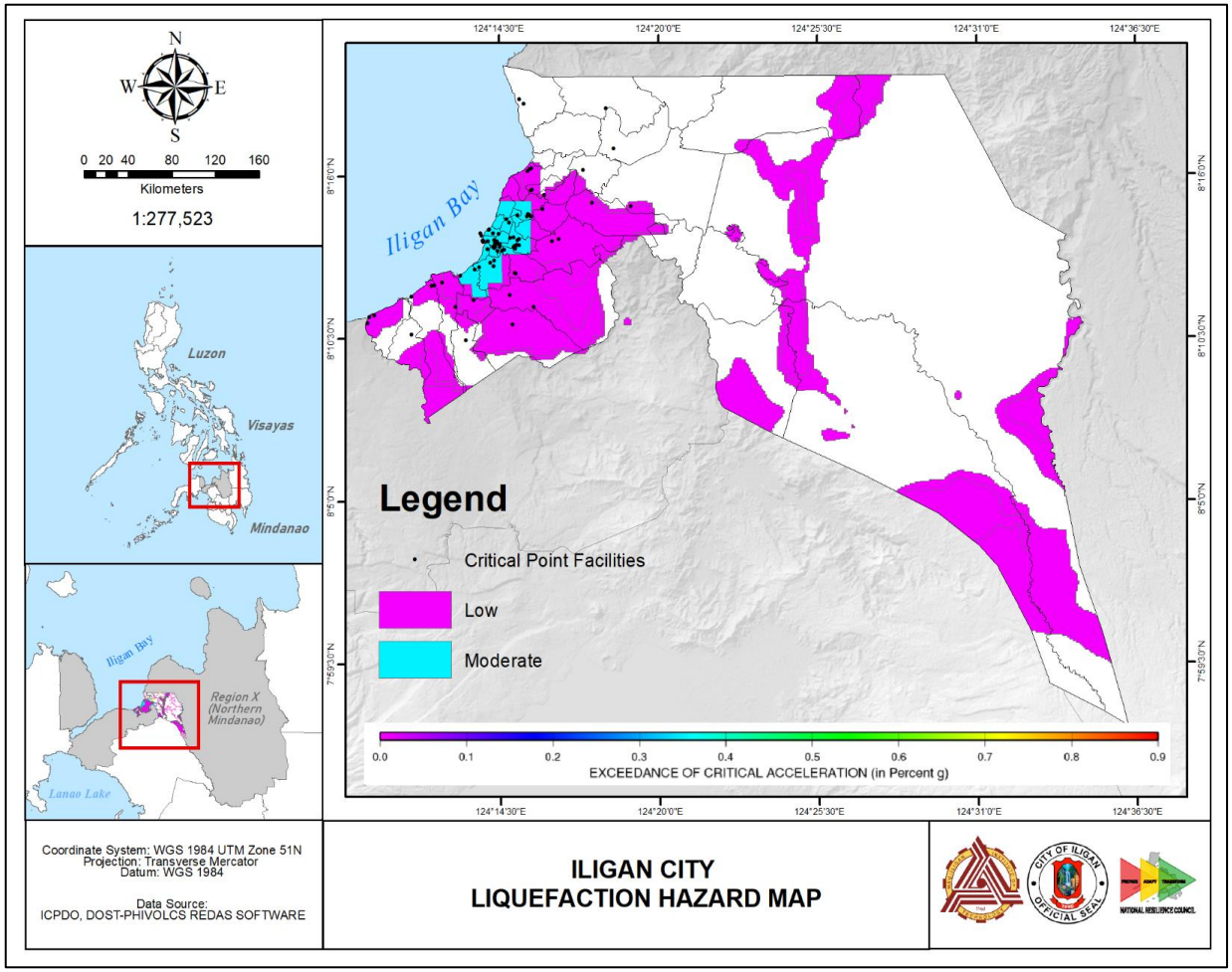


Figure 65. Liquefaction Susceptibility on Critical Point Facilities in Iligan City

Liquefaction represents an undesirable geological phenomenon where certain types of soil and geological formations become soft when subjected to ground shaking. According to the Comprehensive Land Use Plan (CLUP), historical records of Iligan City indicate occurrences of liquefaction in Barangay Tambacan, near the mouth of the Iligan River. The Comprehensive Master Development Plan (CMDP) from 1995 documented 28 barangays identified as susceptible to liquefaction. However, recent data reveals that 39 barangays are now susceptible to liquefaction. The collected data indicates that a total of 23,853 hectares have been affected, with 22,517 hectares falling under the low susceptibility level and 1,336 hectares classified as having a medium susceptibility level.

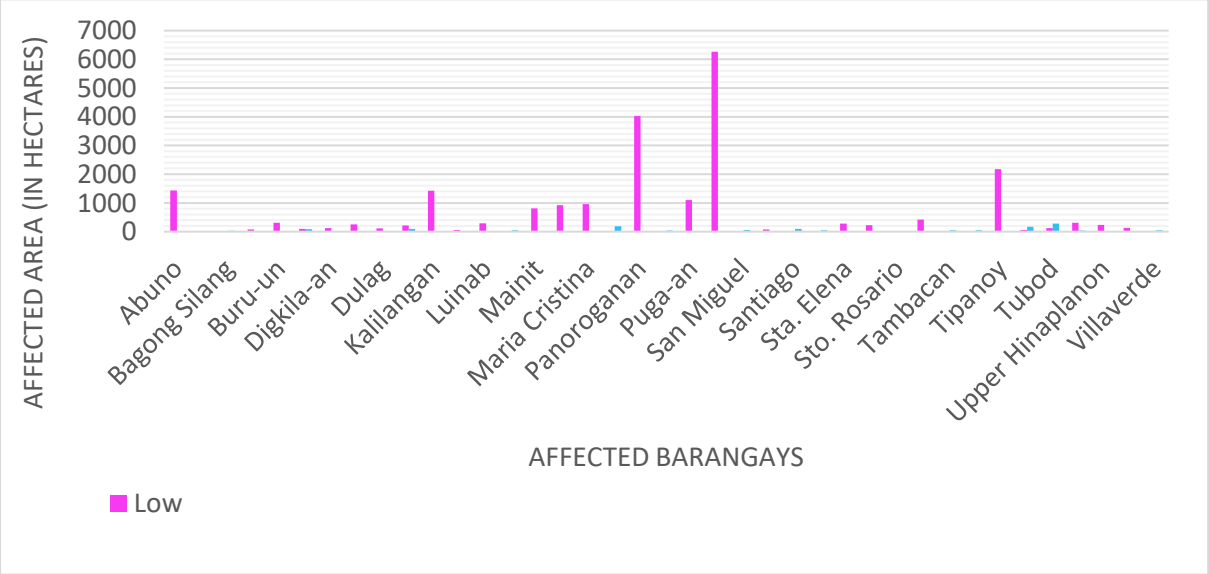
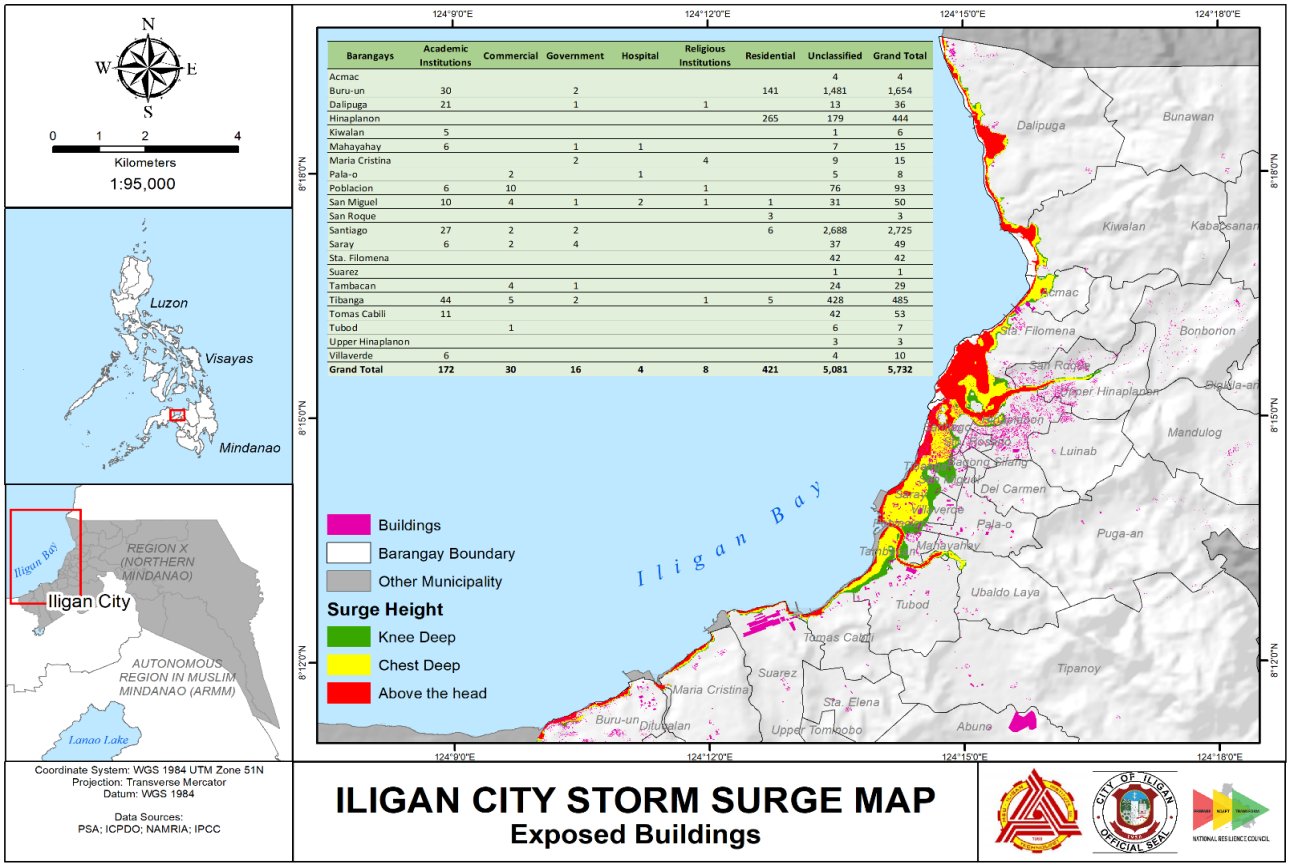


Figure 66. Affected Areas to Liquefaction

Furthermore, in the low susceptibility category, Barangay Rogongon demonstrates a substantial affected area of 6,260 hectares, followed by Panoroganan (4,023 hectares), Tipanoy (2,173 hectares), Abuno (1,435 hectares), Kalilangan (1,420 hectares), and Puga-an (1,101 hectares). However, in the medium susceptibility level, only 18

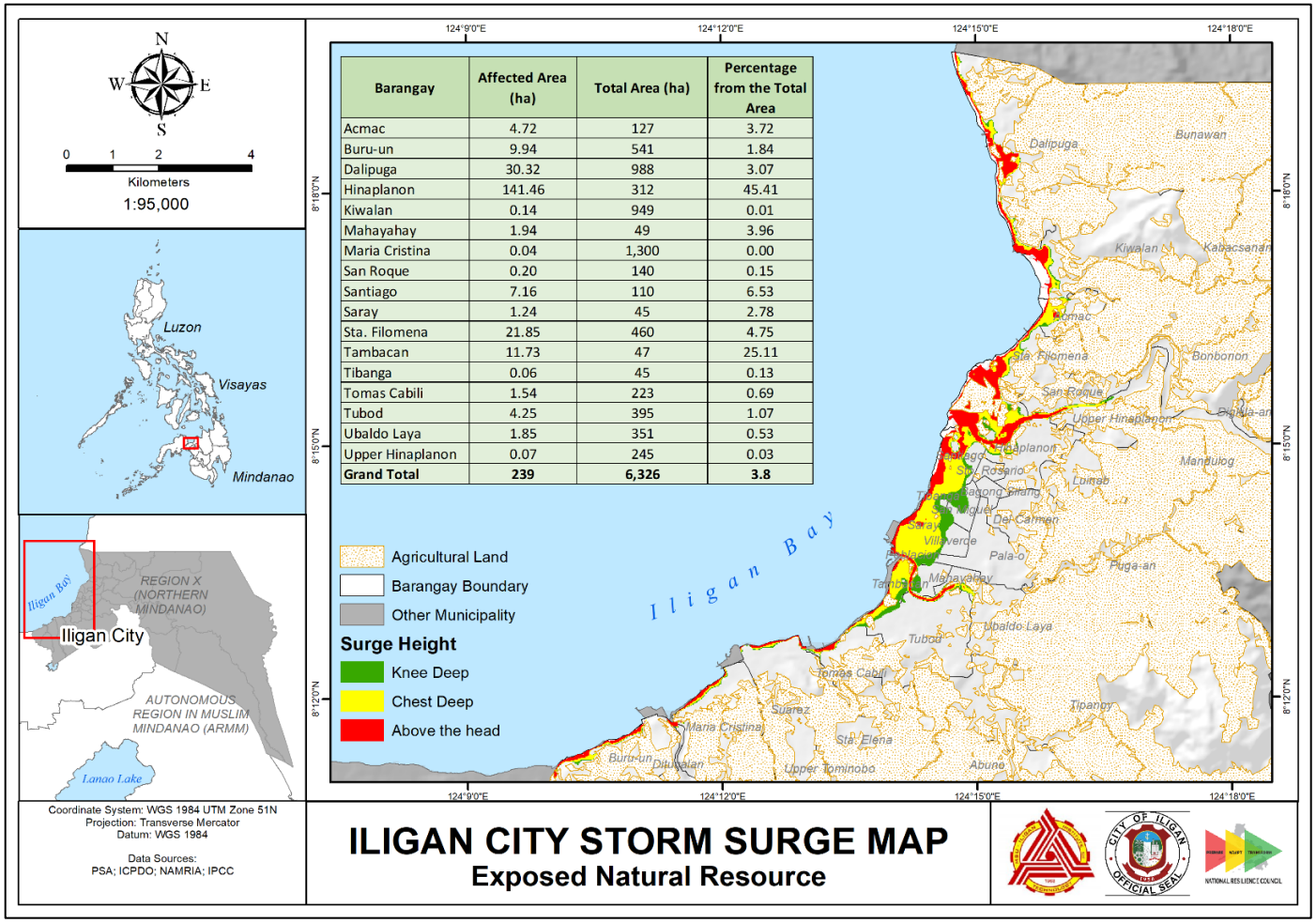
barangays exhibit vulnerability to liquefaction. These barangays include Tubod, Pala-o, Tomas Cabili, Hinaplanon, Santiago, Del Carmen, San Miguel, Mahayahay, Villaverde, Tambacan, Tibanga, Saray, Poblacion, Ubaldo Laya, Bagong Silang, Sto. Rosario, Tipanoy, and Puga-an.

3.5.2.5 Storm Surge Exposure Map in Iligan City



Barangays	Academic Institutions	Commercial	Government	Hospital	Religious Institutions	Residential	Unclassified	Grand Total
Acmac							4	4
Buru-un	30		2			141	1,481	1,654
Dalipuga	21		1		1		13	36
Hinaplanon						265	179	444
Kiwalan	5						1	6
Mahayahay	6		1	1			7	15
Maria Cristina			2		4		9	15
Pala-o		2		1			5	8
Poblacion	6	10			1		76	93
San Miguel	10	4	1	2	1	1	31	50
San Roque						3		3
Santiago	27	2	2			6	2,688	2,725
Saray	6	2	4				37	49
Sta. Filomena							42	42
Suarez							1	1
Tambacan		4	1				24	29
Tibanga	44	5	2		1	5	428	485
Tomas Cabili	11						42	53
Tubod		1					6	7
Upper Hinaplanon							3	3
Villaverde	6						4	10
Grand Total	**172**	**30**	**16**	**4**	**8**	**421**	**5,081**	**5,732**

Figure 67. Storm Surge Exposure Map on Urban Use Areas in Iligan City



Barangay	Affected Area (ha)	Total Area (ha)	Percentage from the Total Area
Acmac	4.72	127	3.72
Buru-un	9.94	541	1.84
Dalipuga	30.32	988	3.07
Hinaplanon	141.46	312	45.41
Kiwalan	0.14	949	0.01
Mahayahay	1.94	49	3.96
Maria Cristina	0.04	1,300	0.00
San Roque	0.20	140	0.15
Santiago	7.16	110	6.53
Saray	1.24	45	2.78
Sta. Filomena	21.85	460	4.75
Tambacan	11.73	47	25.11
Tibanga	0.06	45	0.13
Tomas Cabili	1.54	223	0.69
Tubod	4.25	395	1.07
Ubaldo Laya	1.85	351	0.53
Upper Hinaplanon	0.07	245	0.03
Grand Total	**239**	**6,326**	**3.8**

Figure 68. Storm Surge Exposure Map on Natural Resources in Iligan City

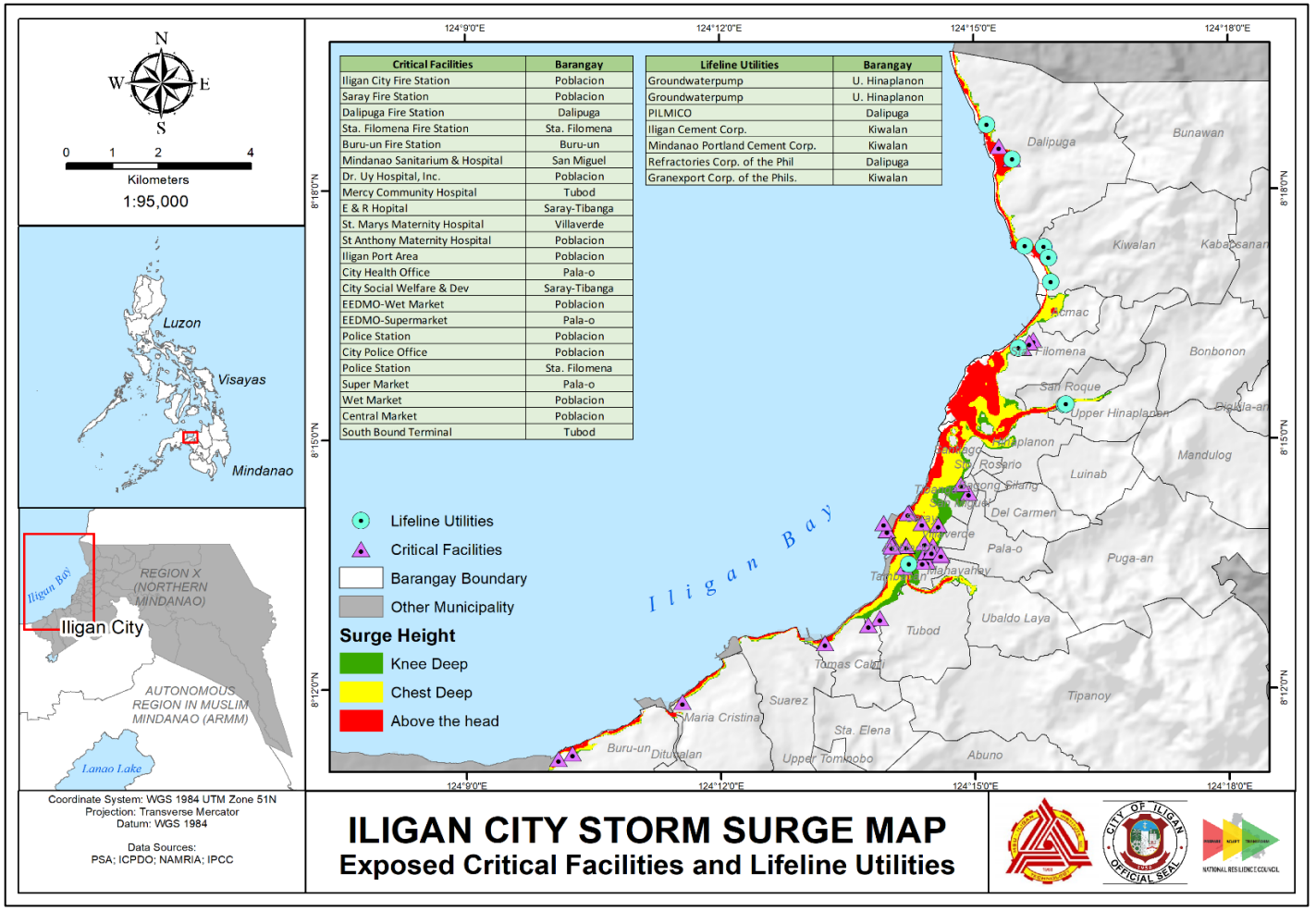
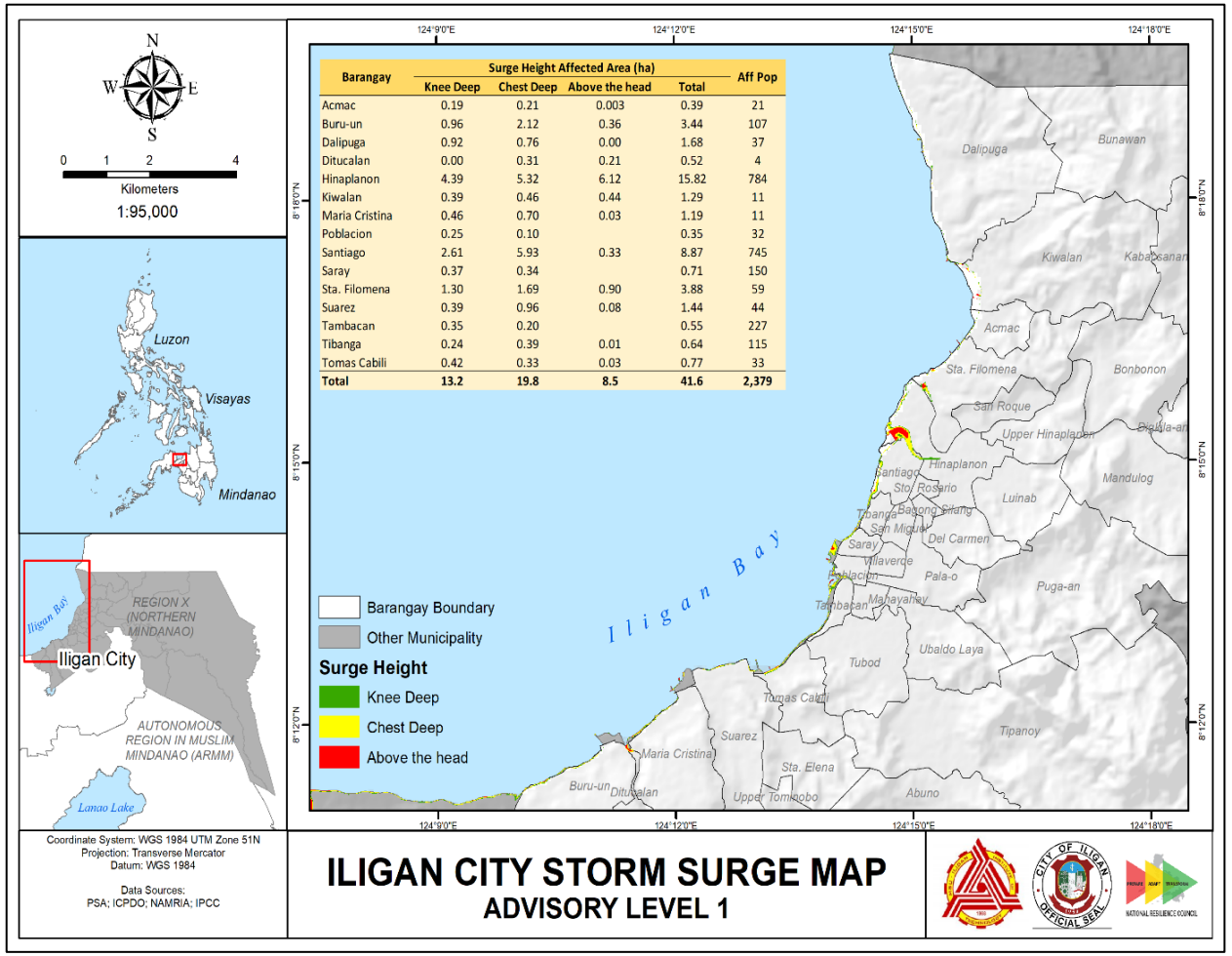


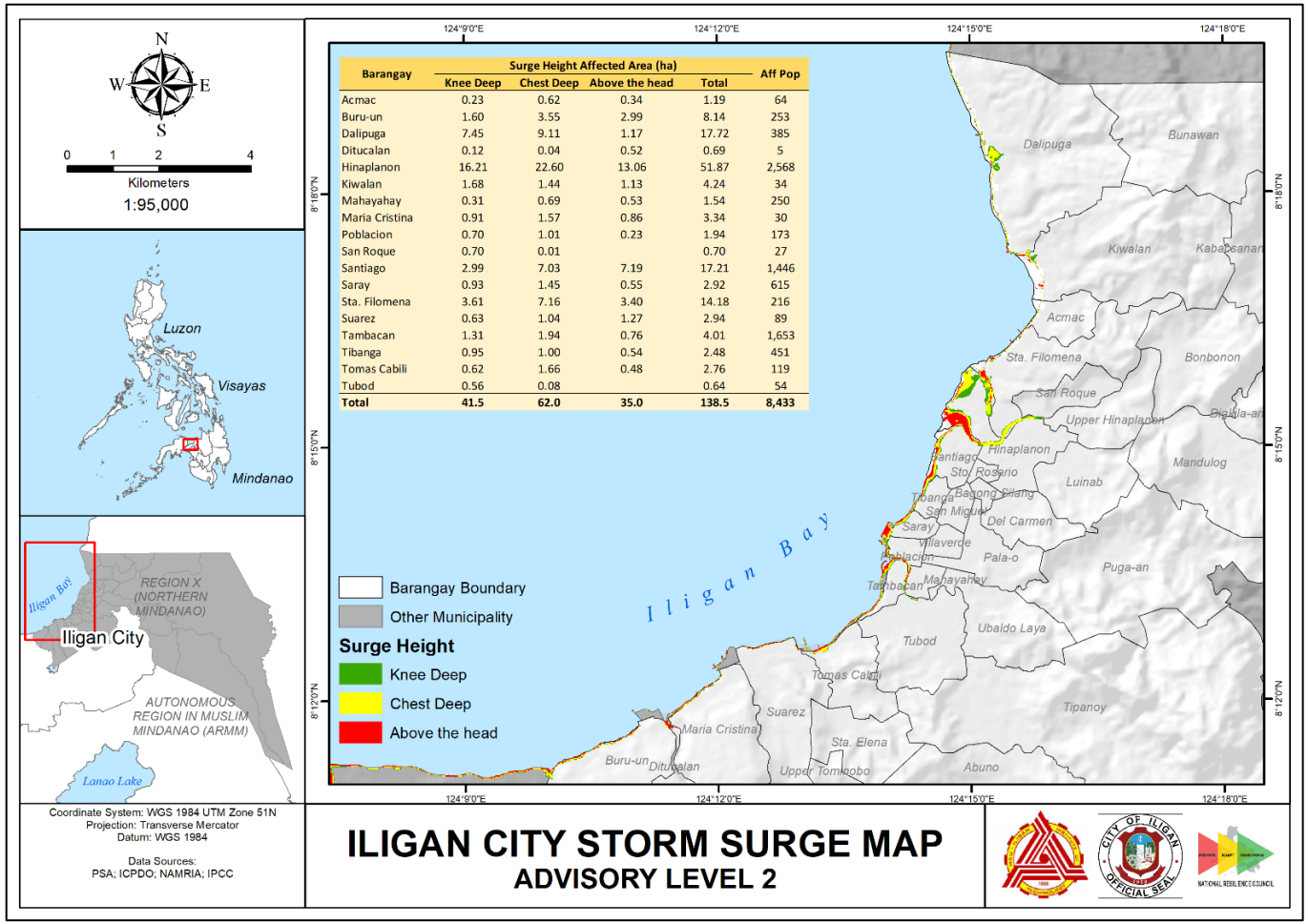
Figure 69. Storm Surge Exposure Map



Barangay	Surge Height Affected Area (ha)				Aff Pop
	Knee Deep	Chest Deep	Above the head	Total	
Acmac	0.19	0.21	0.003	0.39	21
Buru-un	0.96	2.12	0.36	3.44	107
Dalipuga	0.92	0.76	0.00	1.68	37
Ditucalan	0.00	0.31	0.21	0.52	4
Hinaplanon	4.39	5.32	6.12	15.82	784
Kiwalan	0.39	0.46	0.44	1.29	11
Maria Cristina	0.46	0.70	0.03	1.19	11
Poblacion	0.25	0.10		0.35	32
Santiago	2.61	5.93	0.33	8.87	745
Saray	0.37	0.34		0.71	150
Sta. Filomena	1.30	1.69	0.90	3.88	59
Suarez	0.39	0.96	0.08	1.44	44
Tambacan	0.35	0.20		0.55	227
Tibanga	0.24	0.39	0.01	0.64	115
Tomas Cabili	0.42	0.33	0.03	0.77	33
Total	**13.2**	**19.8**	**8.5**	**41.6**	**2,379**

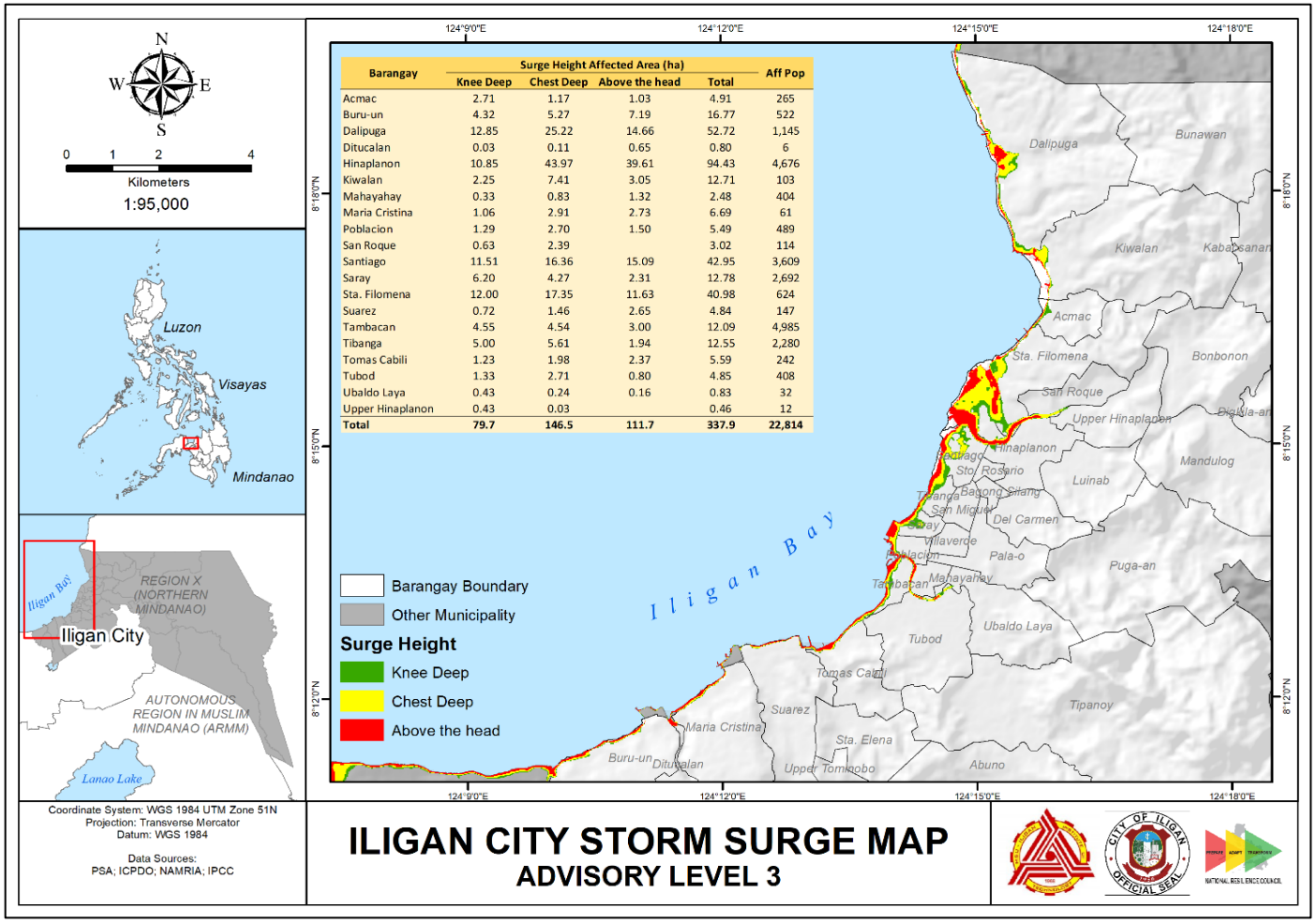
ILIGAN CITY STORM SURGE MAP
ADVISORY LEVEL 1

Figure 70. Storm Surge Advisory Level 1 Exposure Map



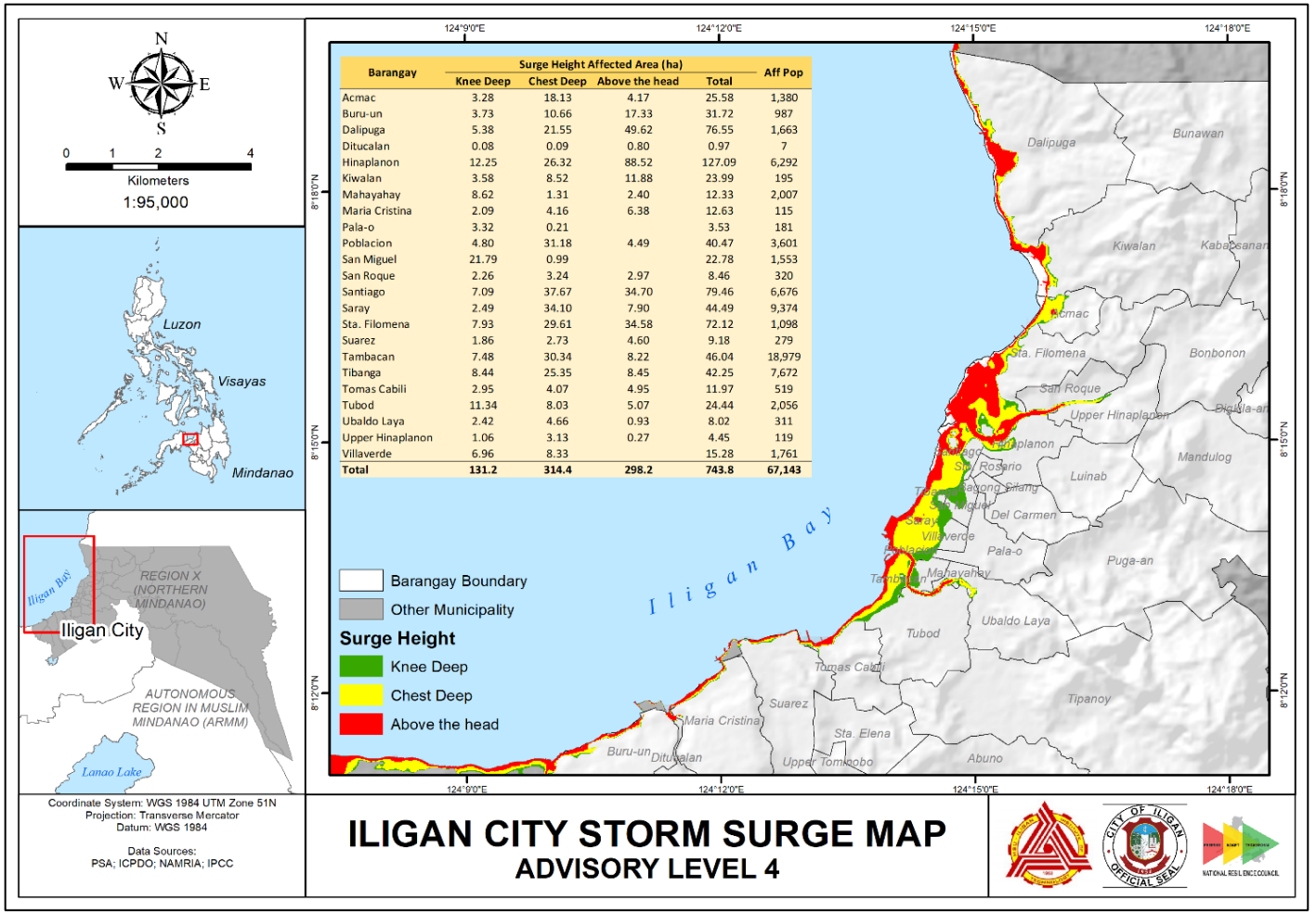
Barangay	Surge Height Affected Area (ha)				Aff Pop
	Knee Deep	Chest Deep	Above the head	Total	
Acmac	0.23	0.62	0.34	1.19	64
Buru-un	1.60	3.55	2.99	8.14	253
Dalipuga	7.45	9.11	1.17	17.72	385
Ditucalan	0.12	0.04	0.52	0.69	5
Hinaplanon	16.21	22.60	13.06	51.87	2,568
Kiwalan	1.68	1.44	1.13	4.24	34
Mahayahay	0.31	0.69	0.53	1.54	250
Maria Cristina	0.91	1.57	0.86	3.34	30
Poblacion	0.70	1.01	0.23	1.94	173
San Roque	0.70	0.01		0.70	27
Santiago	2.99	7.03	7.19	17.21	1,446
Saray	0.93	1.45	0.55	2.92	615
Sta. Filomena	3.61	7.16	3.40	14.18	216
Suarez	0.63	1.04	1.27	2.94	89
Tambacan	1.31	1.94	0.76	4.01	1,653
Tibanga	0.95	1.00	0.54	2.48	451
Tomas Cabili	0.62	1.66	0.48	2.76	119
Tubod	0.56	0.08		0.64	54
Total	**41.5**	**62.0**	**35.0**	**138.5**	**8,433**

Figure 71. Storm Surge Advisory Level 2 Exposure Map



Barangay	Surge Height Affected Area (ha)				Aff Pop
	Knee Deep	Chest Deep	Above the head	Total	
Acmac	2.71	1.17	1.03	4.91	265
Buru-un	4.32	5.27	7.19	16.77	522
Dalipuga	12.85	25.22	14.66	52.72	1,145
Ditucalan	0.03	0.11	0.65	0.80	6
Hinaplanon	10.85	43.97	39.61	94.43	4,676
Kiwalan	2.25	7.41	3.05	12.71	103
Mahayahay	0.33	0.83	1.32	2.48	404
Maria Cristina	1.06	2.91	2.73	6.69	61
Poblacion	1.29	2.70	1.50	5.49	489
San Roque	0.63	2.39		3.02	114
Santiago	11.51	16.36	15.09	42.95	3,609
Saray	6.20	4.27	2.31	12.78	2,692
Sta. Filomena	12.00	17.35	11.63	40.98	624
Suarez	0.72	1.46	2.65	4.84	147
Tambacan	4.55	4.54	3.00	12.09	4,985
Tibanga	5.00	5.61	1.94	12.55	2,280
Tomas Cabili	1.23	1.98	2.37	5.59	242
Tubod	1.33	2.71	0.80	4.85	408
Ubaldo Laya	0.43	0.24	0.16	0.83	32
Upper Hinaplanon	0.43	0.03		0.46	12
Total	**79.7**	**146.5**	**111.7**	**337.9**	**22,814**

Figure 72. Storm Surge Advisory Level 3 Exposure Map



Barangay	Surge Height Affected Area (ha)				Aff Pop
	Knee Deep	Chest Deep	Above the head	Total	
Acmac	3.28	18.13	4.17	25.58	1,380
Buru-un	3.73	10.66	17.33	31.72	987
Dalipuga	5.38	21.55	49.62	76.55	1,663
Ditucalan	0.08	0.09	0.80	0.97	7
Hinaplanon	12.25	26.32	88.52	127.09	6,292
Kiwalan	3.58	8.52	11.88	23.99	195
Mahayahay	8.62	1.31	2.40	12.33	2,007
Maria Cristina	2.09	4.16	6.38	12.63	115
Pala-o	3.32	0.21		3.53	181
Poblacion	4.80	31.18	4.49	40.47	3,601
San Miguel	21.79	0.99		22.78	1,553
San Roque	2.26	3.24	2.97	8.46	320
Santiago	7.09	37.67	34.70	79.46	6,676
Saray	2.49	34.10	7.90	44.49	9,374
Sta. Filomena	7.93	29.61	34.58	72.12	1,098
Suarez	1.86	2.73	4.60	9.18	279
Tambacan	7.48	30.34	8.22	46.04	18,979
Tibanga	8.44	25.35	8.45	42.25	7,672
Tomas Cabili	2.95	4.07	4.95	11.97	519
Tubod	11.34	8.03	5.07	24.44	2,056
Ubaldo Laya	2.42	4.66	0.93	8.02	311
Upper Hinaplanon	1.06	3.13	0.27	4.45	119
Villaverde	6.96	8.33		15.28	1,761
Total	**131.2**	**314.4**	**298.2**	**743.8**	**67,143**

Figure 73. Storm Surge Advisory Level 4 Exposure Map

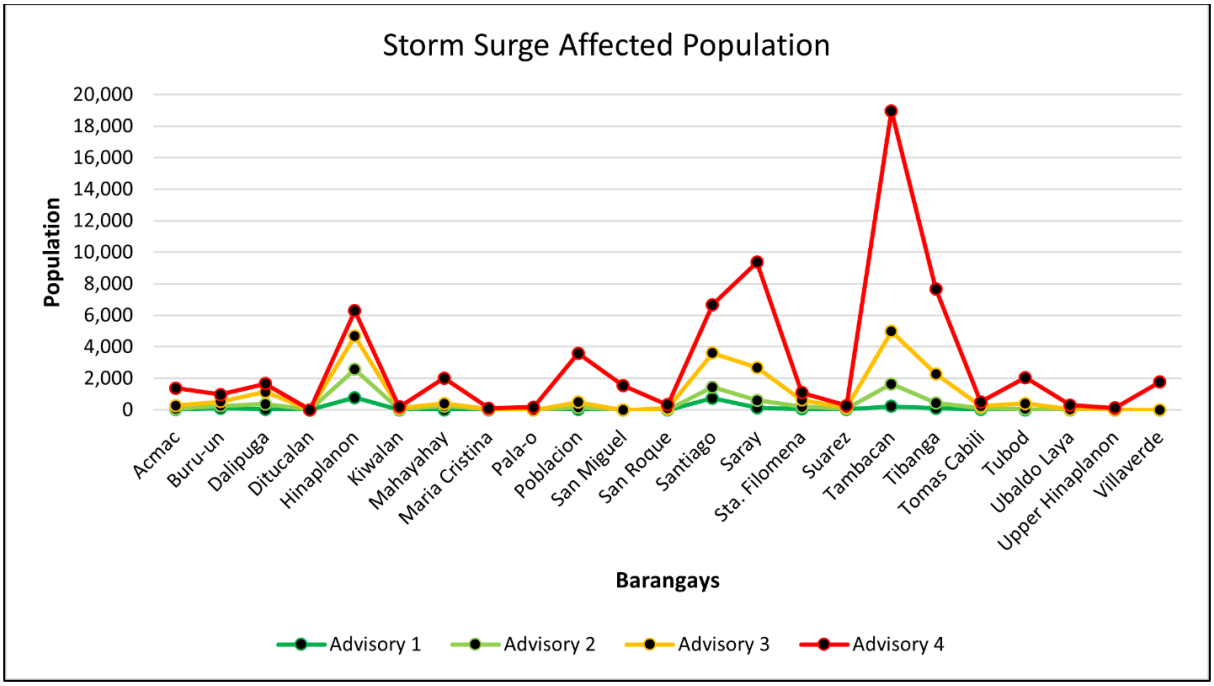


Figure 74. Storm Surge Advisory 1-4 Affected Population (per barangay)

From **Figures 70** to **74**, it shows the exposed areas from storm surge advisory levels which has a widespread effect in Iligan City.

Advisory level 1 has 15 exposed barangays and the most exposed barangays are Barangay Hinaplanon, Santiago, Tambacan, Saray, Tibanga, and Buru-un with 784, 745, 227, 150, 115, and 107 affected population, respectively.

For advisory level 2, 18 barangays are exposed and the most exposed barangays are Barangay Hinaplanon, Tambacan, Santiago, Saray, Tibanga, Dalipuga, Buru-un, Mahayahay, Sta. Filomena, and Poblacion, with 2 568, 1 653, 1 446, 615, 451, 385, 253, 250, 216, and 173 affected population.

At advisory level 3, the most affected barangays are Barangay Tambacan, Hinaplanon, Santiago, Saray, Tibanga, Dalipuga, Sta. Filomena, and Buru-un with more than 500 affected population.

And at advisory level 4, the most exposed barangays having more than 1 000 affected population are Barangays Tambacan, Saray, Tibanga, Santiago, Hinaplanon, Poblacion, Tubod, Mahayahay, Villaverde, Dalipuga, San Miguel, Acmac, and Sta. Filomena.

With these recorded barangays being exposed and are affected with large number of populations, it is important to conduct research, regulate and conduct mitigation measures on these exposed elements.

Based from the CDRA assessment up to the exposure hazard maps, the table below depicts the No Susceptibility land area in percentage of each barangay to each hazard. Barangays with less than 1% are marked 0.00. This will guide policy makers and involved agencies.

Table 29. Summarized No Susceptibility Percentage (%) to each Barangay

Barangay	Flood	Earthquake-Induced Landslide		Rain-Induced Landslide	Liquefaction
		Wet	Dry		
Abuno	91.42	17.91	52.52	12.68	15.68
Acmac	56.73	97.64	0.00	47.28	94.49
Bagong Silang	0.00	1.89	0.00	0.00	0.00
Bonbonon	75.67	21.40	96.09	57.34	86.31
Bunawan	98.23	0.00	0.00	3.39	0.00
Buru-un	87.07	52.89	0.00	12.99	43.84
Dalipuga	94.13	43.67	0.00	7.27	0.00
Del Carmen	86.25	78.55	0.00	13.65	0.45
Digkilaan	83.51	0.00	98.92	16.13	95.70
Ditucalan	89.89	1.17	0.00	14.77	56.25
Dulag	95.59	0.00	48.26	5.28	93.55
Hinaplanon	4.38	0.00	0.00	97.11	0.00
Hindang	0.00	18.61	0.00	6.07	0.00
Kabacsanan	95.95	0.03	0.00	3.98	0.00
Kalilangan	99.40	0.00	12.24	1.45	57.29
Kiwalan	92.31	11.48	95.88	9.69	0.00

Barangay	Flood	Earthquake-Induced Landslide		Rain-Induced Landslide	Liquefaction
		Wet	Dry		
Lanipao	93.68	0.00	86.34	7.11	91.62
Luinab	96.85	39.77	0.00	3.35	0.00
Mahayahay	0.00	0.00	0.00	0.00	0.00
Mainit	95.40	24.86	99.49	5.65	79.44
Mandulog	62.52	0.00	64.04	38.76	17.60
Maria Cristina	94.46	30.79	0.00	10.88	94.02
Palao	79.98	98.57	0.00	19.42	0.00
Panoroganan	98.23	26.01	73.71	7.85	70.51
Poblacion	0.00	0.00	0.00	0.00	0.00
Puga-an	83.49	4.84	59.72	20.08	0.03
Rogongon	96.66	56.07	85.55	0.00	81.85
San Miguel	0.00	0.00	0.00	0.00	0.00
San Roque	18.55	99.29	0.00	80.71	47.84
Santiago	5.19	0.00	0.00	0.00	0.00
Saray	0.00	0.00	0.00	95.51	0.00
Sta. Elena	89.27	83.55	0.00	11.31	0.58
Sta. Filomena	71.55	92.83	0.00	35.72	50.71
Sto. Rosario	0.49	0.00	0.00	0.00	0.49
Suarez	0.49	0.00	0.00	13.97	31.89
Tambacan	1.59	0.00	0.00	97.86	0.00
Tibanga	1.26	0.00	0.00	86.54	0.00
Tipanoy	92.16	0.73	8.96	11.87	14.16
Tomas L. Cabili	91.05	95.53	0.00	8.27	0.00
Tubod	76.03	88.87	96.46	24.64	0.00
Ubaldo Laya	70.42	69.57	88.06	28.62	0.18
Upper Hinaplanon	59.55	51.38	0.00	40.76	4.80
Upper Tominobo	94.97	17.50	0.00	10.38	81.99
Villa Verde	31.09	0.00	0.00	70.76	0.00

Source: CDRA, Iligan City

The table provided further indicates the barangays prone to storm surge impact, along with the corresponding affected area in hectares and the percentage of non-susceptible land. It's important to highlight that this assessment is based on storm surge advisory levels, resulting in varying percentages of non-susceptibility depending on the advisory level. As the advisory levels increase, the percentage of non-susceptible land decreases for the affected barangays.

Table 30. Summarized No Susceptibility Percentage (%) to each Barangay

Barangay	Storm Surge							
	Advisory 1		Advisory 2		Advisory 3		Advisory 4	
	Affected Area (ha)	***No Susceptibility (%)***	*Affected Area (ha)*	***No Susceptibility (%)***	*Affected Area (ha)*	*No Susceptibility (%)*	*Affected Area (ha)*	*No Susceptibility (%)*
Acmac	0.39	**99.70**	1.19	**99.06**	4.91	**96.14**	25.58	**79.87**
Buru-un	3.44	**99.36**	8.14	**98.5**	16.77	**96.9**	31.72	**94.14**
Dalipuga	1.68	**99.83**	17.72	**98.21**	52.72	**94.67**	76.55	**92.26**
Ditucalan	0.52	**99.90**	0.69	**99.88**	0.80	**99.86**	0.97	**99.83**
Hinaplanon	15.82	**94.92**	51.87	**83.35**	94.43	**69.69**	127.09	**59.2**
Kiwalan	1.29	**99.86**	4.24	**99.55**	12.71	**98.66**	23.99	**97.47**
Mahayahay	0	**100**	1.54	**96.85**	2.48	**94.93**	12.33	**74.81**
Maria Cristina	1.19	**99.91**	3.34	**99.74**	6.69	**99.49**	12.63	**99.03**
Palao	0.35	**99.83**	0.00	**100**	0.00	**100**	3.53	**98.32**

Barangay	Storm Surge							
	Advisory 1		Advisory 2		Advisory 3		Advisory 4	
	Affected Area (ha)	***No Susceptibility (%)***	*Affected Area (ha)*	***No Susceptibility (%)***	*Affected Area (ha)*	*No Susceptibility (%)*	*Affected Area (ha)*	*No Susceptibility (%)*
Poblacion	0.00	**100**	1.94	**95.22**	5.49	**86.48**	40.47	**0.326**
San Miguel	0.00	**100**	0.00	**100**	0.00	**100**	22.78	**59.14**
San Roque	0.00	**100**	0.70	**99.5**	3.02	**97.84**	8.46	**93.95**
Santiago	0.00	**100**	17.21	**84.3**	42.95	**60.83**	79.46	**27.53**
Saray	0.71	**98.41**	2.92	**93.45**	12.78	**71.31**	44.49	**0.13**
Sta. Filomena	3.88	**99.16**	14.18	**96.92**	40.98	**91.1**	72.12	**84.33**
Suarez	1.44	**99.76**	2.94	**99.52**	4.84	**99.21**	9.18	**98.5**
Tambacan	0.55	**98.82**	4.01	**91.42**	12.09	**74.12**	46.04	**1.464**
Tibanga	0.64	**98.56**	2.48	**94.43**	12.55	**71.82**	42.25	**5.147**
Tomas L. Cabili	0.77	**99.66**	2.76	**98.76**	5.59	**97.5**	11.97	**94.64**
Tubod	0.00	**100**	0.64	**99.84**	4.85	**98.77**	24.44	**93.82**
Ubaldo Laya	0.00	**100**	0.00	**100**	0.83	**99.76**	8.02	**97.72**
Upper Hinaplanon	0.00	**100**	0.00	**100**	0.46	**99.81**	4.45	**98.18**
Villa Verde	0.00	**100**	0.00	**100**	0.00	**100**	15.28	**68.08**

Source: CDRA, Iligan City

Moreover, in completion to the hazard exposed maps, the following are the specified assessments on each sector.

a. Social Sector

Table 31. Climate and Disaster Risk Assessment on Social Sector

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
Flooding	Residents of 44 barangays spanning all age groups	**44 barangays that have uncleaned surroundings were the presence of stagnant water, low-lying areas during prolonged floods**	Unaware of pre-emptive evacuation procedures. Consequently, they may be evacuating to undesignated evacuation sites where they will be vulnerable to diseases and are lacking basic commodities. In such situations, it's crucial to establish clear and effective communication channels to inform residents about evacuation plans, designated safe locations, and to ensure they have access to necessary	Awareness through IEC is essential for preventing and controlling diseases related to environmental sanitation and the construction of proper drainage. It's important to encourage early consultations with health centers when feeling unwell and to request necessary medicines. Additionally, ensuring access to basic commodities such as food, water, clothes,	Individuals who have contracted the dengue virus, leptospirosis, and other water-borne diseases like HEPA A, C, D, and E, as well as amebiasis, are at risk of experiencing exacerbated health issues. Additionally, those with co-morbid health conditions may see a deterioration in their overall health. IDPs are also vulnerable to worsening health	**Manifest illness to affected individuals such as fever, rashes, fatigue, vomiting, diarrhea, abdominal pain, loose bowl movement, jaundice, acute renal failure, edema which can lead to death.**	Environmental sanitation such as frequent cleaning of surroundings and drained stagnant water (breedings sites mosquitoes); Construct drainage to prevent floods and proper maintenance for it	**Reinforce the implementation of Aksyon barangay Kontra Dengue (ABKD). Full implementation of BDRRMO;** **SP Resolution for a massive reconstruction of the drainage system in Iligan.**

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
			supplies and medical care during evacuations.	blankets, and health services at evacuation sites is crucial.	due to the non-conducive living conditions they may be experiencing.			
Armed Conflict – Population Migration	All populations residing in urban areas including transient individuals	**Saray Tambacan Santiago Tibanga Poblacion Tubod Bagong Silang Palao Ubaldo Laya Del Carmen Hinaplanon Dalipuga Suarez Buru-un**	Constrained areas with large population that hinders education, healthcare, social services, and food security, impacting safety	Urbanization outside urban areas	Inefficient education system, medical and social services. Insecurity of food and safety.	**Price increases due to demand, availability of food supply and education, medical and social services**	Monitor the influx of migrants to determine the severity of hazard to make drastic measures	**Inclusion of urban expansion areas in the Land Use Plan and Zoning Map**
Emerging and Re-emerging infectious diseases (e.g. pandemics)	All population including transient individuals	**44 barangays**	No vaccination or decreased vaccination coverage to the eligible population which resulted to wean off immunity. Lack of awareness, inaccessible to health programs /activities	Educational status, access to health programs/ activities, economic status - employment	Widespread infection of infectious diseases at the community level.	**The exhausted healthcare system of the city leads to full hospital capacity and insufficient supplies of medicines.**	Institutionalization of City Epidemiology Surveillance Unit in conducting active and passive disease surveillance to Emerging and re-emerging infectious	**Propose A.O. for Institutionalization of City Epidemiology Surveillance Unit with plantilla human resource and sufficient materials and equipment for surveillance and response.**

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
			because of economic status – unemployment.			**It resulted in casualties and loss of lives.**	diseases to reduce/prevent the disease from spreading.	

Source: CDRA, Iligan City

b. Economic Sector

Table 32. Climate and Disaster Risk Assessment on Economic Sector

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
FLOODING	Market, businesses, stalls, housing, and subdivisions & Agricultural Industries	**DEL CARMEN BAYUG ISLAND BRGY. HINAPLANON BAGONG SILANG SAN MIGUEL SANTIAGO MAHAYAHAY TAMBACAN LUINAB UPPER HINAPLANON**	The roads suffered from inadequate development due to poor planning and an insufficient drainage system. Also, for agricultural industries, there is no storage facility for crops, limited flood mitigation, and no agricultural insurance.	``1	There will be damaged market roads and even highways that would delay business operations.	**LOW INCOME GENERATION**	Construction of effective drainage system. Regular dredging of canals. Establish flood control system.	**SP Resolution for a massive reconstruction of the drainage system in Iligan.**

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
ILLEGAL QUARRYING	Livestock	**MANDULOG RIVER BONBONON DIGKILAAN**	Limited grazing area and soil quality	Regulated by CENRO with existing local ordinances	There will be higher incident of livestock diseases, low livestock production, and low income for farmers.	**LOWER TAX REVENUE** **HIGHER POVERTY INCIDENCE FOR FARMERS** **HIGHER PRICES FOR LIVESTOCK** **LOW FARMER INCOME**	Coordination with barangay officials for the strict implementation of the law. Checkpoints must be conducted.	**SP Resolution to prevent illegal quarrying.** **Shift to sustainable fisheries production consistent with mangrove and wetland type of habitats.**
	Fish pen	**TAMBACAN BURU-UN SANTIAGO**	There is limited location for fish pens, and limited capacity to relocate fish pen.	NONE	Higher incidence for fish diseases, low production of fish, and low farmer income.			
NON-SEGREGATION OF GARBAGE	Tourist Industry	**DODIONGAN FALLS BONBONON BURU-UN SPRINGS ROGONGON AND OTHER TOURIST SPOTS**	Proximity to sanitary landfill, and the construction of sanitary landfills not being fully functional.	Regulated by CENRO with existing local ordinances and central facilities.	There will be a decrease water quality of tourist spots, and reduced tourist visitors.	**DECREASED OPPORTUNITY TO EARN INCOME**	Coordination with barangay officials to strictly implement solid waste management	**Strengthen the RA 9003 Solid Waste Management Act**

Source: CDRA, Iligan City

c. Infrastructure Sector

Table 33. Climate and Disaster Risk Assessment on Infrastructure Sector

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
Flooding (Surface Overflow)	Low Rise Buildings, Roads, Bridges, Drainages, Flood Controls	**DEL CARMEN HINAPLANON BAGONG SILANG SAN MIGUEL SANTIAGO MAHAYAHAY TAMBACAN UPPER HINAPLANON MANDULOG SAN ROQUE SARAY TIBANGA-VH SANTO ROSARIO KIWALAN ACMAC STA. FELOMINA**	Substandard/Inappropriate materials, poor planning, and design (no. of storey), poor infrastructure maintenance, constructed using light materials, year of construction (some buildings are built beyond operating life)	Strict implementation of no-build zones, efficient IEC thru socmed, availability of Early Warning System, availability of high-quality construction materials	Slowdown of transportation due to road blockage, hampered the delivery of goods and services, slow down emergency responses	**Loss of assets and properties, loss of lives, damage to lifelines, loss of livelihood, high cost of maintenance**	Improvement of drainage and irrigation, Bldgs on fill/stilts, using flood-barriers, improved design of bridges (considering the highest recorded flood height)	**Low rise bldgs** - Zoning Ordinances pertaining to Low rise buildings, Provision of ordinance on buildings located on flood prone areas, Adaption of Resettlement and Relocation Action Plan (RRAP), Institutionalization of CLUP, LCCAP, etc. **Bridges** & **Roads**
Rain-induced Landslide	Roads, Residential Buildings, Drainages	**DALIPUGA KIWLAN ROGONGON STA. FELOMINA**	Lack/insufficient slope protection, poor drainage system.	Strict implementation of no-build zones, constant monitoring of road	Slowdown of transportation due to road blockage, hampered the delivery of goods and services, slow		Improvement of drainage and irrigation, construction of slope protection on landslide-prone areas	

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
				networks and drainages.	down emergency responses, clogging of drainages.			
Earthquake Ground shaking	High rise buildings, bridges, roads	**Tibanga Poblacion Palao Tubod**	Poor planning and design for high-magnitude earthquake	Regular monitoring of structural integrity, access to latest building standards	Slowdown of transportation due to road blockage, hampered the delivery of goods and services, slow down emergency responses, clogging of drainages	**Loss of assets and properties, loss of lives, damage to lifelines,**	Build earthquake-proof structures, providing education on earthquake safety, demolishing dilapidated structures	**High rise bldgs** - Zoning Ordinances pertaining to High rise buildings, Provision of ordinance on buildings located near faultline areas, Institutionalization of CLUP, LCCAP, etc.
Industrial Hazard	Boilers Buildings Lifeline Utilities Kiln	**Kiwalan Maria Cristina Ditucalan**	Poor safety protocols and standards, unsafe practices and conditions, delayed safety validation	Compliant to DOLE standard for safety (docs), required employees to take BOSH/COSH/LCM, monitoring of safety manhours	Hampered operation, water, power, and communication interruption	**Economic loss, Loss of assets and properties, loss of lives**	Comply DOLE safety standards, provide BOSH/COSH/LCM to personnel, Follow safety protocols and standards	**Boilers/Kiln** - Zoning Ordinances pertaining to Industries, Institutionalization of

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
								CLUP, LCCAP, etc. **Utilities** -
Armed Conflict	Lifeline Utilities Buildings	**Maria Cristina Rogongon Poblacion Ditucalan Abuno**	Lack of Security	Trained personnel/ bomb squads and K9 units, trained responders, in placed fire suppression system	hampered the delivery of goods and services, slow down emergency responses, water, power, and communication interruption	**Economic loss, loss of lives, loss of assets and properties**	Provide security, establish connections with local leaders, improve police and army visibility, Provide government services to insurgent-prone area like infrastructures (health centers, schools, FMRs, etc.), education and livelihood,	**Utilities, Buildings & Bridges -** Provision of local peace process ordinance

Source: CDRA, Iligan City

d. Environment Sector

Table 34. Climate and Disaster Risk Assessment on Environment Sector

Climatic & Non-Climatic Impacts (Hazards)	Exposed Elements	Location Specify exact location	Reason/s for Vulnerability of the Exposed Elements	Capacities of exposed and vulnerable elements	Immediate Influence on Exposed Human/Asset	Impact	Interventions	Policy
Flooding	Forest ecosystem flora and fauna	**Rogongon Panoroganan Kalilangan Mt. Agad-agad (Pugaan) Maria Cristina Ditucalan**	The forest's vulnerability, along with its rich flora and fauna, is defined by the presence of very steep slopes and the precarious nature of loose and weathered rocks and soil.	The tropical rainforest's resilience is owed to its multi-layered structure, soil macropores created by burrowing creatures, abundant organic matter from substantial litter fall, and an extensive root system.	Deforestation, irresponsible mining, land conversion, armed conflict, unregulated wildlife hunting, and unsustainable slash-and-burn practices have an immediate and detrimental impact on both the forest ecosystem and human communities.	**Super-saturated soil leads to a cascade of environmental consequences, including heightened surface runoff, increased soil erosion, rain-induced landslides, loss of biodiversity and habitat, exposed soils, amplified lowland sedimentation, reduced freshwater productivity from silted rivers, and decreased photosynthetic production in terrestrial plants.**	Installation of rain gauges and hydrological sensors at appropriate size; Generate policy for the establishment of Protected Area; Crafting of the Ancestral Domain Sustainable development and Protection Plan (ADSDPP) and forest land use plan; Sustainable finance forest guards for sustained monitoring. Establish for	**Crafting of the Ancestral Domain Sustainable Development and Protection Plan (ADSDPP);** **Forest Land Use Plan;** **City ordinance for the deputizing, funding, training, and equipping of forest guards;** **City ordinance for the establishment of the payment for ecosystem services**

Climatic & Non-Climatic Impacts (Hazards)	Exposed Elements	Location Specify exact location	Reason/s for Vulnerability of the Exposed Elements	Capacities of exposed and vulnerable elements	Immediate Influence on Exposed Human/Asset	Impact	Interventions	Policy
							payment for ecosystems services; Establish and strengthen partnerships with private organizations, NGOs, and local government to strengthen forest protection.	
	Coastal ecosystem flora and fauna	**Santiago, Tambacan, Saray, Buruun, Bayug island (Hinaplanon), Maria Cristina**	Low salinity levels can greatly affect the sensitivity of certain aquatic species, impede the photosynthetic production of coastal plants, and increase the vulnerability of young mangrove seedlings to dislodgment by wave action.	Mangroves provide a crucial filtering effect, defend against coastal flooding, and stabilize sediments, serving as a vital natural barrier along the shoreline.	Overharvesting for ruminant feeding and fuelwood, displacement due to coastal infrastructure development, waste dumping, dynamite and cyanide fishing, and coral destruction for the aquarium trade.	**The effects of increased sedimentation and siltation of corals, eutrophication, reduced fish and crustacean coastal productivity, weakening and death of mangrove trees, and the deprivation of migratory birds of their seasonal winter habitat collectively**	Come up with the Coastal used plan with corresponding coastal zoning ordinances, PPAs, and LIBs; Establish for payment for ecosystems services; Establish and strengthens partnerships with	**MOA signing between private, government, and civil society sectors.**

Climatic & Non-Climatic Impacts (Hazards)	Exposed Elements	Location Specify exact location	Reason/s for Vulnerability of the Exposed Elements	Capacities of exposed and vulnerable elements	Immediate Influence on Exposed Human/Asset	Impact	Interventions	Policy
						impact the coastal ecosystem.	private organizations, NGOs, and local government for coastal protection; Installation of hydrological sensor for early flood warning system;	
	Marine ecosystem flora and fauna	**Dalipuga, Maria Christina, Buruun**	Low salinity levels, leading to reduced photosynthetic production in phytoplankton, can affect the delicate balance of aquatic ecosystems.	Wave action serves to uniformly distribute salt throughout the entire sea profile.	The intrusion of foreign and local fishing vessels equipped with advanced fishing technology leads to the overharvesting of fish resources.	**The disturbance of spawning grounds, coupled with overfishing and insufficient phytoplankton, results in reduced natural fish stock replenishment and lower fish yield in the ecosystem.**	Crafting and enactment of local marine ordinances; Establish and maintain the mechanism for the Payment for Ecosystems Services.	**Crafting and ratification of city ordinances on the marine protection**

Climatic & Non-Climatic Impacts (Hazards)	Exposed Elements	Location Specify exact location	Reason/s for Vulnerability of the Exposed Elements	Capacities of exposed and vulnerable elements	Immediate Influence on Exposed Human/Asset	Impact	Interventions	Policy
Earthquake	Forest ecosystem flora and fauna	**Rogongon, Panoroganan, Kalilangan, Mt. Agad-agad (Pugaan), Maria Christina, Ditucalan**	Has karst landscape, steep slopes, and highly weathered loose rocks.	Extensive root system holds the soil and rocks from erosion and landslide.	Deforestation, irresponsible mining, armed conflict, and unsustainable slash-and-burn practices have an immediate and detrimental impact on both the forest ecosystem and human communities.	**Increases the generation of sinkholes and earthquake-induced landslide.**	Ensure the quality of the various soil and water conservation structures so as to prevent or reduce the impact of earthquake reduced landslide.	**None**
	Coastal ecosystem flora and fauna	**Santiago, Tambacan, Saray, Buruun, Bayug island (Hinaplanon), Maria Christina**	There is a highly liquefaction area and karst landscapes.	Mangrove trees have extensive root system that helps them stabilize from the ground/earth shaking.	Overharvesting for ruminant feeding and fuelwood, displacement due to coastal infrastructure development, waste dumping, dynamite and cyanide fishing, and coral destruction for the aquarium trade.	**Weakening of mangrove trees from disturbances results to mangrove tree fell thereby disrupts the habitat of coastal fauna and results to loss of coastal biodiversity; The highly disturbed and/or displaced mangrove sub ecosystem increases sediment deposition to seagrasses and**	Manage coastal ecosystems for a resilient defense against tsunamis, ensuring the health of mangroves, seagrasses, and corals; Protect the coast ecosystem from overharvesting of leaves and fuelwood from the mangroves,	**None**

Climatic & Non-Climatic Impacts (Hazards)	Exposed Elements	Location Specify exact location	Reason/s for Vulnerability of the Exposed Elements	Capacities of exposed and vulnerable elements	Immediate Influence on Exposed Human/Asset	Impact	Interventions	Policy
						coral reefs thereby affecting coastal productivity.	dynamite fishing; cyanide fishing; destruction of corals to collect aquarium fishes.	
	Marine ecosystem flora and fauna	**Municipal waters**			Intrusion of foreign and local fishing vessel with high-tech fishing equipped resulting to overharvesting of fish.	**Lowered replenishment of marine fish stocks due to the destruction of spawning grounds**	Regulate fishing	**None**
Deforestation	Forest ecosystems flora and fauna	**Rogongon Panoroganan Kalilangan Mt. Agad-Agad (Pugaan) Maria Cristina Ditucalan**	Very steep slopes and loose, weathered rocks and soil	Karst landscape allows infiltrated water to percolate for groundwater replenishment and thereby increases time for soils to be super saturated with water.	Conventional farming, pasture grazing, and tree plantation	**Destruction of forest habitat resulting to loss of biodiversity;** **Conventional farming increases soil erosion;** **Pasture grazing compacts the soil which reduces infiltration and increases surface runoff.**	Craft and ratify city ordinances that will strongly penalize deforestation and that will empower forest guards in terms of training, equipment and compensation; Delineating and demarcating forest land use zone	**None**

Climatic & Non-Climatic Impacts (Hazards)	Exposed Elements	Location Specify exact location	Reason/s for Vulnerability of the Exposed Elements	Capacities of exposed and vulnerable elements	Immediate Influence on Exposed Human/Asset	Impact	Interventions	Policy
							especially key critical habitats; Selection, deputization, training, equipping and compensation of forest guards	
	Coastal ecosystem flora and fauna	**Santiago Tambacan Saray Buru-un Bayug Island (Hinaplanon) Maria Cristina**	Mangrove seedlings in early stages of planting can easily be dislodged by wave action; Naturally occurring faunal species in mangrove areas are sensitive to habitat change (mangrove tree removal) resulting to decrease in its population; Corals are sensitive to	Muddy surfaces and venomous reptiles make the area impenetrable; Filtering effect of the mangroves reduces the deposition of sediment to the coral reefs defense in coastal flooding	Land conversion such as establishment of coastal roads	**Increased sedimentation and siltation of corals; eutrophication; reduced fish and crustacean coastal productivity; weakening and death of mangrove trees; deprive migratory birds of their temporal habitat for winter**	Craft and ratify city ordinances that will strongly penalize and that will empower bantay dagat in terms of training, equipment and compensation; Delineating and demarcating coastal land use zone especially key critical habitats; Selection, deputization, training, equipping	**None**

Climatic & Non-Climatic Impacts (Hazards)	Exposed Elements	Location Specify exact location	Reason/s for Vulnerability of the Exposed Elements	Capacities of exposed and vulnerable elements	Immediate Influence on Exposed Human/Asset	Impact	Interventions	Policy
			increase in water temperature				and compensation of bantay dagat; Establish and strengthens partnerships with private organizations, NGOs, and local government for coastal protection; Craft and ratify integrated coastal management plan	
Mining	Forest ecosystem flora and fauna	**Rogongon Panoroganan Kalilangan Mt. Agad-agad (Pugaan) Maria Cristina Ditucalan**	Very steep slopes; loose and weathered rocks and soil	Karst landscape allows infiltrated water to percolate for groundwater replenishment and thereby increases the time for soils to be super saturated with water	Altered geomorphology	**Soil Erosion;** **Contamination of soil, air and water;** **Mined tailings;** **Silted rivers;** **Reduced aquatic productivity;**	Mining companies should comply and followed the policies and regulation provided in the law in minimizing the impact of its activities and establishing rehabilitation measures to its mined-out areas.	**None**

Climatic & Non-Climatic Impacts (Hazards)	Exposed Elements	Location Specify exact location	Reason/s for Vulnerability of the Exposed Elements	Capacities of exposed and vulnerable elements	Immediate Influence on Exposed Human/Asset	Impact	Interventions	Policy
						Affected corals and seagrasses		
Uncontrolled Waste Disposal	Forest ecosystem flora and fauna	**Rogongon Panoroganan Kalilangan Mt. Agad-Agad (Pugaan) Maria Cristina Ditucalan**	Inability to biodegrade plastic waste	Rich in microorganisms that degrades biodegradable wastes; Biodegradable wastes can be a source of food for forest fauna	Forest seedlings covered with microplastic; Entry of microplastic in to food web chain.	**Contaminated water bodies, leachate generated from the waste enters groundwater which poses a risk in water supply to communities.**	Deputize *bantay kalikasan* guard in clean up drives.	**Strengthen the RA 9003 Solid Waste Management Act**
	Coastal ecosystem flora and fauna	**Santiago Tambacan Saray Buru-un Bayug Island (Hinaplanon) Maria Cristina**		Rich in microorganisms that degrades biodegradable wastes; Biodegradable wastes can be a source of food for coastal fauna	Conversion of coastal area into sanitary landfills; Deposition of plastic wastes;	**Contaminated bodies of water due to leachate**	Deputize bantay dagat in clean up drives; Establish and strengthen partnerships with private organizations,	**Strengthen the RA 9003 Solid Waste Management Act**

Climatic & Non-Climatic Impacts (Hazards)	Exposed Elements	Location Specify exact location	Reason/s for Vulnerability of the Exposed Elements	Capacities of exposed and vulnerable elements	Immediate Influence on Exposed Human/Asset	Impact	Interventions	Policy
					Seagrasses and corals are covered with macroplastics; Microplastics enter the food web chain.		NGOs, and local government to strengthen coastal protection by conducting seminars and awareness with the involvement of communities residing in coastal areas in proper waste disposal; Ensure sustained proper waste management; Upcycling plastic wastes	
	Marine ecosystem flora and fauna	**Dalipuga Maria Cristina Buru-un**	Inability to biodegrade plastic waste	Biodegradable waste can be source of marine fauna	High solar leads to photodegradation which then generate microplastics	Entry of microplastic marine food chain; Marine fauna suffocated and/or strangulated by microplastics	Establish and strengthen partnerships with private organizations, NGOs, and local government to strengthen marine protection by conducting seminars and awareness with	**Strengthen the RA 9003 Solid Waste Management Act**

Climatic & Non-Climatic Impacts (Hazards)	Exposed Elements	Location Specify exact location	Reason/s for Vulnerability of the Exposed Elements	Capacities of exposed and vulnerable elements	Immediate Influence on Exposed Human/Asset	Impact	Interventions	Policy
							the involvement of community in proper waste disposal; Ensure IEC drive for fisher folks and other vessels on the proper disposal of their waste; Conduct clean-up drive	

Source: CDRA, Iligan City

e. Institutional Sector

Table 35. Climate and Disaster Risk Assessment on Institutional Sector

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
Heavy Rainfall (Flood Inundation)	BLGUs, Students, Men and Women, Marginalized Sector, Businesses, Schools, Residentials, Transport Groups	**Santiago, San Miguel, Hinaplanon, Tibanga, Saray, Mahayahay, Tambacan Tubod, Ubaldo Laya, Palao, San Roque, Upper Hinaplanon, Mandulog, Digkilaan, Abuno, Tipanoy Villaverde**	LGUs are facing a range of challenges in disaster preparedness and response. These include a lack of full awareness among BLGUs regarding the impact of CCA and the context of the DRRM Framework, as well as insufficient IEC programs. Furthermore, there are issues related to slow response in making decisions about work and class suspensions, the use of outdated Incident	BLGUs have taken proactive steps by establishing BDRRMCs to enhance local disaster preparedness. While IEC materials have been supplied, there remains a challenge in ensuring their availability across all barangays. Public advisories and declarations from the LCE are effectively disseminated during states of emergency, contributing to community awareness. The development of a	A lack of knowledge regarding the implications of climate change and disaster risk management has led to various challenges. This includes the predicament of stranded employees during emergencies, which exposes them to potential health issues. Additionally, there have been delays and lapses in responding to emergencies, leading to an inefficient use of resources.	**Damage and/or loss of properties and lives.**	Implement a comprehensive emergency response strategy involves the revision of the Incident Command System Manual, installation of early warning equipment, and training personnel to proficiently monitor, interpret, and track historical data from the early warning system.	**Develop and implement a comprehensive disaster risk reduction and management strategy, including the establishment of clear communication protocols for public advisories by local chief executives, strengthening early warning systems, providing guidance to schools and workplaces on contingency plans, conducting regular drills, enhancing coordination among various stakeholders, and institutionalizing Barangay ICS as approved by LGU-Iligan for effective**

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
			Command System Manuals and Operating Manuals, and a lack of a unified emergency response system. Lastly, the limited capacities of the BDRRM teams in conducting emergency response and preparedness activities pose additional challenges for effective disaster management.	standardized emergency response system is in progress, facilitating better coordination from the BDRRMCs at the barangay level to the city-level LGU. There's a collaborative effort towards optimizing the utilization and allocation of DRRM funds to bolster disaster resilience and response capabilities.				**preparedness and response during emergencies.**

Climatic & Non-Climatic Impact Drivers (Hazards)	Exposed Elements	Location Specify Exact Location	Reason/s for Vulnerability of the Exposed Elements	Capacities of Exposed and Vulnerable Elements	Immediate Influence on Exposed Human/Asset	IMPACT	Interventions	Policy
Non-alignment of Iligan City DRRM Plan and its priority PPAs to the NDRRM Framework	Inefficiency of fund utilization intended for PPAs (CCA-DRRM) of Iligan City.	**Iligan City**	Poor Utilization of LDRRM Fund	Existing priority PPAs of Iligan DRRM Plan DRRM actively participate during City Development Council in endorsing Priority PPAs All CCA-DRRM projects are reflected in the Climate Change Expenditure Tagging (CCET).	Change of administration and priority projects. Preference of stakeholders and sectoral concerns Existing projects are not aligned to the success indicators prescribed in the National DRRM Framework	**Delayed development of projects aligned to the National DRRM framework.**	Come up with a new list of priority projects (CCA-DRRM) with reference to CDRA and LCCAP.	**EO to review and update the CDRRM Plan to align with the NDRRM Framework**
Outdated CLUP	Non-responsive PPAs of the City and funding from the National Government	**Iligan City**	Unavailability of some required data for CLUP update	Ongoing CLUP Updates Compliant with existing ordinances, laws, policies, standards and rules and regulations	Non-Issuance of Zoning Certification and building permit processing application	**It will hamper the development of projects related to preparedness and mitigating measures for disaster risk and reduction management.**	Enhanced Iligan City CLUP for year 2024-2033	**None**

Source: CDRA, Iligan City

CHAPTER 4. DEVELOPMENT ISSUES/CONCERNS, GOALS, OBJECTIVES AND STRATEGIES

Development issues and concerns are laid out by sector focus on the 7 strategic areas of the National Climate Change Action Plan. Some issues and concerns are causes/effects of the impacts of climate change while others relate to human inabilities to prepare for the occurrences brought about by climate change. These are based from the City's Comprehensive Land Use Plan and Comprehensive Development Plan of which DRR-CCA was already mainstreamed.

4.1 Development Issues/Concerns

4.1.1 Food Security

1. Damaged crops due to drought and extreme rainfall (agriculture).
2. Polluted waterways resulting to high BOD level (fisheries).
3. Farmers need to be capacitated on farm technologies specifically on climate change adaptation.
4. Insufficient data on agriculture and fisheries.

4.1.2 Water Sufficiency

1. Unequal distribution of water supply.
2. Absence of septage and sewerage facilities.
3. Denuded watershed.

4.1.3 Ecosystems and Environmental Stability

1. Protective forests not delineated.
2. Uncontrolled squatting on coastal areas and river banks.
3. Insufficient and outdated data on biodiversity.
4. Unregulated use of forest resources in the upland.
5. Soil erosion due to deforestation and uncontrolled quarrying.

6. Segregation of solid waste is not strictly implemented at the household level
7. Poor solid/hazardous waste management and sanitation.
8. Huge volume of mixed solid wastes are disposed at the CMRCF affecting the quality of air and water nearby
9. Presence of air pollutants.
10. Presence of flood-prone areas (specifically on low-lying areas and along river banks

4.1.4 Human Security

1. Flood-prone areas are still use for human settlement despite the “danger/no build zone ordinance” (Laxity in the implementation of Policies).
2. Lack of IEC on preparedness and response to climate change risks and disaster risk reduction.
3. Absence of evacuation center.
4. Some barangay health facilities are within flood-prone areas.
5. Resettlement sites are not provided with adequate lifeline facilities (water supply, drainage, etc.) and livelihood for the economically-displaced households.

4.1.5 Climate-smart industries and services

1. Lack of assistance for Small Medium Entrepreneurs (SMEs) to develop capacity for eco- efficient production.
2. Laxity in the enforcement/implementation of environmental laws.
3. Absence of tourism plan for use as blue print to promote green tourism.
4. Absence on baseline data on GHG emissions from industry and other sources.

4.1.6 Sustainable energy

1. Lack of programs for climate- proofing energy.
2. Absence/lack of study on energy efficiency and conservation in Iligan City.
3. Lack of local policies to improve energy efficiency.

4.1.7 Knowledge and Capacity Development

1. Lack of IEC on addressing vulnerability due to climate change and climate variability

4.2 Goal, Objectives, and Strategies

The goals and objectives are extracted from the Iligan's DRR-CCA Enhanced Comprehensive Land Use Plan (CLUP) and Comprehensive Development Plan (CDP) where protection of the ecosystems, disaster resiliency and adaptability to climate change are taken into consideration.

4.2.1 Goal

Ecologically driven, rights-based and transparent governance in a safe, resilient and climate proof environment

4.2.2 Objectives

1. To make Iligan City disaster resilient, a safe place to live, work, and do businesses.
2. To provide an effective and efficient drainage system
3. To treat and dispose wastewater to ensure clean and healthy environment.
4. To rehabilitate and properly utilize forest ecosystem To regenerate and protect coastal ecosystem.
5. To control and manage land development.

6. To achieve an effective waste, water and air pollution management.

4.2.3 Strategies

1. Prepare master plan for possible relocation of infrastructure facilities affected by the impacts of climate change.
2. Conduct study to determine the extent of sea level rise in Iligan City.
3. Determine crops resilient to extreme weather events.
4. Adopt mass transport system (railway or bus rapid transport) to reduce carbon dioxide (CO2) emission.
5. Adopt green architecture.
    i. Urban heat reduction.
    ii. Provides shade from open structures, and canopied walkways.
    iii. Install an open-grid pavement system.
    iv. Provide shade from tree canopy.
6. Water efficient landscaping.
    i. Use of captured rain water.
    ii. Use of recycled waste water.
7. Effective solid waste management.
8. Advocate the implementation of laws/policies that will prevent the adverse impact of climate change.

CHAPTER 5. CLIMATE CHANGE ADAPTATION AND MITIGATION ACTIONS

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
1. Economic Dev't. Sector/ Food Security						
Damaged crops due to drought and extreme rainfall (agriculture)	Crop Production Management & Development Program	20.000	Adopting convergence approach in the development of agriculture, agrarian and environmental protection	5.000	City Agriculture, DA	LGU/National Foreign Agencies
	Fishery Production Management & Development Program	20.000	-	-	City Agriculture, DA, BFAR	LGU/National Foreign Agencies
	Livestock Production Management & Development. Program	25.000	-	-	City Agriculture, DA	LGU/National Foreign Agencies
	Construction of water storage facilities	10.000	-	-	City Agriculture, CEO	LGU/National Foreign Agencies
	Livelihood programs that are tailored to the unique needs of affected community	10.000	-	-	City Agriculture, CDLO, DTI	LGU, National Govt., foreign Assistance
Lack of knowledge on farm technologies that are adaptive/responsive to climate change	-	-	Sustainable Agriculture Program/ Organic Farming to include training, orientation and planning	10.000	DA, City Agriculture	LGU/National/ Foreign Agencies
Lack of data on agriculture and fisheries	Establishment of Agriculture and fishery database	5.000			City Agriculture	LGU
	SUB-TOTAL	**90.000**		**15.000**		

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
2. Infrastructure Dev't. Sector/ Water Sufficiency						
Unequal distribution of water supply	Construction of wells	10.000	Imposing penalty on illegal tapping of water	1.000	ICWS	LGU/National/ Foreign Assistance
	Development of springs	50.000	-	-	ICWS	LGU/DILG/ CHO
	Construction of water reservoirs in Barangay Mahayahay and Hinaplanon	40.000	-	-	ICWS	LGU/DILG
Presence of contaminants in some water sources	Conduct of regular observation visits or monitoring of water and sanitation access points, facilities and services institutions	5.000	-	-	ICWS, CHO	LGU/foreign Assistance
			Capability development of the LGU water, sanitation and septage service units (i.e. CHO and ICWS)	1.000	LUWA	LGU/DPWH
	Improvement of Water Pressure along 6.5km section of the 16" and 18"dia SWSP Cement Coated Transmission Pipeline from Ditucalan source to Tominobo Bridge	25.000				
	Water Supply System for Tipanoy Evacuation Center (including rain water collector basin)	1.5000				
	Water Supply Rehabilitation of old pipelines embedded in drainage canal at Zone 8-9 (Bagong Silang)	1.200			CPDO	20% Dev't. Fund

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Completion of Water Supply Distribution System at Puroks 2 to 7, Sitio Taparac and Puroks 11,23 to 25 Sitio Busluton (Mandulog)	1.000			CPDO	20% Dev't. Fund
	Improvement of Water Supply (Tomas Cabili)	2.500			CPD)	20% Dev't. Fund
	SUB-TOTAL	**136.000**		**2.000**		
3. Environmental Mgt. Sector/ Ecosystems and Environmental Stability						
Protection forests not delineated	Delineation of protective and productive forests	3.000	Review of existing environmental policies to avoid overlapping	1.000	DENR, CEMO	LGU, DENR
Uncontrolled squatting on coastal areas and river banks	Development of riverbanks in urban areas into parks and recreations	100.000	Strict implementation of Section 29 (Resettlement) and Section 30 (Illegal Structures) of RA 7279	5.000	HRO, CEO, CMO, SP, CPDO	LGU, Foreign Funding Agencies/ NHA
	Resettlement of informal settlers from the coastal areas and riverbanks -Establishment of Resettlement area with lifeline facilities	100.000	Close monitoring of new structures mentioned in Section 30 of RA 7279 and providing penalties thereof	5.000		
	Implementation of the coastal zone regulations	3.000			DENR, CEMO	LGU, DENR
Insufficient and outdated data on biodiversity	Establishment of Biodiversity Database	3.000	Undertaking of studies on watershed protection, flood risk management and conservation management	10.000	CPDO, MSU-IIT, CEMO	LGU/DENR

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
Unregulated use of forest resources in the upland	Provision of livelihood to forest resources-dependent community	5.000	Implementation of the Forestry Code of the Philippines		CDLO, DENR, CEMO	LGU/DENR/ Foreign Funding
	Sustaining the IEC programs on environmental protection	5.000	-	-	CEMO	LGU
Soil erosion and river siltation	Rainforestation Program	10.000	Strict implementation of mining policies	3.000	DENR, CEMO	LGU, DENR, Foreign Funding
	Riverbank stabilization	100.000	Implementation of River Easements (PD 1067); 40 m-forestland; 20 m-agricultural; 3 m-urban area	1.000	DPWH, CEO, DENR	DPWH, DENR, LGU, Foreign Assistance
	Monitoring of mining & quarrying activities	3.000	Adopt an upland/hinterland barangay for reforestation	10.000	DENR, CEMO	LGU, DENR, Foreign Assistance
Segregation of solid waste not strictly implemented at the household level	-		Implementation of RA 9003 specifically on waste segregation at the household level	3.000	Brgy Council, CEMO	LGU (Brgy/City)
-Huge volume of mixed solid wastes are disposed at the CMRCF affecting the quality of air and water nearby -Poor solid/hazardous waste management and sanitation	Establishment of Material Recovery Facility in every barangay or cluster of barangays	2.000	-	-	CEMO, BRGY COUNCIL, CMO	LGU
	Construction of Sanitary landfill	100.000	-	-		LGU/Foreign assistance
	Composting of biodegradable waste	5.000	-	-		
	Repair/improvement of the existing facility in the CMRCF	20.000				

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
Presence of air pollutants	Continuous Emission Monitoring System (CEMS) with Telemetry System	1.000	Implementation of RA 8749 or the Clean Air Act of 1999 specifically on prohibiting burning of solid wastes	2.000	CEMO, DENR BRGY COUNCIL, CMO	LGU, DENR
	-	-	Implementation of anti-smoke belching ordinance and environment code	2.000	CEMO, DENR	LGU, DENR
	Acquisition of air quality monitoring facility or telemetry system	25.000	Creating the Airshed Management Board	1.500	CEMO with EMB-DENR	LGU, DENR
Polluted waters (surface & coastal)	Coastal Clean-up	3.000	-	-	CEMO, DENR	LGU
			Linkaging with concern agencies for the protection and rehabilitation of the coastal ecosystem	3.000	CMO, DRRMO	LGU
Absence of septage and sewerage facilities	Feasibility Study for sewerage system and sewage treatment facility at the urban area and Brgy. Ditucalan	10.000	-	-	CPDO, CEO, DPWH	LGU/National Foreign Funding
	Construction of septage facility	50.000	-	-	CEO, DPWH	LGU/National
Frequent flooding specifically in low-lying areas and along river banks cause damage to infra facilities, and other properties	Construction of multi-purpose dam at the upper portion of the Mandulog and Iligan Rivers	150.000	-	-	CEO, DPWH	LGU/National
	Dredging of natural water ways (e.g. Iligan River)	100.000	-	-	CEO, DPWH	LGU/National
	Cleaning/declogging and rehabilitating of existing drainage pipes/canals	100.000	-	-	CEO, DPWH	LGU/National
	Review and implementation of the drainage master plan in coordination with the DPWH	500.000	-	-	CEO, DPWH	LGU/ National

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Riparian reforestation/ bamboo plantation along river banks	15.000	-	-	CEMO, DENR	LGU/DENR
	Redesign/retrofitting and reconstruction of infra facilities found to be substandard or highly expose to hazard	10,000.000	-	-	CEO, DPWH	LGU/National
Unregulated development along the coastal area		-	Formulation of Foreshore Land Area Management Plan	5.000	DENR/LGUs	DENR/LGUs
Urban Warming	Establishment of Linear Parks along major thoroughfare and riverbanks	6.000	Adopt an Ordinance on Green Building and Green Infrastructure	0.500	DENR, CEMO, GCSO	DENR, LGU
Sea Level Rise	Study on new alignment of national highway that can be affected by sea level rise at Barangays Maria Cristina & Dalipuga	1.000				
	SUB-TOTAL	**11,240.000**		**52.000**		
4. Social Development Sector/ Human Security						
Flood-prone areas are still used for human settlement despite the "danger/no build zone ordinance" (Laxity in the implementation of Policies)	Establishment of resettlement sites and construction of houses responsive/adaptive to climate change and other hazard	100.000	Land acquisition and banking program	100.000	CAssO, HRO-CMO, DRRMO	LGU/NHA
			Funding support for the IEC programs	2.000	CEMO, Brgy, DRRMO	LGU/National Agencies

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
Lack of IEC on addressing vulnerability to climate change and climate variability			Establishment of Climate Change Academy	20.000	CEMO/DRRMO	CCC/Foreign Funding
	Information and Communication Technology Equipment (Central 811 and Command Center	2.000			DRRMO	5% CDRRMF
	Disaster Response and Rescue Equipment (Early Warning System)	2.000			DRRMO	5% CDRRMF
	Land Banking for Relocation Site and other Government Projects	38.943			CPDO	20% Dev't. Fund
	Improvement/Repair of Brgy. Health Center	5.000			CPDO	20% Dev't. Fund
	Concreting of Road leading to Temporary Treatment Facility	2.000			CPDO	20% Dev't. Fund
	Additional Funds for the Construction of Transitory Home/ Temporary Shelter for IDPs	5.000			CPDO	20% Dev't. Fund
	Development of Public Cemetery including purchase of land	15.000			CPDO	20% Dev't. Fund
	SUB-TOTAL	**169.00**		**122.000**		
5. Economic Dev't. Sector/ Climate-smart industries and services						

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
Lack of assistance for SMEs to develop capacity for eco- efficient production			Capability building for SMEs to develop eco-efficient production	3.000	CMO, DTI, DOST	LGU, DTI, DOST
Absence on baseline data on GHG emissions from industry and othe sources	Establishment of baseline data on GHG emissions from manufacturing industries and other sources	1.500			DENR-EMB, CEMO	LGU, DENR-EMB
	SUB-TOTAL	**1.500**		**3.000**		
6. Economic Dev't. Sector	Irrigation Development Program	3.000			CPDO	20% Dev't. Fund
	DA/PRDP Counterpart Fund for Farm-to-Market Road Projects	30.000			CPDO	20% Dev't. Fund
	Purchase of Cultural Heritage Sites including Purchase of Lot	17.000			CPDO	20% Dev't. Fund
	Construction of Maria Cristina Falls Viewing Deck	20.000			CPDO	20% Dev't Fund
	One-Barangay-One Product Development Program	5.000			CPDO	20% Dev't. Fund
	SUB-TOTAL	**75.000**				
7. Infrastructure Dev't. Sector/ Sustainable Energy						

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
Lack programs for climate-proofing energy			Preparation of Feasibility Study and design for the dev't. of Indigenous hydro-electric plants, irrigation system & flood control using stream flow or Mandulog River	10.000	NPC, CEO, DPWH,	
Absence/lack of programs on energy efficiency and conservation in Iligan City	Power conservation program	5.000				
Lack of local policies to improve energy efficiency			Crafting of local policy to improve emergency efficiency	0.500	SP, NPC, CMO, DOE	LGU, DOE
Insufficient power supply	Impose energy conservation in all sectors through an ordinance	0.500				
	Installation of Solar Panel (Poblacion)	2.000			CPDO	20% Dev't. Fund
	SUB-TOTAL	**7.000**		**10.500**		
8. Infrastructure Dev't. Sector	Road Widening with Drainage at Quezon Avenue Extension from intersection Jeffrey Road to Crossing Sunburst	13.160			CPDO	20% Dev't. Fund
	Improvement of Stairs at Buhanginan Hills	3.5000			CPDO	20% Dev't. Fund
	Concreting/Rehabilitation/Improvement of Drainage Systems in Brgy. Hinaplanon, Brgy. Bagong Silang, Brgy. Del Carmen and Brgy. Tubod	7.000			DRRMO	5% CDRRMF

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Slope Protection in Landslide prone areas in Brgy. Rogongon, Brgy. Ubaldo Laya and Brgy. Maria Cristina (Growing of Vetiver Grass)	4.000			DRRMO	5% CDRRMF
	Additional Appropriation for the Repair of Merila Bridge	8.000			CPDO	20% Dev't. Fund
	Construction and Flood Control and Slope Protection beside EEDMO Office	30.000			CPDO	20% Dev't. Fund
	Improvement of City Hall building	20.000			CPDO	20% Dev't. Fund
	Repair of Sikyop Access Road, Brgy. Rogongon	5.000			CPDO	20% Dev't. Fund
	Counterpart Fund for Farm to Market Roads	4.800			CPDO	20% Dev't. Fund
	Improvement of Barangay Health Center	6.000			CPDO	20% Dev't. Fund
	Drainage System Improvement Program	99.203			CPDO	20% Dev't. Fund
	Steel Hanging Bridge at Zone1-10 Sta. Lucia (Abuno)	2.000			CPDO	20% Dev't. Fund

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Road Concreting with Drainage Canal at Purok 5 Pobacdal Village and Purok 7 (Bonbonon)	5.000			CPDO	20% Dev't. Fund
	Concreting of Farm-to-Market Road at Purok Malapacan (Digkilaan)	2.000			CPDO	20% Dev't. Fund
	Concreting of Farm-to-Market Road at Pinatao to Danao (Digkilaan)	2.000			CPDO	20% Dev't. Fund
	Road Concreting to Taytay Urban Poor, Purok Mauswagon (Ditucalan)	3.000			CPDO	20% Dev't. Fund
	Road Concreting at Neopoda (Purok 2 -A, Green Village, Hinaplanon)	3.000			CPDO	20% Dev't. Fund
	Construction of Day Care Center Building (Kalilangan)	2.000			CPDO	20% Dev't. Fund
	Road Concreting at Purok 3-A Floraville Subdivison, Luinab	2.000			CPDO	20% Dev't. Fund
	Road Concreting at Purok 29, Maria Cristina	1.500			CPDO	20% Dev't. Fund
	Road Conreting at Purok 31-A, Maria Cristina	1.500			CPDO	20% Dev't. Fund

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Construction of Steel Hanging Bridge across Bayug River (Panoroganan)	2.500			CPDO	20% Dev't. Fund
	Concreting Farm to Market Road at Purok 2 Cor Lumbatin (Pugaan)	4.000			CPDO	20% Dev't. Fund
	Construction of Steel Hanging Bridge at Purok 1-B (Pugaan)	2.000			CPDO	20% Dev't. Fund
	Completion of Barangay Health Center (San Miguel)	2.000			CPDO	20% Dev't. Fund
	Road Concreting at Purok 4A to 5C (Santiago)	2.000			CPDO	20% Dev.t Fund
	Improvement of Health Center (Santiago)	1.000			CPDO	20% Dev't. Fund
	Repair of Isidro Emilia Kho Concrete Road (Saray-Tibanga)	5.000			CPDO	20% Dev't. Fund
	Concreting of Road from Mandaue Foam to Purok 6 (Saray-Tibanga)	4.000			CPDO	20% Dev't. Fund
	Additional Funding for the Improvement of Boulevard (Sta. Filomena)	10.000			CPDO	20% Dev't. Fund

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Road Concreting at Zone Pluto, Suarez	1.000			CPDO	20% Dev't. Fund
	Road Concreting at Zone Neptune, Suarez	2.000			CPDO	20% Dev't. Fund
	Road Concreting at Zone Matinabangon, Suarez	2.000			CPDO	20% Dev't. Fund
	Road Concreting from Jct C3 to LAPCO Village, Bernales (Tipanoy)	2.986			CPDO	20% Dev't. Fund
	Concreting of Farm-to-Market Road at Purok 5 & 6, Sitio Mibolo (Tipanoy)	5.000			CPDO	20% Dev't. Fund
	Road concreting (additional funding) at Purok Santan (Tubod)	7.800			CPDO	20% Dev't. Fund
	Road Concreting at Bahayan to Blissville (Upper Hinaplanon)	3.000			CPDO	20% Dev't. Fund
	Riprapping with Pathway and Railings at Purok 2, Upper Tominobo	7.000			CPDO	20% Dev't. Fund
	5-Barrel Box Culvert at Zone 6, Sitio Malindawag, Abuno	7.000			CPDO	20% Dev't. Fund

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Concreting of Farm-to-Market Road (Bunawan)	3.000			CPDO	20% Dev't. Fund
	Construction of Drainage System for the Relocation Area at Tonggo (Buru-un)	1.848			CPDO	20% Dev't. Fund
	Road Widening from Bel-Air to Boundary (Buru-un)	3.000			CPDO	20% Dev't. Fund
	Construction of Triple Barrel Box Culvert at Brgy. Dalipuga	3.290			CPDO	20% Dev't. Fund
	Road Concreting at Purok 3, Del Carmen (infront of Pablito Abragan Residence)	2.000			CPDO	20% Dev't. Fund
	Road Concreting at Purok 5 & 6, Del Carmen	2.000			CPDO	20% Dev't. Fund
	Road Concreting at Purok 1-B, Del Carmen	0.500			CPDO	20% Dev't. Fund
	Road Concreting at Cebu Village, Digkilaam	2.000			CPDO	20% Dev't. Fund
	Road Concreting at Maglabid, Digkilaan	2.000			CPDO	20% Dev't. Fund

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Road Widening from Buru-un Boundary to New Barangay Hall (Ditucalan)	2.000			CPDO	20% Dev't. Fund
	Road Concreting with Side Drainage at Matuog, Kiwalan	5.000			CPDO	20% Dev't. Fund
	Road Opening at Sitio Gutom, Lanipao	2.500			CPDO	20% Dev't. Fund
	Road Opening at Purok 9, Lanipao	2.500			CPDO	20% Dev't. Fund
	Road Concreting with Side Drainage at Sitio Simbuyan, Lanipao	7.500			CPDO	20% Dev't. Fund
	Road Concreting at Caribao to Kapisahan Road (Phase I), Mainit	4.000			CPDO	20% Dev't. Fund
	Road Concreting at Purok 31A and 31B, Pensioner's Village, Ma. Cristina	3.000			CPDO	20% Dev't. Fund
	Repair and Improvement of Pigsuotan Hanging Bridge, Mandulog	0.400			CPDO	20% Dev't. Fund
	Repair/Rehabilitation of Road at Purok 6 and 8, Sitio Taparac (Mandulog)	1.000			CPDO	20% Dev't. Fund

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Construction of New Barangay Health Center (Mandulog)	2.000			CPDO	20% Dev't. Fund
	Road Concreting and Drainage at Isabel Village, Pala-o (Marianos to Bautista)	1.750			CPDO	20% Dev't. Fund
	Road Concreting and Drainage at 542, Pala-o	3.000			CPDO	20% Dev't. Fund
	Road Concreting at Empire Village, Pala-o	1.000			CPDO	20% Dev't. Fund
	Construction of Hanging Bridge (Panoroganan)	3.000			CPDO	20% Dev't. Fund
	Completion of Barangay Health Center (Panoroganan)	1.000			CPDO	20% Dev't. Fund
	Repair/Rehabilitation of Road at Sitio Hanginan (Poblacion)	1.000			CPDO	20% Dev't. Fund
	Repair of Farm-to-Market Road from Crossing Kinabukasan to Bayug Street, Lower Dungguan (Poblacion)	1.000			CPDO	20% Dev't. Fund
	Repair/Rehabilitation of Concrete Road from Scaling to Poblacion	1.500			CPDO	20% Dev't. Fund

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Rehabilitation of Concrete Road from Jorge Sheker Road corner Hunter's Row up to Baslayan Creek Drain Box Culvert (San Miguel)	2.000			CPDO	20% Dev't. Fund
	Repair and Improvement of Drainage at Purok 10-A (Saray-Tibanga)	1.000			CPDO	20% Dev't. Fund
	Road Concreting at Purok 8-A (Sta. Elena)	4.500			CPDO	20% Dev't. Fund
	Repair and Improvement of Drainage System at Purok 12-C, Sta. Elena	0.500			CPDO	20% Dev't. Fund
	Improvement of Drainage System (Suarez)	2.100			CPDO	20% Dev't. Fund
	Road Concreting with Side Drainage at Purok 4, Canaway (Tibanga)	1.250			CPDO	20% Dev't. Fund
	Road Concreting with Side Drainage at Bernales/LAPCO Village	3.000			CPDO	20% Dev't. Fund
	Construction of Farm-to-Market Road at Purok 6, Sitio Mibolo (Tipanoy)	4.500			CPDO	20% Dev't. Fund
	Concreting of Road with Side Drainage at Laville Subdivision (Tubod)	2.000			CPDO	20% Dev't. Fund
	Road Concreting (70M) at Purok 1 (Upper Tominobo)	1.000			CPDO	20% Dev't. Fund

Dev't. Sector-Strategic Priority/ Development Issues	Programs/Activities/ Projects (PAPs)				Responsible Office/Agency	Funding Source
	Adaptation	Estimated Cost (in Million PhP)	Mitigation	Estimated Cost (in Million PhP)		
	Road Concreting at Purok 7 (Upper Tominobo)	2.000			CPDO	20% Dev't. Fund
	Rehabilitation of Health Center (Upper Tominobo)	1.000			CPDO	20% Dev't. Fund
	SUB-TOTAL	**401.000**				
9.						
Lack of IEC on addressing vulnerability to climate change and climate variability	CCA Awareness/IEC Program in the 44 barangays of the city	2.000			DRRMO	LGU/CCC
Farmers need to be capacitated on farm technologies related to adaptation of climate change	Capability Building Program in every barangay involved in farming activities	3.000			City Agriculture, DA, DRRMO	LGU/DA
			Advocate Organic Act of the Philippines (RA 10068) -Augment Organic Information Drive to Farmers/Farmers' Association -Establish Organic Demonstration Sites -Augment social media organic farming awareness -Strengthen Organic Agriculture Laws	5.000	City Agriculture, DA,	LGU, DA
	SUB-TOTAL	**5.000**		**5.000**		

CHAPTER 6. MONITORING AND EVALUATION

With the complexity and long-term nature of climate change, it is essential that adaptation be considered as a continuous and flexible process, as well as feedback through monitoring and evaluation (M&E) must be periodically conducted. The implementation of adaptation actions need to be regularly monitored, evaluated and revised, both in terms of the validity of the underlying scientific assumptions and the appropriateness of programs, projects, and policies including their effectiveness, efficiency and overall benefits.

6.1 Climate Action Plan Monitoring Committee

There shall be a Climate Action Plan Monitoring Committee (CAPMC) who will be under the supervision of the City Development Council (CDC). The CAPMC will create the Monitoring and Evaluation (M&E) Team who shall be composed of the different stakeholders of the city. The M&E Team shall prepare monitoring systems and procedures, and set indicators as basis for M&E which will delve on the quality of life, climate change-responsive activities, and other vital aspects consistent with NCCAP.

6.2 Monitoring and Evaluation Plan

The Monitoring and Evaluation Plan shall be formulated as guide in the periodic M&E of which a framework for monitoring and evaluation will be developed to ensure that goals and objectives are clearly defined. Significant activities to be undertaken for the success of both mitigation and adaptation actions are laid down to guide the M&E Team.

REFERENCES

1. Comprehensive Land Use Plan of Iligan City (2013-2022)
2. Comprehensive Development Plan of Iligan City (2013-2018)
3. Iligan City Risk Profile
4. LGU Guidebook on the Formulation of Local Climate Change Action Plan Book 2
5. MDGF-1656 “Strengthening the Philippines Institutional Capacity to Adapt to Climate Change, PAGASA-DOST
6. National Climate Change Action Plan 2011-2028
7. National Climate Change Action Strategy
8. Climate and Disaster Risk Assessment of Iligan City (2023-2028)