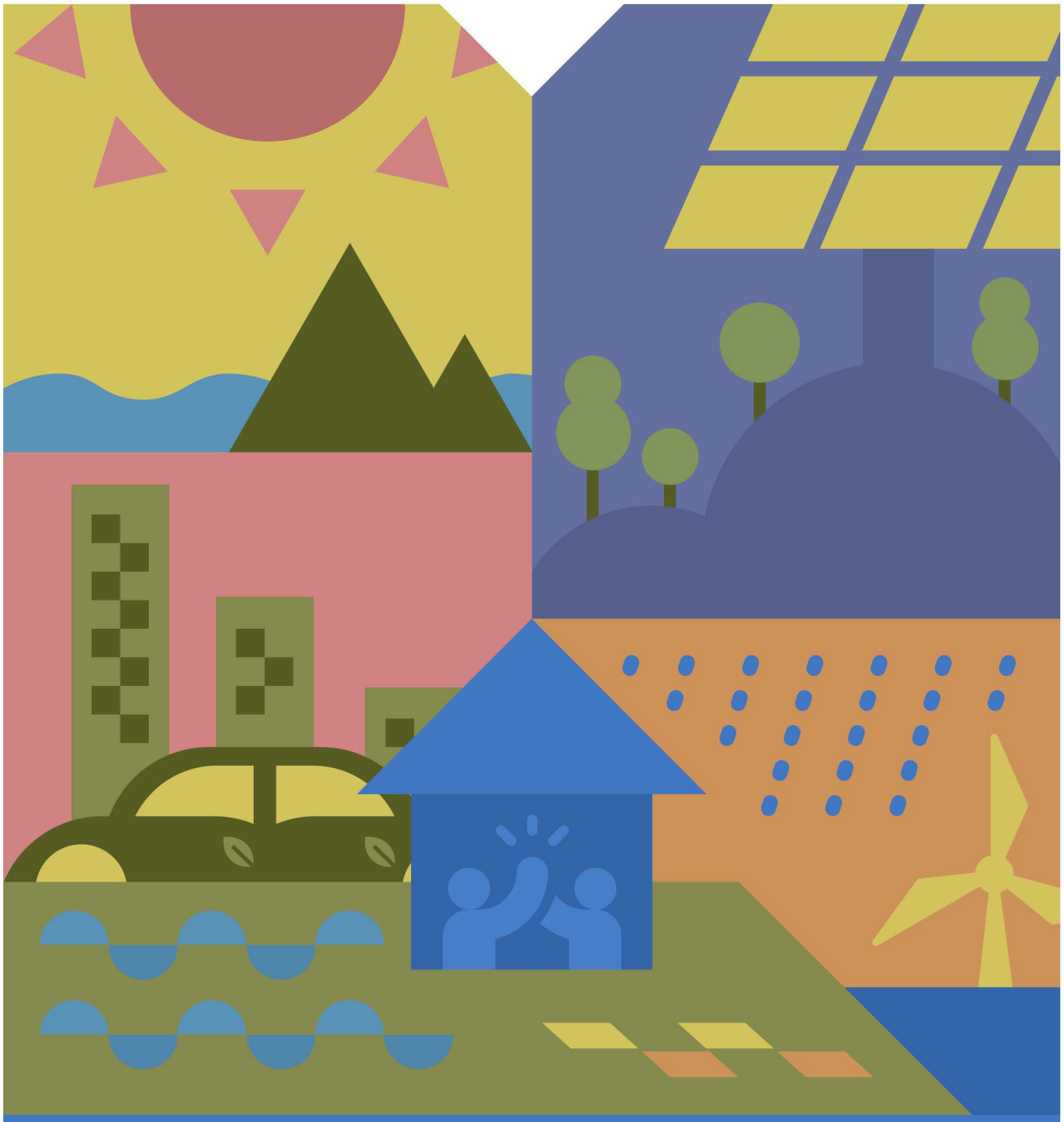

URBAN PLANNING AND DESIGN FOR CLIMATE RESILIENCE

A REFERENCE TOOL FOR LOCAL GOVERNMENTS AND PLANNING ACTORS IN THE PHILIPPINES

DEPARTMENT OF HUMAN SETTLEMENTS AND URBAN DEVELOPMENT • 2019 •

UN-HABITAT

Building Climate Resiliency through Urban Plans and Designs

Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

IKI INTERNATIONAL CLIMATE INITIATIVE

based on a decision of the German Bundestag

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Department of Human Settlements and Urban Development
Environmental, Land Use and Urban Planning and Development Bureau

Technical Support:

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PREFACE

Globally, urbanization has been consistently growing throughout the years and it is projected to increase to 58 per cent in the next five decades. Alongside this growth are intertwined challenges that cities and communities face – economic recession, public health crisis, and most especially, climate change. In the Philippines, 54 per cent of the total population, which translates to 51,730,000 urban residents, were recorded in 2020. The urban population of the Philippines increased at an average of 2.8 per cent from 2015 to 2020, which are concentrated in the National Capital Region and highly urbanized cities in the country.

The Global Climate Risk Index has consistently ranked the Philippines as one of the most vulnerable countries affected by extreme weather events and climate change impacts. With urbanization continuously increasing in the country, cities must be prepared to address climate risks to nurture a better safe, inclusive, and resilient future for the Filipinos.

Building resilience must be at the core of planning and designing our cities. Aligned with the Philippine New Urban Agenda vision of a "Better, Greener, Smarter Cities in an Inclusive Philippines," this reference tool provides a platform to equip users with concepts and technical information on urban planning and design for climate resilience. It aims to deliver guidance for national government agencies, local government units, and other stakeholders in pursuing resilient and sustainable development. Likewise, it presents tools and examples that may be used in analysis and decision-making when developing actions for climate change resilience through urban planning and design.

With years of joint expertise from various organizations, this tool has been developed through collaboration of the Department of Human Settlements and Urban Development, Climate Change Commission, Department of Interior and Local Governance, National Economic Development Authority, and League of Cities of the Philippines. This was made possible through the Building Climate Resilience through Urban Plans and Designs (BCRUPD), a project implemented by UN-Habitat Philippines and supported by the International Climate Initiative of the German government.

Approaches for urban planning and design must urgently pursue climate action in preparation for a dynamic urban future. These approaches must consider the vulnerable populations, unpredictable and potential crises, and the country's looming climate hazards – all these are carefully considered in this reference tool while promoting evidence and data driven planning solutions.

Using the concepts and tools in this reference tool, our aspiration is to see more pronounced local actions of resilient urban planning and design. We see this as a perpetual opportunity to address urban and climate challenges while promoting resilient and sustainable cities and communities in the Philippines.

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MESSAGE

Ar. Jose Rizalino L. Acuzar
Secretary
Department of Human Settlements and Urban Development

As our Administration launches the *Pambansang Pabahay para sa Pilipino Program (4PH)* that commits to meeting the housing needs of Filipinos through integrated housing, human settlements, and climate-resilient urban development, it is imperative that we mobilize our stakeholders, the local government units, and the private sector to achieve this vision in the face of the threats of climate change.

The Philippines has borne the brunt of the adverse effects of climate change and disasters and has therefore passed critical legislations and policies that are now incorporated in our government's thrusts. However, there is a still a need to flesh out details, share specific examples, provide tools and templates to guide our local government units, the private sector, and our stakeholders on climate resilient urban planning and development

It is my pleasure to present the DHSUD's Urban *Planning and Design for Climate Resilience* Reference Tool, which is the result of years of collaboration and hard work predating the DHSUD. I am confident that this will be an invaluable resource for our LGUs and other stakeholders to increase their awareness on climate change and climate resilience measures to address the emerging local climate change concerns in their respective cities and municipalities.

This reference tool was designed for local government units to better equip them in planning, implementing, and monitoring climate-resilient urban plans and designs to create sustainable communities. It is imperative for all of us to work together so that the progress and gains we so dearly worked hard will not be wiped out by disasters and slow creeping climate impacts.

I wish to thank the efforts and support of the UN-Habitat Philippines and the German Government, through UN-Habitat Philippines' *Building Climate Resiliency through Urban Plans and Designs (BCRUPD)* funded by the German Government's *International Climate Initiative (IKI)*, which made this possible.

I am also grateful for the support of the Climate Change Commission, the Department of the Interior and Local Government, the National Economic and Development Authority, and the League of Cities of the Philippines (LCP) for working together with us in advocating climate resilience through local plans and designs.

With various tools, knowledge, and approaches accessible in this Reference Tool, I trust that our LGUs and communities will be able to force local strategies that bring forth a better, greener and smarter human settlements and urban systems in the Philippines.

MESSAGE

H. E. Anke Reiffenstuel
Ambassador
German Embassy in the Philippines

Rapid urbanization in different parts of the Philippines poses challenges in terms of access to social services, housing, infrastructure and economic opportunities. On top of this, the adverse effects of the climate crisis on densely populated urban communities can magnify and exacerbate these challenges. Without adequate and climate-smart urban planning and design, the living environment of a large number of people is put at risk.

It is therefore essential to equip local governments with the right tools to adapt to climate change through promoting climate-responsive, sustainable urban development plans and designs. The launching of this reference tool that is funded by the German government, through its International Climate Initiative (IKI), is an important contribution towards finding solutions to address the climate crisis in urban areas of the Philippines.

Given the Philippines' high vulnerability and exposure to the adverse effects of the climate crisis, cooperation in the field of climate is a priority for Germany's cooperation with the Philippines. The Indo-Pacific Policy Guidelines, the German government's comprehensive strategy for a comprehensive engagement in this dynamic and increasingly relevant region of the world, includes the commitment to address climate change related challenges in this region. In the Philippines - a priority and a pilot country when it comes to bilateral cooperation in the field of climate – this translates into projects with total volume of 31,9 million EUR in the fields of climate adaptation, environmental protection and biodiversity funded under the IKI of the German government. The implementation of the Philippines' national climate and biodiversity policies has been supported by IKI since 2008. This project, implemented by UN-Habitat is also funded via the IKI.

The German government remains a committed partner to support the Philippines in initiatives related to climate and is looking forward to deepen these strong ties.

MESSAGE

Arsenio M. Balisacan, PhD
Secretary
National Economic and Development Authority

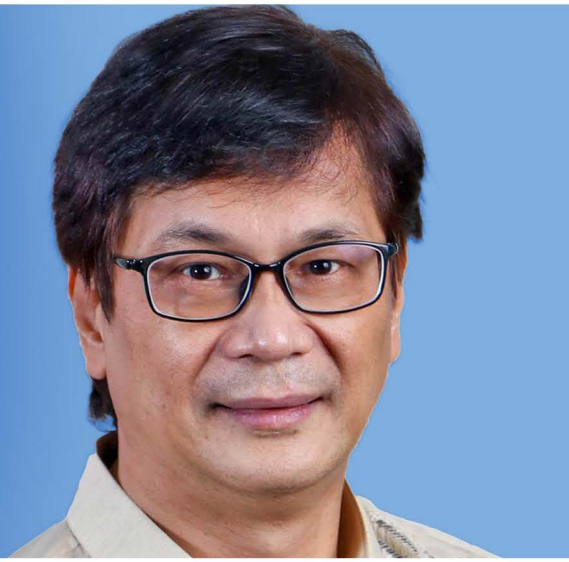
The National Economic and Development Authority (NEDA) congratulates the Department of Human Settlements and Urban Development (DHSUD) and its partner agencies and institutions for leading the preparation of the Reference Tool on Urban Planning and Design for Climate Resilience.

As the country's premier socioeconomic planning agency, the NEDA supports initiatives and projects that address the impacts of climate change and environment-related disruptions. The reference tool will provide technical information and policy guidance in planning and design towards climate change resilience.

This reference tool is aligned with the Philippine Development Plan (PDP) 2023-2028, as it provides the necessary guideposts for making our cities and municipalities more livable and more prepared for multiple risks, particularly as we recover from the scars of the pandemic. It also comes at an opportune time as our local government units (LGUs) gear up for greater responsibilities, given the Mandanas-Garcia ruling. Through the leadership of LGUs and stronger collaboration with national government agencies, we hope to spur greater interest in well-crafted local development and land use plans. Such plans will support our national development agenda towards full economic recovery and transformation for a prosperous, inclusive, and resilient society.

Congratulations to the DHSUD, together with its partner agencies and institutions. We hope that this initiative will lead us to more sound urban plans and designs for our communities.

MESSAGE



Atty. Benjamin C. Abalos, Jr.
Secretary
Department of the Interior and Local Government

My warmest greetings and gratitude to the Department of Human Settlements and Urban Development (DHSUD) for developing the "Urban Planning and Design for Climate Resilience: A Reference Tool for Local Governments and Planning Actors in the Philippines" that promotes climate-responsive and risk-based planning of local government units (LGUs).

This tool is a relevant guide for national and local governments and other planning practitioners especially in integrating urban climate resilience principles in their decision-making, stakeholder participation, spatial and development planning, investment programming, and financing.

As the Vice-Chair for Disaster Preparedness of the National Disaster Risk Reduction and Management Council (NDRRMC), the DILG continuously enhances the capacities of LGUs in dealing with the adverse impacts of climate change and natural disaster.

With this reference tool, the LGUs will be further guided in assessing and determining their risks and vulnerabilities and be able to identify and implement appropriate interventions in dealing with such adversities. The formulation of climate-resilient urban plans and designs of LGUs is a step towards the attainment of the Philippine New Urban Agenda Vision of having a "Better, Greener, Smarter Cities in an Inclusive Philippines".

We extend our heartfelt appreciation to the United Nations Human Settlements Programme (UN-Habitat) and the German Government's International Climate Initiative (IKI) for extending much-needed support to the Philippine Government as we continue our efforts on disaster risk reduction and management and climate change adaptation and mitigation.

The DILG is one with the UN-Habitat Philippines in creating climate change resilient localities reflected in the Department's U.N.I.T.E. agenda, which stands for unleashing maximum potential of good local governance; nourishing the bonds of national and local governments; innovating governance processes and systems through technology; and, enhancing the capabilities of the Department and its attached agencies.

I would also like to commend the National Economic and Development Authority (NEDA), Climate Change Commission (CCC), and the League of Cities of the Philippines (LCP) for their unwavering support in the development of this reference tool.

The DILG encourages the LGUs to utilize this tool as their guide in preparing their urban plans and design as they cart toward climate-resilient urban communities.

May this tool lead to further innovations at the local level and serve its ultimate goal of espousing climate change resilient localities and protecting the lives of Filipinos, especially in highly vulnerable communities. Let us be firmly united in our one aspiration for a climate-resilient Philippines!

Kaisa't katuwang po ninyo ang DILG, sampu ng mga matitino, mahuhusay at maaasahang kawani nito, tungo sa paglalayong maging ligtas sa banta ng climate change ang mga pamilyang Pilipino sa mga pamayanan.

MESSAGE

Mayor Michael L. Rama
Cebu City
National President
League of Cities of the Philippines

The Philippines is considered one of the most vulnerable countries in the face of climate change. With more than half of the nation's population residing in cities catering to thousands of vehicles every day, more pronounced local action is needed to curb the effects of rising global temperatures and protect the most vulnerable.

To do as such, it is necessary to radically rethink the way we design urban spaces. Local urban development must be guided by resilient and sustainable planning. This reference tool, which provides local governments with information on key concepts and best practices for resilient urban planning and design, will be pivotal in improving our local planning systems.

This publication on climate-resilient urban planning and design is a testament to the hard work of various stakeholders committed to improving the lives of the Filipino people geared towards livable, sustainable, and people-centered cities. I am optimistic that through this initiative, local governments will become better equipped with the necessary knowledge, strategies, and resources to address urban and climate challenges.

It has been a privilege to work alongside our partners at the UN-Habitat Philippines, the Department of the Interior and Local Government, the Department of Human Settlements and Urban Development, the National Economic Development Authority, and the Climate Change Commission in the pursuit of definitive climate plans and actions.

I would also like to take the opportunity to laud and express my appreciation to the five (5) partner cities that have participated in this project: Angeles, Cagayan de Oro, Legazpi, Ormoc, and Tagum. Their experiences and learning during the Building Climate Resilience through Urban Plans and Designs (BRUPD) Project have been instrumental in crafting and refining this guide.

The League of Cities of the Philippines, as the official association of Philippine cities, remains committed to protecting and safeguarding an inclusive, green, and resilient future for all Filipinos.

FOREWORD

Christopher Rollo
Country Programme Manager
UN-Habitat Philippines

The fight against climate change will be won and lost in cities. In the past decade, we have seen the challenges cities and communities face in the midst of growth, such as increasing inequality, public health crisis, and climate change. This is evident in the Philippines, which ranks as one of the most vulnerable countries affected by extreme weather events and climate change impacts. In fact, the Philippines ranked number one out of 193 countries in the 2022 World Risk Index (WRI) which measures countries' disaster risk from extreme natural events and the effects of climate change.

The IPCC Assessment Report 6 highlighted that cities and human settlements have continued to grow at rapid rates and remain crucial as concentrated sites of increased exposure to risk and increasing vulnerability. The 2022 World Cities Report states it clearly – building resilience must be at the heart of the future of cities. Climate resilience with greener investments and stronger multilevel collaboration to confront future shocks must be the building blocks of a resilient urban future. Local government units are at the frontlines of climate change impacts, and they need more information and technical guidance to better inform their local plans and actions to build their resilience.

Urban Planning and Design for Climate Resilience: A Reference Tool for Local Governments and Planning Actors in the Philippines bridges that gap, between knowing what can be done in building climate resiliency by using urban planning and design, and how to do it on the ground. It provides technical and policy guidance, introduces tools for analysis and decision-making on actions for climate resilience, and guides mainstreaming climate resilient urban plans and designs into local planning and budgeting systems.

This tool is informed by the 5-year experience of the Building Climate resiliency through Urban Plans and Designs (BCRUPD) Project implemented by UN-Habitat in 2017-2022 with funding from the International Climate Initiative of the Federal Republic of Germany. The leadership of the Department of Human Settlements and Urban Development, together with the Climate Change Commission, Department of the Interior and Local Government, League of Cities of the Philippines, and National Economic Development Authority guided the project and the development of this tool. The experience of our partners cities Ormoc, Tagum, Legazpi, Angeles and Cagayan de Oro informed the ground-truthing of this tool for local use in actual plans and designs, some of which have been implemented while others have been packaged into investment portfolios to access finance for eventual implementation. Planners, urban designers, subject matter experts, and technical staff have also contributed in developing this reference tool.

With better equipped local government units and urban actors, we can achieve our shared goal of better, greener, more climate resilient urban future for the Philippines.

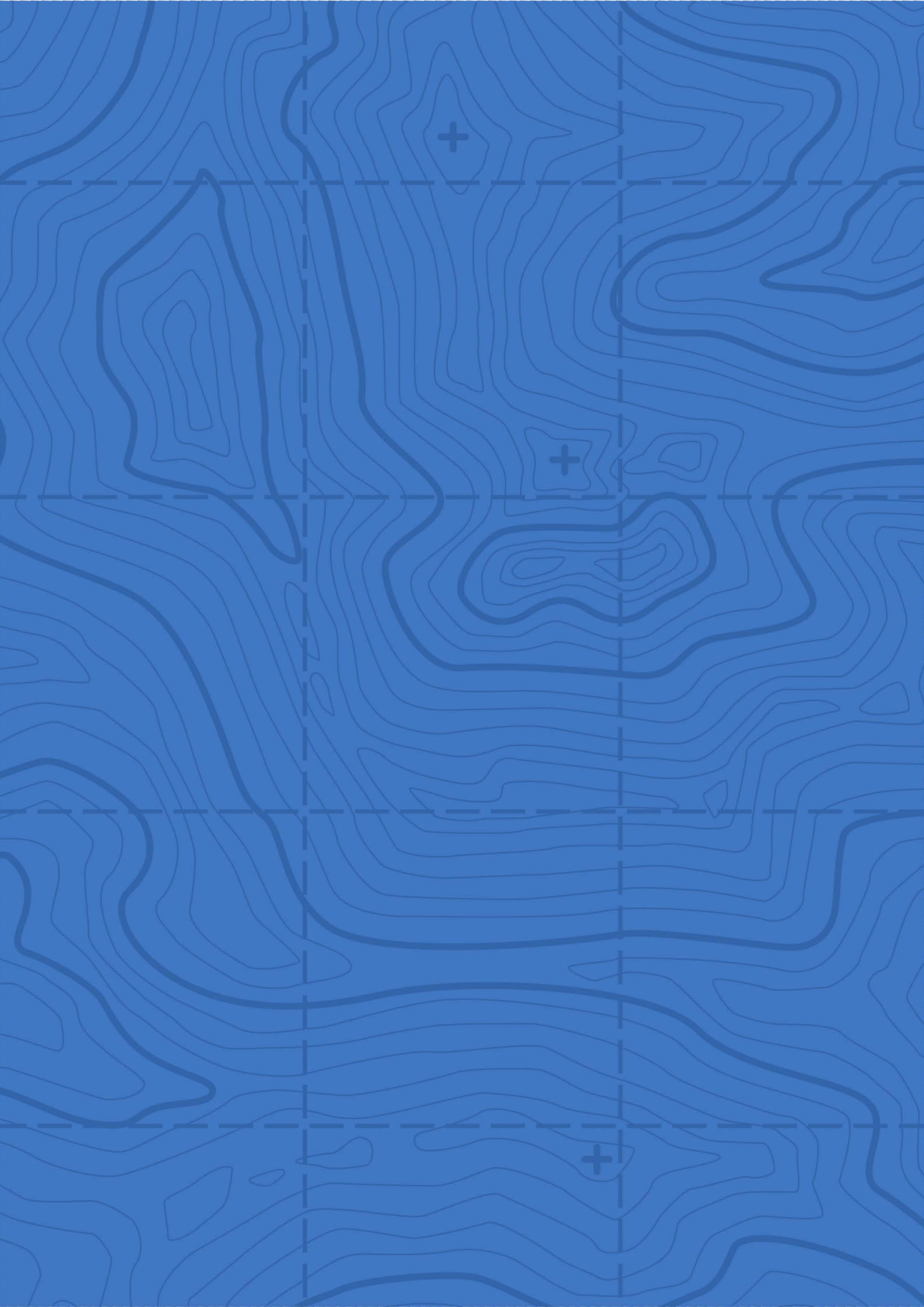
CONTENTS

ABBREVIATIONS

ADB	Asian Development Bank
AIP	Annual Investment Program
AR5	Intergovernmental Panel on Climate Change Fifth Assessment Report
AR6	Intergovernmental Panel on Climate Change Sixth Assessment Report
BCRUPD	Building Climate Resilience through Urban Plans and Designs
CBD	Central Business District
CCA-DRR	Climate change adaptation – disaster risk reduction
CCA	Climate change adaptation
CCAM	Climate change adaptation/mitigation
CCC	Climate Change Commission
CCET	Climate Change Expenditure Tagging
CDP	Comprehensive Development Plan
CDRA	Climate and Disaster Risk Assessment
CLUP	Comprehensive Land-Use Plan
CO2	Carbon dioxide
CRUPD	Climate resilient urban plans and designs
CSO	Civil society organizations
DBM	Department of Budget and Management
DENR	Department of Environmental and Natural Resources
DHSUD	Department of Human Settlements and Urban Development
DILG	Department of Interior and Local Government
DOTr	Department of Transportation
DPWH	Department of Public Works and Highways
DRR	Disaster risk reduction
DRRM	Disaster risk reduction and mitigation
DRRMF	DRRM Fund
GCF	Green Climate Fund
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GHGI	GHG emissions Inventory
GtCO2-eq	Gigaton of carbon dioxide equivalent
HH	Household
HLRUB	Housing and Land Use Regulatory Board
ICCTF	Indonesian Climate Change Trust Fund
IEC	Information, Education, and Communication
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
LAO	Local Architect's Office
LCCAP	Local Climate Change Action Plan
LCP	League of Cities of the Philippines

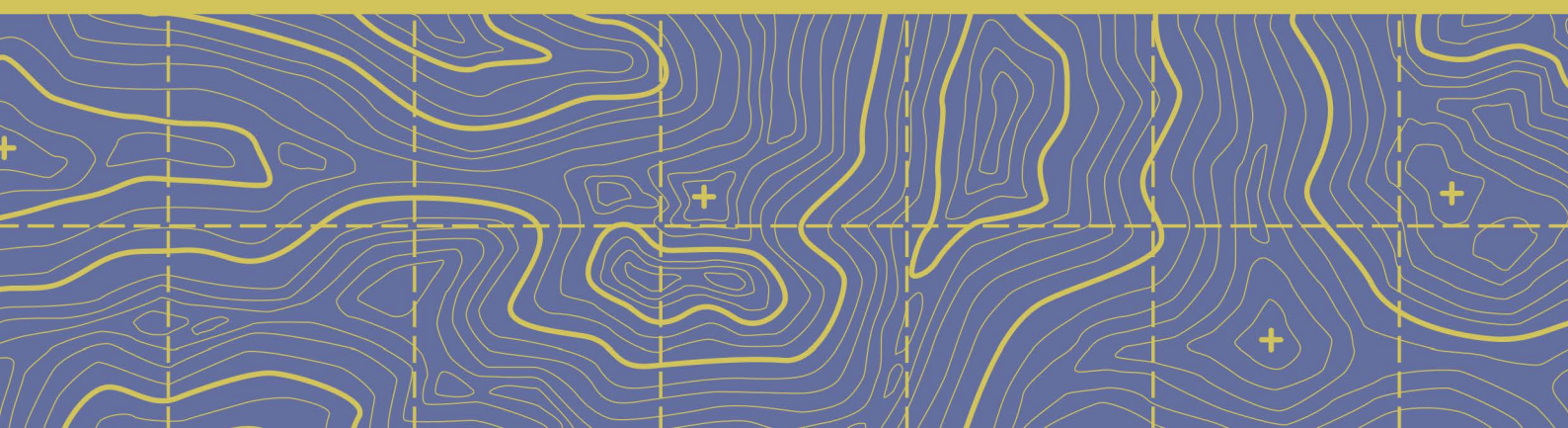
LDCF	Least Developed Countries Fund
LDIP	Local Development Investment Program
LDRRMO	Local Disaster Risk Reduction and Management Office
LEO	Local Engineer's Office
LGU	Local government unit
LID	Low Impact Development
LMP	League of Municipalities of the Philippines
LPDO	Local Planning and Development Office
LPP	League of Provinces of the Philippines
M&E	Monitoring and evaluation
MAPSO	Maximum allowable percentage of site occupancy
MC	Memorandum Circular
MDDA	Metropolitan Davao Development Authority
MEL	Monitoring, evaluation, and learning
MMDA	Metropolitan Manila Development Authority
MRE	Monitoring, review, evaluation
MtCO2e	Metric tons of carbon dioxide equivalent
NCCAP	National Climate Change Action Plan
NDC	Nationally Determined Contribution
NDRRMP	National Disaster Risk Reduction and Management Plan
NEDA	National Economic and Development Authority
NFSCC	National Framework Strategy on Climate Change
NGA	National government agency
NHUDSP	National Housing and Urban Development Sector Plan
NUA	New Urban Agenda
NUDHF	National Urban Development and Housing Framework
NWP	Nairobi Work Programme
OECD	Organisation for Economic Co-operation and Development
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PCRD	Provincial Climate Risk Diagnostic
PDP	Philippine Development Plan
PFS	Pre-Feasibility Study
PNUA	Philippine New Urban Agenda
PPA	Programs, projects, and activities
RBMES	Results-Based Monitoring and Evaluation System
RCP	Representative Concentration Pathway
SDG	Sustainable Development Goals
SLR	Sea level rise
SREX	IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation
SROCC	Special Report on the Ocean and Cryosphere in a Changing Climate
SUDS	Sustainable Urban Drainage Systems

TWG	Technical Working Group
UCD-OZ	Urban Corridor Overlay Zone
UDG	Urban Design Guidelines
UHI	Urban heat island
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UDD	Urban Design and Development
ULAP	Union of Local Authorities of the Philippines
UPD	Urban plans and designs
WG III	Working Group III
WSUD	Water Sensitive Urban Design
ZO	Zoning ordinance



PART 1

I. INTRODUCTION



A. BACKGROUND AND RATIONALE

WHY DO WE HAVE THIS REFERENCE TOOL?

The Philippines ranked fourth worldwide among the most affected countries to climate change and its impacts from 2000 to 2019 based on the 2021 Global Climate Risk Index. The report highlights that the Philippines belongs to the group of climate hotspots, which are being affected by extreme events on an ongoing basis. With climate change and owing to its geographical location, the country is at risk from more destructive and frequent typhoons, higher temperatures and intense drought, and worse flooding. Climate change impacts in the Philippines threatens its whole archipelagic landscape. Development sectors, including the agriculture and fisheries sectors, land and marine biodiversity, trade, energy, social services including health, and the built environment, which are all crucial to achieve sustainable urban development must consider current and future climate impact drivers – changing trends on precipitation and temperature as well as extreme events – to ensure the resiliency of communities, activities, as well as the spaces and places that supports peoples' well-being.

According to a report[1] produced by the Asian Development Bank and the Potsdam Institute for Climate Impact Research, unabated climate change could severely affect future growth, reverse current development gains, and degrade quality of life of countries in Asia and the Pacific. Development gains and growth prospects of the Philippines, unless climate-ready, can easily be lost and missed due to climate change impacts and disasters events.

With 50 per cent of the country's population now living in urban areas, the nexus of climate actions and sustainable urban development is extremely crucial. Climate resilience should be a core part of urban plans and designs (UPD) as it prepares cities and towns in dealing with urban growth and climate risks; reduces vulnerability to climate change by facilitating improved access to resources, services, and amenities; and guides patterns of land use, energy use, and transportation systems that improve climate adaptation. Climate resilient UPD also brings about co-benefits in terms of facilitating reduction in greenhouse gas emissions and achieving Sustainable Development Goals (SDGs). Urban planning as an established field, albeit needing improvement and innovation, is a critical means to initiate and sustain climate actions. Meanwhile, urban design, as a fairly new discipline in the country, can be maximized for climate change action when integrated with urban and sector planning.

Climate governance and climate science at the international and national levels have developed substantially over the years. Many references in using UPD as a mechanism to build climate change resilience are now available. The Philippine government, through the Climate Change Commission (CCC) and various agencies involved in climate and disaster risk reduction (DRR) and management, has been providing guidance and policy support to local government units (LGUs) in building climate resilience. This reference tool will provide LGUs with information on how key issuances are related to and be used to integrate UPD in climate actions. There are existing climate change adaptation-disaster risk reduction (CCA-DRR) mainstreaming frameworks for both spatial and sectoral development planning (i.e., Comprehensive Land Use Plan [CLUP] supplemental guide, new Comprehensive Development Plan [CDP] guide) are already being applied but there is a need to enhance and provide further details to these mainstreaming efforts, particularly in the use of urban design to better understand and address climate-related risks. Capacity needs assessment, with pilot LGUs and national agencies, showed the need and desire for more technical guidance in urban planning and design for climate resilience, risk-sensitive land use planning, risk assessment, and sustainable urban design.

This material expounds on the references and information from the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC), which are promoted and espoused by CCC and other national government agencies. The references from UNFCCC and IPCC assessment reports are explained in this reference tool as they may be relevant to LGUs in updating and improving their urban climate actions.

[1] Asian Development Bank & Potsdam Institute for Climate Impact Research. (2017). A Region at Risk: The Human Dimensions of Climate Change in Asia and the Pacific. Asian Development Bank.ental

B. USES OF THE REFERENCE TOOL

WHAT ARE THE OBJECTIVES OF ISSUING THIS MATERIAL FOR LGUS?

With LGUs identified as frontline actors to address climate change impacts, more information and technical guidance are essential to better inform local plans and actions especially in building resilience of municipal town centers, peri-urban, and urban areas.

Specifically, this reference tool aims to:

- Provide technical information and policy guidance in planning and design towards climate change resilience.
- Serve as a resource and guidance for the national government, subnational and local government units, and other stakeholders, primarily those involved in sustainable development and in crafting and implementing urban plans and designs.
- Integrate climate resilience principles into existing planning principles that govern comprehensive development in the country and support sustainable development frameworks and strategies advocated by the government.
- Present tools and examples that may be used in analysis and decision-making when developing actions for climate change resilience through urban planning and design.
- Encourage further discussion, learning, and innovation on climate change actions as linked to sustainable urban development.

WHO SHOULD USE THIS REFERENCE TOOL?

The Urban Planning and Design for Climate Resilience is a reference tool for local government units, planning practitioners, communities, and institutions working in local planning and development. It aims to equip technical staff, decision-makers, and stakeholders with information, approaches, and tools to ensure that climate resilience is considered as a fundamental principle of and basis for local plans and designs.

Moreover, local authorities and decision makers could use this material to likewise be informed and stay abreast with key information on building resilience through UPD as they perform their mandated roles in plan and action approvals, policy making, investment prioritization, and guiding implementation.

Climate action planning specialists who are not too familiar with UPD are also one of the target users of this reference tool. The discussions contained in this publication on the nexus of climate change and urban planning and urban designs could support climate planning practitioners to look into and expand focus of actions into urban settings and consider urbanization trends.

C. SCOPE AND LIMITATIONS

HOW CAN THIS TOOL SUPPORT CLIMATE RESILIENCE BUILDING?

As urban planning and design is applied at different scales, the reference tool generally seeks to influence the various levels of urban governance that provide mechanisms and set standards for planning and design. The primary sphere of influence however would be local government units, and consequently the plans and programs that they are mandated to craft and execute.

With reference to national policies, this tool embeds itself within the harmonized planning process implemented by LGUs as promoted by the Philippine Government. As such, the reference tool covers urban planning and design at the subnational level, particularly physical framework and development plans anchored and consistent with regional development plans.

At the national scale, it aims to be a point of convergence for climate-resilient urban planning and design policies provided by national government agencies such as Department of Human Settlements and Urban Development (DHSUD), Department of Interior and Local Government (DILG), National Economic and Development Authority (NEDA), CCC, Department of Environmental and Natural Resources (DENR), and Department of Public Works and Highways (DPWH), among others.

As this reference tool serves to supplement existing government policies, statutory guides, and national legislation, it is bound by their current limitations and standards. However, where no legal or national regulations exist to anchor the local initiative, it encourages non-statutory means to promote UPD for climate change resilience to initiate and advance transformative actions.

A limitation of this tool is that some sections use the current available climate science and information, which may be updated and change over time. The climate data and information at the scale needed by LGUs for planning and design however are not easily available. For this, the current official issuance on climate information from government at the scale of province and/or Philippine regions have been developed for LGUs to use in planning and decision making. This publication, therefore, may be updated as necessary. Uncertainties are inherent to climate planning as in other fields. Limitations in data and future scenario must not stop LGUs from acting on climate change. The uncertainties may be addressed by LGUs through adaptive management in UPD where robust and flexible climate strategies are developed to identify and implement actions that can be modified once new insights are developed from research and experiences.

Furthermore, the processes and information in this reference tool are anchored mostly on "no-regrets strategies" in using UPD to address climate change issues. This means "taking climate-related decisions or action that make sense to development, whether or not a specific climate threat actually materializes in the future, which is achieved by building resilience to changing economic, social, and environmental conditions[2]."

D. MAINSTREAMING URBAN PLANNING AND DESIGN IN DEVELOPMENT PLANNING

WHEN TO USE THIS REFERENCE TOOL IN VIEW OF CLUP AND CDP FORMULATION?

This UPD reference tool supplements the already existing guide from national government planning oversight agencies on mainstreaming climate change and DRR in local planning. Illustrations provided in this tool show users where approaches and tools on climate resilience through UPD fit into the planning steps of CLUP and CDP.

[1] Siegel, P. (N.D) No-Regrets" Approach to Decision-Making In a Changing Climate: Toward Adaptive Social Protection and Spatially Enabled Governance. *World Resources Report*. The World Resources Institute: Washington D.C. https://www.wri.org/our-work/project/world-resources-report/no-regrets-approach-decision-making-changing-climate-toward#:~:text=The%20%22%CB%9Cno%20regrets'%20aspect,changing%20economic%2C%20social%20and%20environmental

COMPREHENSIVE LAND USE PLAN AND ZONING ORDINANCE

The CLUP and the Zoning Ordinance (ZO) are operationalizing urban planning and design as a tool that planners may use to provide detailed guidance to both public and private property to address challenges in the area. In relation to the CLUP, an updated Urban Design and Development (UDD) Guide in the CLUP Guidebook 2014 Volume 2: Sectoral Analysis and Tools for Situational Analysis lays out improvement to the technical content of urban design and development and making it more reflective and applicable to the current Philippine setting. The UDD Guide can be utilized by the LGU to develop distinctive characteristics and thorough development strategies for specific areas that are reflective of the development objectives of the CLUP.

On the other hand, this Reference Tool reinforces urban planning and design in line with climate resilience features. It considers and anticipates potential risks and opportunities brought about by climate change.

The following steps show the integration of climate resilient UPD in the CLUP's 12-step process.

Step 1: Organize. A crucial step that outlines the reasons why experts in urban planning and climate change must be involved as well as the knowledge that is already accessible should be prepared. This will influence how the CLUP proposal is planned.

Step 2: Identify Stakeholders. Climate change experts and urban design professionals should be included because of their specialized knowledge, interests, and issues with urban planning and design in the CLUP formulation.

Step 3: Set the Vision. Climate Resilient Urban Plans and Designs (CRUPD)-related vision descriptors should represent the desired quality of the vision statement. The vision shall serve as the driving force that will move the entire LGU to achieve its climate objectives.

Step 4: Analyze the situation. This ties in to Step 3: Assess the context of the area or community of the Thematic Area Assessment Guide of the Updated CLUP - Urban Design and Development Guide. Climate change-related design issues and indicators should be analyzed and integrated to different sectors and land uses.

Step 5: Set the Goals and Objectives. Goals and objectives, outcomes, and output indicators should be responsive to the issues, needs, and potentials of the LGU and the design-related indicators should recommend strategies and options to achieve climate goals and objectives.

Step 6: Establish Development Thrust and Spatial Strategies. The desired physical form of the LGU should be anchored on the preferred development and spatial strategies, and the Adaptation Strategy Policy Framework.

Step 7: Prepare the Land Use Plan. Resilient urban design concerns should be considered when translating and mapping the land use needs and policy areas created in the structure or concept plan into land use categories.

Step 8: Draft the Zoning Ordinance. The rules, criteria, and development controls of the various zones defined in the ZO should consider resilient urban design. Zones and overlay zones can be used to specify regulation and control.

Step 9: Conduct Public Hearing. Consultations with the public and other stakeholders provide an avenue to present the plan and ensure an objective and participatory review of the draft CLUP and ZO. This also ensures the stakeholders' common ownership of the plan and gain support for plan implementation.

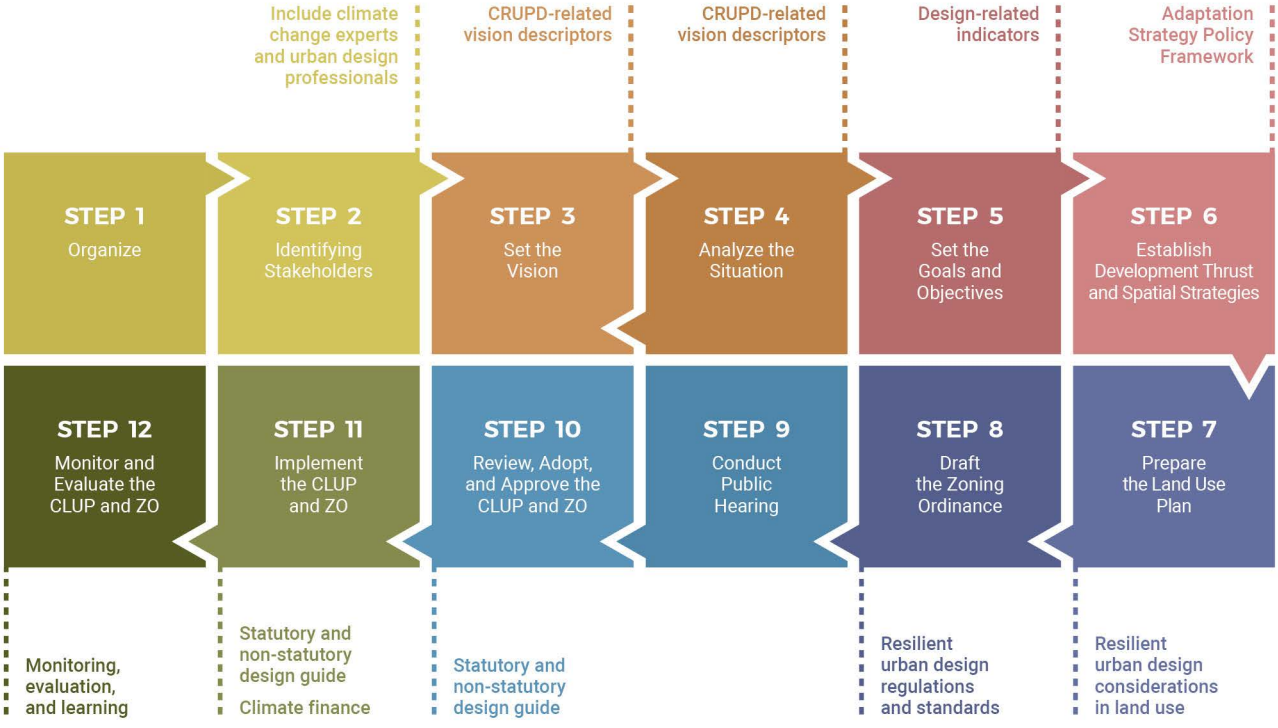
Step 10: Review, Adopt, and Approve the CLUP and ZO. Design guides are powerful tools to promote and achieve climate resilience when they are informed by climate data. Both statutory and non-statutory design guides assist in translating the principles, goals, and vision for high-quality urban design using understandable language and illustrations.

Step 11: Implement the CLUP and ZO. Implementing the CLUP and ZO requires an Information, Education and Communication (IEC) Plan/Advocacy as well as strong climate funding to support the Plans, Programs, and Activities (PPAs). These requirements are supported by statutory and non-statutory design standards.

Step 12: Monitor and Evaluate the CLUP and ZO. Take into consideration the climate parameters and climate impacts (from the Climate Disaster and Risk Assessment [CDRA]) as part of the baseline and the UPD climate actions and UPD adaptation results as part of the performance criteria. Measure this against the adaptation principles, technical benchmarks, and the resilience character it intends to achieve.

Figure 1 illustrates how developing and implementing resilient UPD fits into the CLUP's 12-Step Process. The illustration provides the vital considerations related to climate-resilient urban planning and design that must be integrated or covered in each of the steps.

Figure 1: Integration of climate resilient UPD in the CLUP's 12-Step process



COMPREHENSIVE DEVELOPMENT PLAN

Sustainable and resilient UPD goes beyond planning. LGUs must link the process of planning and designing with financing to complete the cycle of project development and implementation. Linking resilient urban plans and designs with the CDP process is very crucial in realizing its implementation and expected benefits. The CDP, as a mandated plan of the LGUs, provides practical and strategic opportunities in accessing resources to implement resilient UPD projects. It makes the UPD ambitions more implementable from the onset by deliberately linking the urban plans and designs with the CDP and local budgeting procedures.

The following steps provide practical entry points in mainstreaming resilient UPD in the CDP steps.

Step 1: Organize and mobilize the planning team. Expand or involve urban planners and climate change professionals in the composition of the CDP planning team. The LGU should consider the CLUP core team for this purpose to avoid duplication and make the local planning team more efficient and effective. In the absence of an urban planner in the LGU personnel, the LGU can tap the academe and local associations of environmental planners to join the team. Likewise, the DHSUD and DILG Regional Offices may also provide technical guidance to the planning team.

Step 2: Revisit existing plans and review LGU vision. Taking off from the ecological profile and the CDP vision, the planning team must consider the identified gaps and priorities for resilient urban plans and designs of the LGU. In the review and updating of the CDP vision, the planning team must characterize the desired resilient urban planning and design descriptors to be reflected in the vision. In this way, PPAs for urban planning and design are rationalized and synchronized with the long-term development goals of the city/municipality.

Step 3: Prepare eco-profile and structured list of PPAs. Using the CDP template for ecological profile and PPA preparation, urban planning and design projects must be incorporated in the list of PPAs. Related UPD projects must complement the results of the CDRA, CLUP, CDP vision, and LGU-preferred project prioritization criteria (efficiency, acceptability, social and economic benefits, affordability, and others) in preparing the PPAs. The preparation of urban design briefs (discussed on page 97) can serve as a reference in developing the PPAs. This would facilitate matching the most important climate resilience projects with the most appropriate fund source of the local government.

Step 4: Prepare the Local Development Investment Program (LDIP). The next stage is to reflect the resilient UPD projects in the LDIP and LGU annual budget allocation also known as the Annual Investment Program (AIP). Identifying UPD projects must be part of the whole LGU planning and budget allocation process to realize the implementation of UPD projects.

Step 5: Prepare needed implementation instruments. Oftentimes, resilient UPD projects would require substantial investments and institutional support from various stakeholders. Hence, local policy support (e.g., development controls, design code, and zoning ordinance) and institutional cooperation arrangement might be necessary to implement the UPD related PPAs.

Figure 2 elaborates how climate resilient UPD projects can be integrated into the CDP steps and ensure allocation of resources for their implementation and sustainability.

Figure 2. Integration of climate resilient UPD in the CDP process

MAINSTREAMING RESILIENT UPD IN THE CDP PROCESS / STEPS		CDP PREPARATION
Expand / Involve urban planners and CC professionals and other resilient UPD	▶	STEP 1: Organize and Mobilize Planning Team
Integrate resilient urban planning & design issues and gaps and formulate descriptors	▶	STEP 2: Revisit Existing Plans and Review LGU Vision
Identify and prioritize resilient UPD projects to be considered in the PPAs. Prepare design briefs.	▶	STEP 3: Prepare Eco-Profile and Structured List of PPAs
Integrate resilient urban planning & design resource requirement	▶	STEP 4: Prepare the Local Development Investment Program
Initiate legal and institutional actions to support the implementation of resilient UPD projects	▶	STEP 5: Prepare Needed Implementation Instruments

E. ROLES OF PUBLIC INSTITUTIONS IN PROMOTING RESILIENT UPD

National and local government agencies and bodies have important roles to play in planning and implementing climate resilient urban plans and designs in line with their mandates and functions. In particular, national and local actors in the public sector are proposed to take on specific roles to promote the use of this Reference Tool on Urban Planning and Design for Climate Resilience and other planning guidelines and standards on resilient urban plans and designs. Moreover, there is a need for a more coherent and integrated planning of public infrastructure, utilities, and other facilities among national government agencies (NGAs) and between NGAs and LGUs.

The matrix of actors and their proposed roles in the following tables is not exhaustive and may be expanded to include other government agencies and bodies, and the private sector. While the private sector mostly leads the development of the built environment in the Philippines, the government must take on a more proactive role to direct and manage developments to create sustainable, climate resilient, and socially inclusive towns and cities.

NATIONAL GOVERNMENT AGENCIES AND BODIES

AGENCY / OFFICE	MANDATE	ROLES IN PROMOTING THE REFERENCE TOOL AND UPD
Department of Human Settlements and Urban Development (DHSUD)	The primary government agency responsible for the management of housing, human settlements, and urban development.	▶ Lead agency in the conduct of technical assistance for Urban Planning and Design for Climate Resilience ▶ Provide other capacity building activities relevant to preparing and updating the CLUP and ZO, and other urban development initiatives to mainstream and increase capacities of NGAs and LGUs on UPD. ▶ Provide necessary policy guidance and directives to promote resilient UPD and the use of the Reference Tool in national and local planning processes. ▶ Prepare and conduct communication activities and materials to promote the Reference Tool and UPD.
Department of the Interior and Local Government (DILG)	The executive department responsible for promoting peace and order, ensuring public safety, and strengthening the capability of local government units to effectively deliver basic services to the citizenry.	▶ Provide necessary policy guidance and directives to promote resilient UPD and the use of the Reference Tool in local planning.

AGENCY / OFFICE	MANDATE	ROLES IN PROMOTING THE REFERENCE TOOL AND UPD
		▶ Support technical assistance activities for Urban Planning and Design for Climate Resilience, particularly on local planning, investment programming, project development, and monitoring and evaluation (M&E). ▶ Provide other capacity building activities relevant to preparing and updating the CDP, LDIP, and AIP to mainstream and increase capacities of LGUs on UPD. ▶ Actively participate and engage LGUs on advocacy activities on UPD and the Reference Tool.
Climate Change Commission (CCC)	The lead policy-making body of the government tasked to coordinate, monitor, and evaluate government programs and ensure mainstreaming of climate change in national, local, and sectoral development plans towards a climate-resilient and climate-smart Philippines.	▶ Provide necessary policy guidance and directives to promote resilient UPD and the use of the Reference Tool in national and local planning processes. ▶ Support technical assistance activities for Urban Planning and Design for Climate Resilience, particularly on climate financing, project development, and M&E. ▶ Provide financing windows and resources to implement resilient UPD. ▶ Provide other capacity building activities on mainstreaming climate change in local plans, policies, programs, and projects.
National Economic and Development Authority (NEDA)	The country's premier socioeconomic planning body, highly regarded as the authority in macroeconomic forecasting and policy analysis and research. It provides high-level advice to policymakers in Congress and the Executive Branch	▶ Provide necessary policy guidance and directives to promote resilient UPD and the use of the Reference Tool in the national and local planning processes. ▶ Support technical assistance activities for Urban Planning and Design for Climate Resilience, particularly on inter-regional and regional planning, investment programming, and project development.

AGENCY / OFFICE	MANDATE	ROLES IN PROMOTING THE REFERENCE TOOL AND UPD
Department of Public Works and Highways (DPWH)	The Department undertakes major infrastructure projects, which involve the planning of infrastructure, such as national roads and bridges, flood control, water resources projects and other public works; and the design, construction, and maintenance of national roads and bridges, and major flood control systems.	▶ Prepare and update design and planning guidelines for buildings and public works to integrate climate resilience. ▶ Support capacity building activities of NGAs and LGUs by providing technical advice and experts to plan, implement, and monitor public infrastructure.
Department of Transportation (DOTr)	The primary policy, planning, programming, coordinating, implementing and administrative entity of the executive branch of the government on the promotion, development, and regulation of a dependable and coordinated network of transportation and communications systems, as well as fast, safe, efficient, and reliable transportation services.	▶ Integrate resilient UPD in planning, implementing, and monitoring transportation infrastructure and issue necessary policies to promote resilient transportation systems. ▶ Support capacity building activities of NGAs and LGUs by providing technical advice and experts to plan, implement, and monitor transportation facilities.
Department of Budget and Management (DBM)	The DBM leads public expenditure management to ensure the equitable, prudent, transparent, and accountable allocation and use of public funds to improve the quality of life of each and every Filipino.	▶ Provide financing windows and resources to implement resilient UPD. ▶ Provide necessary policy directives to promote resilient UPD.
National leagues (Union of Local Authorities of the Philippines [ULAP], League of Provinces of the Philippines [LPP], League of Cities of the Philippines [LCP], and League of Municipalities of the Philippines [LMP]) and Metropolitan development agencies (Metropolitan Manila Development Authority [MMDA], Metropolitan Davao Development Authority [MDDA])	Platform for LGUs in discussing local issues with the national government, and bringing national policies, projects and programs on the ground.	▶ Promote resilient UPD and the use of the Reference Tool among LGUs. ▶ Coordinate and provide resources for capacity building of LGUs on resilient UPD and the Reference Tool.

LOCAL GOVERNMENT UNITS

Local Government Units are at the forefront of service delivery. Given this tremendous role, LGUs are in a strategic position to maximize the use of urban plans and designs for climate resilience and ensure the welfare of its citizens. The different departments in each LGU mirror the functions of different NGAs to align plans, programs, and projects across government. However, most LGUs need of additional manpower and capacity building to perform and deliver their functions, including those related to climate change mitigation and adaptation.

AGENCY / OFFICE	MANDATE	ROLES IN PROMOTING THE REFERENCE TOOL AND UPD
Local Planning and Development Office (LPDO)	Responsible for formulating the land use plan, various socio-economic development plans, and investment programs; monitoring and evaluation of programs, projects and activities; coordinating development; promoting people participation; and providing policy advice and administrative and technical services to the Local Development Council as its official secretariat.	▶ Formulate and implement a comprehensive and integrated plans that reflect the principles, strategies, and specific interventions on climate-resilient urban plans and designs. ▶ Coordinate with other relevant agencies, whether national or local. in the planning, implementing, and monitoring resilient UPD interventions. ▶ Disseminate information and raise public awareness on climate resilient urban plans and designs. ▶ Develop, strengthen, and operationalize mechanisms for partnership or networking with the private sector, civil society organizations (CSOs), and other stakeholders.
Local Disaster Risk Reduction and Management Office (LDRRMO)	Responsible for preparing for, preventing, and mitigating any disaster, in any given situation. Coordinates DRR and management activities consistent with the National Council's standards and guidelines.	
Local Engineer's Office (LEO)	Primarily responsible for administering and implementing infrastructure development and public works projects of the Local Government Unit.	
Local Architect's Office (LAO)	Responsible reviewing and recommending appropriate action on architectural plans and designs submitted by governmental and non-governmental entities or individuals, particularly those for undeveloped, underdeveloped, and poorly designed areas.	

II. URBAN PLANNING AND DESIGN: A CATALYST TO TRANSITION TO CLIMATE-RESILIENT AND CLIMATE-SMART LOCAL DEVELOPMENT

As discussed in the previous section, this reference tool advances the use of **urban planning and design as a means for localities to achieve climate resilience**. The focus is on climate change and its impacts on communities, and how urban planning and design can create conditions that will reduce risks and vulnerabilities while taking advantage of opportunities that a changing climate brings. Using various processes and tools, climate change data will inform analyses, local development strategies, as well as more detailed and climate change-driven plans and designs.

This section outlines key concepts that are important to know in promoting climate resilience through urban plans and designs; and shares guiding principles as adopted by global actors and existing national policies that serve as references in developing local climate action plans. Furthermore, it features policy review matrices assessing the promotion or inclusion of climate change actions and urban planning and design in the said policies.

A. KEY CONCEPTS

CLIMATE CHANGE AND PROJECTED IMPACTS IN THE PHILIPPINES

Climate change is defined by the UNFCCC as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

The Philippine government advocates the use of climate information and data to ensure sustainable urban development in the country. Mainstreaming climate change in development planning is being supported with data released by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). The climate change information[3] by the said agency, which is now used in planning for climate change, provides its latest key findings. The summary from its 2018 report is presented in Figure 3.

Figure 3: Climate Information in the Philippines from PAGASA. 2018

TEMPERATURE

Observed temperature in the Philippines is warming at an average rate of 0.1°C/decade. Climate projections suggest continuous warming in the future. It is projected that the country-averaged mean temperature could increase by as much as 0.9°C-1.9°C (assuming the moderate emission scenario, RCP4.5) and 1.2°C-2.3°C (considering the high emission scenario, RCP8.5) in the mid-21st century (2036-2065). Warmer conditions are further expected by the end of the 21st century (2070-2099), which could range from 1.3°C-2.5°C (based on the RCP4.5) to 2.5°C-4.1°C (based on the RCP8.5) increase in mean temperature relative to the baseline climate.

RAINFALL

Increasing trends in annual and seasonal rainfall were observed in many parts of the country. Such trends were found to be associated with extreme rainfall events. Multi-model projections suggest a range of increase and decrease in seasonal-mean rainfall exceeding 40% of its historical values. Nevertheless, the multi-model central estimate of projected changes in rainfall could be within the natural rainfall variations, except for the projected rainfall reduction over central sections of Mindanao that are beyond the observed rainfall variations in the past.

TROPICAL CYCLONE

In the past 65 years (1951-2015), a slight decrease in the number of tropical cyclones (TCs) and a minimal increase in the frequency of very strong TCs (exceeding 170kph) were observed over the Philippine area of responsibility (PAR). These trends are projected to continue in the future. It has to be noted, however, that the high year-to-year variations in the frequency of occurence and intensity of TCs remain to be dominant in the future Philippine climate conditions.

SEA LEVEL RISE

The sea level has risen by nearly double the global average rate of sea level rise over certain parts of the Philippines from 1993 to 2015. Projections reveal that sea level in the country is expected to increase by approximately 20cm by the end of the 21st century under the RCP8.5 scenario. Such projected increase in sea level might worsen storm surge hazards particularly on coastal communities.

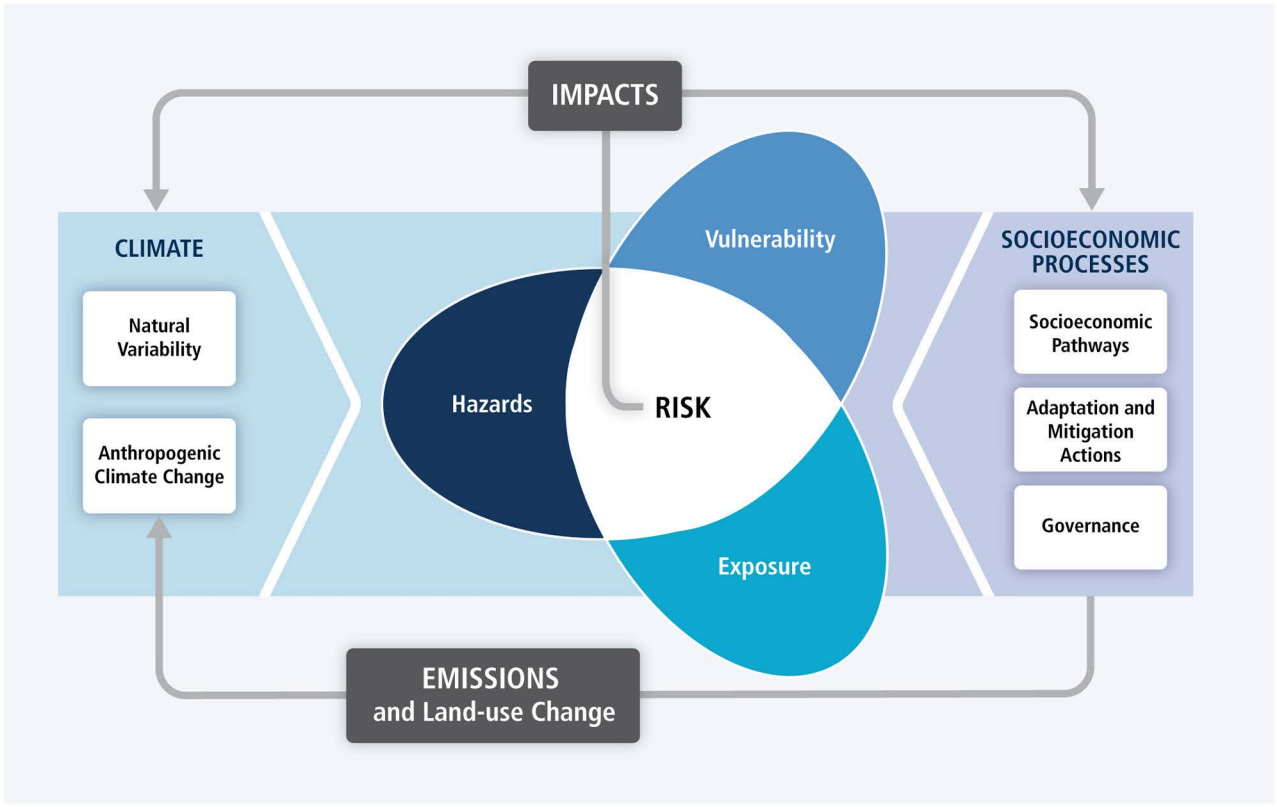
PAGASA, together with the Manila Observatory, also released *Climate Extremes Report 2020: Observed and Projected Climate Extremes in the Philippines to Support Informed Decisions on Climate Change Adaptation and Risk Management*. Climate extremes in the report refers to both extreme weather events and extreme climate events. As noted in the report, "extreme weather events" occurs within time frames of less than a day to a few weeks, and is typically associated with changing weather patterns, while "extreme climate event" happens on longer time scales and can be the accumulation of several (extreme or non-extreme) events. The report provides climate extreme indices for magnitude, frequency, and duration of temperature and rainfall annual extremes.

[3] DOST-PAGASA. (2018). Observed and Projected Climate Change in the Philippines. Philippine Atmospheric, Geophysical and Astronomical Services Administration, Quezon City, Philippines. 36 pp.

CLIMATE RISK

The Philippines Disaster Risk Reduction and Management (DRRM) Act of 2010 (Republic Act 10121) defines "risks" as "the combination of the probability of an event and its negative consequences." While such definition is used to cover the wide typologies of risks, "climate-risk" was defined in the Philippines Climate Change Act of 2009 (Republic Act 9729) as, "the product of climate and related hazards working over the vulnerability of human and natural ecosystems." The Intergovernmental Panel on Climate Change Fifth Assessment Report (IPCC AR5) notes the same definition of climate risks. This risk-focused understanding was illustrated (see Figure 4) in IPCC-AR5 on "assessing and managing the risks of climate change."

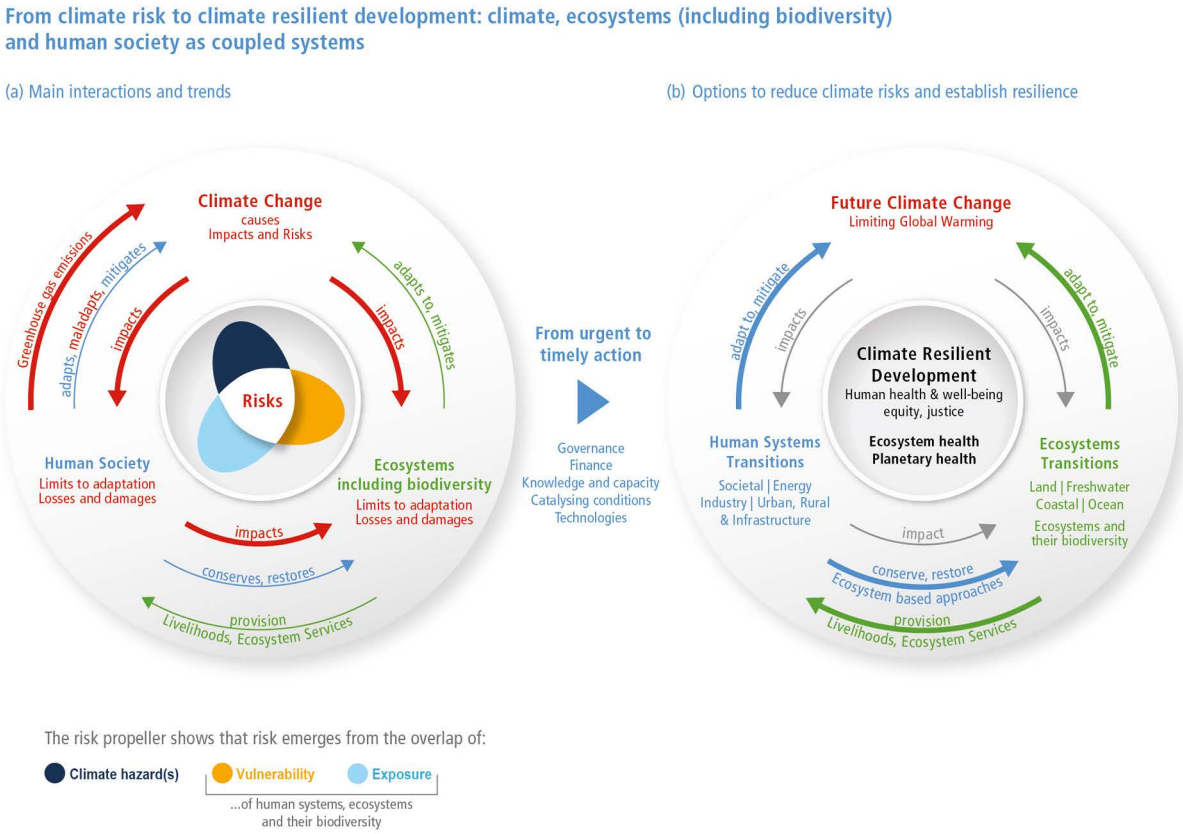
Figure 4: IPCC AR5 Risk-Based Conceptual Framework



The IPCC Assessment Report 6 (AR6) released in 2022 applies a more comprehensive risk framework building on AR5 and other Special Reports that IPCC has issued including Special Report on Global Warming of 1.5°C (IPCC 2018b), the Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC) (IPCC 2019b).

The IPCC AR6 defines "risk" as the **potential** for adverse consequences for human or ecological systems, recognizing the diversity of values and objectives associated with such systems. As the AR6 focuses on risks and solutions (Figure 5), the risk framing includes risks from the responses to climate change, considers dynamic and cascading consequences, describes with more geographic detail risks to people and ecosystems, and assesses such risks over a range of scenarios.

Figure 5: IPCC AR6 Risk Framing



RESILIENCE AND CLIMATE RESILIENCE

In generic terms, resilience is (1) the ability of people or things to recover quickly after something unpleasant, such as shock, injury, and others, or (2) the ability of a substance to return to its original shape after it has been bent, stretched or pressed[4]. While resilience could be used in view of many shocks, stresses, and disturbance due to other factors unrelated to climate change, the "resilience framework" has also emerged strongly for climate actions. Resilience building involves a systems-thinking approach, which implies "that social and ecological systems cannot be considered in the absence of one another but must be understood as related coupled systems. In this sense, a society may be able to cope well with the change from a social perspective (e.g., improving irrigation technology and increasing agricultural subsidies), but not from an ecological perspective (e.g., the ecological impacts of increased farming and groundwater pumping)[5].

While the Philippines Climate Change Act (RA 9729) and its amendment law RA 10174 do not offer a definition of "resilience," the Republic Act 10121 or the Disaster Risk Reduction and Management Act of 2010 defines resilience as

[4] Oxford University Press. (2022). 'Resilience.' In *Oxford Learner's Dictionary*. https://www.oxfordlearnersdictionaries.com/us/definition/english/resilience?q=resilience

[5] Nelson, D. R., Adger, W. N., & Brown, K. (2007). Adaptation to environmental change: contributions of a resilience framework. Annual review of Environment and Resources, 32(1), 395-419. http://eprints.icrisat.ac.in/4245/1/AnnualReviewofEnvResources_32_395-419_2007.pdf

the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management."

The IPCC AR6 defines resilience as "the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation. Resilience as a system trait overlaps with concepts of vulnerability, adaptive capacity, and, thus, risk, and resilience as a strategy overlap with risk management, adaptation, and transformation."

IPCC reports have emphasized the importance of a transformative approach to resilience, resulting in fundamental, systemic, and sustainable changes in overall development. This is aptly illustrated in Figure 5, which is elaborated as:

a. Human society causes climate change. Climate change, through hazards, exposure, and vulnerability generates impacts and risks that can surpass limits to adaptation and result in losses and damages. Human society can adapt to, maladapt and mitigate climate change, ecosystems can adapt and mitigate within limits. Ecosystems and their biodiversity provision livelihoods and ecosystem services. Human society impacts ecosystems and can restore and conserve them.

b. Meeting the objectives of climate resilient development thereby supporting human, ecosystem and planetary health, as well as human well-being, requires society and ecosystems to move over (transition) to a more resilient state. The recognition of climate risks can strengthen adaptation and mitigation actions and transitions that reduce risks. Taking action is enabled by governance, finance, knowledge, and capacity building, technology, and catalyzing conditions. Transformation entails system transitions strengthening the resilience of ecosystems and society (Section E). In (a), arrow colors represent principle human society interactions (blue), ecosystem (including biodiversity) interactions (green), and the impacts of climate change and human activities, including losses and damages, under continued climate change (red). In (b), arrow colors represent human system interactions (blue), ecosystem (including biodiversity) interactions (green), and reduced impacts from climate change and human activities (grey).

ADAPTATION TO CLIMATE CHANGE

Adaptation is a major priority of the Philippine government in responding to climate change. In the Philippines Republic Act 9729 or the Climate Change Act of 2009 as amended by RA 10174, **adaptation** refers to "adjustments in natural and human systems in response to actual or expected climatic stimuli and their effects, which moderates harm or exploits beneficial opportunities." This definition also underlines the importance of identifying the potential opportunities that a changing climate brings, and including the opportunities into the process of analyzing, prioritizing, and deciding on adaptation measures to implement.

The IPCC's Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX) and AR5 clarified the distinction between adaptation in natural and human systems, both of which have the capacity to cope with adverse impacts of climate change. AR5 stresses that human systems can allow and facilitate natural systems to adjust to a changed or changing climate to maintain the ecosystem services it provides to support life. The report also highlights the importance of both incremental and transformative adjustments of a system to facilitate adaptation. "Incremental adaptation refers to actions where the central aim is to maintain the essence and integrity of the existing technological, institutional, governance, and value systems, such as through adjustments to cropping systems via new varieties, changing planting times, or using more efficient irrigation. In contrast, transformational adaptation seeks to change the fundamental attributes of systems in response to actual or expected climate and its effects, often at a scale and ambition greater than incremental activities. It includes changes in activities, such as changing livelihoods from cropping to livestock or by migrating to take up a livelihood elsewhere, and also changes in our perceptions and paradigms about the nature of climate change, adaptation, and their relationship to other natural and human systems.[6]

Successful adaptation requires the understanding of risks and vulnerabilities and the recognition that adaptation is highly context-specific. Details of actions, therefore, need to particularly be designed and implemented according to local needs and realities, especially how vulnerability indicators interact with the hazards given their specific built and natural environment and adaptive capacity. While the strategy for adaptation (e.g., Ecosystem-based Adaptation) might be similar in many areas, it is expected that there will be nuances in the details of action design, objectives, and implementation approaches as well as in the indicators for adaptation results and impacts. Adaptation options may come in a variety of approaches and categories to cover a wide array of sectors to deliver results for social, economic, natural environment, and physical or spatial development. Options and approaches to adapt to climate change impacts may be developed and implemented in an integrated manner and even simultaneously. The image in Figure 6 is derived from IPCC AR5 Summary for Policy Makers and should be used as a reference to understand and develop adaptation actions.

[6] IPCC AR5; WGII Adaptation Needs and Options (p.839)

Figure 6: Examples of Adaptation Approaches, Category, and Actions from IPCC AR5 - Summary for Policy Makers

Overlapping Approaches	Category	Examples
Vulnerability & Exposure Reduction through development, planning, & practices including many low-regrets measures	Human development	Improved access to education, nutrition, health facilities, energy, safe housing & settlement structures, & social support structures; Reduced gender inequality & marginalization in other forms.
	Poverty alleviation	Improved access to & control of local resources; Land tenure; Disaster risk reduction; Social safety nets & social protection; Insurance schemes.
	Livelihood security	Income, asset, & livelihood diversification; Improved infrastructure; Access to technology & decision-making fora; Increased decision-making power; Changed cropping, livestock, & aquaculture practices; Reliance on social networks.
	Disaster risk management	Early warning systems; Hazard & vulnerability mapping; Diversifying water resources; Improved drainage; Flood & cyclone shelters; Building codes & practices; Storm & wastewater management; Transport & road infrastructure improvements.
	Ecosystem management	Maintaining wetlands & urban green spaces; Coastal afforestation; Watershed & reservoir management; Reduction of other stressors on ecosystems & of habitat fragmentation; Maintenance of genetic diversity; Manipulation of disturbance regimes; Community-based natural resource management.
	Spatial or land-use planning	Provisioning of adequate housing, infrastructure, & services; Managing development in flood prone & other high risk areas; Urban planning & upgrading programs; Land zoning laws; Easements; Protected areas.
Adaptation including incremental & transformational adjustments	Structural/physical	***Engineered & built-environment options***: Sea walls & coastal protection structures; Flood levees; Water storage; Improved drainage; Flood & cyclone shelters; Building codes & practices; Storm & wastewater management; Transport & road infrastructure improvements; Floating houses; Power plant & electricity grid adjustments.
		Technological options: New crop & animal varieties; Indigenous, traditional, & local knowledge, technologies, & methods; Efficient irrigation; Water-saving technologies; Desalinization; Conservation agriculture; Food storage & preservation facilities; Hazard & vulnerability mapping & monitoring; Early warning systems; Building insulation; Mechanical & passive cooling; Technology development, transfer, & diffusion.
		Ecosystem-based options: Ecological restoration; Soil conservation; Afforestation & reforestation; Mangrove conservation & replanting; Green infrastructure (e.g., shade trees, green roofs); Controlling overfishing; Fisheries co-management; Assisted species migration & dispersal; Ecological corridors; Seed banks, gene banks, & other *ex situ* conservation; Community-based natural resource management.
		Services: Social safety nets & social protection; Food banks & distribution of food surplus; Municipal services including water & sanitation; Vaccination programs; Essential public health services; Enhanced emergency medical services.
	Institutional	***Economic options***: Financial incentives; Insurance; Catastrophe bonds; Payments for ecosystem services; Pricing water to encourage universal provision and careful use; Microfinance; Disaster contingency funds; Cash transfers; Public-private partnerships.
		Laws & regulations: Land zoning laws; Building standards & practices; Easements; Water regulations & agreements; Laws to support disaster risk reduction; Laws to encourage insurance purchasing; Defined property rights & land tenure security; Protected areas; Fishing quotas; Patent pools & technology transfer.
		National & government policies & programs: National & regional adaptation plans including mainstreaming; Sub-national & local adaptation plans; Economic diversification; Urban upgrading programs; Municipal water management programs; Disaster planning & preparedness; Integrated water resource management; Integrated coastal zone management; Ecosystem-based management; Community-based adaptation.
	Social	***Educational options***: Awareness raising & integrating into education; Gender equity in education; Extension services; Sharing indigenous, traditional, & local knowledge; Participatory action research & social learning; Knowledge-sharing & learning platforms.
		Informational options: Hazard & vulnerability mapping; Early warning & response systems; Systematic monitoring & remote sensing; Climate services; Use of indigenous climate observations; Participatory scenario development; Integrated assessments.
		Behavioral options: Household preparation & evacuation planning; Migration; Soil & water conservation; Storm drain clearance; Livelihood diversification; Changed cropping, livestock, & aquaculture practices; Reliance on social networks.
Transformation	Spheres of change	***Practical***: Social & technical innovations, behavioral shifts, or institutional & managerial changes that produce substantial shifts in outcomes.
		Political: Political, social, cultural, & ecological decisions & actions consistent with reducing vulnerability & risk & supporting adaptation, mitigation, & sustainable development.
		Personal: Individual & collective assumptions, beliefs, values, & worldviews influencing climate-change responses.

Human settlements, cities, and urban systems are key thematic areas for adaptation identified by UNFCCC's Nairobi Work Programme (NWP)[7]. The patterns of exposure, social and physical vulnerability, and **capacity for resilience** of urban areas are determined by how settlements and key infrastructure are planned, designed, and maintained.

The IPCC AR6 flags, however, that "maladaptation has been observed for instance, because of inadequate knowledge, short-term, fragmented, single-sectoral and/or non-inclusive governance planning and implementation. It includes inflexible infrastructure that cannot be adjusted easily or affordably, or stranded assets or stranded vulnerable communities, which cannot afford to move or adapt." In this view, the said report fully noted that long-term planning will contribute to help avoid maladaptive lock-ins while also creating opportunities to build capacity to act in a timely and pre-emptive manner, and to reduce risks to ecosystems and people.

CLIMATE CHANGE MITIGATION

Climate change mitigation involves human interventions that reduce the sources or enhance the sinks of greenhouse gases (GHGs).

Mitigation of GHG emissions is a key target of the Paris Agreement, which was ratified by UN member states, including the Philippines. Article 2 of the Paris Agreement outlines the target to "hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change."

The 2022 IPCC AR6 noted that the global share of emissions that can be attributed to urban areas is increasing. In 2015, urban emissions were estimated to be 25 gigaton of carbon dioxide equivalent (GtCO2-eq) (about 62 per cent of the global share) and in 2020, 29 GtCO2-eq (67–72 per cent of the global share). The drivers of urban GHG emissions are complex and include population size, income, state of urbanization and urban form. An earlier UN-Habitat report[8] revealed that Gross Domestic Product (GDP), population and urban expansion contribute to growing GHG emissions in cities. The report's analysis shows the following general trends:

- Larger cities tend to have a stronger relationship between GDP and carbon dioxide (CO_2) in the transport and industrial sectors. For cities of more than 1 million inhabitants, a 1 per cent increase in GDP is associated with a 0.5 per cent increase in transport CO_2 emissions; in cities of fewer than 100,000 inhabitants, the increase is close to 0.3 per cent. A similar pattern is found in CO_2 emissions from the industrial sector, where a 1 per cent increase in GDP ranges from 0.22 per cent in cities with less than 100,000 inhabitants to 0.3% in cities with more than 1 million people. In contrast, an increase in GDP is associated with a slight decrease in residential CO_2 emissions in cities of fewer than 500,000 inhabitants: a 1 per cent increase in GDP is associated with a decrease in residential emissions of around 0.03 per cent.

- Population plays a key role in the increase of emissions in the residential sector among intermediary cities. Indeed, the estimated effect of a 1 per cent increase in population is an increase in emissions of 0.24 per cent in cities with less than 100,000 inhabitants to 0.46 per cent in cities of 100,000 to 500,000 inhabitants. In contrast, for transport emissions, the relationship between population and emissions is negative: a 1 per cent increase in population is associated with a decrease in emissions of 0.21 per cent to 0.29 per cent across all city sizes.

- Built-up expansion is positively associated with higher CO_2 emissions, but only in cities of fewer than 500,000 inhabitants. The effect is particularly acute in the residential sector, where a 1 per cent increase in built-up land is associated with an increase of 0.33 per cent to 0.34 per cent in CO_2 emissions in cities with fewer than 500,000 inhabitants.

Considering the above, mitigation actions in an urban setting is extremely important as GHG emissions from urban areas and cities will continue to increase as economies of developing countries transform and continue to build.

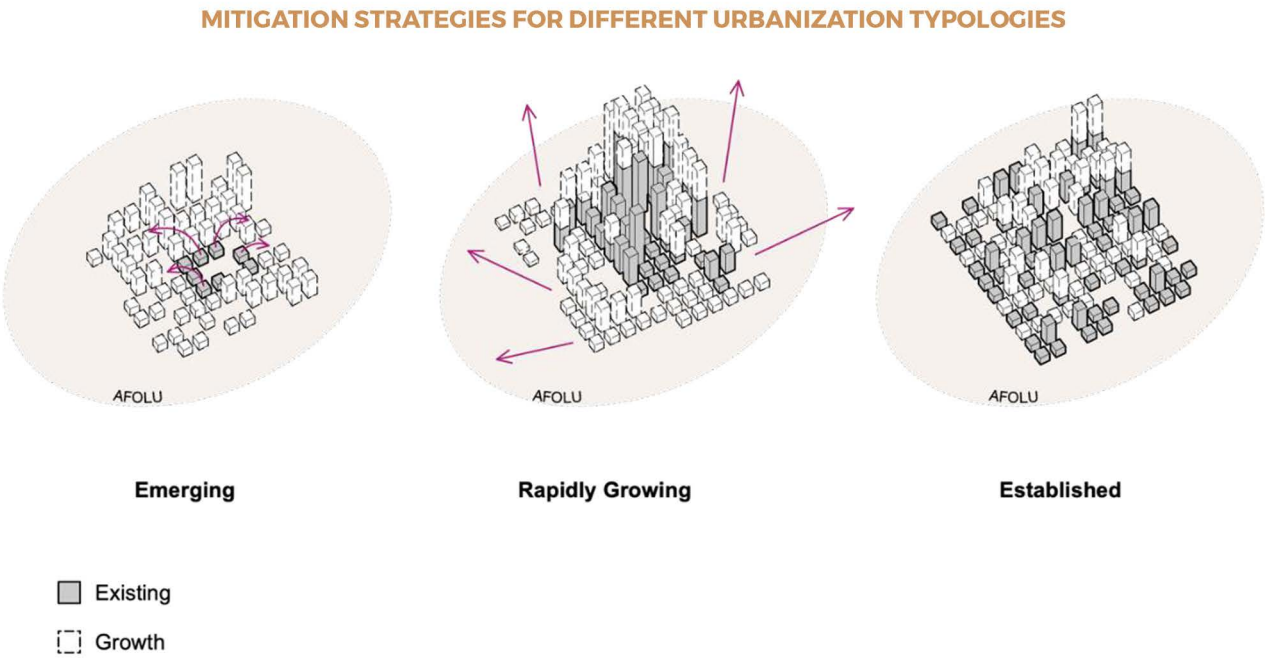
[7] UNFCCC Decision 17/CP.19; SBSTA 44; and SBSTA 48

[8] OECD/UN-Habitat. (2022). Intermediary Cities and Climate Change: An Opportunity for Sustainable Development. OECD Publishing, Paris. https://doi.org/10.1787/23508323-en

The Philippines' Nationally Determined Contribution (NDC) submitted to UNFCCC in 2021 states that country emissions are on the average of 1.98 metric tons of carbon dioxide equivalent per capita in 2020, or way below the global average of 4 metric tons per capita. In such context, the Philippines commits to a projected GHG emissions reduction and avoidance of 75 per cent, of which 2.71 per cent is unconditional and 72.29 per cent is conditional, representing the country's ambition for GHG mitigation for the period 2020 to 2030 for the sectors of agriculture, wastes, industry, transport, and energy. This commitment is referenced against a projected business-as-usual cumulative economy-wide emission of 3,340.3 metric tons of carbon dioxide equivalent (MtCO2e) for the same period.

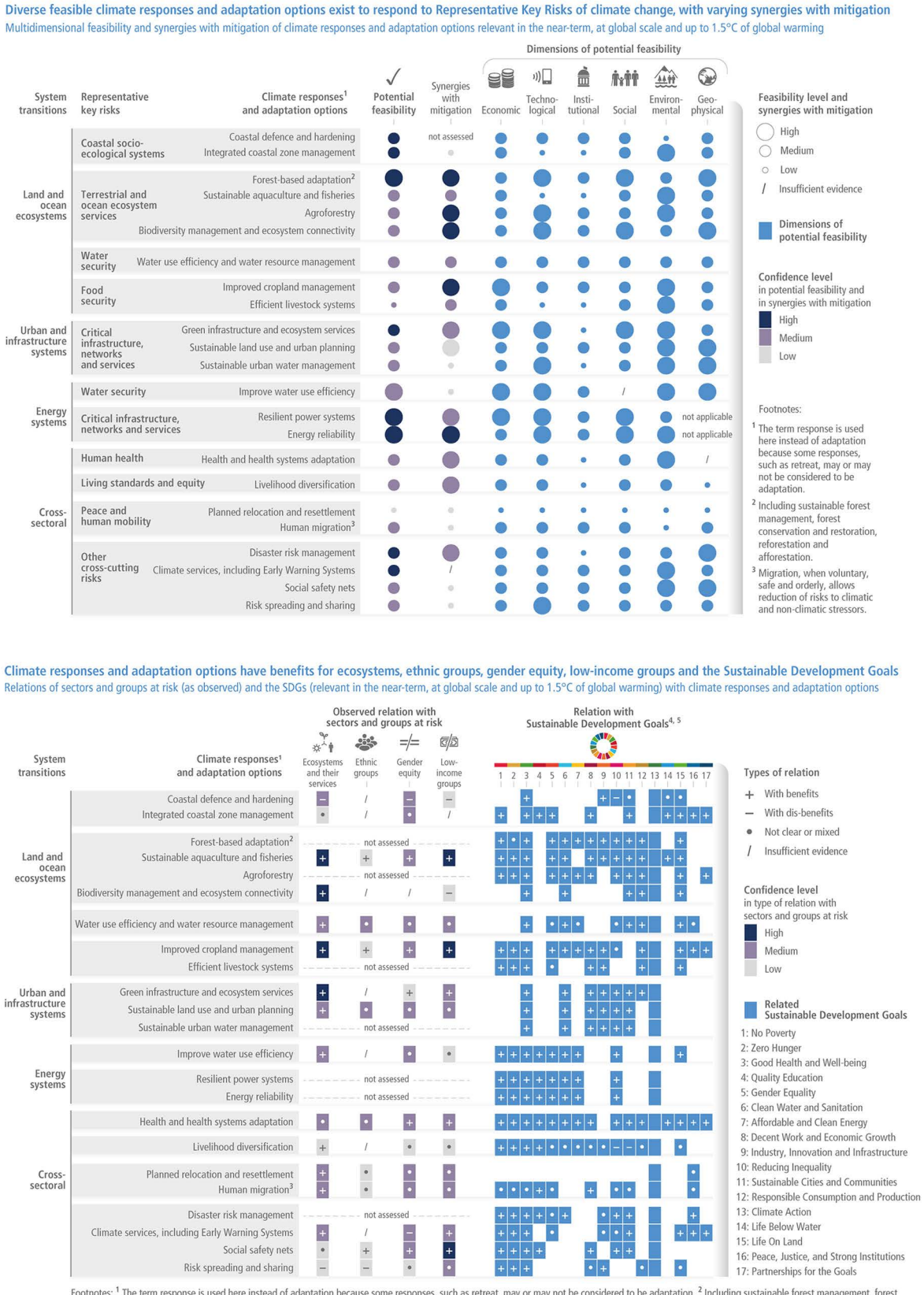
As the country pursues its mitigation action as in its NDC, it will be crucial to take stock of the recent IPCC AR6 Working Group III (WGIII) findings (very high confidence) that "Urban areas can create opportunities to increase resource efficiency and significantly reduce GHG emissions through the systemic transition of infrastructure and urban form through low-emission development pathways towards net-zero emissions." The opportunities have been elaborated in the report according to the typology of urban areas/cities characterized as 1) established cities, 2) rapidly growing cities, and 3) new and emerging cities as the report surmised that **the potential and sequencing of mitigation strategies to reduce GHG emissions will vary depending on a city's land use, spatial form, development level, and state of urbanization.**

Figure 7: Mitigation Strategies from IPCC AR6



Climate change mitigation actions can deliver adaptation benefits and support resilience building. It can also link and support wider goals such as the SDGs given its intersection across many sectors.

Figure 8: Feasible Climate Responses and Adaptation Options with Mitigation Synergies



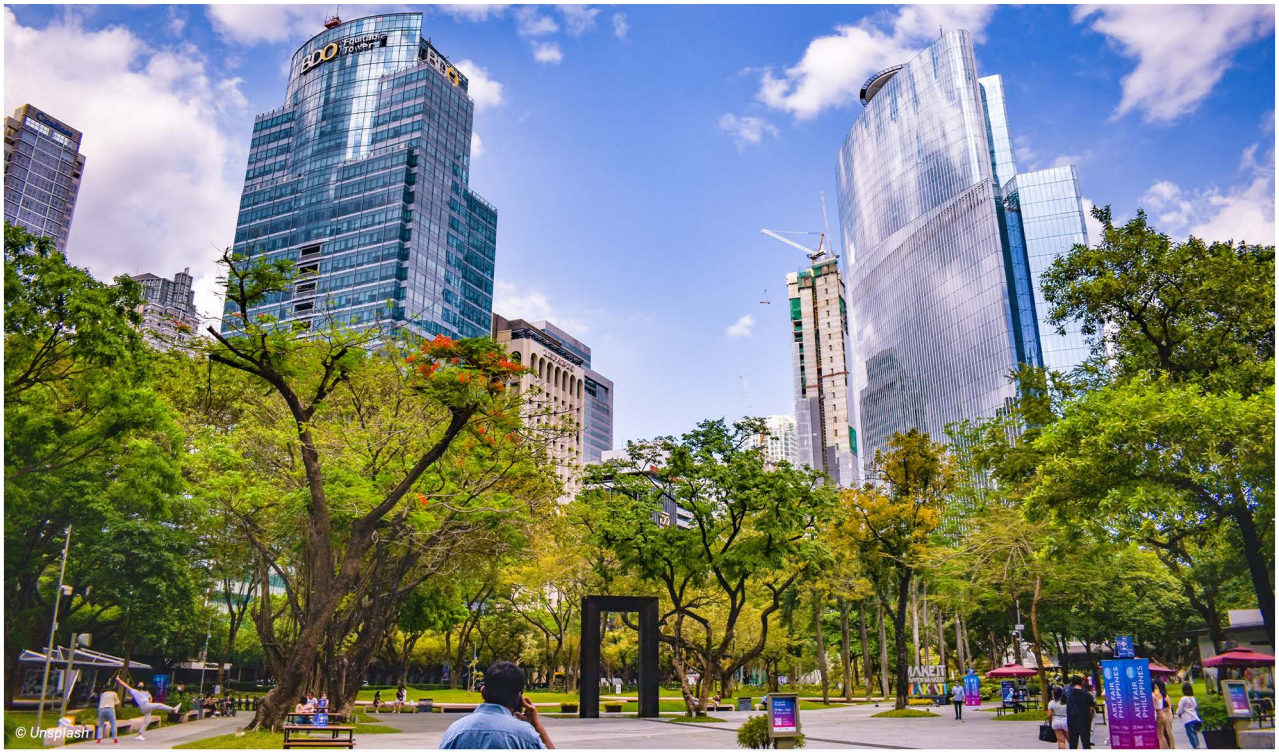
URBAN PLANNING AND DESIGN

Urban planning, also known in the Philippines as environmental planning, is the "multi-disciplinary art and science of analyzing, specifying, clarifying, harmonizing, managing, and regulating the use and development of land and water resources, in relation to their environs, for the development of sustainable communities and ecosystems" (Environmental Planning Act or RA10587). Its scope includes development, physical framework, or comprehensive land use plans; zoning and related ordinances, codes, and other legal issuances for the development and management, preservation, conservation, rehabilitation, regulation, and control of the environment, including all land, water, air, and natural resources; planning and development of a barangay, municipality, city, province, region, or any portion or combination thereof; development of a site for a particular need or special purpose, such as economic or ecological zones; tourism development zones; and housing and other estate development projects, including the creation of any other spatial arrangement of buildings, utilities, transport, and communications.

The implementation of urban planning in the Philippines is primarily promoted and supported by the national government through the general guidelines and policies issued by agencies to local governments. The Department of Human Settlements and Urban Development is responsible for issuing the Comprehensive Land Use Planning Guidebooks for LGUs, while the Department of Interior and Local Government issues a guidebook for Comprehensive Development Planning that further links the sector plan to budgeting. Existing guidelines and issuances by the two agencies may be referred to for the detailed and elaborate discussions on urban planning.

While not explicit in the definition, Urban Design is associated and linked as part of the overall urban planning process. The Comprehensive Land Use Planning Formulation Guidebook released by the Housing and Land Use Regulatory Board (HLURB) (2016) provides a more specific definition for Urban Design that it is "concerned with the arrangement, appearance, and function of the environment. It determines the physical scale, space, and ambiance of a place and establishes the built and natural forms within which individual structures are situated. It operates at various scales, from the urban structure to the micro-scale of street furniture."

Currently, the practice of Urban Planning and Urban Design in the Philippines is performed by three distinct professions – the Environmental Planners for the planning and the Architects and Landscape Architects for the design. Regardless of who performs the tasks, the concept is for Urban Planning and Design decisions to be related and even interdependent. To create a more sustainable built environment that supports coherent and transformed societal and environmental conditions, urban design should anchor on and contribute to the overall developmental vision not only of a particular scale but of the larger urban planning scale or city/municipality. In such a context, UPD is espoused to be a multi-disciplinary activity that engages multiple sectors of the city that all have stakes in the resulting plan and design.



The latest CLUP formulation guidebook for LGUs in the country has integrated special areas and thematic concerns[9], including urban design, in the land use planning process to ensure the conservation and sustainable management of critical elements that may be present and relevant to the local area being planned.

Below are the specific urban design elements[10] that planners are encouraged to consider as they formulate their comprehensive land use and development plans:

Urban Structure

The overall framework of a region, town, zones, or district, showing relationships between zones of built forms, landforms, natural environments, activities, and open spaces. It encompasses broader systems, including transport and infrastructure networks. Figure 9 shows an example of urban structure of.

Figure 9: Example of City Urban Structure

Source: Louwie A. Gan

[9] Apart from urban design, the other special areas and thematic concerns integrated in the last iteration (2014) of the CLUP guide include ancestral domain, biodiversity, heritage, and green growth

[10] HLURB HTAP training module as adopted from "Creating Places for People: An Urban Design Protocol for Australian Cities"

Urban Grain

The balance of open space to built form, and the nature and extent of subdividing an area into smaller parcels or blocks. It considers the hierarchy of street types, physical linkages and movement between locations, and modes of transport. For example, a "fine urban grain" might constitute a network of small or detailed streetscapes. Figure 10 shows the urban grain of the City of Manila.

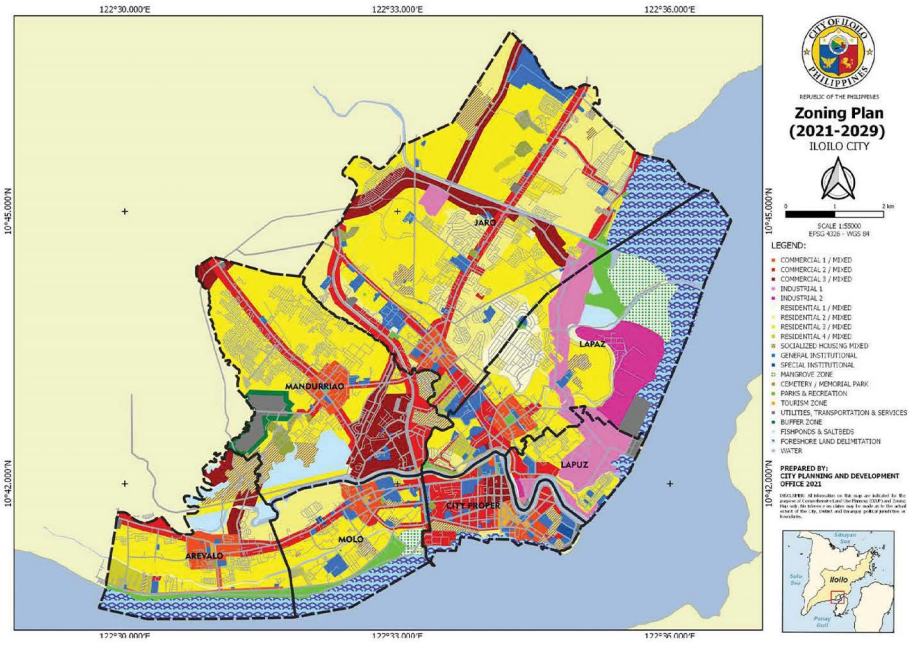
Figure 10: Manila City's Urban Grain Structure

Source: SCHWARZPLAN.eu

Density + Mix

The intensity of development and the range of different uses (such as residential, commercial, institutional, or recreational uses).

Figure 11: Density + Mix Map of Iloilo City



Source: Iloilo City Zoning Plan 2021-2029

Height + Massing

The scale of buildings in relation to height and floor area, and how they relate to their surroundings. It also incorporates building envelope, site coverage, and solar orientation.

Figure 12: Urban Landscape Showing Variation in Height + Massing

Source: Council on Tall Buildings and Urban Habitat

Streetscape + Landscape

The design of public spaces such as streets, open spaces, and pathways, and includes landscaping, and planting. Figure 13 is captured in Filinvest City, Muntinlupa featuring wide sidewalks separated from the roads with green shrubs.

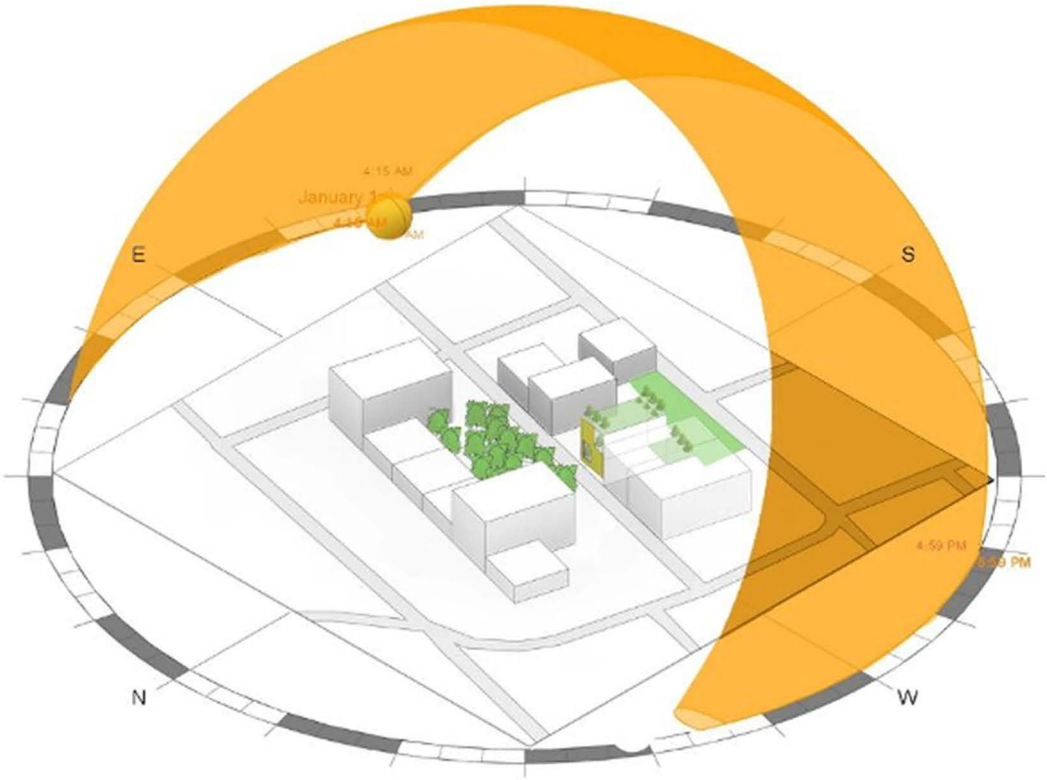
Figure 13: Streetscape + Landscape in Filinvest City, Alabang, Muntinlupa

Source: Wikimedia Commons

Facade + Interface

The relationship of buildings to the site, street, and neighboring buildings (alignment, setbacks, and boundary treatment) and the architectural expression of their facades (projections, openings, patterns, and materials).

Figure 14: Drawing Representing Façade + Interface of an Area



Source: Keivani Architects

Details + Materials

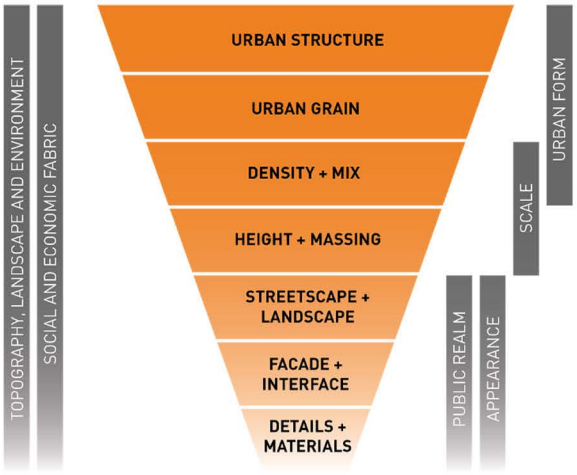
The close-up appearance of objects and surfaces and the selection of materials in terms of detail, craftsmanship, texture, color, durability, sustainability, and treatment. It includes street furniture, paving, lighting, and signage. It contributes to human comfort, safety, and enjoyment of the public domain.

Figure 15: Example of Details + Materials of a Shelter

Source: Louwie A. Gan

Figure 16 presents the key considerations and aspects of the urban design elements, which are shown from largest to smallest. The spatial structure, grain, and density and mix are elements that configure the "urban form." The scale of the urban form is characterized further by density + mix as well as the designed height and massing of the buildings and spaces. The smallest elements of urban design are principally concerned about the public realm and appearance.

Figure 16: Elements of Urban Design



Source: Adopted from Urban Design Protocol for Australian Cities, 2011

URBAN PLANS AND DESIGNS FOR CLIMATE CHANGE RESILIENCE

Climate resilient development requires large and equitable changes in human and natural systems. As noted in IPCC AR6, five transitions in socioeconomic systems—energy, land and ecosystems, **urban and infrastructure**, industrial, and societal—must occur at a large scale and rapid rate to achieve climate resilient development.

Urban Planning has been recognized as a key means to address climate change. Focusing on towns and urban centers is now extremely critical to achieving wider and systemic adjustments. Urban planning for resilience is crucial considering the densities, activities, and institutional resilience impacts it can yield. Since urban planning is a forward-looking endeavor, it can take a comprehensive approach towards enhancing climate resilience now and into the future. It can concern itself with introducing preparedness and flexibility to accommodate both the sudden and slow-onset impacts of climate change, which fit within the mid to long-term planning periods that are characteristic of effective urban plans. Urban design, meanwhile, can provide more details to urban elements adjustment to increase resilience. As an interdisciplinary practice, UPD is also able to unite built environment professions such as urban planning, architecture, landscape architecture, and civil engineering, as well as social development practitioners together in one process. As a multi-disciplinary practice, UPD can produce a plan that addresses the complex nature of climate resilience and sustainability.

As urban plans and designs operate at multiple scales, the risks and vulnerabilities in all the planning scales (as may be related to the built environment, natural environment, and communities) could be assessed and planned for in the context of systems resilience building. This makes UPD a critical means to assure climate-resilience and sustainability of all areas for new development and redevelopment.

Box 1: The Role of Urban Design in Local Adaptation

Since AR5, there has been a growing literature about the role of urban design, creating new opportunities for both incremental and transformative adaptive responses to climate change (medium evidence, high agreement). For example, some of these creative design approaches compliment and extend regulatory and land use planning approaches such as form-based codes and established certifications such as Leadership in Energy and Environmental Design–Neighbourhood Design (LEED-ND) (Garde, 2018; Garde and Hoff, 2017) and the USA's Sustainable Sites Initiative (SITES) (Valente, 2014). Emphasis on sufficiency has also influenced urban design, for example, with the mobilisation of 'doughnut' economics that emphasise both a social foundation and an environmental ceiling, for example Amsterdam (Raworth, 2017). However, such cases are rare, substantial public investment is often required (high confidence, high agreement) (see also Section 6.4.7 on finance and insurance). Other approaches underscore innovation and creativity, at the essence of which are context-specific interventions that draw on a compendium of urban design principles such as indeterminacy (to accommodate climate uncertainty), polyvalency and diversity, and harmony with nature (Dhar and Khirfan, 2017). Creative interventions include the daylighting of buried streams to create climate adaptive public realms (Khirfan et al., 2020; Khirfan, Mohtat and Peck, 2020). For example, the demolition of a major expressway and the restoration of the Cheonggyecheon Stream reorganised downtown Seoul, South Korea, and significantly contributed to climate change adaptation through stormwater management and reducing the urban heat island effect (Kim and Jung, 2019). Biomimicry and ecological infrastructure are design features that governance bodies can use to reshape space and contribute to place making (Santos Nouri and Costa, 2017; Prior et al., 2018). For example, urban metabolism and local ecological knowledge has constituted the essence of urban design interventions on the Island of Tobago in ways that capitalise on the contiguous relationship between ecosystems (e.g., the mangrove forest) and human actions (rainwater harvesting and grey water management) (Khirfan and Zhang, 2016). While lack of funding or design capacity, restrictive planning regulations, inequality and competing urban agendas can create barriers for the implementation of creative design solutions. Transition architecture movements are also driving local urban adaptation experiments and exploring ways local learning can be scaled up (Tubridy, 2020; Irwin, 2019).

Source: IPCC, 2022: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

B. GUIDANCE TO LOCAL CLIMATE PLANNING: GLOBAL ACCORDS, PLANNING PRINCIPLES, AND CRITERIA FOR ADAPTATION OPTIONS

It is crucial to consider local level integrated climate change action planning as LGUs proceed with the development of climate-resilient urban plans and designs. This importance is recognized by global frameworks, and international agreements on climate planning such as: (1) Guiding principles for Local Climate Action Planning; (2) UNFCCC – Nairobi Work Programme; (3) Sendai Framework for Disaster Risk Reduction 2015–2030; (4) Paris Agreement on Climate Change; (5) UN Agenda 2030 for Sustainable Development Goals; and (6) New Urban Agenda.

The Philippines passed the following laws and implemented the following policies to localize these global frameworks and agreements: (1) Climate Change Act of 2009; (2) National Disaster Risk Reduction and Management Act; (3) Supplemental Guidelines on Mainstreaming Climate Change and Disaster Risks in the Comprehensive Land Use Plan; (4) Guidelines on Mainstreaming Climate Change Action and Disaster Risk Reduction in Local Development Planning; (5) National Disaster Risk Reduction and Management Framework; (6) National Disaster Risk Reduction and Management Plan; and the (7) National Climate Change Action Plan.

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GLOBAL GUIDES

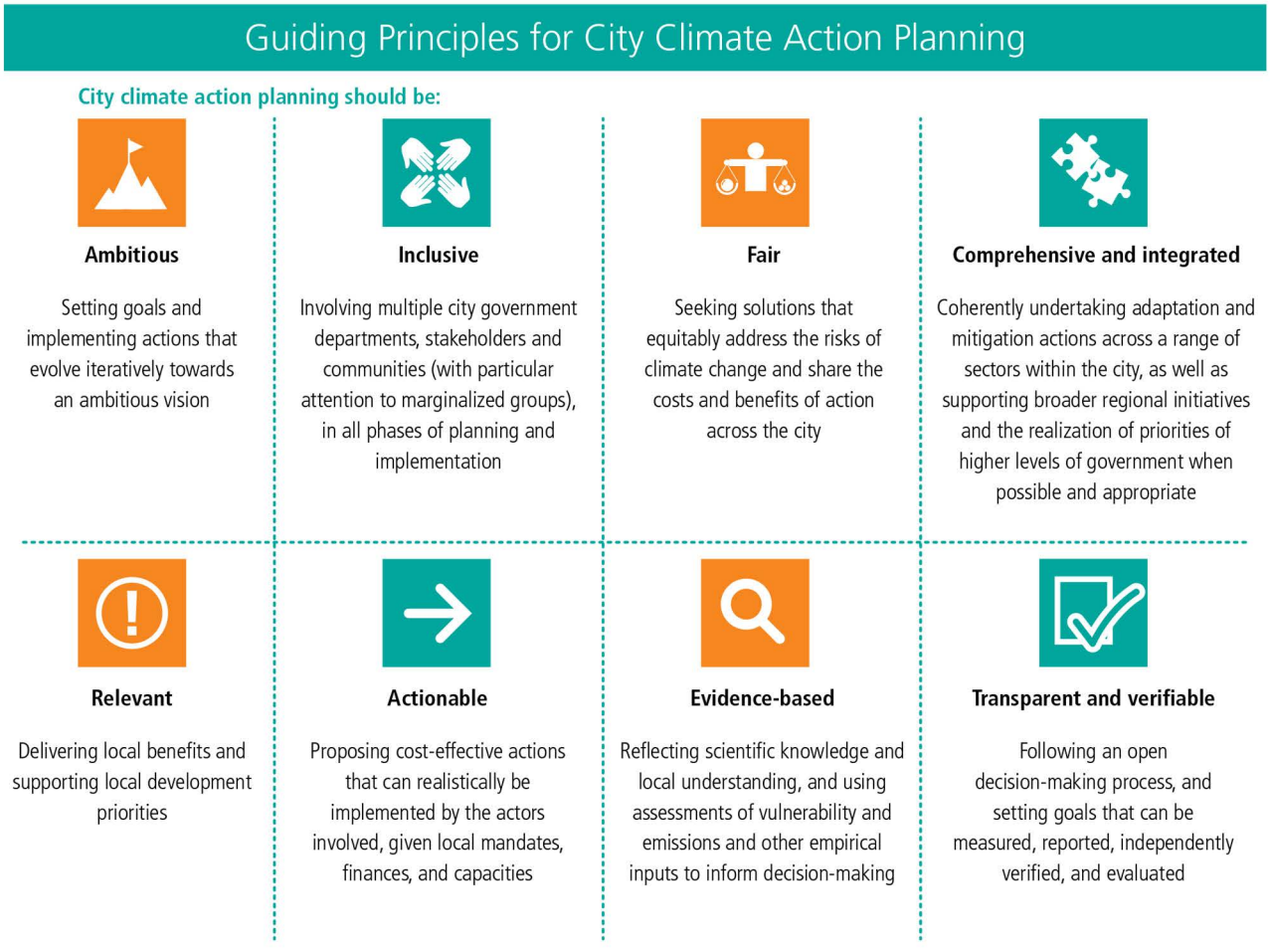
GUIDING PRINCIPLES FOR LOCAL CLIMATE ACTION PLANNING

In an effort to guide cities addressing climate change, several agencies and institutions working at the international level with leadership from UN-Habitat agreed on a set of guiding principles for climate action planning. The globally released document is presented in this tool as a reference to enable actors in the Philippines to undertake rational, values-driven steps towards climate resilience.

The *Guiding Principles for Local Climate Action Planning (Guiding Principles)* reviews typical steps in the city-level climate action planning process considering a proposed set of globally applicable principles to help cities build local climate resilience. They support planning that aims to reduce GHG emissions and adopt low emission development trajectories (mitigation), as well as adapt to the impacts of climate change (adaptation). The *Guiding Principles* offer a framework that encompasses planning, implementation, monitoring, reporting, evaluation, and improvement. They can be applied flexibly and across the various components of climate action and can be evident both in the planning process and the output, enabling LGUs to develop plans, strategies, and actions aligned with their urban development vision and at the same time tackle the climate challenge in a comprehensive way.

The Guiding Principles are illustrated in Figure 17, and further reading may be accessed from https://unhabitat.org/guiding-principles-for-climate-city-planning-action.

Figure 17: Guiding Principles on City Action Planning



Source: UN-Habitat

UNFCCC – NAIROBI WORK PROGRAMME

A set of Criteria for Adaptation Actions to Achieve Resilience can be referenced from the UNFCCC knowledge-to-action hub for adaptation and resilience. The Nairobi Work Programme, a mechanism of the UNFCCC, disseminates knowledge to inform and support adaptation policies and practices on climate change impacts, vulnerability, and adaptation to climate change to member countries such as the Philippines.

The NWP released reference material on *Assessing the Cost and Benefits of Adaptation Options: Overview of Approaches*. The document offers an introduction to a range of different assessment approaches and methodologies and shares best practices and lessons learned. A guide was provided to adaptation planners to ensure that they identify and agree on a set of criteria to be used in assessing defined adaptation options (see Figure 18).

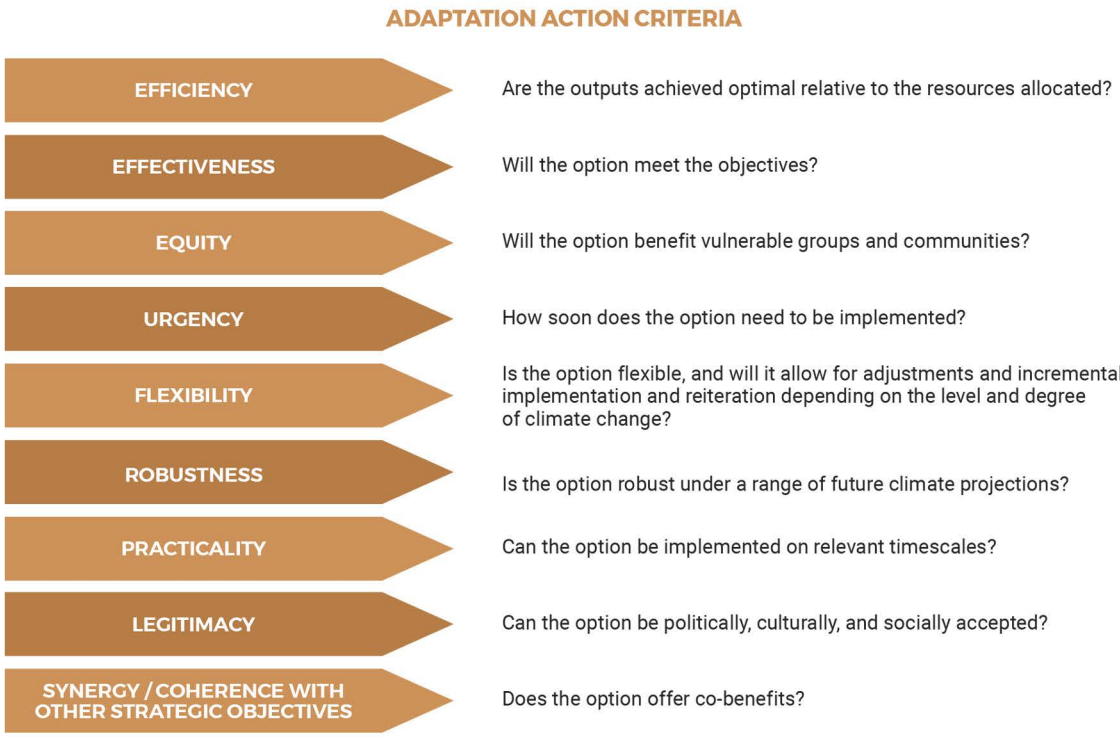
The set of criteria could cover all actions, including urban design-related, and can be applied to various development and thematic action plans. These criteria for adaptation actions are useful, especially in the strategies and actions phase of the planning process – when actions are defined, decided on, and implemented. Guided throughout the process by the overarching principles mentioned above, local actors can now explore, analyze, and validate interventions against these adaptation criteria, to ensure that programs and projects help achieve climate resilience.

It is likewise important to refer to two key international agreements in advancing urban planning and design to develop adaptation actions and build climate resilience – the **Sendai Framework for Disaster Risk Reduction 2015–2030**, and the legally binding **Paris Agreement on Climate Change**, which came into effect in 2016. The Philippines is a signatory to both global actions and has committed country-level initiatives to contribute to the fulfillment of objectives outlined in the DRR action roadmap and climate change accord.

The Paris Agreement directs all Parties to the agreement to report national GHG inventory (Article 13.7-a) and progress in implementing and achieving their respective NDC (Article 13.7-b). It also asks all parties, as appropriate, to report their climate change impacts and adaptation (Article 13.8). This is in line with Article 7.9d of the Agreement, which states that "Each Party shall, as appropriate, engage in adaptation planning processes and the implementation of actions, including the development or enhancement of relevant plans, policies and/or contributions, which may include: (d) Monitoring and evaluating and learning from adaptation plans, policies, programs, and actions."

These provisions related to monitoring and evaluation are significant to the Philippines as a signatory to the Paris Agreement with an NDC, which has both mitigation and adaptation components for its climate actions.

Figure 18: Examples of Criteria in Assessing Adaptation Options



Source: UNFCCC Nairobi Work Programme, 2011a.

Figure 19: Sustainable Development Goals

Source: UN.org

2030 AGENDA FOR SUSTAINABLE DEVELOPMENT AND THE NEW URBAN AGENDA

In September 2015, the United Nations Member States has adopted the 2030 Agenda for Sustainable Development to guide international, regional, and national development efforts for the next 15 years. The agenda, as contained in the outcome document, "Transforming our World: the 2030 Agenda for Sustainable Development," has 17 SDGs and 169 targets that cover the economic, social and environmental dimensions of development.

Following the bi-decennial cycle, the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) was convened in 2016 in Quito, Ecuador to galvanize global efforts towards sustainable urbanization. Building on the Habitat Agenda of Istanbul in 1996, the theme of Habitat III was the renewal of global commitments to sustainable urbanization through the implementation of the New Urban Agenda (NUA).

The New Urban Agenda underscores the link between good urbanization and development. The agenda recognizes that sustainable urbanization generates jobs and livelihood and improves the quality of life. Thus, the New Urban Agenda is intrinsically connected to the 2030 Agenda for Sustainable Development, particularly SDG 11 - Make cities and human settlements inclusive, safe, resilient, and sustainable.

The link between the New Urban Agenda and SDG 11 is amplified in the paradigm shift presented by NUA. The framework enables cities and human settlements to be planned, designed, financed, developed, governed and managed in order to attain development.

NATIONAL CLIMATE PLANNING POLICIES

CLIMATE CHANGE ACT OF 2009 (R.A. 9729)

Aligned with the policy to afford full protection and the advancement of the right of the people to a healthful ecology in accord with the rhythm and harmony of nature, the government has adopted the principle of "protecting the climate system for the benefit of humankind, on the basis of climate justice or common but differentiated responsibilities and the Precautionary Principle to guide decision-making in climate risk management." The Climate Change Act mandates the national government to formulate the National Climate Change Action Plan, which includes the following components:

- Assessment of the national impact of climate change;
- Identification of the most vulnerable communities/areas, including ecosystems to the impacts of climate change, variability, and extremes;
- Identification of differential impacts of climate change on men, women, and children;
- Assessment and management of risk and vulnerability;
- Identification of GHG mitigation potentials;
- Identification of options and prioritization of appropriate adaptation measures for joint projects of national and local governments.

Furthermore, the law recognizes LGUs as the frontline agencies in the formulation, planning, and implementation of local climate change action plans (LCCAPs) in their respective areas, consistent with the provisions of the Local Government Code, the NFSCC, and the National Climate Change Action Plan. LGUs shall regularly update their action plans to reflect changing social, economic, and environmental conditions and emerging issues.

The Climate Change Act of 2009 can be accessed from: https://www.officialgazette.gov.ph/2009/10/23/republic-act-no-9729/.

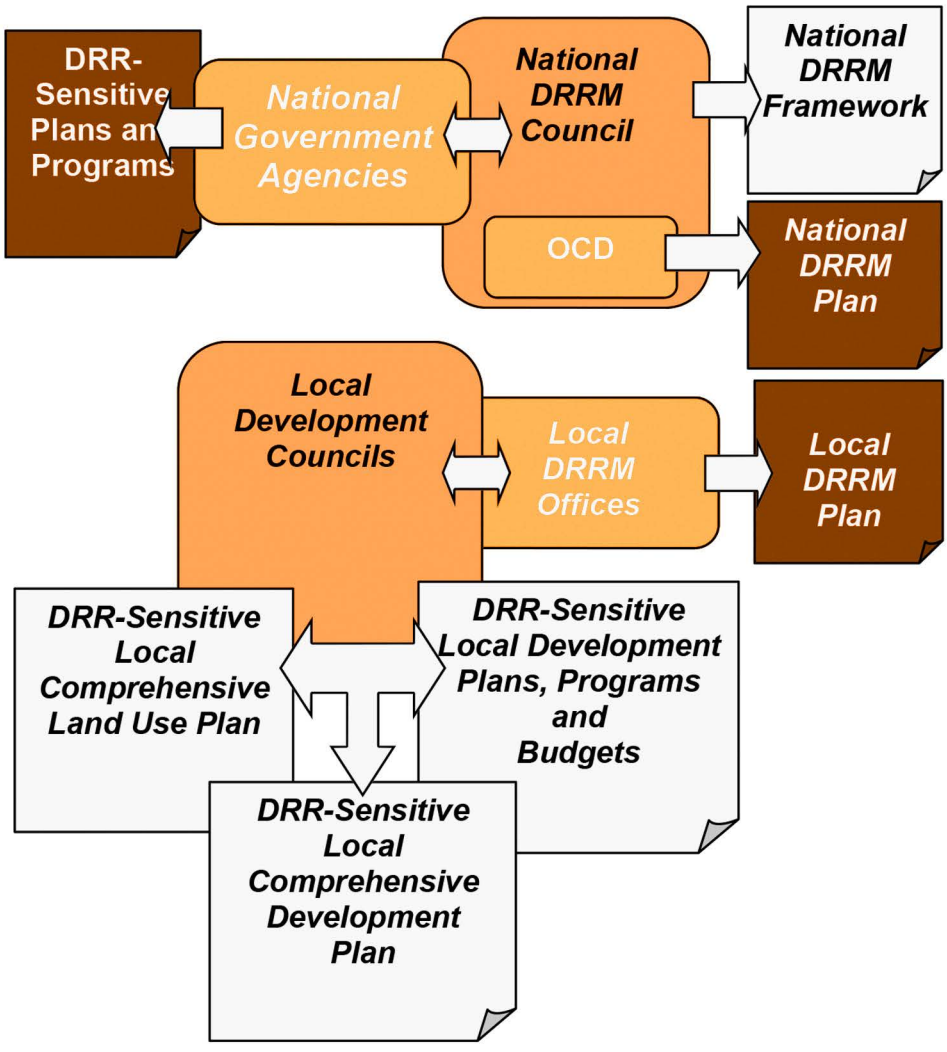
DISASTER RISK REDUCTION AND MANAGEMENT ACT OF 2010 (R.A. 10121)

Republic Act 10121 is another landmark law of the Philippine Government, as in the Climate Change Act, to promote and ensure disaster resilience in the country. This law paved the way for a more proactive approach to managing risks faced by the country, being among the top nations in the world in terms of vulnerability to natural disasters. Salient features of the DRRM Act of 2010 include advancing coherence with international frameworks (i.e., Hyogo Framework for Action) and adherence to universal norms, principles, and standards of humanitarian assistance. It also establishes good governance and transparency, promotes strengthening institutional mechanisms on DRRM, establishes the integrated and multi-sectoral approach to risk reduction, and further reiterates the empowerment of Local Government Units as frontline actors not only in responding to disasters but also in proactively addressing risks and vulnerabilities. A vital feature of the law is the establishment of the DRRM Fund (DRRMF) at the national and local levels.

Section 2(g) of RA 10121 declared that it is the policy of the State to "mainstream disaster risk reduction and climate change in development processes such as policy formulation, socio-economic development planning, budgeting, and governance, particularly in the areas of environment, agriculture, water, energy, health, education, poverty reduction, **land-use and urban planning**, and public infrastructure and housing, among others." Figure 20 presents the whole of government approach in implementing DRRM in the country.

The DRRM Act of 2010 can be accessed from https://www.officialgazette.gov.ph/2010/05/27/republic-act-no-10121/

Figure 20: Philippines DRRM Whole-of-Government Approach



Source: DRRNet Primer on R.A. 10121

SUPPLEMENTAL GUIDELINES ON MAINSTREAMING CLIMATE AND DISASTER RISKS IN THE COMPREHENSIVE LAND USE PLAN (2015)

The Supplemental Guideline on Mainstreaming Climate and Disaster Risk in the Comprehensive Land Use Plan was developed in compliance and consistent with the Climate Change Act of 2009 and the Disaster Risk Reduction and Management Act of 2010. The Supplemental Guidelines is the HLURB's response to address and support LGUs to mainstream Climate Change Adaptation (CCA) and DRR into the Comprehensive Land Use Plans and Zoning Ordinances.

The CLUP is an integral instrument for LGUs to address existing risks effectively, and avoid the creation of new risks to people, assets, and economic activities by rationalizing distribution and development of settlements, and the utilization and management of natural resources. In the context of DRRM, land use planning is a proactive approach, which emphasizes pre-disaster prevention and mitigation. Through anticipatory interventions, it is expected that the population would be safer, the economy more resilient, and essential services and infrastructure robust. With this appreciation of the CLUP, the Supplemental Guideline, a complementary tool to the CLUP Formulation Guidebooks, also developed by HLURB, was released to mainly assist city and municipal planners in the assessment of risks and vulnerability in their respective cities and municipalities.

The *Supplemental Guidelines* introduced a six-step CDRA process to analyze risks and vulnerabilities of exposed elements, namely: people, urban areas, agriculture, forestry and fishery production areas, critical point facilities, lifelines, and other infrastructure that are exposed to natural hazards and climate change. It illustrates how LGUs can translate land-use policies on disaster risk reduction and climate change adaptation into zoning parameters to adequately address risks by managing exposure and encouraging resilient structures to ensure the safety of the population and limit structural damages caused by hazards.

The framework proposed in the Supplemental Guideline does not alter the comprehensive land-use planning process. Instead, it illustrates how risk information from an analysis of the hazards and the vulnerability of elements exposed to these hazards are derived through a climate and disaster risk assessment process. With CDRA results, cities and municipalities are expected to formulate risk-sensitive comprehensive land use plans that shall create safer and resilient human settlements and effectively reduced and managed climate and disaster risks.

The full version of the Supplemental Guide can be accessed from https://dhsud.gov.ph/wp-content/uploads/Publication/Guidebooks/HLURB_Supplemental_Guidelines.pdf

GUIDELINES ON MAINSTREAMING CLIMATE CHANGE ADAPTATION (CCA) AND DISASTER RISK REDUCTION (DRR) IN LOCAL DEVELOPMENT PLANNING

The DILG issued Memorandum Circular (MC) 2015-17 as a "Guideline on Mainstreaming Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) in Local Development Planning." Considering the Rationalized Planning System used by the government, the MC acknowledges that mainstreaming CCA and DRR in the LGU's Comprehensive Development Plan would require consistency with the Housing and Land Use Regulatory Board's Guidelines. The HLURB supplemental guide includes the Climate and Disaster Risk Assessment process and tools.

LGUs need to note that the DILG MC 2015-17 indicated that "Local Climate Action Plans should not be treated as a stand-alone plan but a plan that can either be integrated or derived from the CDP." Moreover, it espouses the Ridge-to-Reef or integrated watershed ecosystems management framework to be adopted by LGUs while also asking LGUs to include special concerns such as **green growth and urban design** in developing the city and municipal Ecological Profile. A city and municipal Ecological Profile is part of the basic requirements before proceeding to spatial and sectoral planning.

Fundamental to climate actions in the country as noted in the issuances from HLURB and DILG is the vertical and horizontal alignments of plans, especially since disasters and climate change impacts go beyond political boundaries. DILG MC 2015-17 stipulates that principles and consideration of local plans, particularly when cities and municipalities in a province share risks, must be consistent, and actions thus must be complementary.

The DILG MC further states that to ensure that identified programs and projects to address disasters and climate risks are implemented, these should be included in the LGUs Local Development Investment Programme and Annual Investment Programme. Likewise, MC 2015-17 advised LGUs to optimize resources by incorporating CCA and DRR considerations in the design of sectoral development projects such as those in agriculture, infrastructure, water, housing, and health.

The DILG MC 2015-17 can be accessed from https://www.dilg.gov.ph/PDF_File/issuances/memo_circulars/dilg-memocircular-2015722_e9147d39be.pdf

The **National Disaster Risk Reduction Management Plan (NDRRMF)**, with its vision of "safer, adaptive and disaster-resilient Filipino communities toward sustainable development" also signals a shift towards human settlements centered on communities' increased awareness of disaster risk reduction and management (DRRM) and a push towards resilience. Its consequent plan, the **National Disaster Risk Reduction and Management Plan (NDRRMP)** 2011-2028, sets down the expected outcomes, outputs, key activities, and indicators to achieve this vision. The NDRRMP identifies two outcomes in which DHSUD is the lead. These outcomes describe the nature of disaster-resilient human settlements (Outcome 8) and the access to either affordable disaster-resilient housing or financial assistance to rebuild houses for affected families or individuals (Outcome 21).

Meanwhile, the **National Climate Change Action Plan (NCCAP)** provides policy guidance with its vision "to build the adaptive capacities of women and men in their communities, increase the resilience of vulnerable sectors and natural ecosystems to climate change, and optimize mitigation opportunities towards a gender-responsive and rights-based sustainable development." It further identifies and details thematic areas where human settlements can become a platform to build resilience, including water sufficiency, human security, sustainable energy, and climate-friendly industries and services, among others.

C. GUIDANCE FROM EXISTING NATIONAL URBAN AND URBAN-RELATED POLICIES TOWARDS CLIMATE CHANGE RESILIENCE

Climate-resilient urban development is core to the Philippines' development agenda. There are several urban and urban-related policies and pieces of legislation that have been instituted by the Philippine government to guide the country's actions, especially that of LGUs, to ensure sustainable and resilient urban development across the country. Three policies are specifically issued to guide urban actions, the National Urban Development and Housing Framework (NUDHF), the National Housing and Urban Development Sector Plan (NHUDSP), and the Philippine New Urban Agenda (PNUA). These policies aspire to achieve the vision of **Better, Greener, Smarter Urban Systems in a More Inclusive Philippines**. The PNUA, NUDHF, and NHUDSP are consistent and aligned with AmBisyon Natin 2040 and the Philippine Development Plan (PDP) 2017–2022. AmBisyon Natin 2040 represents the collective long-term vision and aspirations of the Filipino people for themselves and the country in the next 25 years. Although AmBisyon Natin 2040 has no direct reference to climate resilience and urban planning and design, it, however, identifies Housing and Urban Development as a priority sector. As such, it may be deduced that investments in urban development ought to promote Filipino lives that are strongly **rooted, comfortable and secure** – outcomes that cannot be achieved without climate resilience.

Box 2: Ambisyon Natin 2040

AMBISYON NATIN 2040

"MATATAG, MAGINHAWA, AT PANATAG NA BUHAY"

By 2040, Filipinos enjoy a strongly rooted, comfortable, comfortable, and secure life.

Filipinos are strongly rooted: matatag.

Filipino families live together; there is work-life balance so that there is time to spend with family even for members who work. On weekends, families and friends enjoy time together in parks and recreational centers. It is a high-trust society with a strong sense of community. There are volunteer opportunities, and Filipinos spend time to serve the community, help others who are in need, and contribute to various causes.

Filipinos are comfortable: maginhawa.

No one is poor, no one is ever hungry. Filipino families live in comfortable homes with the desired amenities and secure tenure. Families and friends are within reach because transport is convenient and affordable, and they can take a vacation together within the country and abroad. Children receive quality education so that they realize their full potentials and become productive members of society. Decent jobs that bring sustainable income are available, including opportunities for entrepreneurship.

Filipinos are secure: panatag.

Filipinos feel secure over their entire lifetime. They expect to live long and enjoy a comfortable life upon retirement.There are resources to cover unexpected expenses, and there are savings. They feel safe in all places in the country. Filipinos trust their government because it is free of corruption and provides service to all its citizens equally.

PHILIPPINE DEVELOPMENT PLAN 2017-2022

PDP 2017–2022 takes off from the Administration's Ten Point Socioeconomic Agenda and is the first medium-term plan anchored on AmBisyon Natin 2040 following Executive Order 5, series 2016. The current PDP aims to lay a stronger foundation for inclusive growth, a high-trust society, and a globally competitive economy toward realizing the vision by 2040.

The document is organized into seven parts. Part I provides the overall context for the Plan. Part II is about enhancing the social fabric to build the foundations for a high-trust society. Part III stresses the importance of reducing inequalities in economic development opportunities. Part IV focuses on increasing potential growth. Part V calls for a supportive economic environment that will enable the economy to sustain growth, and Part VI is about foundations for inclusive and sustainable development. Finally, Part VII describes the institutional arrangements for implementation and monitoring – making sure that what is planned is implemented and that timely adjustments are made. As the PDP 2017–2022 is the first concrete step towards realizing AmBisyon Natin 2040, the government needs to make sure that it contributes to achieving the collective aspirations of its citizens.

PHILIPPINE NEW URBAN AGENDA

The PNUA lays down development direction at the national level, with the goal of achieving the vision of **Better, Greener, Smarter Urban Systems in a More Inclusive Philippines**. It does so by providing agenda points in several action areas (Figure 21).

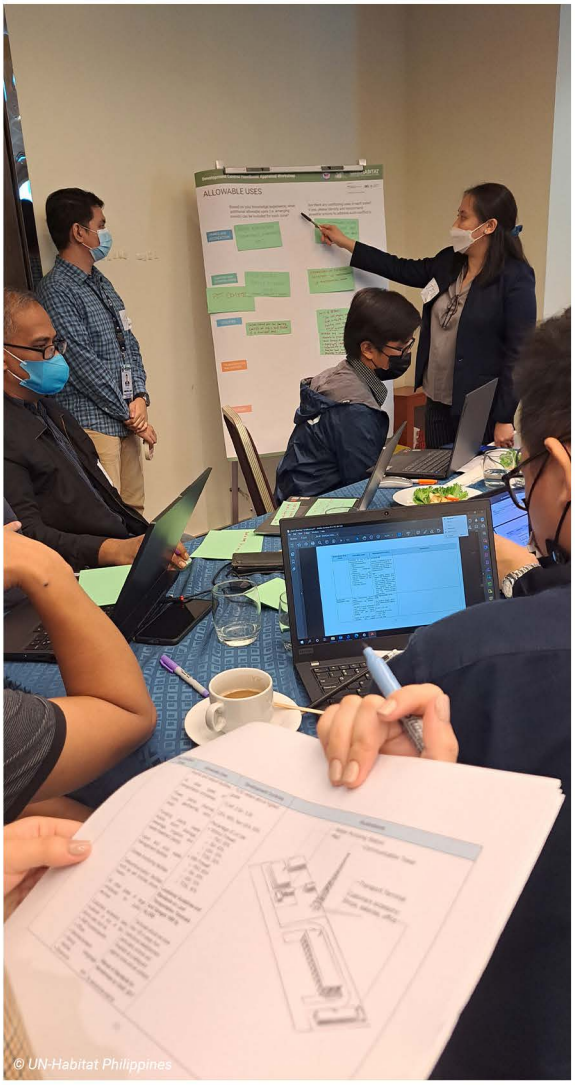
The second and third action areas provide a natural anchor for this reference tool. Nonetheless, activities under these themes will also affect other action areas, owing to the encompassing nature of climate change. The Philippines is committed to submit a report on the progress of the PNUA implementation every four years since 2018 as agreed during the 72nd UN General Assembly. The full copy of the Philippine New Urban Agenda may be accessed from https://hudcc.gov.ph/sites/default/files/styles/large/public/document/Habitat%20III%20-%20Philippine%20National%20Report.pdf.

Figure 21: Focus Areas of the Philippine New Urban Agenda

Source: Housing and Urban Development Coordinating Council, 2016a.

PHILIPPINE GREEN BUILDING CODE

The Philippine Green Building Code, a referral code to the National Building Code of the Philippines, is a set of regulations that set minimum standards for compliance to reduce GHG emissions and lessen the impacts of buildings to health and environment through resource management efficiency.



NATIONAL URBAN DEVELOPMENT AND HOUSING FRAMEWORK

Following the directives set under the Urban Development and Housing Act (RA 7279), the NUDHF provides an overarching framework (Figure 22) for urban development and housing, consisting of a vision, policy statements and strategies, and encompassing core development sectors and spatial elements. Adopting the vision of the PNUA, it intends to guide the efforts of the Philippine government, private sector, and other stakeholders in improving the performance and efficiency of the country's urban systems.

The latest NUDHF was crafted considering new and emerging issues and challenges, particularly climate change, and can provide anchor policy directions and references. Its strategies in the urban planning and design focus area (Table 1) can be a useful reference for users of this guide.

The full copy of the NUDHF may be accessed from https://dhsud.gov.ph/wp-content/uploads/Publication/Guidebooks/NUDHF_Full_Version_FINAL.pdf.

Figure 22: NUDHF Main Diagram of Key Principles

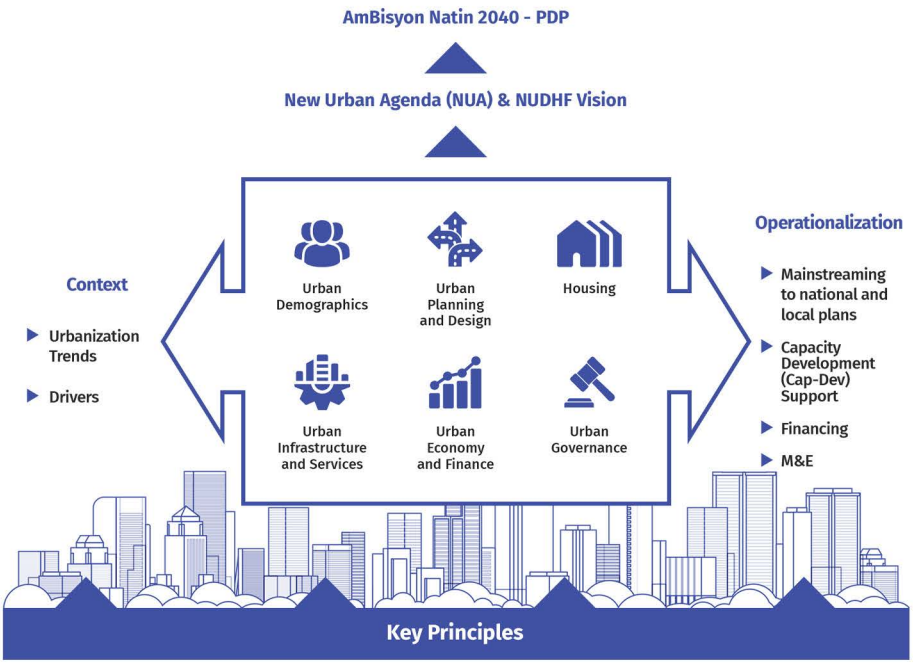


Table 1: NUDHF Strategies for Urban Planning and Design in View of Climate Change and Disaster Risk Reduction

NUDHF PRINCIPLES	"Climate change resilience as a base for spatial structuring and sectoral development: Resilience as the foundation in planning and decision-making for spaces (neighborhoods, settlements, development areas, cities, municipalities, provinces, regions) and for addressing sectoral and/or cross-sectoral challenges (environment, social, economic, infrastructure, institutional, including cultural practices or expression)"	"Sustainability of the urban environment as a fundamental focus - protect ecosystems

NUDHF URBAN PLANNING AND DESIGN STRATEGIES
▶ Strengthen the mainstreaming of disaster risk reduction and management planning and climate change adaptation/ mitigation planning with spatial and sectoral development planning. This includes mainstreaming of DRRM and CCAM in the CLUP and CDP, and streamlining and harmonizing processes on CCAM-DRR and capacity building for planning offices, professionalization, and ethical accountability in the planning process and documentation.
▶ Consider the water cycle in urban planning and design. Plans must support watershed improvement. They must include, where possible, the development of alternative water sources other than groundwater. In line with this, the collection of rainwater and the recycling of domestic water for domestic use must be considered.
▶ Promote adequate networks of public open spaces. Prioritize the identification and protection of open spaces as a first step in designing urban areas, with built-up spaces planned around and in consideration of this network. Design public spaces to support disaster risk reduction and climate change action.
▶ Design barangays and neighborhoods in terms of human scale and walkability, with the necessary infrastructure and services within walking distance of residents. This may be incorporated in the local development planning process following the CLUP Guidebook, specifically under the Special Studies on Urban Design and Development.
▶ Promote compact development. Compact development entails the promotion of efficient densities at all scales of urban planning, which maintains the balance between urban demand and available resources.
▶ Promote mixed use. Mixing land uses allows for the integration of complementing activities, and also supports compact development.
▶ Fully operationalize ridge-to-reef and/or integrated ecosystems planning framework which utilizes systems-based tools such as the ecological transect and other tools.
▶ Enforce delineation and protection of special areas such as protected areas, prime agriculture areas, key biodiversity areas, critical habitats, heritage areas, ancestral domains. Consistent with the strategy on urban planning and design, government must clearly delineate, map, and protect special areas such as critical habitats and prime agricultural and heritage areas. Enforcing protection helps government and stakeholders manage urban growth within the bounds of the ecosystem. It will also benefit the urban system by helping achieve food security, increase biodiversity, and contribute to climate change action and disaster risk reduction.
▶ Integrate mobility and transport planning in land use planning. shift from car-oriented to people-oriented mobility. A new hierarchy of transportation and mobility is introduced, prioritizing pedestrians first, then non-motorized vehicles such as bicycles, followed by public transport, commercial vehicles, taxis, and single-occupancy vehicles.
▶ Promote energy efficiency. LGUs can adopt measures that promote more efficient energy consumption. Energy efficiency should be considered in settlements planning, building design and construction, and transportation.
▶ Promote resilient housing. Development of climate resilient, affordable housing. Can be achieved through the adoption of appropriate housing standards or building codes, technologies, and innovations, incorporating conditions for resilience and resource efficiency
▶ Promote and support green industries. Prioritize green industries in land use allocation and urban design, by incorporating appropriate performance standards for business enterprises in the CLUP and Zoning Ordinance. These can include requirements and guidelines on energy and water use, and sustainable building design and construction.

NATIONAL HOUSING AND URBAN DEVELOPMENT SECTOR PLAN

The Sector Plan is the 20-year roadmap that aims to harmonize and sustain housing and urban development initiatives by consolidating the existing and proposed programs, activities, and projects of DHSUD, its key shelter agencies, and stakeholders. It operationalizes the NUDHF and cuts across the six-year administrative terms to ensure continuity of the PPAs laid out in the plan (Figure 23).

Figure 23: Interaction of the NHUDSP in Operationalizing the NUDHF

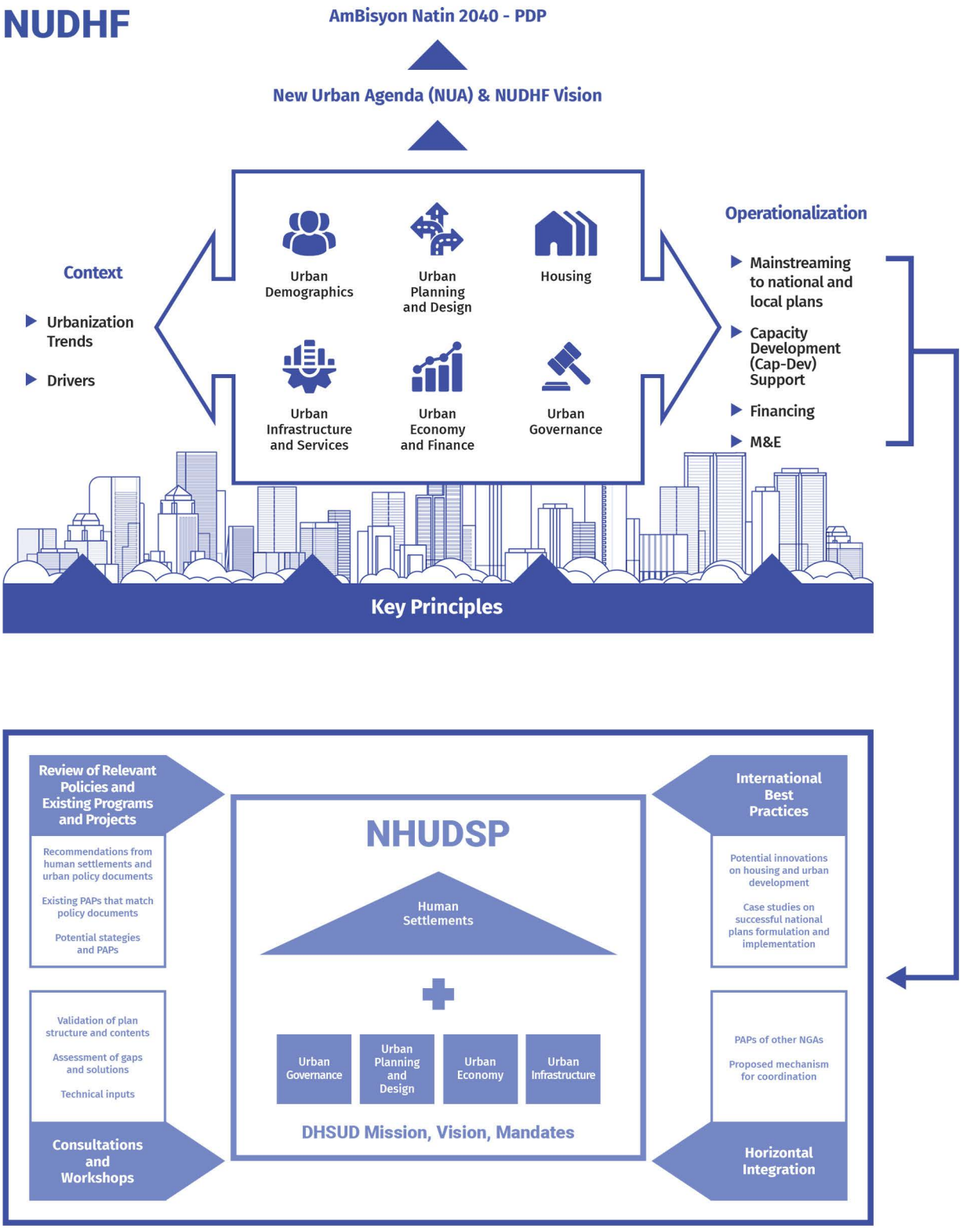


Figure 24: Resilient and Green Human Settlements Framework

RESILIENT AND GREEN HUMAN SETTLEMENTS FRAMEWORK (RGHSF)

The RGHSF provides guidance on using green development and adopts a resilience-driven perspective to assess, develop, manage, and evaluate settlements and their component parts. It shall be used as a reference for all state actors involved in human settlements development, and serve as a basis for mechanisms on post-disaster housing and resiliency planning, research and development and extension, and the monitoring and evaluation of programs, projects, and activities to protect vulnerable persons and communities in hazard-prone areas from the adverse effects of climate change and disasters. The RGHSF has six Key Result Areas (KRAs) or desired outcomes for each development sector, namely Demography/Population, Land and Urban Planning, Environment, Governance, Economy, and Housing and Basic Services; and contains enabling actions which identify specific strategies to be carried out by institutions primary responsible for implementing these actions (Figure 24).

D. REVIEW OF PHILIPPINE POLICIES IN RELATION TO CLIMATE CHANGE, URBAN PLANNING, AND URBAN DESIGN CONSIDERATIONS

Tables 2 to 5 present the results of the review of the policies mentioned above and other vital legislations and government official issuances in terms of how far they promote/mention (a) climate change actions, (b) urban planning and design, and (c) urban design elements.

Similarly, laws and official documents of the Philippine government on climate change were reviewed on the same parameters. In the matrices presented, each policy/law is marked with colored circles, that describe whether it contains provisions on aspects such as resilience, adaptation, GHG mitigation, and urban planning and design elements to promote climate resiliency. Green circles mean that the policy/law explicitly contains provisions on the key aspects marked. Yellow circles indicate that the policy/law only implies coverage of the key aspects marked. Lastly, red circles mean that the policy/law does not contain provisions on the key aspects marked. Although both adaptation and GHG mitigation have been recognized as key actions to promote climate resilience in the Philippines, the country has its sights set on the former much more than on the latter. This is expected as the country has been considered as one of the more climate change vulnerable countries while posting relatively low GHG emissions.

Table 2: Review of National Policies and Frameworks Related to Climate Change and UPD

Explicit Implicit Not Covered

POLICY REVIEWED	DESCRIPTION	CLIMATE CHANGE ACTION BEING PROMOTED AND/OR MENTIONED			UP&D COVERAGE	URBAN DESIGN ELEMENTS (CHECKLIST)					
		Resilience (General)	Adaptation	GHG Mitigation		Urban Structure / Urban Grain	Density and Mix	Height and Massing	Streetscape and Landscape	Facade and Interface	Details and Materials
AMBISYON NATIN 2040	Long-term vision and aspirations of the Filipino people in the next 25 years	Implicit	Implicit	Implicit	Not Covered	Not Covered	Not Covered	Not Covered	Not Covered	Not Covered	Not Covered
PHILIPPINE DEVELOPMENT PLAN (PDP) 2017-2022	The administration's medium-term plan which aims to lay the foundation for inclusive growth, a high-trust society, and a globally competitive economy	Explicit	Explicit	Implicit	Explicit	Explicit	Explicit	Implicit	Implicit	Implicit	Explicit
PHILIPPINE NEW URBAN AGENDA	Reflects the aspirations of Filipinos for the future of their cities	Explicit	Explicit	Explicit	Explicit	Explicit	Explicit	Implicit	Explicit	Explicit	Implicit
NATIONAL FRAMEWORK STRATEGY ON CLIMATE CHANGE (NFSCC) 2010-2022	Guides the national and sub-national development processes, including the formulation of CLUPs and CDPs	Explicit	Explicit	Explicit	Explicit	Explicit	Implicit	Implicit	Implicit	Implicit	Explicit
NATIONAL DISASTER RISK REDUCTION & MANAGEMENT PLAN 2011-28 (NDRRMP)	Required under RA No. 10121, establishing policies, plans, and programs to deal with disaster	Explicit	Explicit	Implicit	Explicit	Explicit	Implicit	Implicit	Implicit	Implicit	Implicit
NATIONAL URBAN DEVELOPMENT AND HOUSING FRAMEWORK (NUDHF)	The development framework for urban and urbanizing areas, which guides the collective efforts of stakeholders to improve the performance and efficiency of the county'surban systems	Explicit	Explicit	Explicit	Explicit	Explicit	Explicit	Implicit	Explicit	Implicit	Implicit
NATIONAL HOUSING AND URBAN DEVELOPMENT SECTOR PLAN (NHUDSP)	A 20-year road map that aims to harmonize and sustain the housing and urban development initiatives by consolidating the existing and proposed PAPs of the department, its key shelter agencies and stakeholders	Explicit	Explicit	Explicit	Explicit	Explicit	Explicit	Implicit	Explicit	Implicit	Implicit
RESILIENT AND GREEN HUMAN SETTLEMENTS FRAMEWORK (RGHSF)	Provides a lens through which the complexity of communities and the drivers that contribute to its resilience can be understood	Explicit	Explicit	Explicit	Explicit	Explicit	Explicit	Implicit	Explicit	Implicit	Implicit

Concerning urban planning and design as actions towards climate resilience, the national policies identified are quite robust. All of the policies, with the exception of the AmBisyon 2040, contain explicit references to urban planning and design as drivers of climate resilience. The Philippine Development Plan, the Philippine New Urban Agenda, the National Urban Development and Housing Framework, the National Housing and Urban Development Sector Plan, and the Resilient and Green Human Settlements Framework contain various provisions on urban design elements to promote climate resilience. In contrast, the National Disaster Risk Reduction and Management Plan (NDRRMP) contains express provisions relating to urban structures.

Thus, it can be deduced that, at the national level, urban plans and design are already recognized tools for promoting climate resilience. The Philippine New Urban Agenda, the National Urban Development and Housing Framework, the National Housing and Urban Development Sector Plan, and the Resilient and Green Human Settlements Framework must continue to inform subsequent iterations of the Philippine Development Plan to keep putting UPD as primary drivers of climate resilience.

Table 3: Review of Climate Change and Urban Design Considerations in Philippine Planning and Design Laws

● Explicit ● Implicit ● Not Covered

POLICY REVIEWED	DESCRIPTION	CLIMATE CHANGE ACTION BEING PROMOTED AND/OR MENTIONED			UP&D COVERAGE	URBAN DESIGN ELEMENTS (CHECKLIST)					
		Resilience (General)	Adaptation	GHG Mitigation		Urban Structure / Urban Grain	Density and Mix	Height and Massing	Streetscape and Landscape	Facade and Interface	Details and Materials
LOCAL GOVERNMENT CODE	Governs the creation, powers, functions, and limitations of provinces, cities, municipalities and barangays	●	●	●	●	●	●	●	●	●	●
ACT CREATING THE DHSUD	Creating a full-fledged DHSUD mandated to provide access to adequate, safe, secure, habitable, sustainable, resilient and affordable homes	●	●	●	●	●	●	●	●	●	●
URBAN DEVELOPMENT AND HOUSING ACT OF 1992	Provides for a omprehensive and continuing urban development and housing program	●	●	●	●	●	●	●	●	●	●
SPECIAL ECONOMIC ZONE ACT OF 1995, AS AMENDED BY RA NO. 8748	Provides the framework for the creation, operation, administration and coordination of special economic zones in the Philippines	●	●	●	●	●	●	●	●	●	●
PHILIPPINE GREEN JOBS ACT OF 2016	Promoting the creation of green jobs	●	●	●	●	●	●	●	●	●	●
PHILIPPINE GREEN BUILDING CODE	Prescribes measures/ standards to minimize the effects of buildings on human health and environment	●	●	●	●	●	●	●	●	●	●
PD 1216, DEFINING OPEN SPACE IN RESIDENTIAL SUBDIVISIONS	Prescribes open space requirements for housing development	●	●	●	●	●	●	●	●	●	●

Moreover, the yellow circles found in both the NDRRMP and National Framework Strategy on Climate Change (NFSCC) must be seen as opportunities to either revisit the policy or ensure UPD is recognized and infused into the local action plans, as required to be prepared by these policies.

The summary matrix of Laws on Climate Change and Disasters in Table 4, again, shows the country's proclivity towards adaptation rather than GHG mitigation, considering its climate change vulnerabilities and its relatively low GHG emissions. All three laws identified explicitly contain provisions that promote resilience and adaptation while having only two out of three laws explicitly discussing GHG mitigation as a climate change action.

Much is left to be desired on urban planning and design as actions towards climate resilience. Only the Philippine Disaster Risk Reduction and Management Act of 2010 directly refers to urban planning as a mode of intervention. Urban design elements may only be considered as implicitly covered, with the law requiring mainstreaming of DRRM elements into the country's development, land use, and urban planning processes.

The foregoing laws may still be considered as bases to make UPD more relevant drivers of climate resilience. A closer look at the said laws reveals that their terminologies are couched in language that could embrace urban planning and design interventions. Moreover, local plans, required by these laws, can very well accommodate UPD approaches to climate resilience.

Excluding the Environmental Impact Statement System and the Clean Air Act, the summary matrix of Environmental Laws (Table 5) show how all the other identified laws contain explicit provisions on urban planning/design. This means that said laws may be explored to serve as bases of UPD interventions. This is especially relevant in light of the fact that the urban design elements are filled with yellow circles. Hence, said laws contain provisions that may be further defined to support the use of UPD for climate resilience.

Also, these laws, as well as the purposes for which they were enacted, may be legislated locally by LGUs through ordinances. The coverage of these laws, namely environment, waste management, air, water and sanitation, may be considered as critical areas of concern to be addressed by UPD for climate resilience

Table 4: Review of UPD Considerations in the Climate Change and Disaster Risk Reduction Laws

Explicit Implicit Not Covered

POLICY REVIEWED	DESCRIPTION	CLIMATE CHANGE ACTION BEING PROMOTED AND/OR MENTIONED			UP&D COVERAGE	URBAN DESIGN ELEMENTS (CHECKLIST)					
		Resilience (General)	Adaptation	GHG Mitigation		Urban Structure / Urban Grain	Density and Mix	Height and Massing	Streetscape and Landscape	Facade and Interface	Details and Materials
CLIMATE CHANGE ACT OF 2009	Promote state policy to integrate the concept of climate change in various phases of policy formulation, development plans, poverty reduction strategies and other developmental tools of government	●	●	●	●	●	●	●	●	●	●
PHILIPPINE DISASTER RISK REDUCTION AND MANAGEMENT ACT OF 2010	Provides for the development of policies and plans and the implementation of actions and measures pertaining to all aspects of disaster risk reduction and management	●	●	●	●	●	●	●	●	●	●
PEOPLE'S SURVIVAL FUND	Creation of a fund and a disbursement mechanism to support adaptation activities of local governments and communities	●	●	●	●	●	●	●	●	●	●

Table 5: Review of UPD Considerations in Key Environmental Laws

Explicit Implicit Not Covered

POLICY REVIEWED	DESCRIPTION	CLIMATE CHANGE ACTION BEING PROMOTED AND/OR MENTIONED			UP&D COVERAGE	URBAN DESIGN ELEMENTS (CHECKLIST)					
		Resilience (General)	Adaptation	GHG Mitigation		Urban Structure / Urban Grain	Density and Mix	Height and Massing	Streetscape and Landscape	Facade and Interface	Details and Materials
PHILIPPINE ENVIRONMENTAL CODE	Establishing specific environment management policies and prescribing environment quality standards	Implicit	Implicit	Implicit	Explicit	Implicit	Implicit	Implicit	Implicit	Implicit	Implicit
ENVIRONMENTAL IMPACT STATEMENT SYSTEM (PD 1586 AND PP 2146)	Establishes an environmental impact system to reconcile socio-economic undertakings with the requirements of environmental protection and conservation	Explicit	Explicit	Implicit	Implicit	Implicit	Implicit	Implicit	Implicit	Implicit	Implicit
ECOLOGICAL SOLID WASTE MANAGEMENT ACT OF 2000	Adopting a systematic, comprehensive, and ecological solid waste management program	Implicit	Implicit	Explicit	Explicit	Implicit	Implicit	Implicit	Implicit	Implicit	Implicit
PHILIPPINE CLEAN AIR ACT OF 1999	Establishes a holistic national program of air pollution management premised on balancing development and environmental protection	Implicit	Implicit	Explicit	Implicit	Implicit	Implicit	Implicit	Implicit	Implicit	Implicit
PHILIPPINE CLEAN WATER ACT OF 2004	Premised on the framework of sustainable development, to pursue economic growth in a manner consistent with the preservation of water resources	Implicit	Implicit	Implicit	Explicit	Implicit	Implicit	Implicit	Implicit	Implicit	Implicit
WATER CODE	Management of water resources to adequately meet further developments	Explicit	Explicit	Implicit	Explicit	Implicit	Implicit	Implicit	Implicit	Implicit	Implicit
CODE ON SANITATION	Prescribes requirements for operation of establishments, with the intent of promoting health through sanitation	Implicit	Implicit	Implicit	Explicit	Explicit	Implicit	Implicit	Implicit	Implicit	Implicit

E. UPD AND CLIMATE ACTIONS: CONVERGENCE STRATEGY AND FRAMEWORK

Considering existing national policies, climate change action/climate adaptation, and urban planning and design, must converge (see Figure 25) and be considered as an integrated process. This Framework of convergence and interdisciplinary approach in developing and managing the urban system ensures the:

- Creation of a feedback system between climate adaptation and urban planning and design principles.
- Use of the results of feedback system to inform planning and design policies, transforming them into climate-resilient UPD.
- Application of climate-resilient UPD at different levels of urban governance, from national to site level.
- Implementation of climate-resilient urban policies influences adaptation results across scales of action, from national, sub-national, community, and even site scales.

Figure 25 : Convergence of UPD and Climate Adaptation Principles for Policies in Different Levels

III. MANAGING CLIMATE RISKS AND OPPORTUNITIES THROUGH RESILIENT URBAN PLANS AND DESIGN

A. UNDERSTAND CLIMATE IMPACTS AND USE OF CDRA

Climate risk management involves a systematic approach to the use climate information and the practice of considering climate-related trends and events in development decision-making to cope with climate change and minimize potential harm (UNISDR 2008).

When planning for and managing risk, it is essential to have a clear understanding of "who is at risk," "where (the spatial context) is the risk," as well as "why and what are driving the forces for the risk." Beyond those, however, it is also crucial to know what opportunities may arise from a changing climate. For instance, increasing average rainfall may not automatically equate to flood risk because it may also bring positive opportunities, say, for example, to communities that historically face water shortages. The impacts will depend on the conditions or state of the natural and built environment to accommodate the changed rainfall average. It is thus crucial to investigate the climate stimuli, in such case the rainfall volume, to learn about where, when, and why it will likely cause negative or positive impacts.

When negative impacts are foreseen based on data from previous disaster events and future climate projections, probing how the negative consequences – or what we call risk – could be managed is a critical step. On the other hand, when climate change impacts are seen to bring about opportunities, a deeper understanding of how it could be adequately harnessed and maximized to serve the most vulnerable and advance local sustainable development is as crucial. Local climate actors should keep in mind that climate adaptation entails adjustments not only to reduce the negative impacts of climate change but also exploit the beneficial opportunities (IPCC; UNFCCC).

A more nuanced perspective of climate change impacts allows for a broader range of possible solutions and actions to be developed. For this, a more comprehensive analysis not only of climate change information but also the data from various development sectors could help. It may assist in determining more specific details of the vulnerability, risks, and opportunities to help the exposed communities to plan and design their spaces and activities that best suit their particular climate and development realities.

As noted in the previous section of this tool, the process for a comprehensive Climate and Disaster Risk Assessment is already outlined in a Supplemental Guide to LGUs by the HLURB, now DHSUD. This UPD Reference Tool complements the CDRA guidance and suggests elaboration on the analysis portion (steps 4 and 5) to determine the potential contributions of urban plans and design to enhance the climate adaptation and resilience capability of LGUs over the immediate and long-term period. It means that before identifying specific climate actions, the local planning team or committee should extend the CDRA process or steps to involve the following activities:

- Cross analysis of climate projections and impacts with the current and planned growth nodes or development zones
- Analysis of the capacity of the current urban design elements to adapt to climate risks and impacts as it also interacts with state of urbanization and economic growth (e.g., population growth, industry development, mobility demands, and water); and
- Identifying climate change-driven design parameters across all stages of the planning process (from Visioning to M&E)

The above cited additional activities and analysis are illustrated through actual city examples in the next section.

CROSS ANALYSIS OF CLIMATE PROJECTIONS AND IMPACTS WITH THE CURRENT AND PLANNED GROWTH NODES/DEVELOPMENT ZONES

The Case of Angeles City

The North-South Corridor covers the urban center of Angeles City composed of the Balibago Growth Center, North Central Business District and East Section of the Pampang Growth Center, Heritage District, and Santo Domingo Growth Area and Southern Portion of the Pampang Growth Center. These areas are expected to undergo rapid urban expansion compared to other areas of the city. Climate projections suggest increasing seasonal temperatures by 2099 by as much as 3.9°C (Representative Concentration Pathway [RCP] 8.5) triggering urban heat stress and increased GHG emissions.

Also, changes in seasonal precipitation patterns suggest two possible scenarios where rainfall will be significantly less than observed (RCP8.5 low bound), which may trigger water scarcity, or slightly higher than observed (RCP8.5 high bound), which is beneficial to recharge ground and surface water resources.

Given these scenarios, the city is gearing towards adjusting how these urban growth nodes are designed to accommodate these climate triggers by maintaining natural cooling systems, promoting resource efficient buildings, reducing the heat absorption of the urban landscape, harvesting rainwater, and increasing ground permeability to hasten ground water recharge.

The East-West Corridor covers the Sapangbato watershed reserve, Abacan river development corridor, and agricultural production areas. Identified climate impacts include projected increasing temperatures affecting temperature sensitive crops and projected reduction in rainfall affecting agriculture production yield and its implications on local food security, reduced household incomes affecting agriculture dependent households, and reduction in domestic potable water supply. The city adaptation policy and strategy framework mention interventions to rehabilitate and conserve its watershed, climate resilient agricultural production, and establishment of water retention and detention ponds and parks.

Figure 26: Urban Adaptation Strategy for Angeles City Considering Two Urban Growth Nodes

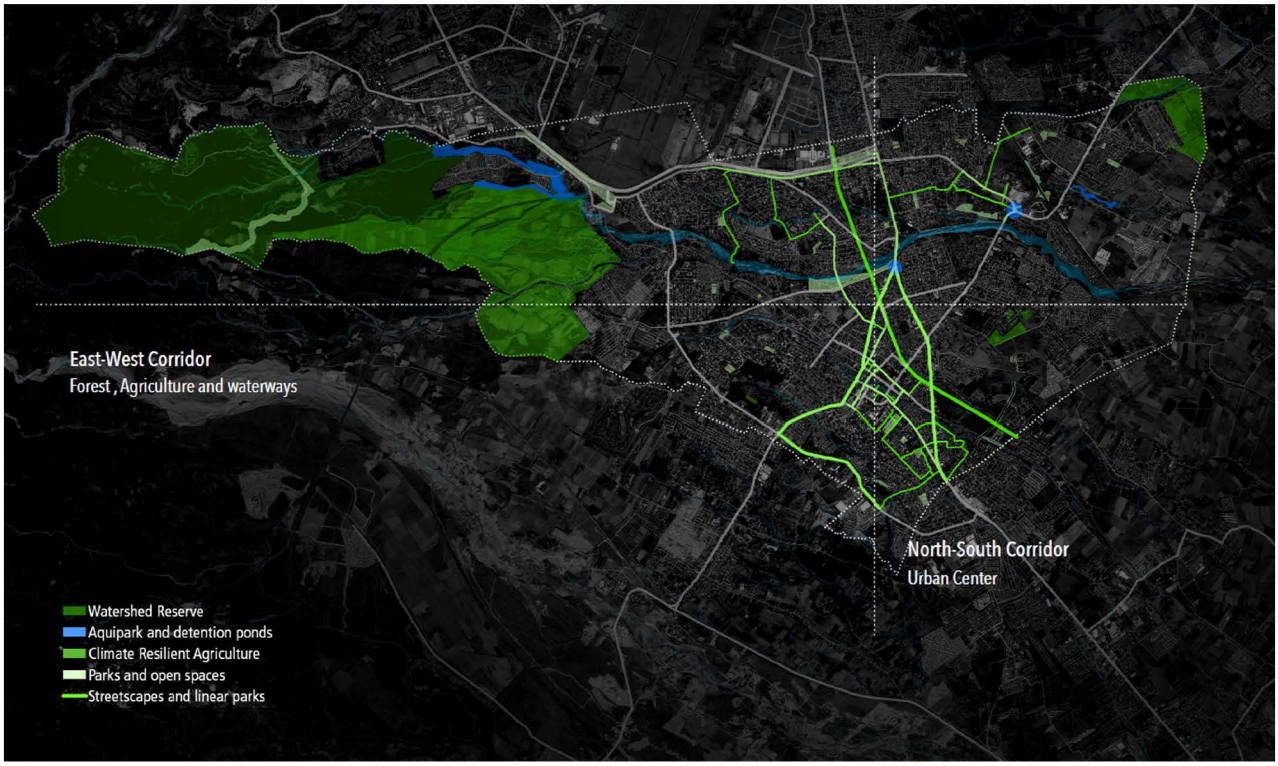


Figure 27: Map of Tagum City Showing Intensity of Heat Stress

ANALYSIS OF THE CAPACITY OF THE CURRENT URBAN DESIGN ELEMENTS TO ADAPT TO CLIMATE RISKS AND IMPACTS AS IT ALSO INTERACTS WITH STATE OF URBANIZATION AND ECONOMIC GROWTH (E.G., POPULATION GROWTH, INDUSTRY DEVELOPMENT, MOBILITY DEMANDS, AND WATER)

CURRENT URBAN DESIGN AND THE STATE OF URBANIZATION IN A CHANGING CLIMATE

The Case of Tagum City

The City of Tagum is a 1st class city and capital of the Davao del Norte Province and is designated as a sub-regional center and will serve as a secondary urban growth and trade center of the Davao Region (Davao Regional Development Plan 2017–2022). The Central Business District covers five of the most densely populated urban barangays of the city. The city's annual population growth rate of 3.98 per cent was also higher compared to provincial, regional, and national rates. The Magugpo district is also being planned as the major commercial and medium density residential zone.

High urban heat stress areas were observed in the Central Business District (CBD) mainly due to the highly concrete character, lack of tree cover, and lack of available open spaces in the area. Based on climate change projections, Tagum City temperatures are projected to increase by as much as 2.3 to 4.2°C by the mid and late century respectively. Conventional urban design practices may trigger a further warming of the CBD triggering unintentional impacts to human health, increased dependence on motorized mode of transportation for mobility, and increased electricity consumption, which may further trigger increased GHG emissions.

Recognizing the potential impacts, the city is pursing urban design policy and strategy interventions to accommodate increasing temperatures and effectively cool the CBD and adjacent growth centers. These include increasing tree cover, strategic location of green spaces, incorporating sun-path and prevailing winds considerations in site and district design, and promoting and incentivizing resource efficient buildings.

UNDERSTANDING OPPORTUNITIES FROM GREEN-GREY NEXUS

The Case of Legazpi City

Typical interventions to address climate and disaster risks use the traditional grey infrastructure approach requiring significant investments. Funding infrastructure-based interventions, on a scale needed to address the various climate impacts, has been extremely challenging to local governments. Nature-based solutions such as forests, mangroves, and wetlands are recognized as viable solutions for effective climate change adaptation and mitigation. Integrating green and grey infrastructure is capable of addressing various climate impacts, provides multiple benefits to biodiversity, mitigates GHGs, and is considered more cost-effective compared to purely grey infrastructure interventions.

Legazpi City currently has numerous grey infrastructure projects to manage floods, storm surges, and lahar. These include its flood pumping station, riverbank embankments, and coastal road sea-walls. These big infrastructure projects were realized with external funding assistance and have significantly contributed to effective management of current climate risks. However, it is still uncertain whether these can accommodate and withstand the potential impacts of a changing climate. Rather than further investing in retrofitting these structures at the specifications to accommodate these changes, the city is looking at complimenting these with additional green-grey infrastructure. These include flood impoundment wetland parks, flood detention hybrid parks, renaturing of highly susceptible lahar areas, constructing coastal parks, and restoring mangrove forests capable of reducing storm surge intensities. Furthermore, to reduce the surface flow volumes exiting the Macabalo River during extreme rainfall events affecting riverside communities, instead of increasing the height of its riverbank embankments, the city is exploring ways of increasing the tree cover and establishing agriculture, swales, and earth dams in the upland areas of the Macabalo River Basin.

Figure 28: Citywide Climate Adaptation Strategy of Legazpi City through UPD

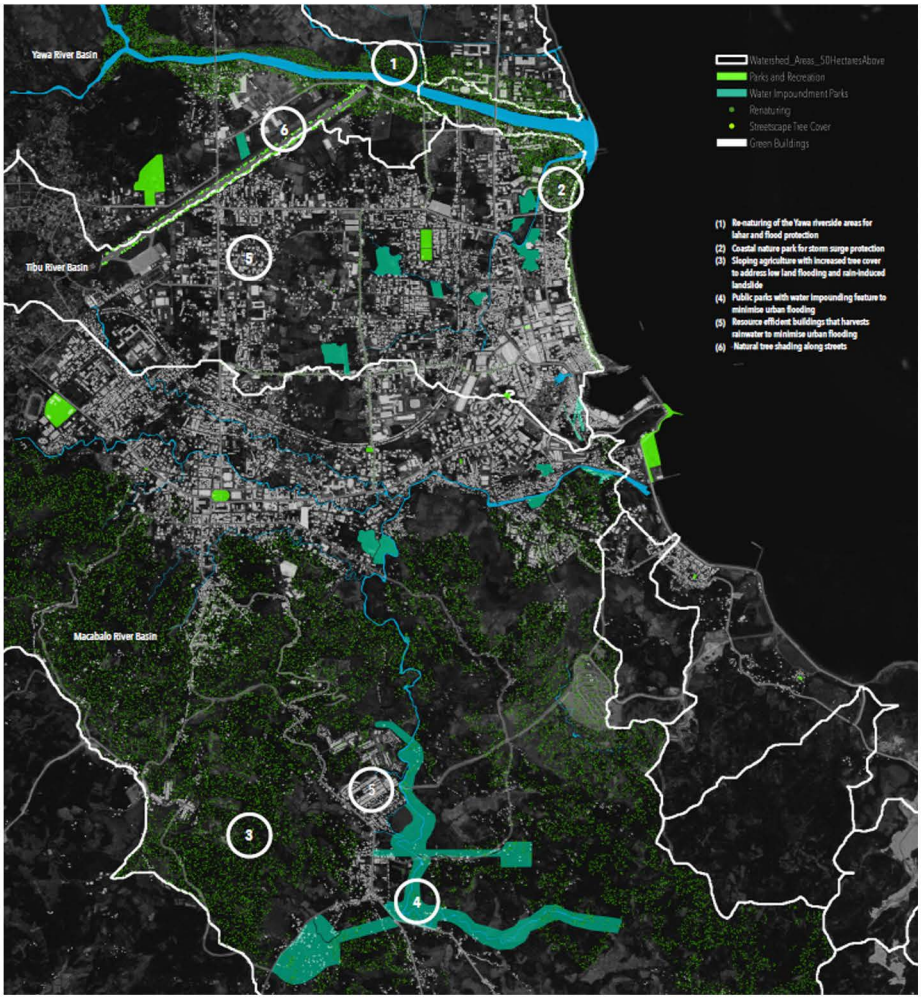
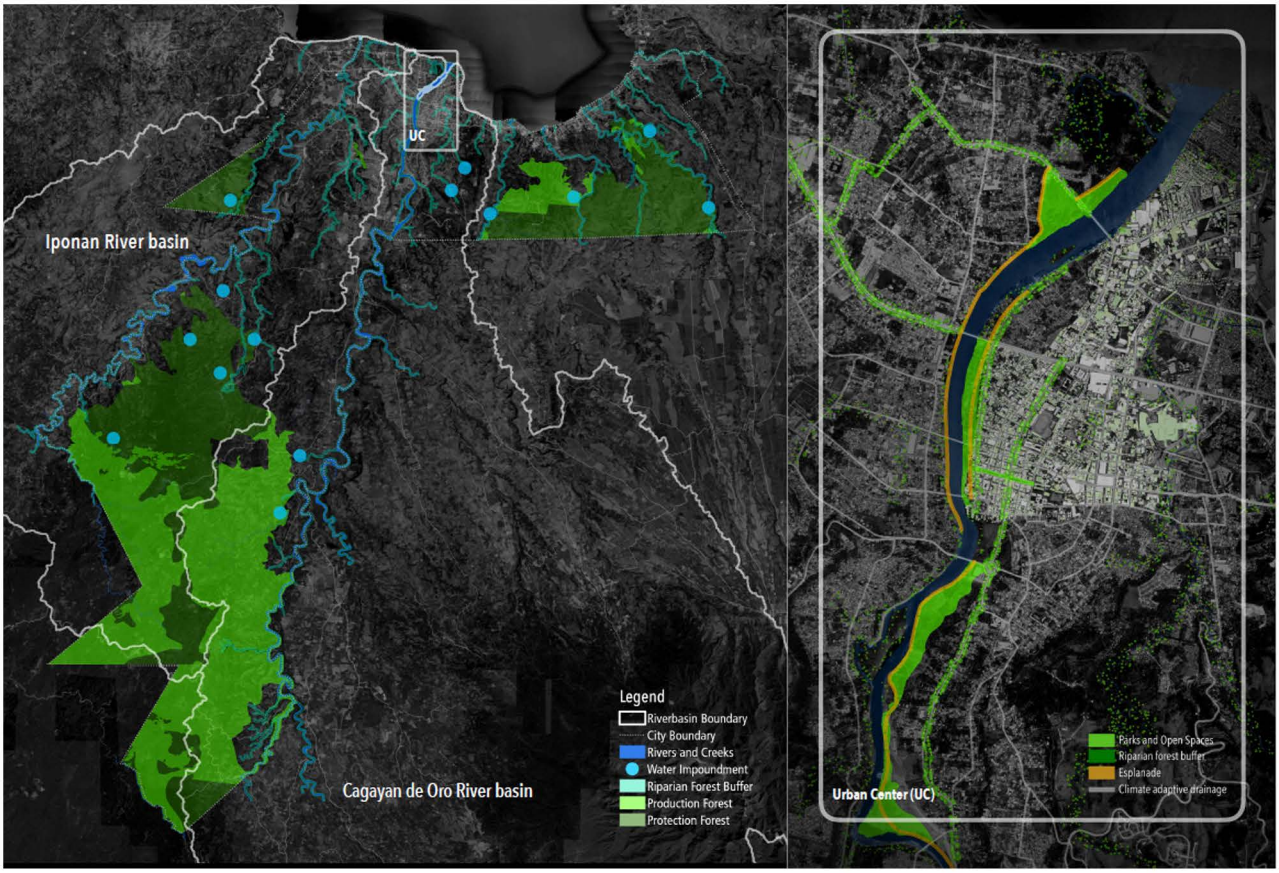


Figure 29: Planned Climate Resilient UPD Strategy for Cagayan de Oro City



EXPANDING THE SCALE OF STRATEGY FROM SITE TO CITY/ECOSYSTEM AND DEFINE COHERENT OPTIONS FOR RESILIENT URBAN DESIGN ELEMENTS

The Case of Cagayan de Oro City

The City may experience two plausible scenarios as a result of potential changes in seasonal and annual rainfall patterns. Reduction in annual rainfall may affect local potable water supplies, water availability in agricultural areas, and the challenges of balancing water requirements of various users. Annual rainfall patterns may also potentially increase compared to the current baseline, which provides development benefits to the local water supply and water availability for agricultural production. Also, the urban center, being located adjacent to the Cagayan de Oro and Iponan Rivers, is highly susceptible to flooding triggered by continuous and extreme rainfall events.

Given these challenges, the City Government recognized the need implement adaptation strategies by redesigning the city using climate resilient urban design principles and approaches at different scales. At the building to district scales, strategies include redesigning drainage systems and constructing parks and open spaces capable of detaining rainwater, increasing public open spaces especially along rivers to prevent future exposure, rainwater harvesting to augment local water supplies and reduce surface water flow, and maximizing and increasing the permeability of urban spaces to recharge ground water supplies. Apart from urban design adjustments at the urban center, adaptation strategies were expanded to cover interventions within the upland areas of the Cagayan de Oro and Iponan river basins. These include establishing water impoundment facilities, restoring riparian forests, and increasing tree cover in the upland production and protection forests. These interventions will help provide water for agricultural purposes as well as help address flooding in low-lying areas by reducing river surface flow volumes or delaying the onset of floods during extreme rainfall events. However, to significantly reduce flooding in areas near the exit points of rivers, further expansion of these strategies can be adopted by other municipalities and cities within the Cagayan de Oro and Iponan river basins.

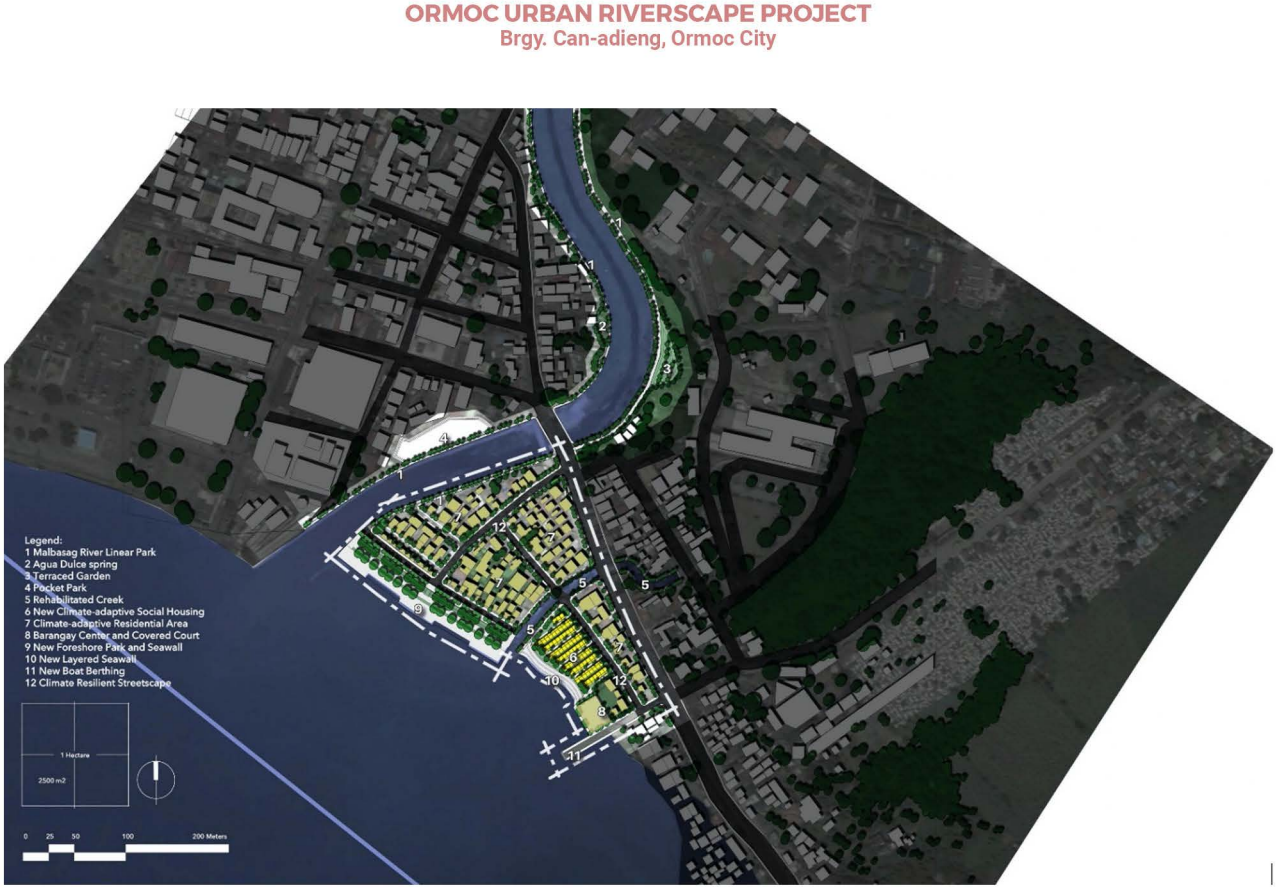
IDENTIFYING CLIMATE CHANGE DRIVEN DESIGN PARAMETERS ACROSS ALL STAGES OF THE PLANNING PROCESS

The Case of Ormoc City

The path to city resilience was facilitated by the formulation of the Ormoc City local climate change action plan. The climate and disaster risk assessment and GHG emission inventory (GHGI) provided evidence-based information to guide decision making towards systematic climate change urban adaptation and resilience. With quantifiable information, the city was able to identify its urban adaption objectives relative to the local development context, climate triggers, the scale of potential impacts to the various development sectors, a quantitative measure on the level of exposure, sensitivities, and adaptive capacities at elements at risk, and potential opportunities brought about by climate change. This led to the determination of its urban adaptation pathways, its urban adaptation strategy framework for the next 10 years relative to current capacities of the local government, which were then translated into urban adaptation objectives. With better objective statements and targets, this allowed the identification of the type, scale, and general details of climate urban adaptation programs, projects, and activities that are consistent and contribute to the achievement of the various urban adaptation objectives and targets of the City.

The Ormoc Urban Riverside Project was conceptualized to address the various urban development issues in Barangay Can-adieng coastal and river decision area as a result of the CDRA. The project supports numerous urban adaptation objectives of the LCCAP and is consistent with the plan vision and urban adaptation strategy framework of the city. To ensure consistency with the overall city adaptation objectives, M&E indicators were identified and serve as the means to assess the contribution of the project relative to the overall urban adaptation objectives and targets of the city and allow succeeding fine-tuning and or upscaling of the project to cover other similar areas.

Figure 30: Overview of Ormoc City Urban Riverscape Project from Technical Findings to M&E



TECHNICAL FINDINGS

- Submergence of houses to flood causing structural stresses to walls, ceilings, and floors and damages to other domestic properties in 29 high-risk barangays.
- Flood event that affect 153,351 people equivalent to a tripled replacement cost of PhP 64.96 billion by 2030.
- Increasing rainfall will lead to increase of available water for capture, storage, and use.
- Decrease in income due to disruption of economic activities to an estimate 8,000 participants of the informal economy, related to disrupted tourist flow due to suspended sea and air transportation.
- Increasing seasonal temperatures triggering increasing electricity consumption of 11,460 residential and 423 commercial establishments for cooling units, primarily to 42 urban barangays where heat will be more intense due to compactness of concrete buildings that do not employ passive cooling architecture.

VISIONING

- Ormoc City as the agro-commercial and industrial gateway in Eastern Visayas and the Renewable Energy Capital of the Philippines; with a growth-inclusive economy, in a disaster-resilient environment, administered by an accountable local government.

OBJECTIVE SETTING

- Decreased risks of population due to flooding by ten percent every three years by 2028.
- Increased household income by five percent in 2020, ten percent in 2025, and twenty five percent in 2030.
- Improved design of housing units and commercial establishments.
- Improved design development and re-development of parks and open spaces, ecotourism spots and cultural heritage sites.
- Improved design of institutional buildings.
- Improved design of roads, sidewalks, and drainage systems.
- Decreased cases of dengue by 2030.
- Decreased cases of water-borne and vector-borne diseases by 2030.
- Increased public investment on health by five percent every year.

MONITORING AND EVALUATION (INDICATORS)

- Number of climate hazard resilient residential units constructed or retrofitted.
- Number of climate resilient housing beneficiaries.
- Percentage of at risk families below the poverty threshold.
- Percentage of at risk families with security of tenure.
- Percentage of institutional buildings with climate resilient structural design.
- Volume of water collected, stored, and used.
- Linear kilometers of improved/upgraded roads and sidewalks.
- Linear kilometers of improved/upgraded drainage.
- Electricity consumption and GHG emissions of commercialand residential users.

B. DEVELOP UPD STRATEGIES AT SCALE FOR CLIMATE ADAPTATION AND RESILIENCE

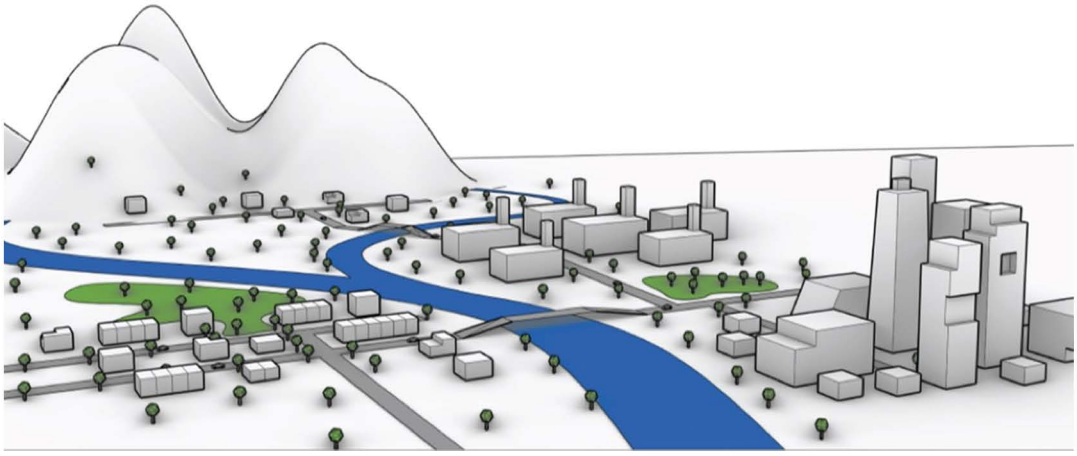
The results of the CDRA process should lead LGUs to have a multi-scale and integrated approach to climate adaptation and resilience building. Once the LGU is able to analyze their climate issues on the appropriate scale, the details of how climate impacts interact with and manifest in the broader urban system will be more evident. Such clarity will then help LGUs define the suitable urban plan and design interventions needed to address their climate-related issues.

Since climate change and disaster impacts cut across scales and administrative boundaries, developing the LGU's adaptation strategies, therefore, must take this reality into account. The LGU's CDRA results should lead towards a coherent approach across spaces or spatial levels and groupings where influence can be made by the LGU, either through policies or direct action.

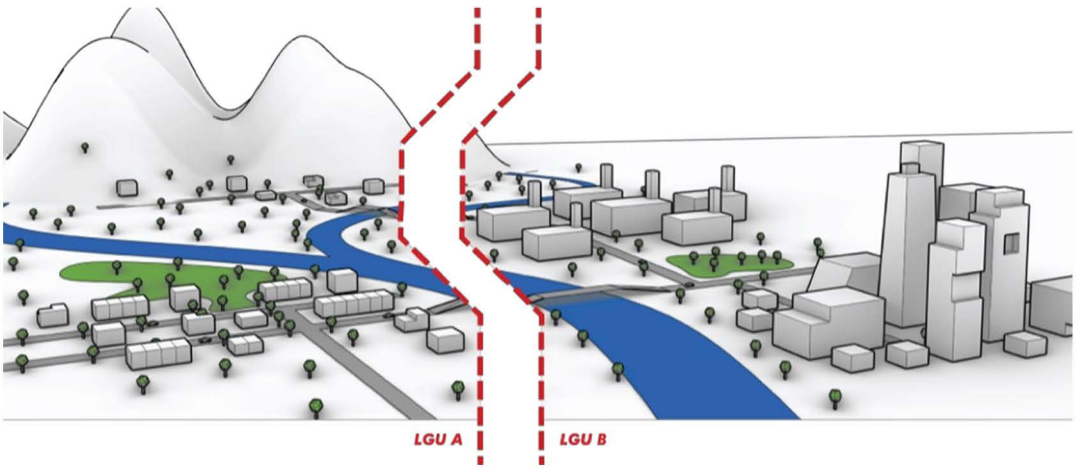
To ensure coherent resilience actions through UPD as well as in consideration of Philippine local planning context, the scale of adaptation strategies for the urban design elements could be **(a) ecosystem-wide**, **(b) LGU or administrative boundary-wide**, **(c) at the levels of districts/neighborhood or barangay**, and **(d) site-specific or building level**.

Figure 31: UPD Strategies at Ecosystem, City, and Neighborhood Scale (Illustrations by Jethro Philip Mamonong)

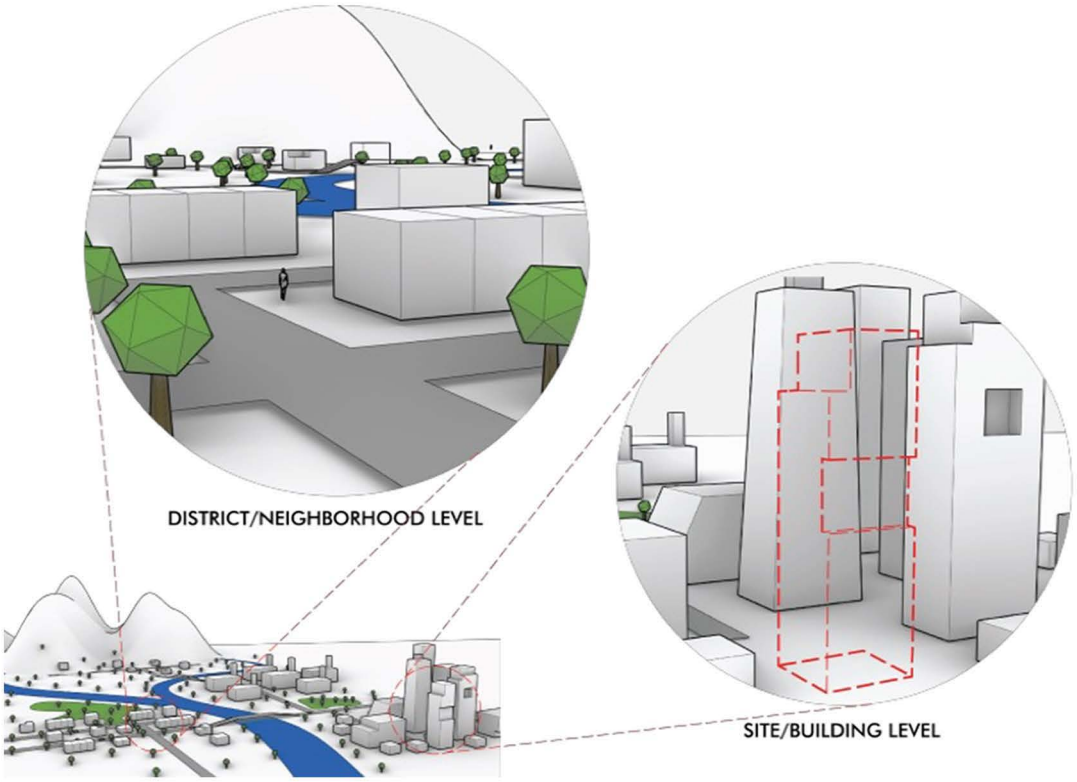
ECOSYSTEM / INTER-LGU LEVEL



CITY / MUNICIPALITY LEVEL



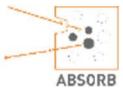
DISTRICT / NEIGHBORHOOD OR BARANGAY LEVEL AND SITE / BUILDING LEVEL



Defining the LGU adaptation strategies to build climate resilience may take off from the Philippine national government's definition of resilience, which identifies six abilities of a resilient system, community, or society to manage risks in a timely and effective manner. Table 6 explains the characteristics or indicators of resilience related to climate change actions.

Having a broader approach to address climate risks through integrated plans and designs could deliver more effective resilience results and help LGUs avoid maladaptation. Moreover, a comprehensive resilience approach will not only help them identify a variety of adaptation options to take but also facilitate identification of the roles of actors or responsible agents for the climate action considering the governance required for the scale of climate action/s.

Table 6: Risk Resilience Indicators in Relation to Climate Actions

RISK RESILIENCE STRATEGY / INDICATORS	CONTEXT RELATED TO CLIMATE ACTIONS
	▶ Climate actions that enable the system or make exposed elements withstand known negative effects of climate-related hazards and change. ▶ Hazards are present but the system/elements will not collapse, be damaged, or be penetrated.
	▶ Climate actions that increase the ability of the system or exposed elements to take in or let impacts occur (whether positive or negative) and then just manage the effects to minimize or limit the losses (e.g., risk transfer).
	▶ Climate actions that make room for, direct, or control the expected impacts as the condition of the system can accept the change, "residual risks," and manage the "uncertainty" associated with climate change.
	▶ Climate actions that relate to adjustments that moderate negative impacts of climate change as well as capture and maximize opportunities. ▶ Could be related to "incremental adaptation," in which existing practices are adjusted to make them better suited to new or projected conditions.
	▶ Climate actions that relate to "transformational or transformative adaptation." ▶ As opposed to adaptation, which can be incremental and small in scope, transformative adaptation refers to more purposive changes and not just limited adjustments or small improvements. Transformative climate change actions are characterized by "systemic change."
	▶ Climate actions typically related to activities done after the occurrence of climate-related disaster events. Actions intend to address and regain from the negative effects and losses by building back better through resilience-building strategies.

C. USE URBAN PLANS AND DESIGN OPTIONS FOR CLIMATE ADAPTATION AND BUILD CLIMATE RISK RESILIENCE

Adaptation actions or options using UPD should respond to the risks and opportunities identified in the CDRA process. The options, while flexible, should firmly anchor on achieving the resilience indicators, which likewise may frame the guiding adaptation strategies for actions. Being in a vulnerable country already feeling the impacts of climate extremes, most LGUs often concentrate on developing and defining actions for acute hazards related to climate change (e.g., typhoons, floods, and drought). It is crucial for LGUs to adapt to these hazards, which are projected to be getting more severe and intense due to climate change, in a systems approach to avert the cycle of losses from the disaster impacts. Adjusting and transforming the LGU plans and designs will facilitate a systemic change. Plans and designs locks in the LGU to a particular physical state, which, if not climate flexible and robust, could lead to severe negative impacts and losses. Adaptation options thus must include adjustments in urban design elements to reduce and mitigate risks from acute hazards.

Adaptation options must also be planned, designed, and implemented to address climate change-related chronic hazards such as increasing temperature, increasing and/or decreasing precipitation, and rising sea levels. LGUs should ensure that these types of hazards are part of their CDRA assessment, so appropriate actions could also be identified and applied. Chronic hazards may be assessed by understanding the baseline situation and projected trends over time. Key to understanding impacts and risks would be analyzing how both the natural and built systems are interacting with the current change and in particular and different timescales. When LGUs use the Representative Concentration Pathway (RCP) Projections from PAGASA, it must be understood that the projections provided present a "range of possible scenarios" considering climate uncertainties. All the scenarios should be considered in developing strategies and deciding the options to take, especially those relating to urban plans and design.

The impact chain analysis introduced in the CDRA is the basic tool used in the current climate planning processes of LGUs. The planning team may also conduct more detailed studies (impact modeling and others) if resources are available. Detailed studies may provide more basis for identifying climate actions and options and in developing project designs as a response to chronic hazards or the slow-onset climate impacts.

DESIGN SOLUTIONS

As suggested throughout this reference tool, urban plans and design can be used to implement climate-responsive actions to increase a community's resiliency. As such, there is a need to be familiar with different urban design elements, which range from the overall urban structure down to the more specific details and materials in determining the possible range of UPD actions for a specific hazard. Table 7 below defines each urban design element while more details and examples can be found in the *Updated CLUP Volume 2: Special Area Study on Urban Design and Development Guide*.

Table 7: Description of Urban Design Elements

URBAN DESIGN ELEMENT	DESCRIPTION
URBAN STRUCTURE	The overall framework of a region, town, zones or district, showing relationships between zones of built forms, land forms, natural environments, activities, and open spaces.
URBAN GRAIN	The balance of open space to built form, and the nature and extent of subdividing an area into smaller parcels or blocks.
DENSITY AND MIX	The intensity of development and the range of different uses (i.e., residential, commercial, institutional, and recreational).
HEIGHT AND MASSING	The scale of buildings in relation to height and floor area, and how they relate to its surroundings.
STREETSCAPE AND LANDSCAPE	The design of public spaces such as streets, open spaces, and pathways, including landscaping and planting.
FACADE AND INTERFACE	The relationship of buildings to the site, street, and neighboring buildings and the architectural expressions of their facades.
DETAILS AND MATERIAL	The close-up appearance of objects and surfaces and the selection of materials.

Tables 8 to 12 show examples of climate-resilient urban plans and design for LGUs to consider. The tables are presented for each climate hazard with the potential UPD actions/options that might be taken according to spatial scale. The tables also provide information on the possible resilience character/indicator it contributes to. Figure 32 presents a sample for LGUs in managing increasing temperature through urban design elements across the different levels in an urban ecosystem.

In these examples, it is vital for LGUs to know that while various actions can be done, transformative adaptation is more likely to happen when the urban structure and the urban grain facilitates it. It is in this context that climate strategies and actions should be mainstreamed in the LGUs' CLUP and CDP.

Figure 32: Example of Managing Increasing Temperature through Urban Design Elements (Illustration by Jethro Philip Mamonong)

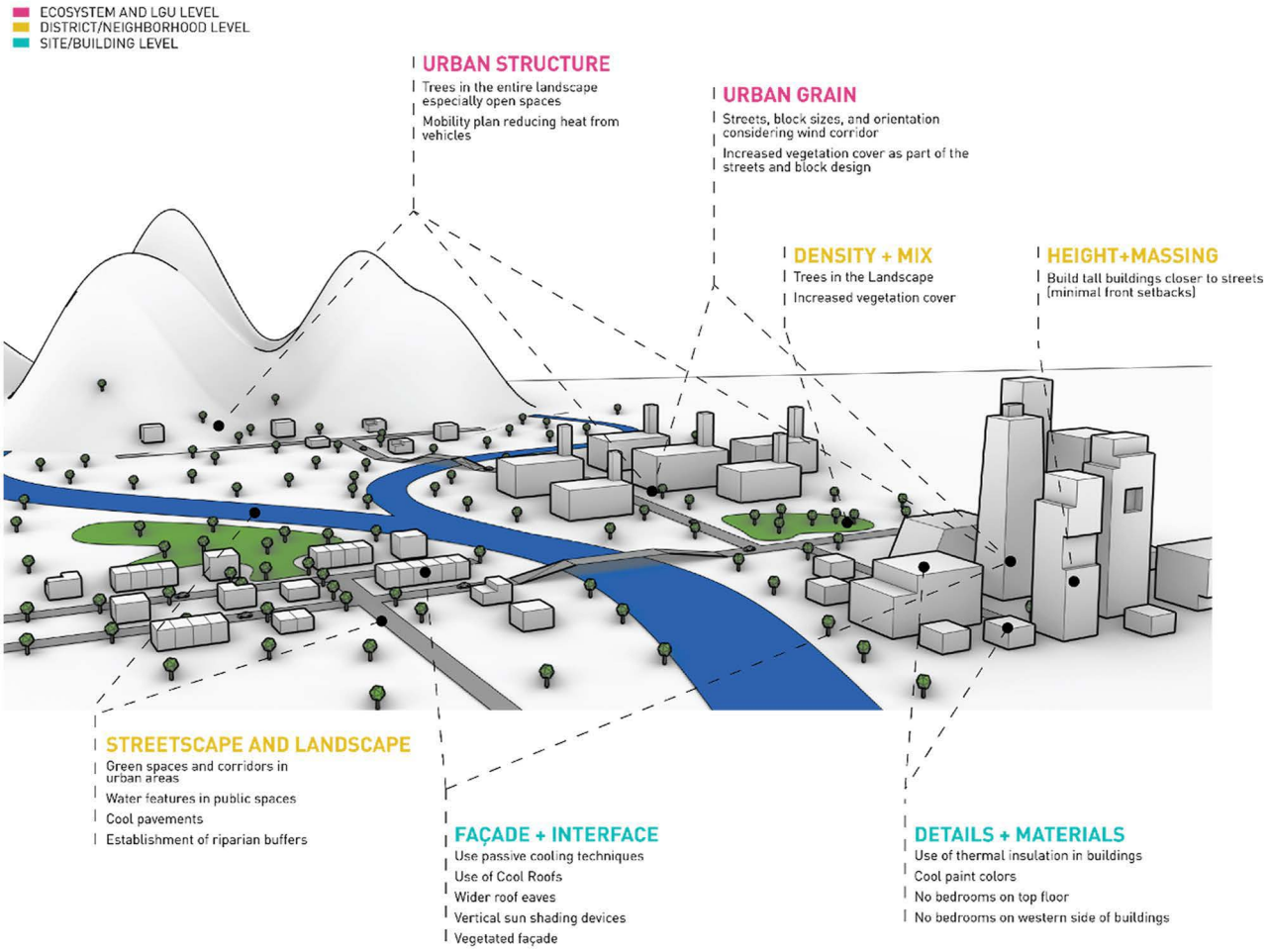


Table 8: Climate Resilient UPD Options for Increasing Temperature

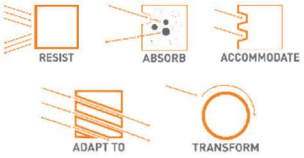
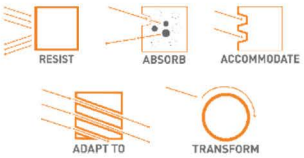
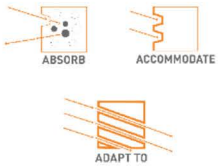
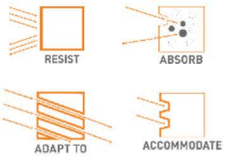
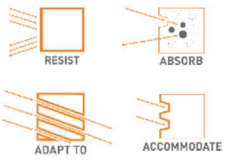
INCREASING TEMPERATURE			
SCALE OF ACTION	**URBAN DESIGN**	**EXAMPLE UPD ADAPTATION OPTIONS / ACTIONS**	**POTENTIAL RESILIENCE CONTRIBUTION**
ECOSYSTEM	**Urban Structure**	▶ Trees in the entire landscape especially open spaces ▶ Mobility plan reducing heat from vehicles	
	Urban Grain	▶ Increased vegetation cover as part of the streets and block design ▶ Streets, block sizes, and orientation considering wind corridor	
NEIGHBORHOOD	**Density + Mix**	▶ Trees in the landscape ▶ Increased vegetation cover	
	Height + Massing	▶ Build tall buildings closer to streets (minimal front setbacks)	
	Streetscape + Landscape	▶ Green spaces and corridors in urban areas ▶ Water features in public spaces ▶ Cool pavements ▶ Establishment of riparian buffers	
BUILDING	**Facade + Interface**	▶ Use of Cool Roofs ▶ Use passive cooling techniques ▶ Wider roof eaves ▶ Vertical sun shading devices ▶ Vegetated façade	
	Details + Materials	▶ Use of thermal insulation in buildings ▶ Cool paint colors ▶ No bedrooms on top floor ▶ No bedrooms on western side of buildings	

Table 9: Climate Resilient UPD Options for Increasing Precipitation

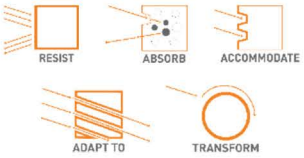
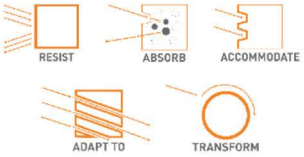
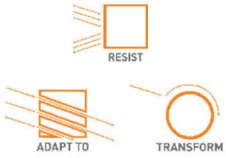
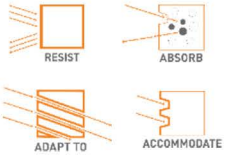
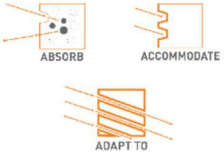
INCREASING PRECIPITATION			
SCALE OF ACTION	**URBAN DESIGN**	**EXAMPLE UPD ADAPTATION OPTIONS / ACTIONS**	**POTENTIAL RESILIENCE CONTRIBUTION**
ECOSYSTEM	**Urban Structure**	▶ Adaptive land use policies and regulations ▶ Maintaining upland forests and wetlands ▶ River system/network management (i.e., increase river channel volume by widening/deepening river channels)	
	Urban Grain	▶ Identify and avoid landslide prone areas ▶ Avoiding construction on steep slopes and landslide prone areas ▶ Drainage network and system improvement to accommodate change	
NEIGHBORHOOD	**Density + Mix**	▶ Making space for water – retreat from high-risk areas ▶ Restrictions on hazard-zone activities	
	Height + Massing	▶ Engineered slope protection ▶ Biotechnical stabilization (slope stabilization using vegetation) ▶ Flattening or reducing slope angles ▶ Benching slopes ▶ Retaining walls and gabions	
	Streetscape + Landscape	▶ Increased storm-drain capacity ▶ Minimizing surface irrigation ▶ Stream channel lining ▶ Directing surface water away from potential landslide areas ▶ Directing groundwater away from potential landslide areas	
BUILDING	**Facade + Interface**	▶ Using pile foundations for buildings in sloped areas ▶ Covering slopes with impermeable membrane ▶ Rainwater harvesting	
	Details + Materials	▶ Debris flow basins ▶ Deflection walls and debris fences ▶ Directing flows away from structures using sandbags ▶ Permeable pavements	

Table 10: Climate Resilient UPD Options for Decreasing Precipitation

DECREASING PRECIPITATION			
SCALE OF ACTION	**URBAN DESIGN**	**EXAMPLE UPD ADAPTATION OPTIONS / ACTIONS**	**POTENTIAL RESILIENCE CONTRIBUTION**
ECOSYSTEM	**Urban Structure**	▶ Establishing/restoring upland forests (reforestation/afforestation) ▶ Water restrictions and consumption cuts	ADAPT TO, TRANSFORM
	Urban Grain	▶ Adaptive groundwater management ▶ Improved water retention in essential and viable areas ▶ Water-sensitive urban design (WSUD) ▶ Sustainable Urban Drainage Systems (SUDS)	ADAPT TO, TRANSFORM
NEIGHBORHOOD	**Density + Mix**		
	Height + Massing		
	Streetscape + Landscape	▶ WSUD ▶ SUDS ▶ Urban farming and gardening in open spaces	ADAPT TO, TRANSFORM
BUILDING	**Facade + Interface**	▶ Rainwater harvesting	ADAPT TO
	Details + Materials	▶ Water recycling ▶ Rainwater harvesting ▶ Use of water-efficient plumbing fixtures and fittings	ADAPT TO, TRANSFORM

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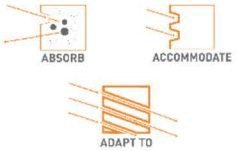
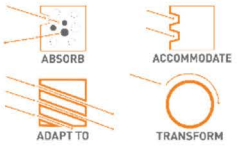
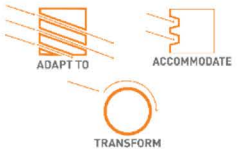
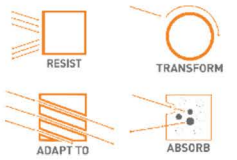
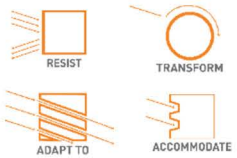
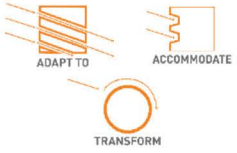
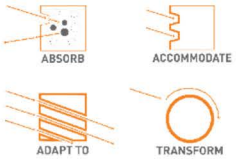
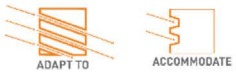
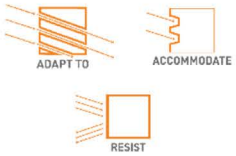
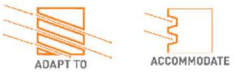
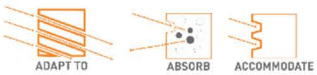
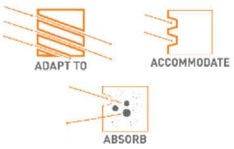
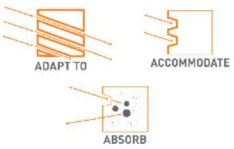
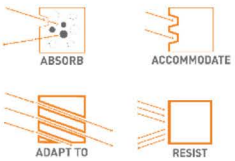
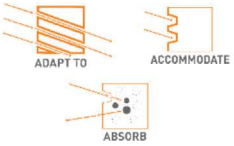
Table 11: Climate Resilient UPD Options for Sea Level Rise

SEA LEVEL RISE			
SCALE OF ACTION	**URBAN DESIGN**	**EXAMPLE UPD ADAPTATION OPTIONS / ACTIONS**	**POTENTIAL RESILIENCE CONTRIBUTION**
ECOSYSTEM	Urban Structure	▶ Retreat from high-risk areas ▶ Groins, breakwaters, and artificial reefs ▶ Restoration and management of coastal wetlands (mangrove forests) ▶ Seawalls and Jetties ▶ Building new/improve existing dikes and dams ▶ Rehabilitate wetlands and restore floodplains	RESIST, ACCOMMODATE, ADAPT TO, TRANSFORM
	Urban Grain	▶ Road dikes	RESIST
NEIGHBORHOOD	Density + Mix		
	Height + Massing	▶ Building on partially elevated areas	ADAPT TO
	Streetscape + Landscape	▶ Dune construction and strengthening ▶ Floating or elevated roads	ADAPT TO
BUILDING	Facade + Interface	▶ Floating and amphibious buildings ▶ Raise ground floor elevation above flood level	ADAPT TO
	Details + Materials	▶ Salt-tolerant building material ▶ Use regional materials	RESIST, ACCOMMODATE

Table 12: Climate Resilient UPD Options for Extreme Events

EXTREME EVENT: STRONG WIND DUE TO TYPHOONS			
SCALE OF ACTION	**URBAN DESIGN**	**EXAMPLE UPD ADAPTATION OPTIONS / ACTIONS**	**POTENTIAL RESILIENCE CONTRIBUTION**
ECOSYSTEM	**Urban Structure**	▶ Implementation of latest structural code requirements for wind loading ▶ Land use zoning ▶ Forest protection and restoration boundary ▶ Set urban boundary zones ▶ Green infrastructure integration	
	Urban Grain	▶ Higher tree canopy than building height ▶ Grouping of buildings ▶ Smooth transition between buildings and natural artifacts	
NEIGHBORHOOD	**Density + Mix**	▶ Ecotoned Building Density ▶ Compact development	
	Height + Massing	▶ Avoiding windswept sites at hilltops ▶ Building at sheltered leeward sites ▶ Building length oriented along prevailing wind ▶ Uniform building height distribution	
	Streetscape + Landscape	▶ Planting trees 10 meters away from buildings ▶ Preventive pruning of trees during typhoon season ▶ Staking of newly planted trees ▶ Preventive maintenance of billboards and signages prior to typhoons ▶ Streets oriented along prevailing wind ▶ Streetscape elements designed for disassembly ▶ Strategic dispersement of natural artifacts	
BUILDING	**Facade + Interface**	▶ Avoiding flat roof designs ▶ Using hip roofs at 20-40 degrees slope for housing ▶ Strong core shelter for low-cost housing ▶ Solid façade assembly ▶ Façade orientated along prevailing wind direction ▶ Free-flow structure	
	Details + Materials	▶ Limit roof eaves to 60 cm overhang ▶ Avoiding complicated roof shapes ▶ Avoilding complicated building shapes ▶ Detail connections designed for disassembly for self-renewal ▶ Smooth finish building material	

EXTREME EVENT: FLUVIAL FLOODING DUE TO HEAVY RAINFALL			
SCALE OF ACTION	**URBAN DESIGN**	**EXAMPLE UPD ADAPTATION OPTIONS / ACTIONS**	**POTENTIAL RESILIENCE CONTRIBUTION**
ECOSYSTEM	**Urban Structure**	▶ River system/network management (i.e., increase river channel volume by widening/deepening river channels) ▶ Retreat from high-risk areas ▶ Building sea/river walls and jetties ▶ Buillding new/improving existing dikes ▶ Rehabilitating wetlands and restoring floodplains ▶ Green infrastructure integration ▶ Buffer Zoning ▶ Set urban boundary zones	
	Urban Grain	▶ Use water detention basins where applicable ▶ Strategic clustering of building footprint	
NEIGHBORHOOD	**Density + Mix**	▶ Balanced building density and natural	
	Height + Massing	▶ Building on partially elevated areas ▶ Building height (habitable floors) above flood level ▶ High area-to-volume-ratio massing	
	Streetscape + Landscape	▶ Dune construction and strengthening where applicable ▶ Elevated lifeline roads ▶ Natural artifact disperse flood velocity ▶ Smooth non-linear (curvilinear) streets	
BUILDING	**Facade + Interface**	▶ Floating and amphibious buildings ▶ Increase difference between street level and ground floor levels ▶ Wet- and/or dry floodproofing buildings ▶ Raising ground floor elevation above flood level ▶ Parallel or angled to fluvial flow direction ▶ Free-flow at ground	
	Details + Materials	▶ Ground floor materials designed for disassembly ▶ Designate ground floor as support area ▶ Designate upper floors as habitable area	

EXTREME EVENT: PLUVIAL FLOODING DUE TO HEAVY RAINFALL (URBAN FLOODING)			
SCALE OF ACTION	**URBAN DESIGN**	**EXAMPLE UPD ADAPTATION OPTIONS / ACTIONS**	**POTENTIAL RESILIENCE CONTRIBUTION**
ECOSYSTEM	**Urban Structure**	▶ Interconnecting waterway networks ▶ Protect and restore ecological sites ▶ Set urban boundary limitation	
	Urban Grain	▶ Water detention basins and pumping stations ▶ Preserve natural topography ▶ Cascading water retention and filtration system	
NEIGHBORHOOD	**Density + Mix**	▶ Low Impact Development (LID)	
	Height + Massing	▶ Building on partially elevated areas ▶ Increase water retention on vertical surfaces ▶ Greenwalls	
	Streetscape + Landscape	▶ Reducing paved surfaces ▶ SUDS ▶ Bioswale ▶ Constructed wetlands ▶ Stormwater retention ponds	
BUILDING	**Facade + Interface**	▶ Floating and amphibious buildings ▶ Increase difference between street level and ground floor levels ▶ Wet- and/or dry floodproofing buildings ▶ Raising ground floor elevation above flood level ▶ Greenwall ▶ Water harvesting facade	
	Details + Materials	▶ Green roofs ▶ Unpaved surface area ▶ Pervious surface materials	

PART 2

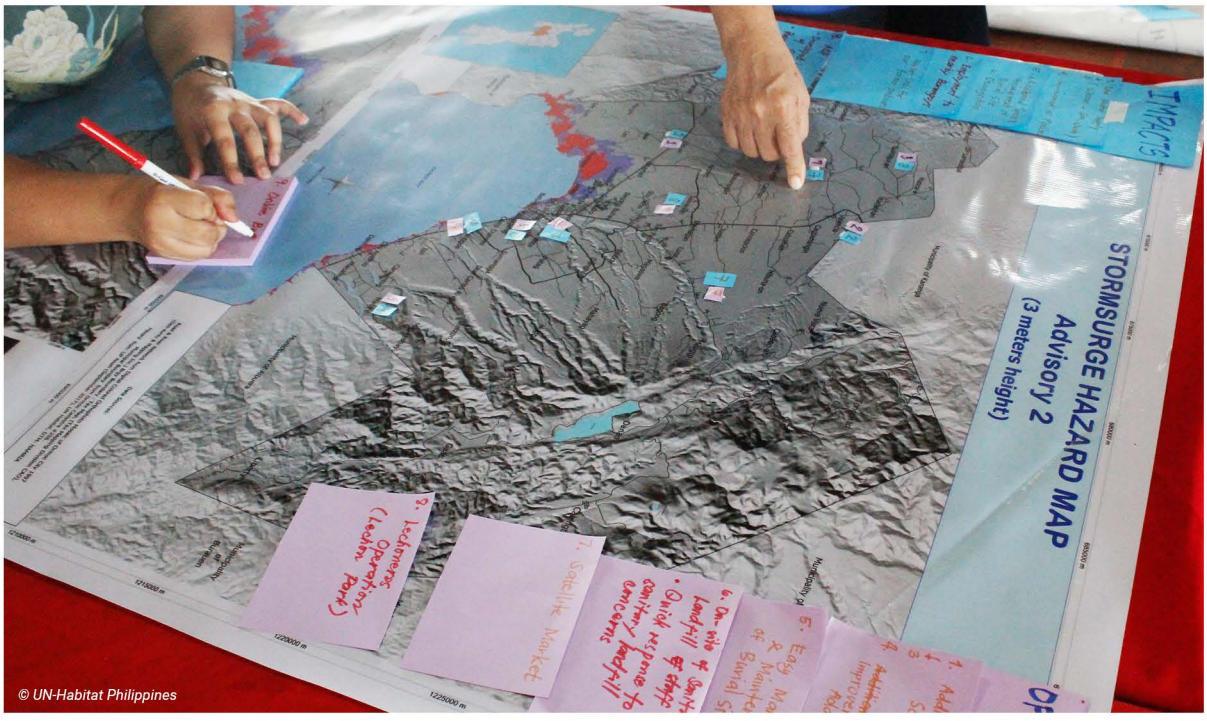
IV. RESILIENCE THROUGH UPD - PATHWAY APPROACH AND RELATED TOOLS

A pathway is a course or track that leads to a certain destination. It is used as a metaphor to illustrate and visualize the process of robust action considering climate uncertainties and temporal complexities. Development and climate change actions have been taking the "pathway approach" towards the goal of a sustainable future for all. According to the IPCC AR5, "climate-resilient pathway for development is a continuing process for managing changes in the climate and other driving forces affecting development, combining flexibility, innovativeness, and participative problem solving with effectiveness in mitigating and adapting to climate change. If effects of climate change are relatively severe, this process is likely to require considerations of transformational changes in threatened systems if development is to be sustained without major disruptions." Further, IPCC AR5 notes that climate-resilient pathways involve two main categories of actions:

1. *Actions to reduce human-induced climate change and its impacts, including both mitigation and adaptation toward achieving sustainable development, and*

2. *Actions to ensure that effective institutions, strategies, and choices for risk management will be identified, implemented, and sustained as an integrated part of achieving sustainable development.*

Considering the above concepts put forward by leading climate science experts at the international front, using UPD towards a climate-resilient pathway should be fully explored and ensured across the climate governance structure of a developing country such as the Philippines. In line with the first category, UPD solutions to be applied by LGUs in the context of this Guide while supporting adaptation should likewise lead to GHG mitigation co-benefits. Category 2 also relates that LGUs and other institutions should have the capacity and "political will" to make decisions, implement, and sustain the UPD options they need to build climate resilience.



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Furthermore, the pathway approach concerning adaptation, without undermining the more comprehensive climate-resilient pathway, has been successfully applied and used by many countries for various sectors and/or urban system. For example, Australia's CoastAdapt provides a discussion on adaptation pathways specifically on (a) how it can be used for adaptation planning, (b) why it is useful, (c) how to undertake a pathways approach, and (d) the theoretical background and practical cases and materials. Users of this reference tool may access the full discussions from https://coastadapt.com.au/pathways-approach. Table 13 presents the general considerations from the CoastAdapt tool on "how to apply adaptation pathways approach" along with how it may be used by LGUs in view of the current practice and national tools on local climate action planning. Figure 33 presents an illustration of the current "classic" concept of adaptation pathways, which is a series of adaptive learning decision cycles over time. Continuing research on adaption results from its application flags that LGUs must know that the "framing" of their pathway is critical. For that, LGUs should note the following considerations[11]:

- The landscape of the adaptive space may change over time;
- The LGUs may not even be in the adaptive space now; hence the current defined action/s may be leading to maladaptation. Drastic transformation (i.e., governance and policies, technology option, and others) could be needed to get into the track of the adaptive space;
- History and historical context must inform the pathway and every decision point;
- The decision cycle context may change as cultural values and practice may evolve;
- Avoid single track and rigid path dependency; flexibility and robustness are crucial principles to be applied; and
- The pathways perspective implies an iterative and ongoing approach, informed by a strategic vision that enables experimentation and learning so that choices along pathways can be altered in response to predefined triggers.

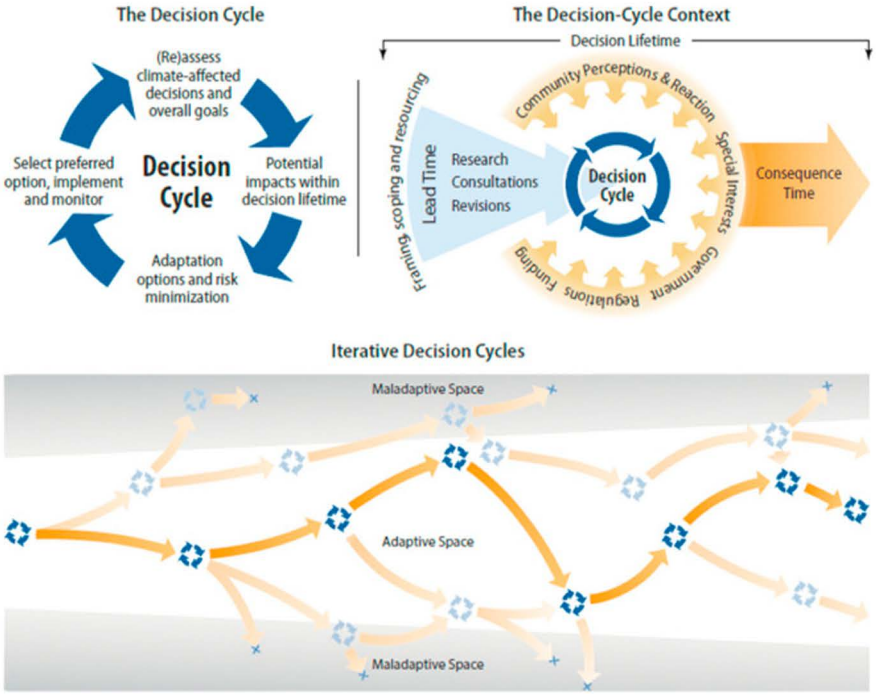
Table 13: Undertaking the Adaptation Pathways Approach in Relation to Philippine Climate Action Context

HOW TO UNDERTAKE THE ADAPTATION PATHWAYS APPROACH	
COVERAGE (BASED ON AUSTRALIA COASTADAPT)	**LINKS TO PHILIPPINE LGU CLIMATE ACTION PLANNING PROCESS AND RELEVANCE TO RESILIENT UPD**
1. **Defining and scoping the areas of decision-making including determining the objectives or a vision of what success might look like. The results of this scoping exercise can be used to identify stakeholders and elicit their values.**	▶ Links to Step 1& 2 of the LCCAP (Getting Started and Stakeholder analysis) ▶ Links to Step 4 of the (Goals and Objectives formulation as linked to the LGU development Vision) ▶ Links to the guidance for Resilient UPD to complement the overall development vision of the city given the current and future risks it is facing as founded by results of the CDRA process ▶ Related to the guidance that climate planning should involve climate change experts and urban design experts
2. **Determining thresholds and trigger points. Achieving this step is likely to involve stakeholder consultation and/or interrogation of future climate change scenarios and projections**	▶ Links to Step 3 of the LCCAP (vulnerability and risk assessment) ▶ Links to Step 5-6 of the LCCAP (Options Identification and Options Assessment) ▶ Must be considered in determining and choosing the adjustments needed urban design options may address. Adjustments in urban elements must address the threshold and trigger points for negative impacts and based on the CDRA climate hazards characterization and review of previous and projected events.

[11] Wise, R. M., Fazey, I., Smith, M. S., Park, S. E., Eakin, H. C., Van Garderen, E. A., & Campbell, B. (2014). Reconceptualising adaptation to climate change as part of pathways of change and response. Global environmental change, 28, 325-336. https://doi.org/10.1016/j.gloenvcha.2013.12.002

HOW TO UNDERTAKE THE ADAPTATION PATHWAYS APPROACH	
COVERAGE (BASED ON AUSTRALIA COASTADAPT)	**LINKS TO PHILIPPINE LGU CLIMATE ACTION PLANNING PROCESS AND RELEVANCE TO RESILIENT UPD**
3. Determining the range of adaptation options and their lead-times and then making an evaluation of each option in terms of a set of criteria involving cost, community acceptability, time to implement, technical complexity etc.	▶ Same as above (#2) ▶ (See Tools for Decision Making and Prioritization)
4. Developing decision pathways and decision points and beginning the journey along the chosen pathway.	▶ Links to Step 7-9 (Implementation, M&E, and Plan Modification and Adjustment) ▶ Relevant to the whole process of understanding, developing, using UPD options for resilience, as explained in Part 1 of this reference tool. ▶ (See Tools for Decision Making and Prioritization)

Figure 33: Adaptation Pathways in a Series of Learning Decision Cycles



This is the current 'classic' conceptualisation of adaptation pathways – as a series of adaptive learning decision cycles over time (top left, cf. Willows and Connell, 2003; Haasnoot et al., 2013) with their decision lifetimes (top right – the sum of lead and consequence times, cf. Stafford Smith et al., 2011), where some chains of decisions lead to maladaptive outcomes over time, but there may be other alternatives that are adaptive (bottom, cf. Reeder and Ranger, 2011; Haasnoot et al., 2013). From the perspective of the current decision point at the left, a currently satisfactory pathway can be plotted through the future (strongest colour), but this must be re-visited at each decision point (Figure developed by Andy Reisinger, pers. comm.).

Source: Wise, R.M., et al., Reconceptualizing adaptation to climate change as part of pathways of change and response. Global Environ. Change (2014), http://dx.doi.org/10.1016/j.gloenvcha.2013.12.002

A. TOOLS FOR DECISION MAKING AND PRIORITIZATION

The following tools are used for Decision-Making and Prioritization:

1. Local Adaptation Strategy and Policy Framework;
2. LGU/City Design Guide (city-level tool);
3. Design Code (neighborhood and site-level); and
4. Project-level Decision-Making Tools (Prioritization and Screening)

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LOCAL ADAPTATION STRATEGY AND POLICY FRAMEWORK

The Local Adaptation Strategy and Policy Framework is developed from the results of the technical findings of the CDRA. It identifies the strategies to achieve adaptation objectives that will deliver climate-resilience character/indicators that the LGU targets to deliver (refer to Table 6). It consolidates and rationalizes the existing policy framework for climate action within the planning context and directs actions in scale and by sector. The strategy and policy framework specific to resilient UPD actions are derived from this.

BENEFITS

- Can provide overall guidance and direction to LGU in identifying and detailing UPD actions.
- Provides a reference for internal and external actors.
- Provides a reference for the urban designer or team.
- Helps to show the linkages of UPD actions across scales and sectors.
- Supports and links to the implementation of adaptation pathways.

DRAWBACKS

- If not regularly reviewed and updated, might get outdated and lead to insufficient action or even maladaptation.
- If not developed based on the CDRA, business as usual or non-climate responsive actions may continue and not lead to transformative adaptation.

HOW IT'S DONE

Key questions when formulating the local adaptation strategy:

- **What** do you want to do with the risks and vulnerabilities?
- **Who** and what will the strategies focus on? Where and when will it happen?
- **How** are they connected within the larger system (city, province)?
- Are there conflicts and trade-offs between climate change actions? Climate change and other development actions? **What** are the possible technical and/or policy adjustments required in such cases?
- **What** general policies (existing or planned) are necessary to support implementation? How will it affect the CLUP? CDP? Zoning Ordinance?

The strategy and policy framework are developed within the CDRA process and can be finalized with specific design-related strategies and policy implications. Specific adaptation strategy and policy framework on resilient UPD is identified and detailed with urban planners and design experts as well as professionals and stakeholders from other disciplines.

Box 3

WHAT'S YOUR OBJECTIVE?

1. Minimize / reduce / retreat from / transfer / share / absorb / avoid all or only part of the expected or observed impacts;
2. Return levels of human well-being to pre-climate change levels;
3. Maintain current levels of risk or as a minimum reduce them cost-effectively within agreed budgets or pre-defined acceptable levels.

(Sample question from UNFCCC NWP assessing costs and benefits of adaptation options, 2011)

EXAMPLES OF LOCAL ADAPTATION STRATEGY AND POLICY FRAMEWORK

TAGUM CITY URBAN ADAPTATION STRATEGY FRAMEWORK

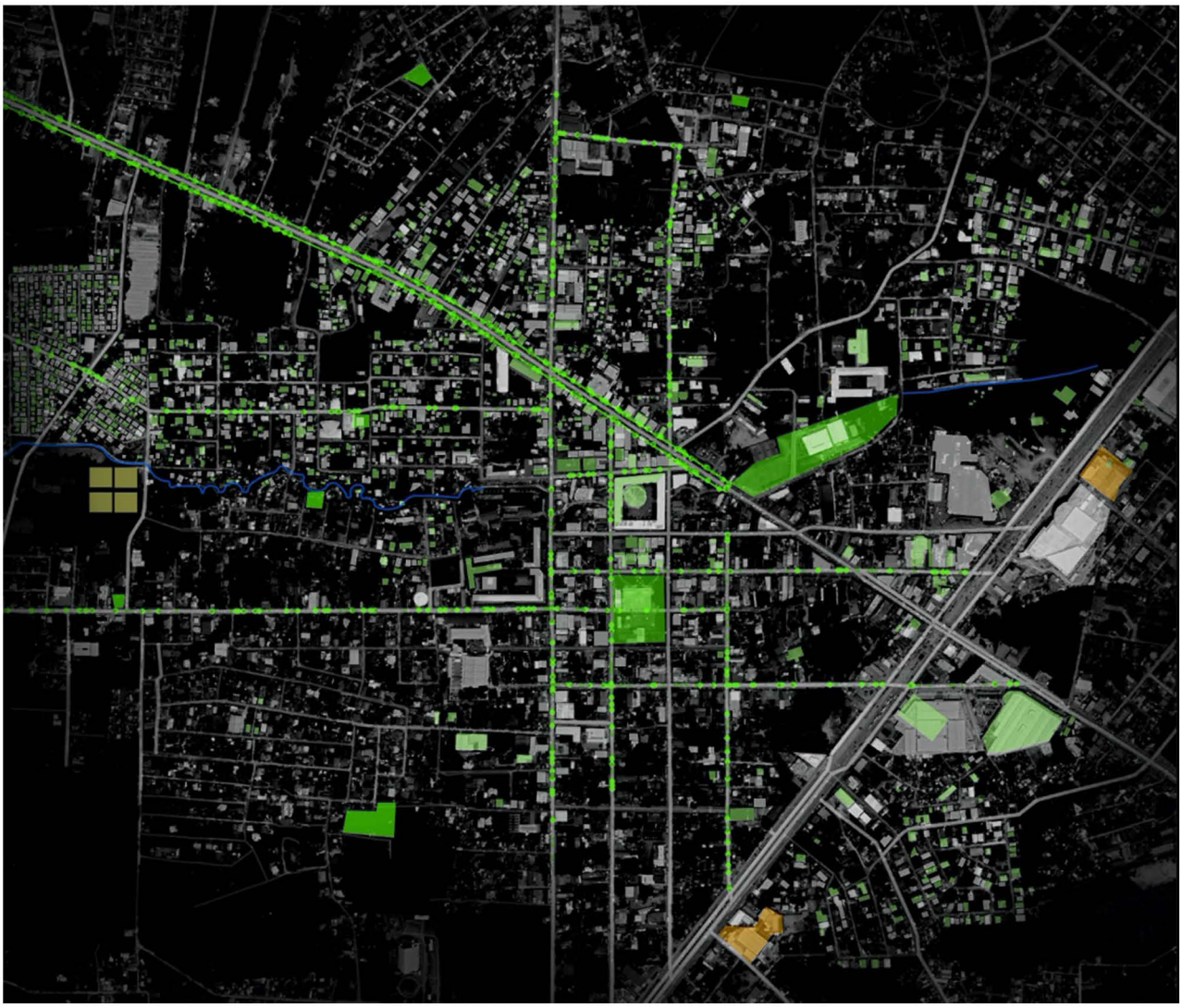
Tagum City will experience hotter temperatures ranging from 1.4°C to 2.3°C by 2036–2065 compared to the observed baseline. Increasing temperatures may trigger the further heating of its built-up areas, which may cause health problems to residents, increased power consumption for indoor cooling, and influence commuting preferences that may result in increased GHG emission levels especially in the planned urban growth center.

Given these climate triggers and potential impacts, the city formulated its climate adaptation strategy framework to guide its local climate action, address current challenges, and anticipate potential risks.

Urban design strategies include increasing the tree cover along streetscapes to reduce the heat exposure of roads, expanding public open spaces for passive cooling, and institutionalizing building design standards incorporating green and resource efficient design principles. Tagum City also emphasizes increasing the resilience of highly vulnerable groups by providing green and inclusive socialized housing, further strengthening mechanisms to allow their participation in the local green economy, and encouraging multi-stakeholder and public participation in resilience site planning and design especially within hazard-prone areas. Furthermore, to reduce its GHG emissions, the city is exploring strategies such as mass transport systems, promoting green transportation, and expanding its pedestrian networks and bike lanes.

These identified strategies serve as a guide and provide the overall direction of local urban adaptation actions, visualization, and location of various urban planning and design actions at the building to district scales. They can also serve as a quick reference to external and internal actors on relevant programs, projects, and activities to pursue and facilitate the detailing of projects related to urban design and other local development projects.

Figure 34: Map Representation of Tagum City's Urban Adaptation Strategy Framework



REDESIGNING OUR STREETSCAPES

- Act as breezeways and air paths to reduce micro- climate temperatures
- Proper orientation of roads to maximise prevailing winds for urban cooling
- Improve walkability nd pedestrian experience
- Encourage non-motorised mobility to reduce GHG emissions

HEAT ADAPTIVE BUILT ENVIRONMENT

- Designing buildings, streets, neighborhoods, and districts to accommodate future increase in mean temperatures
- Formulate regulations to reduce urban temperatures such as solar reflectance, building orientation relative to prevailing winds and sun path, building densities and typologies and natural shading interventions

EXPANDING PUBLIC OPEN GREEN SPACES

- Serve as breezeways and air paths to improve micro-climate
- Transforming river and creek areas as public access corridors
- Increase carbon sequestration

PROMOTING GREEN AND INCLUSIVE HOUSING

- Provide climate and hazard resilient housing construction materials to moderately vulnerable families
- Provide technical assistance on retrofitting
- Ordinance on inclusion of climate variability in the housing standards
- Acquire land suitable for resettlement and inclusion in the Local Shelter Plan
- Provide climate resilient medium-rise housing
- Develop incentives for medium-rise low cost housing cartering to developers

CLEAN ENERGY AND RESOURCE EFFICIENT BUILDINGS

- Green engineering and building design principles institutionalised and implemented
- Retrofitting of public buildings incorporating resource efficient design principles
- Encourage off grid solar panel

STRENGTHENING A LOCAL GREEN ECONOMY

- Increase the adaptive capacities of highly vulnerable groups through social and economic participation in community green economy
- Incentivise resource-efficient commercial establishments
- Subsidise resource-efficient and climate resilient SMEs
- Promote green jobs

ORMOC CITY URBAN ADAPTATION STRATEGY FRAMEWORK

The City may experience two plausible scenarios as a result of potential changes in seasonal and annual rainfall patterns. Reduction in annual rainfall may prolong water recharge rates and affect local potable water supplies derived from surface and ground water sources and create problems in balancing water supply and demand to cope with its rapid urbanization. Annual rainfall patterns may also increase compared to the current baseline, which provides benefits to the domestic potable water supply when properly harnessed.

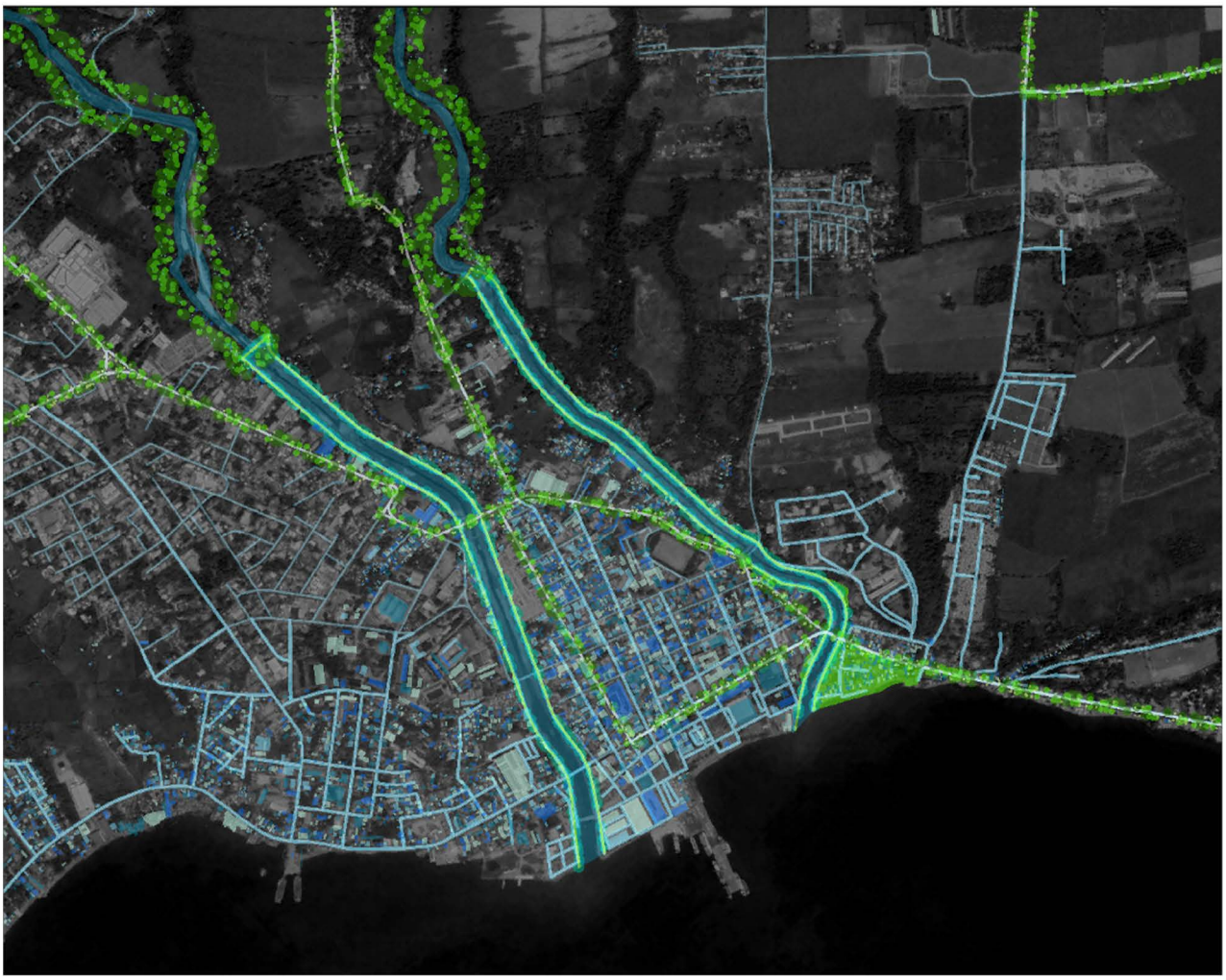
PAGASA also projects a slight reduction in the frequency of tropical cyclones but slight increase in intensity, which may trigger extreme hazards such as floods and storm surges affecting coastal areas in the urban center. These climate extremes may significantly impact the welfare and well-being of people especially the highly vulnerable and marginalized coastal and riverside communities.

To anticipate these potential impacts, the city formulated its urban adaptation strategy framework for the urban center. Strategies include developing a nature-based drainage system to manage urban flooding, increasing the water permeability of urban surfaces to improve recharge rates of ground water, restoring riparian forests and establishing water impoundment installations along rivers to manage surface flow, and managing wastewater to prevent contamination of ground water resources and water quality along the rivers and coast. The city also identified the need to increase the structural resilience of buildings to withstand storm surges and floods, and promote rainwater harvesting to augment domestic water supply.

Furthermore, to increase the resilience of highly vulnerable and marginalized groups, the City intends to provide resilient socialized housing, which will also incorporate resilient, green, and resource efficient design standards through inclusive site development and planning with potentially at-risk families.

The various strategies identified in the urban adaptation and strategy framework served as a guide in the preparation of the Ormoc Urban Riverside Project where various climate resilient urban design principles were applied in the detailing of the project.

Figure 35: Map Representation of Ormoc City's Urban Adaptation Strategy Framework



CLIMATE PROOFING OF BUILDING STRUCTURES

- Develop regulations and incentive mechanisms to increase structural hazard resilience of buildings to withstand storm surges and floods
- Promote risk transfer mechanisms
- Rainwater harvesting to reduce surface run-off

MANAGING SURFACE RUN-OFF

- Establishment of water impoundment installations along rivers and creeks to temporary detain water during extreme rainfall events
- Additional green spaces for GHG sequestration

INCREASING PERMEABLE SURFACES AND NATURE BASED DRAINAGE SYSTEM

- Increasing permeable surfaces through bioswales and absorption beds to recharge ground water
- Construction of bioswales along urban, coastal, and national roads to manage urban and coastal flooding

ENCOURAGING NON-MOTORISED MOBILITY

- Improving natural shading of sidewalks along national, urban, and coastal roads to enhance pedestrian experience
- Tree line sidewalks with ground crops to minimize heat
- Transforming river and creek areas as walkable public access corridors
- Encourage non-motorised mobility through bike lanes to reduce GHG emissions

MANAGING WASTEWATER

- Individual septic tanks as primary treatment of household wastewater and secondary treatment through community bio-filtration system
- Waste trap system on creek to prevent solid wast from entering the seawater

INCLUSIVE CLIMATE ACTION PLANNING

- Increasing the resilience of vulnerable groups through inclusive site planning and design
- Multi-stakeholder and public participation in resilience planning
- Put the people at the center of urban design

LGU / CITY DESIGN GUIDE (CITY-LEVEL TOOL)

Design guides are developed by LGUs to be used as a basis and reference of urban planners and designers in developing the details of related plans and projects. They help translate the principles, goals, and vision for quality urban design using accessible language and illustrations, being a powerful means to promote and achieve climate resilience when informed by climate information. They generally come in two forms: statutory and non-statutory (New Zealand Ministry for the Environment, 2007).

- **Statutory design guides (legal instruments)**
  - have legal status and provide explicit criteria for assessing the quality of design outcomes
  - contain explanations and illustrations to demonstrate the context and rationale for design principles
  - include design objectives to clarify the intent of the guidelines and allow for flexibility in the design approach.
- **Non-statutory design guides (promotion/advocacy)**
  - used for education and advocacy and, when combined with promotion, can be an effective means of distributing information on quality design
  - no compulsion for a developer or designer to consider a non-statutory design guide, it will be most effective when the majority of users are persuaded that it is in their interests to follow the guide

BENEFITS

- Can provide directions and consistency across designs, but still allow for creativity and flexibility.
- Allows for robust assessment and decision-making process.
- Can be used across different scales from specific areas (e.g., city centers) to development types (e.g., multi-unit housing) and design issues (e.g., streetscape quality/safety).
- Incorporated into CLUP and ZO or adopted as a standalone provision (to supplement the ZO).
- Can include specific instructions or specifications and recommendations such as building specifications (height, dimensions, and others for urban heat island [UHI] effect and energy efficiency); open spaces as resilience-building spaces; size and materials for streets for thermal and precipitation issues.

DRAWBACKS

- Not as fixed or legally-binding in the case of non-statutory design guides.
- Set out the general principles for development but without the specific requirements for the physical development of a site.

HOW IT'S DONE

Below are questions to use when formulating the design guide, which can be answered using the template table for ease of summary.

- Which are the areas of concern?
- What is the specific climate change-related design issue? Must link directly to climate change risks and opportunities (check LCCAP).
- What strategies could be used to address the climate change-related design issues?
- What design ideas and elements should be avoided to ensure that the climate change-related design issues will not be aggravated and cease to be an issue?
- What specific actions (projects, sub-projects, activities, and others) can be used to achieve the strategy's intended results?

AREA NAME	SPECIFIC CLIMATE CHANGE-RELATED DESIGN ISSUE (MULTIDIMENSIONAL)	DESIGN STRATEGY	WHAT TO AVOID	WHAT TO PROMOTE	SPECIFIC ACTIONS

**Use the table above as template for plotting the details of your city design guide*

EXAMPLES OF LGU / CITY DESIGN GUIDE

- **Urban Design Guidelines for Hong Kong**

  Included as a chapter in the Hong Kong Planning Standards and Guidelines. The guidelines were formulated based on the findings and recommendations from two Studies, the "Urban Design Guidelines for Hong Kong" (the UDG Study) in 2003 and the "Feasibility Study for Establishment of Air Ventilation Assessment System" (the AVA Study) in 2005. Hong Kong's urban design guidelines cover both the major general urban design issues and air ventilation to shape a better physical environment in aesthetic and functional terms and at macro and micro levels.

- **New York City Climate Resiliency Design Guidelines (v4, September 2020)**

  A pioneering guideline issued by the city to address climate change impacts. Provides step-by-step instructions on how to supplement historic climate data with specific, regional, forward-looking climate change data in the design of City facilities. The Guidelines apply to all City capital projects except coastal protection projects (e.g., sea walls, bulkheads, and levees), for which the City is developing separate guidance.

- **Boston Climate-Resilient Design Standards and Guidelines for Protection of Public Rights-Of-Way**

  Provides specific city-level guidance on the design of public rights of way including paths and public spaces for protection against flooding due to sea level rise and storm surges.

- **Western Australian Planning Commission Liveable Neighbourhoods**

  Guides the structure planning and subdivision for greenfield and large brownfield sites with key design principles.

LEGAZPI CITY URBAN DESIGN GUIDE

The City Government of Legazpi conducted an urban design guide workshop to formulate non-statutory policy options and recommendations to promote and enhance its climate resiliency applying urban design principles and approaches. Various alternative design options and recommendations covering elements of urban design such as urban structure, urban grain, density, mix, height, massing, streetscape, landscape, facade, interface, details, and materials were discussed and applied at different planning scales (e.g., city, district, neighborhood, streets, and buildings). Taking off from the results of the climate and disaster risk assessment, the goals and objectives of the local climate change action plan, and its local setting and development context, the city identified various areas requiring climate resilient urban design interventions. An excerpt of the urban design workshop covers its riverside areas that are highly susceptible to flooding that can potentially affect highly at-risk communities (Table 14).

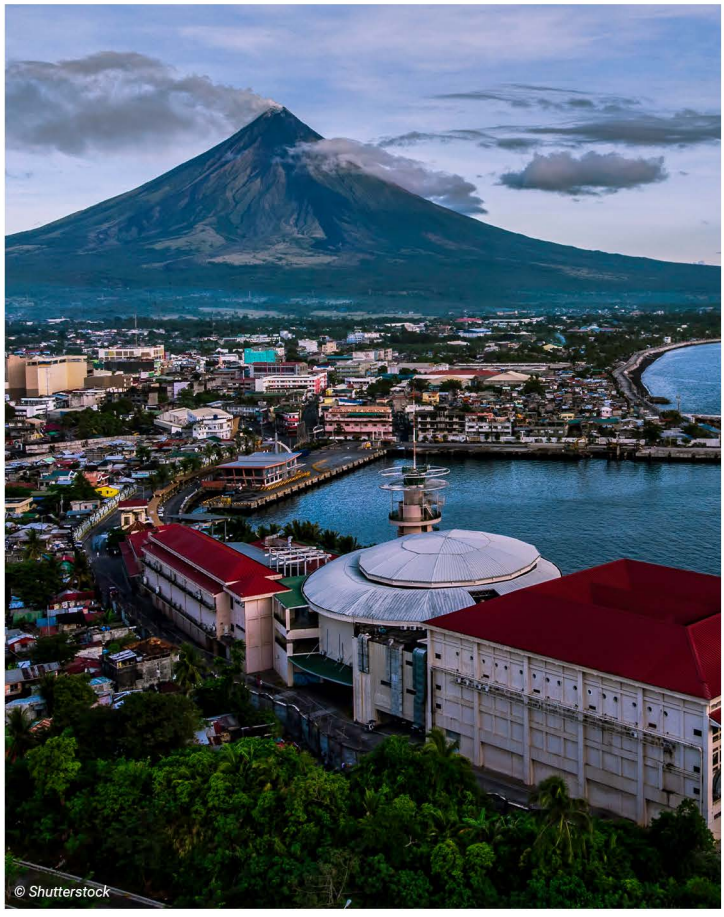


Table 14: Summary of Urban Design Recommendations for Flood Susceptible Areas, Legazpi City

AREA	SPECIFIC CLIMATE DESIGN ISSUE	DESIGN STRATEGY	WHAT TO AVOID	WHAT TO PROMOTE	SPECIFIC ACTIONS
Residential areas within the Port District, CBD, Victory Village north and south, Dinagaan, Imperial Court, PNR Penaranda along the Macabalo, Tibu and Sagumayon Riverside Corridors	▶ Rainfall volume during December to February to have an additional increase of 297.9 mm and 585.2 mm in 2036-2065 and 2070-2099, respectively. These could be 40% to 79% increase from the current observed rainfall volume. ▶ Flood intensities may range from 0.5 m - 1.5 meters and in some areas more than 1.5 meters, which may submerge existing buildings. ▶ 72% of residential structures are made of light to salvageable materials susceptible to significant structural damage, and damage to building contents. ▶ High proportion of residential buildings with no hazard mitigation design. ▶ Very narrow streets and lack of setbacks in residential areas and encroachment of development along riverside setbacks, which may restrict ease of access during emergency response and evacuation. ▶ Minimum lot sizes are too small to accommodate necessary flood resilient site and building design regulations and parameters. ▶ 3.278 potential at risk population where 93% are informal settlers and around 48% of households (HHs) are below the poverty threshold. ▶ Flooding areas are the planned residential and commercial expansion zones of the City.	▶ Flood resilient building structures. ▶ Expand riverside easements and setbacks and transform them as pedestrian networks. ▶ Road network layout designed to facilitate emergency evacuation and disaster response. ▶ Establish riverside residential commercial corridors to provide income opportuni-ties to benefit the potentially at-risk population. ▶ Manage surface water flow during extreme rainfall events using sponge city approaches and river basin perspective.	▶ Road network layout that is predominantly parallel to rivers. ▶ Building densities and lack of provision of building setbacks that restrict parallel movement of people relative to the rivers and creeks. ▶ Encroachment of built areas along riversides areas and closing public access to riverside easements. ▶ Maximum building height where more than 66% of the gross floor area of buildings is below the expected flood depth. ▶ Lot sizes that are too small to accommodate imposition of necessary setbacks and open access areas. ▶ Building orientation that treats riversides and creeks as part of the backyard. ▶ Buildings typologies that are not adaptive to prolonged flood water submersion and expected flood depths and velocities.	▶ Road network perpendicular to riversides to facilitate pedestrian and vehicular movement away from riversides during extreme flooding events. ▶ Minimum lot size of 192sq.meters (Residential-2 basic) and adjust the maximum allowable percentage of site occupancy (MAPSO) to promote increased building setbacks to facilitate perpendicular pedestrian movement relative to rivers for the purposes of evacuation and emergency response operations. ▶ Increase building heights and ensure 66 to 100% of the gross floor area is above flood depths emanating from a 100 year extreme rainfall event. ▶ Use of building materials to withstand prolonged flood water submersion and expected velocities. ▶ Interfacing of buildings to facilitate emergency evacuation. ▶ Treating riverside setbacks as property frontages. ▶ Transform river easements and setbacks as part of the pedestrian network. ▶ Renaturing of riverside areas to reduce flood velocities and minimize riverbank erosion. ▶ Incorporate residential, commercial uses to provide income opportunities to at-risk population.	▶ Flood modelling studies to establish flood water patterns (flood depth and velocity) from a 25, 50 and 100 year extreme rainfall recurrence as basis for the local building code on flood resilience and zoning regulations covering zonal densities, building heights, and (MAPSO) and permeable surface requirements / standards. ▶ Expansion of riverside easements and setbacks along major rivers of the City and incorporation in the Zoning Ordinance. ▶ Site development plan covering the Macabalo, Tibu and Sagumayon Riverside Corridors with emphasis on providing opportunities to increase adaptive capacities of potentially at-risk population. ▶ Rainwater Harvesting Ordinance review prescribing the rainwater storage capacity requirements and area coverage. ▶ River basin spatial framework planning covering Tibu, Sagumayon, and Macabalo rivers. ▶ Pre-feasibility study on the Imelda Roces and Benny Imperial Avenue retention pond parks.

DESIGN CODE (NEIGHBORHOOD AND SITE-LEVEL)

This tool is mostly used in the United Kingdom. Generally, design codes are different from design guidelines as they are more specific and precise to the subject area of design. It consists of a set of templates and rules for the placement and design detail of a lot, building, or open space design within a development area, also establishing how they should relate to each other and to the larger vision of the city. This usually comprises a masterplan and written information providing a three-dimensional view of the development area and intended arrangement of spaces, buildings, and design details, along with an explanation. Design Codes facilitate sustainable place-making and resilience building.

BENEFITS

- Ensures clarity around the rules of what constitutes acceptable design in the area including the climate change responsiveness of all its design elements needed now and in the future.
- Ensures the consistency and quality of development being done in the neighborhood or site even if it is being executed by different actors or developers and when projects are done in stages or in phases.
- Ensures that the overall development and all its elements can effectively meet the vision of the LGU especially the resilience indicators that have to be met and achieved.
- Helps the LGU implement national level building and design code to a higher standard than the minimum required given what is needed on the ground considering the area-specific risks and vulnerabilities from climate change impacts and other hazards.

DRAWBACKS

- Must be careful not to lock in risks by not thoroughly evaluating them from the outset with climate and hydrology models.
- Need to allow for future changes in use and environmental risks.
- Will tend to be a limiting factor if stakeholders were not engaged and did not participate in its crafting.

HOW IT'S DONE

The following stages indicate steps in preparing design codes (Department for Communities and Local Government n.d.). Figure 36 also summarizes the stages mentioned here:

- **Stage 1: Initiating the design code**

  Thinking through and defining an agreed process for preparing and operating the code, and establishing leadership arrangements.

- **Stage 2: Coordinating inputs into the design coding process**

  Bringing together the skills, financial resources, and the roles and relationships that will create and implement the design code.

- **Stage 3: Appraising the local context for design coding**

  Assessing the existing policy and guidance framework and any consents already covering the site or area, its character, and any existing physical vision such as a masterplan.

- **Stage 4: Designing and testing the design code**

  Devising, structuring, writing, and designing the content and expression of the design code, and then testing its robustness, including its market viability, likely capacity to deliver quality, and its ease of use to all users.

- **Stage 5: Formalizing the design code**

  Giving the design code status by adopting it for planning, highways, or other purposes, or by formalizing it through other means such as through development control powers or control over freehold rights.

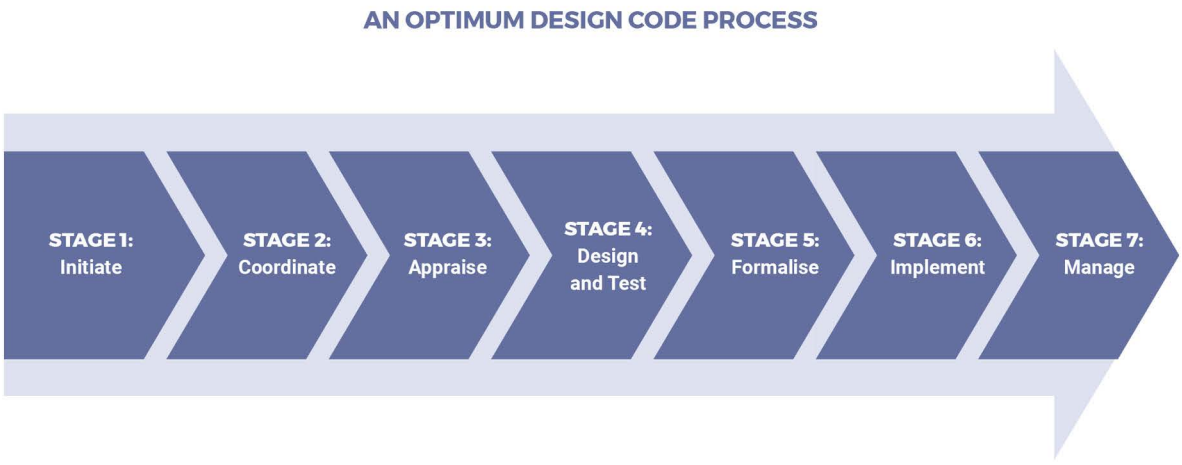
- **Stage 6: Implementing the design code**

  Using the design code to select design and development teams for individual land parcels, to inform the parcel design process itself, and for the assessment and regulation of the proposals coming forward.

- **Stage 7: Managing design code compliance**

  Monitoring and enforcing design code implementation, evaluating the success of the design code to refine it, and using the design code for project aftercare.

Figure 36: An Optimum Design Code Process for LGUs



Source: UK Department for Communities and Local Government

EXAMPLES OF DESIGN CODES

- **Hobart City Council Water Sensitive Streetscape Development**

  Provides site strategies for how to increase the water sensitiveness of streetscape to integrate road layout and vehicular and pedestrian requirements with water management needs. It uses design measures such as maximizing permeable areas, local storm water detention in road reserves, managed landscaping, and others.

- **Model Code for Neighbourhood Design, A Code for Reconfiguring a Lot; Queensland, Australia**

  Provides information on the performance outcomes for neighborhood designs. Specifically notes that the "layout of streets, lots and infrastructure: (a) avoids or minimizes alteration to natural features such as drainage lines and waterways; (b) minimizes the need for vegetation clearing; (c) retains or provides viable ecological corridors for wildlife movement; (d) minimizes alteration to the natural topography and the amount of excavation and filling; and (e) avoids increasing the risks associated with natural hazards."

- **Preparing Design Codes: A Practice Manual**

  Released by the former the Department for Communities and Local Government, now Ministry of Housing, Communities and Local Governments of the United Kingdom. Shares the practice of developing community design codes as guide for developers, local authorities, designers, and the communities themselves to use Design Coding as an option to achieve high-quality, well-designed places.

- **Design Code for Aylesbury Estate Regeneration**

  Provides design guidance for the delivery of the Aylesbury Estate masterplan over the next 20 years. Establishes the characteristics of the development and provides Mandatory Guidance to identify how the new development will look and feel. Scale, massing, streets, landscaping, use, parking, architectural language, and materiality are presented in a hierarchy of mandatory, discretionary, and illustrative elements.

Figure 37: Key Principles to Integrate and Assess Sustainable Design in the Masterplanning of New Settlements through BREEAM Communities

Source: BRE Group via https://bregroup.com/

PROJECT-LEVEL DECISION-MAKING TOOLS (PRIORITIZATION AND SCREENING)

A well-defined approach to decision-making at the project level ensures the attainment of program and policy resiliency objectives. It also leads to improved transparency, engagement, and communication with partners, stakeholders, and internal and external funding sources. Guided by the LGU's Local Adaptation Strategy and Policy Framework to adaptation and resilience, decision-making tools should consider current and future climate risk and impacts while maximizing the co-benefits not only to GHG mitigation but also to sustainable development.

BENEFITS

- Ensures that the identified projects will address the climate change impacts and issues consistent with the LGU's pathways to climate adaptation.
- Helps ensure the design is appropriate in terms of scale, timing, and cost.
- Enables planners, designers, and stakeholders to decide together and understand the "trade-offs" of actions or projects.
- Helps in defining the project components and details based on set criteria agreed among stakeholders, especially the community.

DRAWBACKS

- Prioritization and Screening criteria should be clear and accepted among actors. If not, it could lead to misunderstanding and take a longer period to develop a decision.
- May create a tendency for LGUs to just focus on the "urgent" and "easily executable" projects rather than those most likely to create lasting benefits for both the community and climate.

HOW IT'S DONE

Decision-making process steps and schemes depend on the stage of the decision making as well as the tool being used. Generally, project prioritization and screening for decision making would involve:

- Organizing the options according to parameters (e.g., relevance to risks strategy and adaptation objectives)
- Screening and ranking the options
- After the screening and ranking, evaluating each ranked option looking into:
  - ability to deliver desired results (managing climate risks and applying adaptation principles).
  - trade-offs analysis (mitigation and sustainable development).
  - project-specific cost implications (both monetary and non-monetary) using Multi-Criteria Analysis, Cost-Effectiveness Analysis, and Cost-Benefit Analysis, whichever is appropriate.

SAMPLE CRITERIA TO SCREEN AND RANK PROJECTS OR OPTIONS

Stakeholder Acceptability

Technical Feasibility

Urgency of Implementation

Ease of Implementation

Relative Effectiveness

Relative Cost

Contemplation to Local Development Goal / Multi-sector Relevance

Relevance to the National Climate Change Action Plan (NCCAP)

EXAMPLES OF PROJECT-LEVEL DECISION-MAKING TOOLS

Table 15 presents a variety of tools that can be used in prioritizing and screening projects. Note that this is not a definitive list and more than one tool may be chosen or combined with another, when appropriate. In addition, not all are specific to urban design projects but they can be used purposively to assess design projects' consideration of climate change projections, intervention implications, and contribution to current and future risk avoidance, retreat, reduction, transfer or sharing, elimination, or absorption.

The first two tools in the table have already been detailed in the government's Guide for LCCAP formulation and Supplemental Guide on CDRA. Additional information is provided through case samples Multi-Criteria Analysis, Cost-Effectiveness Analysis, and Cost-Benefit Analysis specific to climate change actions (See Annex A).

Table 15: Tools in Prioritizing and Screening CRUPD Projects

PROJECT-LEVEL DECISION-MAKING TOOLS				
TOOL	**WHAT IS IT?**	**WHEN TO USE IT?**	**HOW IS IT USED?**	**WHAT IS IT USEFUL FOR?**
Screening and Prioritization (LCCAP)	a. Urgency Test b. Prioritization of options c. Technical screening and ranking of options d. Screening for Compementarity-Compatibility-Conflict Matrix e. Goal Achievement Matrix f. Direct Ranking of Options	▶ When taking a more holistic approach to assess options within their wider institutional context and their relationship to other options and existing projects	▶ Recommended to use at least 2 tools that are most relevant to situation, providing a summary or justification for the ranking. a. Prioritize or assess programs, activities, and projects as urgent, essential, desirable, acceptable, or deferable. b. Identifies timelines and prioritizes options that cover mitigation as function of adaptation c. Parameters such as: stakeholder acceptability, technical feasibility, cost, mainstreaming potential, etc. d. Lists existing projects to see if expected benefits nullify each other or are compatible with each other. e. Scoring and prioritizing according to sectoral development goals and objectives. f. Reviewing high ranked options from using tools A-D to select which best to implement.	▶ Considering capacities, available resources, and development goals. ▶ Enables parameters to be chosen that are most relevant to the situation and context.

PROJECT-LEVEL DECISION-MAKING TOOLS				
TOOL	**WHAT IS IT?**	**WHEN TO USE IT?**	**HOW IS IT USED?**	**WHAT IS IT USEFUL FOR?**
Risk Evaluation Matrix	▶ Compares the programmes, infrastructure, or populations most at risk.	▶ When trying to maximise the risk mitigation and adaptation components of a project.	▶ Combining the likelihood and consequence of climate and non-climate-related impacts.	▶ Long-term planning, risk mitigation, and adaptation
Multi-Criteria Analysis (MCA)	▶ Assess different adaptation options against several criteria.	▶ When benefits cannot be measured quantitatively or when multiple diverse benefits cannot be aggregated.	▶ Each criterion is given a weighting, and based on this an overall score is obtained.	▶ When only partial data available, cultural and ecologigcal considerations are difficult to quantify and monetary benefit and effectiveness only part of desired outcome.
Cost-Benefit Analysis (CBA)	▶ Assesses cost-efficiency of different adaptation options.	▶ When all the costs and benefits can be measured in monetary terms.	▶ Calculating and comparing all the monetary costs with the monetary benefits to society including social and environmental, direct and indirect to find the cost-benefit ratio (CBR).	▶ When decision makers want to know the likely efficiency of an adaptation investment i.e. the lowest cost per unit of benefit.
Cost-Effectiveness Analysis (CEA)	▶ Assesses cost-efficiency of different adaptation options.	▶ When adaptation benefits are difficult to express in monetary terms but must be expressed in the same unit (e.g. better human health and protected habitat.	▶ Calculating all the monetary costs and non-monetary benefits to society, including social and environmental, direct and indirect to find the CBR.	▶ When decision makers want to know the likely efficiency of an adaptation investment i.e. the lowest cost per unit of benefit.

Source: Philippine LCCAP Guide and CDRA Guide

B. TOOLS FOR IMPLEMENTING CLIMATE RESILIENT UPD

After the design ideas or options have been prioritized and the LGU has decided on what to promote and what to avoid in line with their adaptation strategy, there are several tools that can be used to further structure and implement these actions. These are:

1. Zoning Ordinance (Development Control and Management);
2. Climate-resilient zoning;
3. Design Brief; and
4. Design Assessment.

ZONING ORDINANCE (DEVELOPMENT CONTROL AND MANAGEMENT)

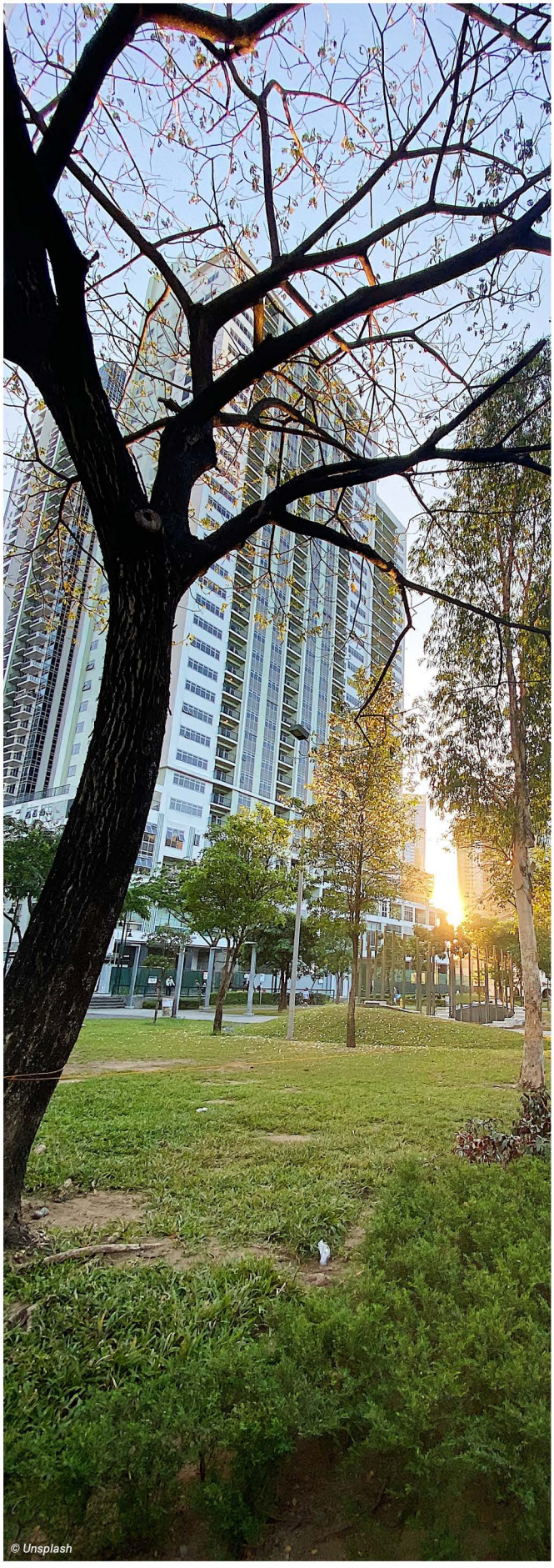
Zoning is the process of regulating and managing the development and use of public and private land, including construction, expansion, or changes of use of sites and buildings. It includes agreements, conventions, standards, laws, executive and administrative orders, guidelines, standards, procedural manuals, and their implementing mechanisms (e.g., executive orders, administrative orders, and memorandum circulars).

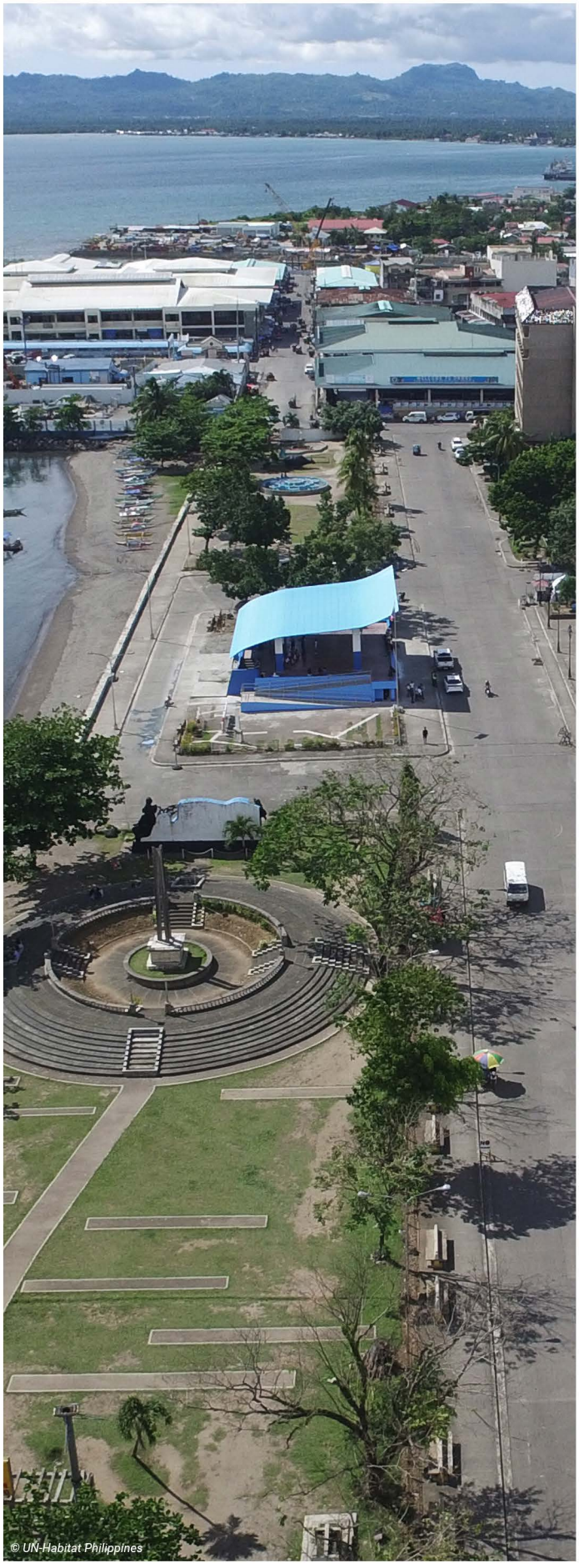
In the Philippines, each city or municipality is divided into zones or sub-zones (e.g., commercial, residential, industrial, agricultural, and others) according to present and potential uses of land to maximize, regulate, and direct their use and development in accordance with the CLUP. Locally enacted ordinances provide, among others, regulations affecting uses allowed or disallowed in each zone or sub-zone, the conditions for allowing them, and the procedures on evaluating deviations. Some examples of ordinances include those on the regulation of building heights, bulk, open space, and density provisions in each area.

HOW CAN WE ENHANCE REGULATION AND CONTROL OF DEVELOPMENT FOR CLIMATE RESILIENCE?

Regulation and control can manage physical development to help reduce or address the impact of climate change by:

- Ensuring that the built environment can withstand impacts for the community
- Encouraging development that utilizes and exploits changes in climate
- Preserving, protecting, and harnessing the natural environment
- Educating stakeholders and decision-makers
- Transforming design policy into implementation instruments
- Pushing the positive, arresting the negative





CLIMATE-RESILIENT ZONING

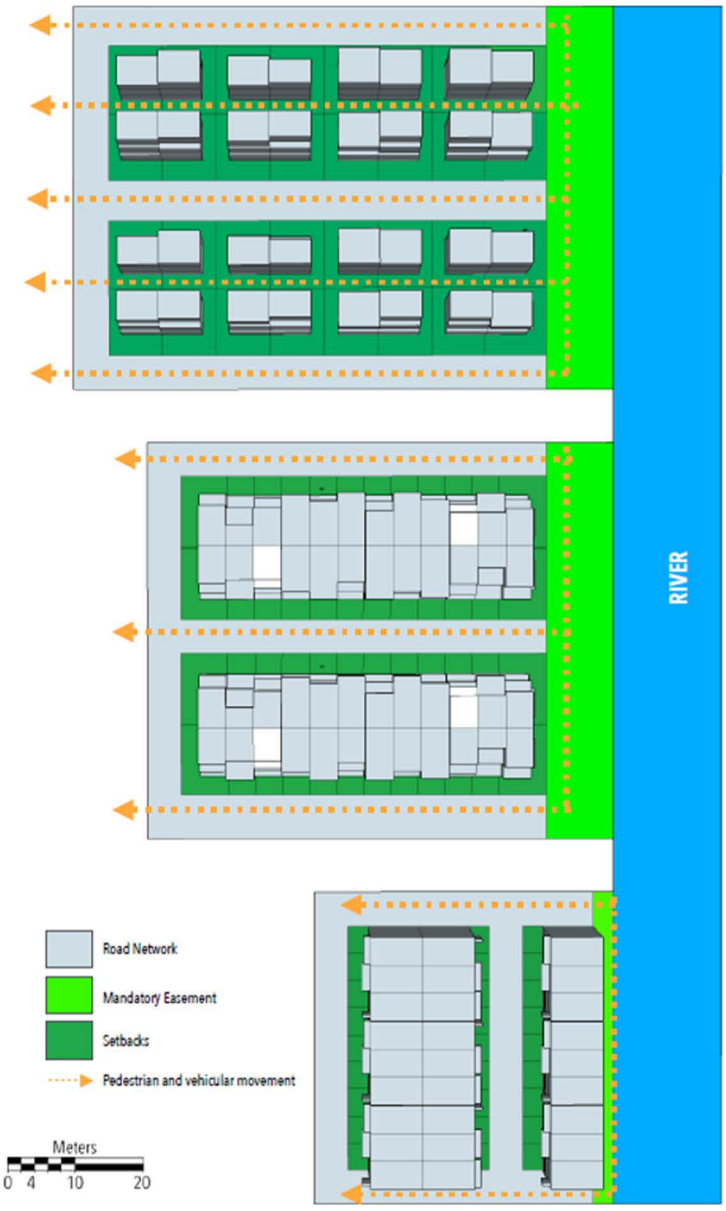
Table 16 presents a summary of different zoning types and their benefits and drawbacks for use in building climate resilience. Broadly they can be split into two different types:

1. **Climate-resilient zoning** – considers anticipated impacts and makes recommendations or requirements for where it is best to develop or can be developed at the broader city level through projections, models, maps, but may not always specify designs to mitigate or adapt. Examples include Flux-based Zoning, Climatic Zoning, Sea Level Rise (SLR) Zoning, Compact Development Zoning.

2. **Conventional or standards-based zoning** – works largely within existing zoning ordinances to encourage or make mandatory actions that promote climate resilience at the site or development level. Examples include Flexible Zoning, UHI Zoning, Low-carbon Zoning, Zoning Incentives, and Performance Standards.

Numerous climate design issues relative to the potential impacts of flood were outlined including the profiles of people at risk. This led to the identification of possible design strategies to increase the resilience of urban elements as well as increase the adaptive capacities of communities at risk. Sponge city concepts, flood resilient building and site design, and improved area access and mobility, with emphasis on inclusive development, were identified among the major design strategies for further detailing. In this case, recommended design specifications of the various urban design elements were enumerated covering minimum lot size, allowable land uses, orientation of roads and buildings relative to the river, expanded easements, and setback recommendations. Recommended design specifications were then translated into schematic diagrams to illustrate the design elements that should be promoted and discouraged. Although the initial intention of the workshop was to generate non-statutory urban design options, some recommendations became statutory provisions in the Zoning Ordinance.

Figure 38: Example of Plan with River as Property Frontage



ALTERNATIVE 2: RIVERS AND CREEKS AS PROPERTY FRONTAGE (R-2 BASIC)

- Frontage setbacks can be imposed on top of the 3-meter mandatory easement, similar to properties along roads.
- Frontages will be considered public open access spaces.
- Lot sizes are large enough (192 sq. m.). for the imposition of front, side, and rear setbacks.
- Perpendicular roads and rear setbacks can be used as possible evacuation or emergency access routes.
- Expanded easement of 10 meters along rivers can be renatured for erosion control and stabilization using appropriate landscaping.
- Areas adjacent to rivers can be designated as frontage areas where an additional 3-meter setback can be applied.

ALTERNATIVE 1: RIVERS AND CREEKS AS PROPERTY FRONTAGE (R-3 BASIC)

- Lot sizes are small (80 sq. m.), the tendency is to maximize the building footprint (50 sq. m.) making it difficult to impose additional setback requirements.
- Perpendicular roads for evacuation or emergency access routes.
- Expanded easement of 10 meters along rivers can be renatured for erosion control and stabilization using appropriate landscaping.
- Areas adjacent to rivers can be designated as frontage areas where an additional 3-meter setback can be applied.

BUSINESS AS USUAL (R-3 BASIC)

- Treating rivers creeks and setbacks as part of the rear end of properties.
- 3-meter mandatory easements turned into engineered structures for riverbank protection often depriving access among nonresidents.
- Lot sizes are small, the tendency is to maximize the building footprint (50 sq. m.).
- Limited evacuation/emergency access routes.

Table 16: Elaboration of Various Types of Climate Resilient Zoning

CLIMATE-RESILIENT ZONING					
TYPE	**WHAT IS IT?**	**HOW IS IT USED?**	**WHAT IS IT USEFUL FOR? (BENEFITS)**	**WHAT IS IT NOT USEFUL FOR? (DRAWBACKS)**	**EXAMPLE CASES / REFERENCES**
Flux-based Zoning	Zoning that follows a dynamic model related to fluctuating groundwater table levels (tides, storm events, runoff) to the physical conditions on the surface (permeability, building footprint, foundations, use).	Mapping projected flood risk, ground water, permeability, infrastructure, topography, geology and other factors alongside zoning. Treats zones as sections, considering the surface elevation and the vertical depth from surface to groundwater.	Coastal cities and those threatened with SLR, erosion, and flooding to incentivize water-sensitive urban development and design.	Considering other environmental and climatic conditions such as temperature rise and encouraging design actions that mitigate against climate change.	▶ Broward County, Flordida
Flexible Zoning	**Dynamic Zoning:** Automatically changes applicable regulations as conditionson ground change.	Triggers in the code change requirements when conditions hit a certain threshold.	Reflecting and responding to a wide range of changes in community needs and priorities including demographic and climatic changes.	Proactively responding to changes. May be too late to change if threshold is set too high and so needs to be updated regularly.	
	Floating Zone: Not yet tied to a specific area but describes resilience characteristics that must be met before zoning approved for parcel of land.	Written as an amendment in the zoning ordinance and only added to zoning map once a development application is approved. Developers request to have zone applied to their parcels, perhaps in exchange for financial or procedural incentives.	Advancing sustainable neighborhood projects and incorporating green development criteria into more general development standards. Can also enable communities to achieve specific goals in a comprehensive plan such as affordable housing, renewable energy, etc.	Ensuring all characteristics or conditions are met since tradeoffs must be made between developer and community needs and goals through incentives.	▶ USGBC Neighborhood Development Floating Zone ▶ City of Keene Sustainable Energy Efficient Development
Climatic Zoning	Urban Climatic Planning Zones (UCPZs) derived from a climatic analysis map providing recommendations to ensure early consideration of climatic issues in the planning process.	Need to produce an Urban Climatic Map (UCMap), requiring several input layers including climatic and meteorological elements, geographic terrain data, greenery information, and planning parameters to represent the spatial distribution of urban climate types.	Making climate-sensitive recommendations of where and how to develop land based on the wind or ventilation, thermal, and air pollution environments.	Including the effect of future climatic changes without regular updates and enough data. Only provides recommendations, not regulations or orders.	▶ Overlay Urban Climatic Map Studies: A Review ▶ Hong Kong Urban Climatic Analysis Map

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CLIMATE-RESILIENT ZONING					
TYPE	**WHAT IS IT?**	**HOW IS IT USED?**	**WHAT IS IT USEFUL FOR? (BENEFITS)**	**WHAT IS IT NOT USEFUL FOR? (DRAWBACKS)**	**EXAMPLE CASES / REFERENCES**
Sea Level Rise Zoning	Zoning that identifies sea level rise (SLR) protection / conservation / accommodation zones.	Based on the best available scientific understanding of SLR for an area, a high-resolution digital map is produced providing an overlay for existing zoning conditions prescribing building regulations (e.g. setback, elevation), construction requirements, densities, etc. **Conservation zones** can be used to facilitate retreat and allow for gradual relocation of development in highly vulnerable areas. **Accommodation zones** can allow for continued development while requiring structures to be sited and made more resilient to impacts. **Protection zones** can be used for areas with critical infrastructure and dense development that have few options for adaptation.	Cities and communities threatened by SLR, educating developers and community on the impacts of climate change. Does not restrict development outright but imposes stricter building requirements in areas most at risk from SLR.	Considering other environmental and climatic conditions such as temperature rise and encouraging design actions that mitigate against climate change.	▶ Maryland Model SLR Ordinance ▶ Norfolk, Virginia Coastal Resilience Overlay (CRO)
Urban Heat Island (UHI) Zoning	Zoning that identifies UHI hot spots promoting mitigation strategies.	Mapping high urban temperature areas, usually those with higher density buildings and paved surfaces providing a range of mitigation strategies or requirements that developers must follow, potentially in return for development bonuses. For example: ▶ When replacing an existing roof or constructing a new building, the owner must install either a green roof or highly reflective roof. ▶ When constructing a new building, at least 20% of the building site must remain open ground and be landscaped with plants, brushes, and trees.	Reducing UHI effect, associated health benefits from reduced heat stroke and other illnesses, mitigation and adaptation against other climate impacts by increasing energy efficiency and reducing stormwater runoff.	Directly reducing the impacts from other environmental and climatic conditions such as SLR and anticipatory future projected changes.	▶ Reducing Urban Heat Islands: Compendium of Strategies ▶ Philadelphia Green Roof Density Bonus ▶ Glenview, Illinois Parking Lot Landscaping Ordinance & Design Guidelines ▶ Measures to Reduce the Heat Island Effect in Rosemont-La Petite-Patrie
Low-Carbon Zoning	Zones for mixed use, economically viable, socially inclusive, environmentally friendly, and resource efficient neighborhoods and communities.	For new and future development areas, applying energy-related performance targets and technical requirements at site and street block level to ensure that sustainability targets for the entire area can be met. These can include energy reduction levels, storm water infiltration levels, water reuse and saving facilities, green open space, and roof garden area requirements.	Comprehensive approach to reducing carbon emissions, taking mitigative actions against climate change through energy reduction, renewable energy use, higher building standards.	Considering existing climatic conditions and underlying vulnerabilities to climate change which may make certain areas more or less appropriate to develop.	▶ Low Carbon City Zoning Codes for Beijing
Compact Develop-ment Zoning	Zoning that promotes compact development in urban areas and encourages lower-intensity land uses in areas more susceptible to climate impacts	Adopting a form-based code that promotes denser, more pedestrian-friendly neighborhoods with a wide variety of functions including housing, offices, retail, etc. in areas less susceptible to climate impacts. Can be achieved through infill or brownfield development, cluster development (min. number of housing units per land parcel, density growth along mass transit corridors.	Supporting community goals, reducing resource use and dependency on fossil fuels, preserving green areas and natural buffers against climate change.	Specifying adaptive actions or requirements to build climate resilience including performance targets and technical requirements at the site level.	▶ Compact Development Fact Sheet ▶ San Diego Urban Village Overlay Zone

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CLIMATE-RESILIENT ZONING					
TYPE	**WHAT IS IT?**	**HOW IS IT USED?**	**WHAT IS IT USEFUL FOR? (BENEFITS)**	**WHAT IS IT NOT USEFUL FOR? (DRAWBACKS)**	**EXAMPLE CASES / REFERENCES**
Zoning Incentives	Zoning mechanism that increases permitted development rights for a site in exchange for development providing environmental or community benefits.	Providing increased development rights, usually increased plot or floor area ratio or building height increases, in exchange for a benefit such as using CCA / DRRM technology or innovations, i.e. use of solar panels, rainwater harvesting, smart urban drainage systems, green architecture / building systems.	In higher-value development areas where greater climate adaptation or mitigation is needed but cannot be achieved without compensation to landowners and developers. Can achieve additional community benefits such as greater open space or protection of a heritage building.	Ensuring developers comply with conditions and the benefits work as intended since incentive granted before a development built, while precise and accountable criteria required to ensure real benefits.	▶ Arlington County, Virginia Green Building Density Bonus Program
Performance Standards (similar to Low-Carbon Zoning)	The measurement of climate change adaptation and mitigation actions through performance metrics within each zone.	Specifying a set of performance measures for site and building design such as energy and water efficiency, air and water quality, ecological services and solid waste management e.g. use of light coloured materials, open-grid pavement, rainwater reuse, etc.	Comprehensive approach to minimising environmental impact, largely where the nature and probability of climate hazard known.	Ensuring standards met if voluntary with additional costs and expertise required to evaluate and monitor measures. Generic standards may note be appropriate for all sites.	▶ Toronto Green Standard

EXAMPLES OF CLIMATE-RESILIENT ZONING

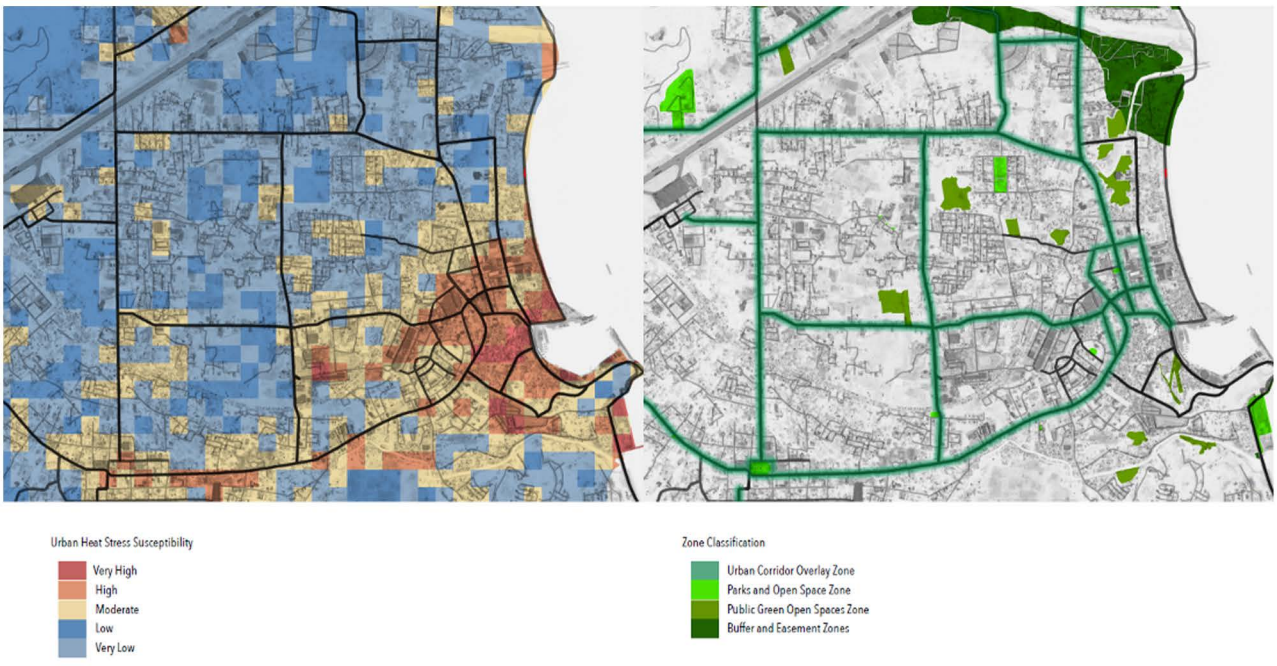
MANAGING URBAN HEAT STRESS THROUGH THE ZONING ORDINANCE

Legazpi City, Philippines

Recognizing the projected seasonal temperatures may increase by as much as 40°C compared to the observed baseline (27.8 to 31.78°C) by 2075–2099 during the months June to August triggering hotter microclimate temperatures in highly built areas, the City Government prepared an urban heat stress map (see Figure 39) to indicate priority areas, which may require urban design interventions. The city also realized that further planned expansion of its urban areas using the business-as-usual urban design approaches will further contribute to the future warming of the urban center and trigger increased GHG emissions over time.

Taking off from the urban design guide workshop, several design recommendations were enumerated to address current areas with highly susceptible to urban heat stress and anticipate the gradual warming of areas designated as future urban expansion areas. Realizing the threats of urban heat stress, some urban design recommendations were incorporated in the Zoning Ordinance using the Urban Corridor Overlay Zone (UCD-OZ), as seen in Figure 39. This prescribed relevant regulations such as setback requirements, installation of vertical gardens covering at least 50 per cent of the total area of concrete surfaces, and treeshading requirements for outdoor parking spaces to minimize heat absorption of concrete spaces exposed to sunlight and reduce street level temperatures. Performance standards include urban heat stress reduction provisions such as solar reflectance index of roofs and pavements and tree landscaping for open areas. Also, pedestrianization of the Central Business District was given emphasis through urban shading and proper observance of setbacks to promote non-motorized mobility to manage GHG emissions emanating from the transportation sector. Numerous parks and open space zones were also incorporated in the Zoning Ordinance to act as breezeways and air paths to promote passive cooling. Furthermore, zoning incentives such as building density bonuses and allowing building height variance for proponents implementing CCA/DRRM technology or innovations (i.e., use of solar panels, rainwater harvesting, smart urban drainage systems, and green architecture and building systems) were included to encourage and facilitate private sector led local climate adaptation action.

Figure 39: Urban Heat Stress and Zone Classification Map of Legazpi City



DESIGN BRIEF

A design brief is a coherent description by the client (including LGUs and developers) to the design team that sets out the physical design criteria and outcomes for an urban design project in line with the relevant design guide, design code, and policy framework.

HOW IT'S DONE

A brief defines the site and context, and outlines the expectations for site development, including important outcomes and conditions, and is often developed in conjunction with a masterplan. It refers to relevant codes and standards to be applied, which shall lead to the higher-level spatial or sectoral development strategy such as the urban design strategy.

1. **The Task:** specifies what a project must achieve, by what means, and in what timeframe so the design team works towards the right direction (e.g., environmental targets, program, and demands for m2).

2. **The Data:** documentation of the site, with all constraints so the design team does not ignore important factors (e.g., other ongoing projects, ownership, and stakeholders).

3. **The Deliverables:** outlining the deliverables and scope, including outputs (documentation and plans) and timing.

EXAMPLES

- **How to develop a design brief**

  Government Architect New South Wales advisory note to project teams, contractors, and consultants on developing a good design brief.

- **Kingston Council Eden Quarter development brief SPD**

  Example of a comprehensive development brief for a specific area of a town including development principles, urban design framework, site guidance and delivery.

Box 4

BUILDING CLIMATE RESILIENCE THROUGH URBAN PLANS AND DESIGNS CASE STUDY

Design Brief (Cagayan de Oro City and Angeles Cities)

ABSTRACT

The project team first needs to consider the city as a whole ecosystem and carefully identify and locate the climate risk that needs to be addressed to develop a design brief for a climate adaptation urban design project. Their primary role is to formulate objectives to ensure that the project is primarily designed for climate adaptation, along with other possible co-benefits. Defaulting to business-as-usual urban development thinking, which puts a premium on urban design (as opposed to climate adaptation) considerations, must be avoided.

THE SITUATION

Cagayan de Oro

- The Technical Working Group (TWG) was tasked to develop a design brief for the BCRUPD pilot project. Right at the start they identified two sites, Isla de Oro and Divisoria, to be redeveloped and turned into recreational parks and open space areas for the general public.
- Isla de Oro was the site of a settlement on a sand bar on Cagayan de Oro River that was washed away by the floodwaters of Typhoon Sendong (Washi) on the night of 16 December 2011. Many people were killed in the tragedy, and hundreds more went missing. As a result of that incident, the 'island' was re-zoned as recreational and resettlement was prohibited. The Department of Public Works and Highways, with foreign funding assistance, also constructed a flood wall on the banks of the river to protect from future flooding events, cutting off the area from the rest of the city.
- Divisoria is a large open space area in the downtown of Cagayan de Oro City and is located perpendicular to Isla de Oro. It used to be a fire breach during the early days of the city but has gradually transformed into a series of parks surrounded by commercial establishments on three sides. While it serves as an important amenity to the city, its development as a whole has been ad hoc and uncoordinated.
- The TWG saw the potential of developing both areas as one integrated central park that will serve the needs of both businesses and the public. They envisioned the development as a shady, tree-filled recreational and open space area with parks, bikeways and paths, fountains and gardens, an amphitheater, and other amenities. Rainwater harvesting and sustainable drainage technologies will be used where appropriate.

Angeles City

- Similar to Cagayan de Oro City, Angeles City started the project with a specific development project in mind.
- The Balen Culiat Heritage district is an historical area in the downtown of Angeles City that includes 10 historic structures, the public library, the city museum, and the public market. Over the years commercial development has taken place within the area but its historic character has been maintained. The city has identified actions that would further strengthen this identity and the project is an excellent opportunity to achieve that objective while addressing increasing climate change risks as well.

RECOGNITION OF THE SITUATION

Writing the initial design briefs started quickly and drafts were completed in early 2019. During the process of reviewing the briefs however, it became apparent that the initial focus of both TWGs was primarily to develop a cultural, parks and recreational urban design project, which was expected to eventually bring about an improvement of the areas' climate adaptability.

In the initial design briefs, climate adaptation therefore became a mere side effect of a development that is more focused on addressing the cultural and recreational requirements of the public, rather than an important issue to be addressed in itself.

It was obvious at this time that the groups were defaulting to business-as-usual thinking, and that the climate adaptation objective of the project was lost somewhere in the process.

BUILDING CLIMATE RESILIENCE THROUGH URBAN PLANS AND DESIGNS CASE STUDY

Design Brief (Cagayan de Oro City and Angeles Cities)

CLARITY OF PROJECT GOALS

In the early stages of the design brief writing process, it was noted that the TWGs followed the common business-as-usual logic of project development illustrated below:

STEP 1
Vision: Urban Design

▶ Justified by ▶

STEP 2
Problem: Perceived Environmental Issues

To correct the issue, it was clarified to both groups that the goal of the projects was primarily climate adaptation, with other urban design gains as co-benefits. A series of work sessions with both cities were undertaken to revisit their recently completed Local Climate Change Action Plans and the earlier-completed Climate Disaster Risk Assessments to bring the focus back to their city's climate adaptation needs.

The process now followed the following logic:

STEP 1
Problem: Identified Issues in CDRA / LCCAP

▶ Leads to ▶

STEP 2
Solution: Urban Design

The two groups were also made to step back several times during the process to look at their city-wide adaptation. This last step is important to ensure that any adaptation measures they do implement in one area will not introduce maladaptation elsewhere.

Once the above were done the writing of the design briefs to guide the pilot project designs were completed with no more major issues.

OUTCOMES

Both cities started writing their design briefs with the end product clear in their minds, driven by a business-as-usual project mindset. Clarifying the project's objectives later forced them to see the issue through a climate lens, and then to weigh their proposals against their adaptation needs accordingly. Doing so ensured that the design objectives they set out in their design briefs actually meets their needs, and the designers can tailor their deliverables to suit their requirements.

Cagayan de Oro

- The Cagayan de Oro TWG started with the objective of developing Isla de Oro and Divisoria into a large contiguous park that will provide the public rest and recreation opportunities, and open space areas, with the added benefit of strengthening the city's adaptation to climate change.
- Upon revisiting their CDRA, however, it became clear that Isla de Oro and Divisoria does need to be developed for entirely different reasons.
- Isla de Oro and Divisoria open spaces were crucial to resisting the effects of increasing urban heat in the city center by providing shade and introducing wind corridors into built up areas.
- Their citywide urban adaptation strategy also indicated that the land side of Isla de Oro and Divisoria were crucial to adapting to pluvial flooding in the area due to increasing amounts of rainfall.
- It was therefore a happy accident that the initial project site proposal was also a key adaptation site identified that needs to be developed, according to the existing data.

BUILDING CLIMATE RESILIENCE THROUGH URBAN PLANS AND DESIGNS CASE STUDY
Design Brief (Cagayan de Oro City and Angeles Cities)

Angeles City

- Similar to Cagayan de Oro, the Angeles City TWG started with the vision of developing Balen Culiat into a project that showcases the City's cultural heritage and addresses urban design urban requirements, as well as promotes climate adaptation.
- Upon revisiting their CDRA and LCCAP, however, they realized that climate adaptation goes beyond their individual site selections, and that to truly adapt they needed to develop a city-wide adaptation strategy that addresses both increasing urban heat and decreasing precipitation.
- After much consideration the TWG decided to recalibrate their approach and address their city's adaptation to decreasing rainfall, a more urgent issue that puts their drinking water supply at risk. An interesting aspect of addressing this issue is that viable adaptation design options needed to be located in a site away from upstream where the problem was imminent.
- The city's final project brief therefore ended up being different from what they originally envisioned, but in the end was much more responsive to their climate adaption needs.

DESIGN ASSESSMENT

This is prepared by the designer on the rationale behind a design proposal for a project and explains how it meets the design brief, design guides, or other criteria.

HOW IT'S DONE

It helps to ensure that new developments have examined the opportunities and constraints of a site and provide design solutions that are context-sensitive and respond to the policy context, especially the climate considerations of the design solution.

It should contain the following elements:

1. Definition of the site and context
2. Response to policy context
3. Urban design goals and objectives for the site
4. Development concept (site design, transitions, public views, parking, accessibility, materials, lighting, architectural treatment)
5. Integration with public realm
6. Sustainable urban design

EXAMPLES

- **City of Guelph Urban Design Brief Terms of Reference**

  Provides guidance on the structure and format of a design assessment.

- **Kingston Council Eden Quarter development brief SPD**

  Example of a completed design assessment by a community planning firm.

C. TOOLS FOR PARTICIPATION AND ADVOCACY TO ADVANCE CLIMATE-RESILIENT UPD

Community participation is essential for developing appropriate and effective urban design solutions as the communities themselves are the ultimate clients and beneficiaries. It enables people to influence and be part of the decision-making process, strengthening ownership of the place, and ensuring a smoother design process. The tools to encourage community participation and advocacy for climate resilient UPD are public hearings (information and consultation), design charrettes (acting together and ownership), and design modelling (deciding together).

Community participation may be drawn through:

1. **Information** – telling people what is planned.
2. **Consultation** – offering different options and listening to feedback.
3. **Deciding together** – encouraging others to provide additional ideas and options and join in deciding the best way forward.
4. **Acting together** – deciding together what is best then forming a partnership to carry it out.
5. **Ownership** – helping others to do what they want with advice and support provided by the resource holder.

PUBLIC HEARINGS (INFORMATION AND CONSULTATION)

A public hearing is a chaired meeting held in a community space that presents a range of design proposals to the community. This is useful for distributing information and undertaking consultation but does not enable people to participate or decide together actively.

In the LGU planning process, the same public hearings done for CLUP and CDP formulation can be used to share the design proposals.

DESIGN CHARRETTES (ACTING TOGETHER AND OWNERSHIP)

This is an activity organized with a multi-disciplinary team (including planners, citizens, city officials, architects, and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other stakeholders) to create the design and implementation plan of a specific project. It is structured to be done in a short time period, compressing the planning process into a few days. Design charrettes produce quick results, boost creativity, and allow people to see the project from an integrated point of view. If not facilitated properly and no further activity is done after the design exercise, they can raise unrealistic expectations about what will happen, so objectives should be made clear from the outset. Experts should not dominate this activity but, in fact, make it a means to learn from other participants and to incorporate their ideas.

EXAMPLES

- **Charrette Use in the Planning Process**

  Overview of design charrettes and their phases.

- **Msimbazi Charrette Initiative**

  The Tanzania Urban Resilience Program applied a team of local and international experts, who worked with engineers, planners, community leaders, and high-level government officials in a dedicated workshop to restore the highly vulnerable flood plain.


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Box 5

IDENTIFYING APPROPRIATE AND EFFECTIVE AND URBAN DESIGN SOLUTIONS THROUGH MULTI-SECTORAL INVOLVEMENT

Angeles City, Philippines

The City of Angeles conducted several participatory and multi-sectoral design charrettes to prepare its city wide and district level urban adaptation strategy framework, identify urban design projects, and detail various components of its pilot adaptation project. These design consultation sessions involved government partner agencies, local decision makers, the Mapua Institute of Technology, homeowner's association, women's group, Kuliat Foundation, Inc., and external local and international urban design experts and groups. The involvement of various internal and external actors in the planning and decision-making process allowed the city to explore best practices and other innovative urban design solutions, tap local expertise, determine its social acceptability among intended beneficiaries, and ensure that solutions are applicable to its local setting and consistent with its development context.

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DESIGN MODELLING (DECIDING TOGETHER)

This is an activity involving model building using simple blocks or paper cutouts of different sizes and shapes. These represent typical urban building elements and can be used to construct different configurations of urban form to test out different options for a site. The scenarios that emerge should be recorded as they arise and can also be achieved through computer simulation.

EXAMPLES

- **Box City: What Our Kids Are Learning – And Can Teach Us**

  Youth engagement in a collaborative class project.

- **Block by Block**

  Using Minecraft as a community participation tool for public space design.

Box 6

MODEL BUILDING USING SIMPLE BLOCKS, PAPER CUTOUTS, AND OTHER MINIATURE OBJECTS

Coaches' Training on Climate Resilient Urban Plans and Design

As part of the capacity building component of the Building Climate Resiliency through Urban Plans and Designs Project of UN-Habitat, project partners from national and regional government agencies were asked to apply climate resilient urban planning and design and develop alternative urban design option for the Tagum City Central Business District based on the development context, climate issues, risk information derived from the climate and disaster risk assessment, and the relevant LCCAP objectives. The CBD is susceptible to floods due to its topographical setting, and potentially susceptible to urban heat stress due to projected increasing seasonal temperatures and high thermal mass characteristic of the urban landscape and water scarcity due to the projected reduction in annual rainfall.

To manage urban heat stress, the groups were able to highlight notable climate resilient urban design principles and strategies such as the interplay of sun path patterns and building heights to cast shadows, looking at building densities to maximize wind paths and promote passive cooling, recommending the use of high solar reflectance index for building facades and roofs, and emphasis on natural shading using trees and urban landscaping.

To manage floods, groups suggested constructing water impoundment parks, harvesting rainwater at the building level, redeveloping the easement and setback areas of creeks to minimize future exposure, and applying resilient building design standards capable of withstanding expected flood levels.

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D. TOOLS FOR INVESTMENT PROGRAMMING & FINANCING CLIMATE-RESILIENT UPD

To ensure that implementation of climate resilient UPD projects will be prioritized, there are various mechanisms and tools that local government units and planning actors can use. This section elaborates on key investment programming and financing tools that can help cities and localities ensure that resources are allocated for implementing their projects.

CDP PROJECT BRIEF (FOR AIP AND LDIP)

1. PRE-FEASIBILITY STUDIES FOR CLIMATE ACTIONS

A pre-feasibility study (PFS), similar to a feasibility study, is intended to demonstrate how a proposed project is technically, economically, socially, and environmentally acceptable but the level of the analyses is less detailed than at the feasibility study level.

As cited in the Green Climate Fund (GCF) Guidelines for PFS, the role of the pre-feasibility study should be to present an assessment of the proposed project or program's interventions in terms of the soundness of their technical design, costs and benefits, social and environmental impacts, legal and regulatory environments in which the proposed interventions and activities are expected to be implemented, institutional and financial aspects, and any other analysis to assess feasibility of the investment. The PFS should be able to provide a clear conclusion with recommendations that will explain the underlying logic of the project structure and activities.[12]

While both have the same purpose, each has different contents. Table 17 shows the differences between a PFS and a feasibility study.

Table 17: Differences Between Pre-feasibility and Feasibility Studies (GCF 2019)

PRE-FEASIBILITY STUDY	FEASIBILITY STUDY
▶ Can rely on secondary data sources complemented by primary sources (as needed) ▶ Uses existing evaluation reports for previously implemented or ongoing projects ▶ Uses proven technologies and solutions with track record to demonstrate the feasibility of proposed technological solution ▶ Assesses feasible options using existing and available data, studies, and resources	▶ Uses primary and secondary data sources ▶ Incorporates in-depth technical studies for the proposed technological solutions ▶ May involve detailed engineering studies or analysis with testing work and on-site appraisals ▶ Includes deeper analysis and testing of each feasible option

2. STRUCTURE

It is important to know the structure and what common elements should be included in the document. There are three main sections that should be considered: Project Rationale, Project Design Elements, and Implementation Arrangements. Table 18 gives an overview of a structure of a project proposal document.

[12] Green Climate Fund (2019). *Guidance on Preparing a Pre-feasibility Study under the Simplified Approval Process.* https://www.greenclimate.fund/sites/default/files/document/guidance-preparing-pre-feasibility-study-under-simplified-approval-process.pdf

Table 18: Common Elements of a Project Proposal

WHAT SHOULD BE REFLECTED IN THE PROJECT PROPOSAL DOCUMENT		
PROJECT RATIONALE	**PROJECT DESIGN ELEMENTS**	**IMPLEMENTATION ARRANGEMENTS**
▶ Background ▶ Climate change information ▶ Context/impacts/identification of the problems ▶ Description of "ideal state" ▶ Relationship to national development strategies ▶ Relationship to national adaptation/local sectoral strategies	▶ Project design format ▶ Technical feasibility ▶ Economic and financial aspects ▶ Environmental and social safeguards ▶ Budget and timeline ▶ Co-financing	▶ Institutional Arrangements ▶ Financial and Project Risk Management ▶ Financial Management and Procurement ▶ Monitoring, Evaluation, and Reporting ▶ Project Sustainability

Source: Guide to Climate Change Adaptation Project Preparation, USAID Adapt Asia-Pacific. (The guide is an extensive collection of excerpts from approved adaptation projects, including examples from the GCF, Adaptation Fund (AF), Asian Development Bank [ADB], Least Developed Countries Fund [LDCF], Indonesian Climate Change Trust Fund [ICCTF], and others).

2.1. PROJECT RATIONALE

A project proposal document needs a section to discuss the rationale and also serve as the baseline of the project. This section has no exact format as it is normally based on the identified funding agency's suggested presentation structure, but common information in this part includes:

1. Background
2. Climate Change Information
3. Context/Impacts/Identification of the Problem
4. Description of "Ideal State"
5. Relationship to National Development Strategies
6. Relationship to National Adaptation/Local Sectoral Strategies

2.1.1. Background

The background consists of information around the problem that will be addressed in the study. This consists of basic data such as the project area's geographic information, political and administrative characteristics, economic indicators, land use patterns and land use change, livelihood activities, and economically important sectors. Table 18 shows the data that will be needed to discuss the related topics.

Table 19: Data Needed by Section

SECTION	DATA NEEDED
Geographic Information	This describes the physical environment of the study area and may consist of the following: ▶ Latitude ▶ Demographics ▶ Pedology ▶ Longitude ▶ Typography ▶ Area ▶ Climate
Political / Administrative Characteristics	Describe the political-administrative hierarchy of the study area and the areas surrounding it.
Economic Indicators	Discuss the economic growth of the study area such as GDP, income level, and others.
Land Use Patterns	Land use change.
Livelihood Activities	Other economically important sectors.

Statistical data and maps from the national and local level can be used to describe the target area and support the extent of the problem that will be addressed. It is important to use only relevant information that describe the study area and problem.

2.1.2. Climate Change Information

An in-depth description of the physical processes associated with climate change must back up the data presented, and may come from various sources such as government reports, research conducted by scientific institutions, academes, funding agencies, international research institutions, and multi or bilateral development banks. Information presented should also be reviewed regularly since climate information is being produced continuously. It is important to cite the references while developing the description of physical processes.

One of the common ways to describe the physical processes associated with climate change is to start with global-scale processes and progressively add details down to the local level that are related to the proposed project. A good source for this type of information is the vulnerability assessment report.

2.1.3. Context, Impacts, and Identification of the Problem

This section emphasizes how the climate change processes are tied to impacts on social, economic, and cultural aspects of the project area that eventually result in problems. An example of this is sea level rise. Sea level rise is an irreversible process and therefore no immediate project can be done to stop it, but its impact results in the displacement of marginalized groups and losses in their livelihood opportunities. The focus should then be on adaptation options designed to reduce the impacts of sea level rise.

Guide question to ask when describing the climate information

- How will you describe exposure, sensitivity, and adaptive capacity to climate change?

Some guide questions that may be useful in describing the context and identifying the problem and its impacts

- What is the general problem that your project seeks to address?
- What statistical information will be used to describe the importance of the problem?
- What anecdotal evidence will be used to describe the importance of the problem?
- What studies, reports, and other research have been conducted in the project area?
- Are there marginalized groups in the target area? Do all members of society have equal access to infrastructure?
- Are there groups expected to be more affected by the impacts of climate change than other groups?
- What techniques will be used to understand the perspective of marginalized groups? How can you ensure that these procedures are inclusive?
- How will you demonstrate the role of climate change in the problem?

2.1.4. Description of "Ideal State"

After describing the problem that would be addressed in the project, it is also important to define the condition that will be realized when the project is completed or the "ideal state." This defines the long-term solution to the identified problem and describes the barriers in achieving the solution. Essentially, "ideal state" will eventually be the project objective, whereas the analysis of barriers will become the outcomes, which contribute to the realization of the project objective. A Problem-Objective Tree Analysis can be useful for framing and then addressing the problem.

Guide questions that can be used to strengthen the description of the "ideal state"

- If the project is successful, how are the conditions changed in the project area? Develop a narrative of the "ideal state."
- Based on this narrative, in one sentence, describe the objective of the project.
- Who are the expected beneficiaries of the project? How will they benefit?

2.1.5. Relationship to National Development Strategies

It is vital to explain to the funding agencies that the goals of the project to be funded are aligned and will contribute to the existing development goals of the national government. Identifying the priorities of the national government is an essential step to build upon on the project document. Most funding agencies also require the project to explain the relationship between its project goals and the national development goals. The following are key information sources that are useful in developing this section:

- National/regional sustainable development strategy
- National strategic development plan or framework
- National socio-economic development plan
- National poverty reduction strategy or policy

Some funding agencies prefer to fund projects that create synergy. Therefore, it is important to review existing climate change adaptation projects and see where the proposed project can complement. If the proposal can demonstrate and prove that it can enhance the impacts and outcomes of the existing projects, it will increase its chance of bankability.

2.1.6. Relationship to National Adaptation Strategies

This section describes how the project fits within the broader institutional and policy context related to national climate change adaptation. The following have to be described:

- Agencies related climate change, as well as the sectors related to the project being proposed
- National and relevant subnational adaptation plans
- Relevant sectoral roadmaps/strategies
- How the project fits in with other national development and climate change projects

2.2. PROJECT DESIGN ELEMENTS

2.2.1 Project Design Format

Guide questions in designing a project

- What is the project objective?
- What are the project outcomes?
- What outputs will support these outcomes?
  - What activities will lead to these outputs?
  - What inputs are needed to conduct these activities?

The project design is a step-by-step description of the activities and outputs that will be required to achieve the "ideal state." Projects follow a general structure called logical framework. The logical framework begins with the objectives of the project. The objectives are achieved through outcomes, which are the results of the project. Generally, the outcome describes a certain component in the project. The next step in the logical framework is identification of the outputs. Outputs are produced by activities, which are the specific actions done. Lastly, the logical framework includes inputs. Inputs are elements that the project needs for the activities to happen. These include personnel, money, and equipment.

i. Technical Feasibility

Technical viability includes the ability to procure the inputs required for the project as well as the activities, methodologies, and technologies that have been chosen to meet the project's objectives. The project document should be able to describe why these activities, methodologies, and technologies are the most appropriate and why they were chosen over alternatives.

Another key consideration in technical feasibility is social acceptability. In some cases, relocation of exposed population may seem to be the most logical solution, but it is important to consider that this exposed population may resist the idea of relocation. In these cases, stakeholder consultations will play an important role in determining the social acceptability of the proposed project.

Additionally, the capability of the implementing entity to carry out the project is also a vital aspect in technical feasibility. When designing the project's activities, it is important to consider the track record and capability of the implementing entity to conduct the project's activities. Moreover, the ability of the labor market in the target area to supply workers to implement the project's activities as well as the supply of required project inputs are also key considerations for technical feasibility.

ii. Economic and Financial Aspects

Economic Analysis looks at the relationship of the project to society, including costs and benefits of the project from the society's perspective. On the other hand, financial analysis looks at the profitability of the project, from the perspective of the investors.

Although financial analysis is seldom asked in projects compared to economic analysis, it is important to include it in the project document as it estimates capital costs, operating expenses, and realistic revenue streams. The demand analysis also helps to verify whether the costs of providing the service will be reasonable and affordable to the users.

iii. Environmental and Social Safeguards

Projects follow certain procedures to minimize the impacts to the environment as well as to society. There is a recognized need to pay specific attention to gender sensitivities and show how climate change impacts men and women differently. It is also important to design projects that will involve the marginalized and indigenous groups of the society.

iv. Budget and Timeline

This section shows milestones and project calendar, including budget required in achieving the milestones. In small projects, the timeline and budget are made part of the project description whereas in bigger projects, time and budget are attached as an appendix.

v. Co-financing

This describes the sources of both internal and external sources of financing or funding that will support the project. This may also include in-kind contributions. Information in co-financing and funding is presented in table format with indications as to whether the co-financed sum is confirmed or not.

2.3. IMPLEMENTATION ARRANGEMENTS

2.3.1. Institutional Arrangements

Projects are generally sponsored by agencies and organizations. These agencies and organizations are often referred to as the executing agency, executing entity, or implementing entity. The project document must include the background information of the executing agency including its responsibilities and competencies. Examples of these competencies are aid coordination, inter-agency coordination, budget planning, procurement, accounting, and financial management.

Aside from the executing agency, this section also needs to describe the stakeholders, organizations, and other agencies that will be involved in the project as well as their roles and responsibilities between and among the different stakeholders. A steering committee or project board is usually formed to provide general and strategic guidance for the project.

Guide Questions on Institutional Arrangements

- Will the project be submitted through a regional or multilateral accredited entity? If so, identify procedures that guide the relationship between the accredited entity and the implementing or executing agency.
- Which in-country agency will sponsor the project?
- Which additional agencies will be involved in the project? How will they be connected during implementation?
- What are the responsibilities of these entities?
- Will the project include a steering committee? If so, what agencies and organizations will be involved?

2.3.2. Financial and Project Risk Management

It is vital to include risk assessment in the project document and explain how these risks might interfere with the achievement of the project objectives. This section is generally in narrative form and in table format. It would be best to describe each of the risks in the table format. The importance and probability of these risks can then be ranked, and mitigation measures can be explained in the document. In several large projects of the GCF, importance can be described as percentage of project value:

Guide questions to be asked on Financial and Project Risk Management

- What kind of risks might interfere with project implementation?
- How will these risks be mitigated? What risks might the project be susceptible to?

- **Low** =< 5 per cent of project value
- **Medium** =< 20 per cent of project value
- **High** => 20 per cent of project value

Some categories of risk include:

- **Political** – political unrest, lack of transparency, and political interference in the allocation of resources.
- **Institutional** – lack of coordination between implementing agencies, lack of capacity to manage the project implementation, staff turnover, and lack of participation from relevant stakeholders.
- **Financial** – sustainability of financing for project outputs and outcomes, and cost overruns.
- **Technical** – failure to obtain data and information relevant to the project.

2.3.3. Financial Management and Procurement

It is critical to show a clear picture of how the project payments will be handled, inputs for the project will be obtained, and its auditing procedures. All these help ensure accountability and transparency in project execution. Having an efficient financial management and procurement system can also minimize the chances of corruption.

Different funding agencies (e.g., World Bank, ADB, and the Japan International Cooperation Agency [JICA]) have different established procurement guidelines that must be followed by the implementing agencies and partners of projects, but the structure of the guidelines and definitions are similar. These guidelines include the following:

- Contracting and subcontracting guidelines
- Advertising and handling of bids
- Rules of nationality and origin and grounds for exclusion
- Conflict of interest guidelines
- Evaluation and selection of bids
- Grievance procedures

2.3.4. Monitoring, Evaluation, and Reporting

Monitoring and Evaluation is a management tool that measures the project's progress in achieving its expected results. Although M&E are often viewed as related, they have distinct functions in project implementation. It is good to recognize the difference between these two tools to maximize its need and usefulness.

Monitoring is a good management tool that will continuously track the project's agreed implementation schedule. It aims to determine whether

Guide questions for M&E

- What are to be monitored and evaluated?
- What activities are needed to monitor and evaluate and when should these be conducted?
- Who is responsible for monitoring and evaluation activities?
- How are monitoring and evaluation carried out?
- What resources are required and where are they committed?

the objectives of the project have been met or not. Monitoring contributes to project evaluation, but evaluation goes beyond monitoring. Evaluation is the process that determines the viability of the project for further resource commitment and contributes to decision making.

M&E are the two most important aspects of determining the success of projects. Below are advantages of a well-executed and effective M&E:

- Help keep the project focused on its outcomes and impacts, and to stay consistent with the project's timeline and budget.
- Assist with making adjustments and improvements to the project while in process. They help identify what is and is not working in the project.
- Reveal lessons for future projects and policies.
- Improve transparency and accountability.

2.3.5. Project Sustainability

Funding and financing agencies prefer to invest in projects that have a lasting impact even after the life of the grant or loan. From an economic perspective, this means that the projects financed can be self-sustaining after the life of the project. Sustainability also demands that technical capability is ensured even after end-of-project transition, which is often called the exit strategy.

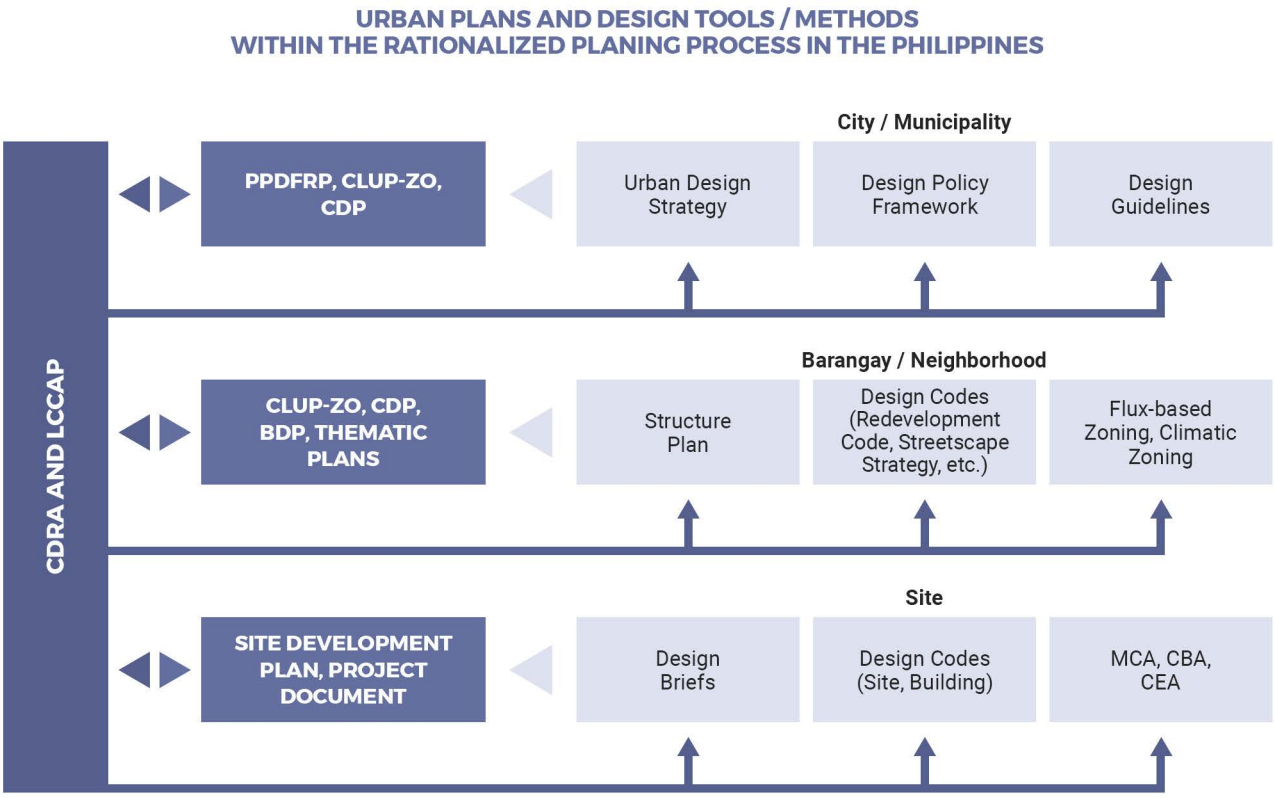
A sustainability plan should be included in the project document. The following are some elements to consider in the sustainability plan:

- Ensure ownership by beneficiary governments, NGOs, CSOs, and beneficiaries. How will consultative processes help foster a sense of ownership on the project beneficiaries? How will lessons during the implementation period be incorporated into existing policies and practices?
- Determine sources of funding, staffing and administration. Will the project be folded into existing government programs?
- Develop operation and maintenance plan with details of estimated costs and responsibilities, sometimes included as an annex. In cases where goods and services are produced, private sector involvement arrangements such as build-transfer-operate may be appropriate.
- Create a cost recovery plan.
- Determine how to ensure that entities continue to function once the project is complete.
- If necessary, build management, maintenance, and monitoring capacity within the beneficiary government and target communities. How will the project develop these skills among the beneficiaries?
- Ensure replicability and scalability. What prospects exist for expanding the activities financed under the project to ensure large-scale impacts in future, including information flows?
- Secure data and information. How will data and information produced by the project be maintained and disseminated? What information technology, data formats, and maintenance will be required?

Several pre-feasibility guidance documents are also available to access from the Green Climate Fund, Cities Development for Asia, and USAID Adapt Asia-Pacific. All are cited accordingly in the References section of this tool.

To conclude the tools section, Figure 40 below provides users an illustration on how and where some of the UPD tools discussed in the previous section links with the LGU planning documents and process.

Figure 40: UPD Tools and Methods and How They Relate to LGU Planning Processes



V. MONITORING AND EVALUATION OF CLIMATE ADAPTATION THROUGH UPD IMPLEMENTATION

Monitoring and Evaluation are essential steps in the planning cycle. Local Government Units in the Philippines are aware of this process and its importance in local governance. Still, it is common for LGUs to miss out not only on investing appropriate time and resources to perform the actual M&E tasks but also in using the learnings gathered from M&E results. Providing inputs and support to LGUs on the use and practice of M&E is crucial, especially with the need to continuously learn from their adaptation actions in the face of the changing climate and its uncertainties.

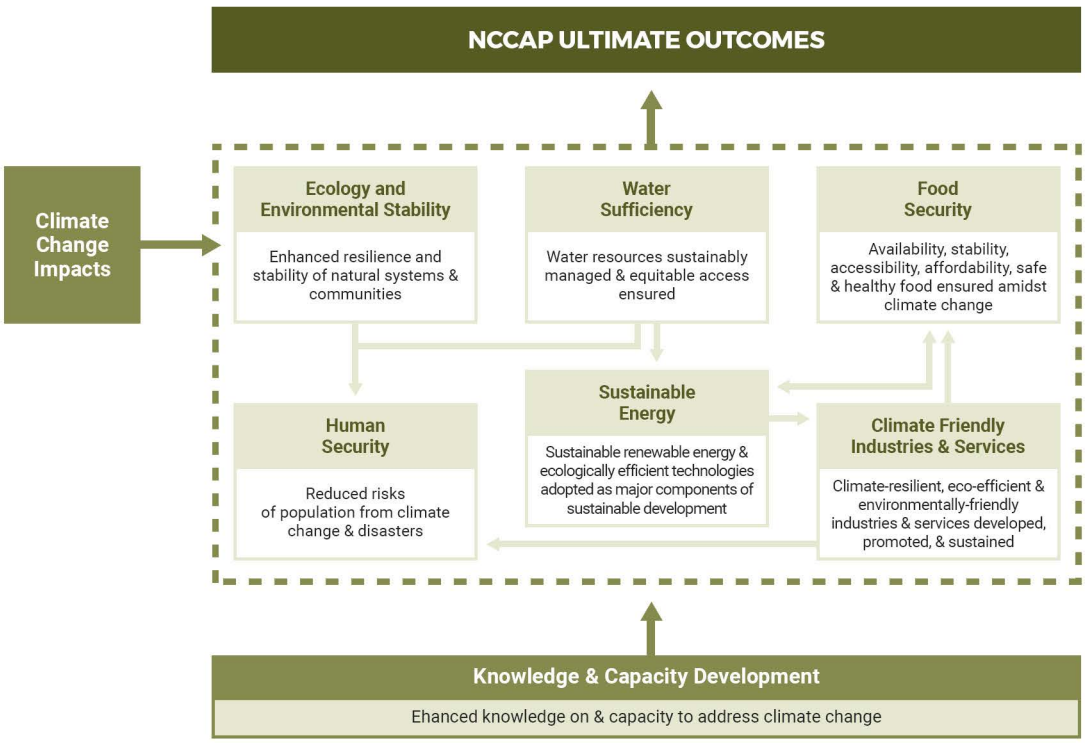
A. POLICY FRAMEWORK FOR NATIONAL CLIMATE ACTION M&E

The monitoring and evaluation of climate change actions are integral to the climate governance regime in the country. The Philippine Climate Change Act of 2009 mandates the formulation of a National Framework Strategy on Climate Change, which shall have M&E as one of its components. The NFSCC does not elaborate details on the monitoring and evaluation protocols, but consistent with the Law notes that "the Climate Change Commission, in coordination with other concerned agencies and stakeholder groups, shall install a monitoring and evaluation system to track the implementation progress of the provisions in the NFSCC and the National Climate Change Action Plan and Local Climate Action Plans."

Given the above, the Climate Change Commission, in its Resolution No. 3 on the Revised Implementing Rules and Regulations of the RA 9729 as amended by RA 10174, gave the Climate Change Office, among others, the role and function of "establishing and maintaining a monitoring and evaluation system for the NCCAP and LCCAPs[13]." The Monitoring and Evaluation Section of the NCCAP emphasized that monitoring and evaluation are essential aspects of the Plan. It states that the NCCAP "M&E is principally aimed at learning from the actions – what were done and how they were done – by focusing on **efficiency**, **effectiveness**, and **impact**." The monitoring system is expected to look at key performance indicators which are to be defined both at the national, though the NCCAP, and local levels. For the latter, it aptly notes that results indicators must be developed together with LGUs. The NCCAP monitoring and evaluation is set to be done annually and every three years, respectively.

Given the above and to ensure that climate actions indeed support and align with the national development plan, the Commission developed a Results-Based Monitoring and Evaluation System (RBMES) to monitor the country-level progress of the NCCAP implementation (Figure 41). The said M&E system identified results-chain and indicators for each of the strategic priorities of the national action plan from 2011–2028.

Figure 41: NCCAP Results Based Monitoring and Evaluation Framework



[13] R-IRR of RA9729 as amended by RA10174 Rule V Sec 1.a (iii)

B. MONITORING, EVALUATION, AND LEARNING (MEL) FOR LGU CLIMATE ACTIONS THROUGH UPD

Monitoring and Evaluation are included as the final steps of the CDRA process, as outlined in the guide released by DHSUD. The said Guide notes that M&E is crucial for two reasons: (1) to ensure the quality of CDRA synthesis as a planning document, and (2) to track the progress and achievement of mainstreaming DRR-CCA in CLUP and CDP by putting in place necessary indicators and mechanism for assessment purposes. There are two templates provided for the M&E: the Review Tool for CDRA and a Template for Monitoring and Evaluation Indicators.

Given the above, this section will introduce and elaborate on MEL for climate adaptation. It will also provide users of this reference tool additional considerations on MEL for climate actions through UPD and how it may be integrated into the existing M&E activities, as shared in the current guidebook for CLUP formulation.

LOCAL-LEVEL MEL SYSTEM FOR CLIMATE ADAPTATION

With an RBMES and indicators well established for national level climate actions, local governments need to be able to align their actions upward. However, as climate actions are done based on local level decisions and with adaptation being context-specific – meaning it responds to local unique vulnerabilities and risks to area-based hazards – LGUs need to monitor, evaluate, and learn from their local climate actions. Even when LGUs apply similar adaptation initiatives and projects, the outcomes and experiences in each locality might turn out differently. The dissimilarities result from the unique LGU geographic settings, differing needs, and priorities vis-à-vis local socio-economic conditions and governance styles, and adaptive capacities.

As such, LGUs are tasked to plan and implement M&E activities to track the progress of their own identified climate actions in the LCCAP or as mainstreamed in their mandated spatial and sectoral plans using a set of indicators. Such task was even supported and expanded by the Climate Change Expenditure Tagging (CCET) directive from CCC and the Department of Budget and Management as contained in the Joint Memorandum Circular 2014-10 and 2015-01. CCET encourages LGUs to track their climate expenditures in their Annual Investment Programs and submitted to CCC.

Current conditions dictate the need to further improve the understanding and implementation of M&E for climate actions among LGUs in the Philippines. Current guidance to LGUs notes that M&E are essential to track their progress using indicators. Additionally, LGUs must know that their identified M&E indicators should help them understand **"what works, where, and why so they can learn and go to scale and sustain results over time, and if needed, further adjust or even transform."** Those pieces of information are critical given that when implementing climate adaptation, most, if not all, the actions are threading an uncharted path as the change in climate continuous to happen with uncertainties of the future, which can be much greater than the initially identified indicators of success. **Learning** has become a vital element for adaptation actions. It so must be purposely included in the M&E system and implementation – expanding the current process to MEL. This information links back to the inputs on the adaptation pathways approach discussed in Section IV of this reference tool. The learnings from adaptation options or activities in every decision cycle should be captured to assure that climate actions continue to be within the adaptive space of the adaptation path to avoid leading to maladaptation (Figure 33).

This reference tool advises LGUs to have a clear context and purpose for the MEL system for their local climate action. The purpose of the MEL generally is to track and measure three general areas, (1) **processes** (or inputs) used, (2) **results** (outputs and outcomes) so far achieved, and (3) **learnings** on the relevance of the actions and further requirements needed. When it comes to the MEL context, it refers to the boundaries and objectives of tracking to be done, whether they are doing an overall (LGU-wide) or just a program or project-specific MEL analysis.

With a clear purpose and scope, the LGU can conduct MEL exercises for their adaptation actions. Note that adaptation monitoring and evaluation are two distinct activities and that the learning component in the MEL system is part of adaptive management, especially that the situation is expected to evolve continuously. LGUs may also use inputs in Box 7 from the Organisation for Economic Co-operation and Development (OECD)[14] for national-level monitoring and evaluating adaptation in conducting their local-level MEL.

[14] Vallejo, OECD/IEA, 2017

Moreover, LGUs and users of this reference tool must ensure that local-level MEL systems track and monitor four key aspects:

- Climate change trends and hazards
- Climate change impacts
- Adaptation actions
- Results delivered by the adaptation action

Sample indicators for these are presented in Annex B. In using indicators, LGUs must know that "no one set of adaptation indicators or a single type of M&E system will work for all adaptation interventions. Indicators must be chosen based on the relationship between planned adaptation activities and the socioeconomic, environmental, and climatic context in which they will be implemented[15]." MEL system indicators must be owned and understood by all actors – the source of information, the MEL implementer, the users and learners of the reports and analysis. The enhanced CDRA and the Provincial Climate Risk Diagnostic (PCRD) tool provide comprehensive sets of baseline data that can be used by LGUs in formulating MEL indicators. Both assessment tools provide local information on climate exposure, sensitivity, adaptation capacity, and vulnerability. Ultimately, MEL should inform and improve local decision-making and policy installation to sustain or further adjust actions towards achieving resilience over the short, mid, and long-term periods.

Box 7: OECD M&E for Climate Adaptation

The **monitoring** of adaptation can examine, on an ongoing basis, one or several of the following aspects:

1. **progress made in implementing** planned initiatives that **directly or indirectly** affect the level of climate resilience or the capacities to develop and implement adaptation policies, plans and strategies, known as **adaptive capacity**.
2. **changes in the enabling environment** in place for adaptation actions and adaptive capacity.
3. **trends in exposure and vulnerability** to climate-related hazards or realized impacts of climate events.
4. tracking **financial or non-financial resources** spent on adaptation initiatives.

The **evaluation** of adaptation is a periodic assessment to answer one or several of the following questions:

1. Are **adaptation actions on track** to meet pre-defined objective and why or why not?
2. Are **resources spent efficiently** allocated?
3. Are these actions **effectively reducing climate risks** and how are they doing so?

[15] Spearman and McGray, 2011

CAPTURING THE CO-BENEFITS OF UPD ACTIONS AND PROJECTS

Monitoring and evaluating the co-benefits of UPD actions in climate change are crucial in measuring actions and results vis-a-vis resilient development. In many accounts, urban plan and design programs or projects can also provide co-benefits aside from the intended climate change adaptation and mitigation objectives. It should be emphasized, however, that climate driven programs and projects should have a clear and robust baseline to make M&E effective. Climate change UPD projects must account co-benefits and should be linked with the larger and desired development track of the project area or locality. A streetscape project for instance that adopts a nature-based urban design approach must first be clear on its climate action objectives (whether adaptation or mitigation or both) and relating its potential socio-economic benefits that are not directly climate related. These co-benefits are important and should be part of the M&E indicators and system. Table 20 provides examples of co-benefits of UPD projects in climate resilience building.

Table 20: Monitoring and Evaluating Co-Benefits

PROJECT TYPE	CLIMATE CHANGE TARGETS	CO-BENEFITS
Streetscape Climate Resilient Project	▶ Reducing pluvial flood impacts ▶ Improving rainwater resource use ▶ Increasing green canopy ▶ Improving micro-climate in the area ▶ Reducing GHG emission as a result of increased active transport utilization	▶ Improved public health ▶ Enhanced economic performance of businesses along the streets ▶ Improved circulation and mobility ▶ Better social inclusion ▶ Land value appreciation of properties sitting along the streets
Compact and Climate Sensitive Urban Redevelopment Program	▶ Increasing use of renewable and clean energy ▶ Reducing GHG emission ▶ Controlling fluvial and pluvial flooding ▶ Improving rainwater resource use ▶ Improving micro-climate in the area ▶ Increasing greenery ▶ Sustaining urban ecosystem services ▶ Developing green jobs	▶ Better circulation and mobility ▶ Improved public health ▶ Improved local economic activities and jobs ▶ Better LGU revenue generation ▶ Increased land value ▶ Better social integration and inclusion ▶ Improved solid waste management ▶ Enhanced social services ▶ Improving urban biodiversity
Climate Resilient Public Open Spaces Program	▶ Increasing greenery ▶ Controlling pluvial flooding ▶ Improving micro-climate	▶ Increased social integration and inclusion ▶ Better public health ▶ Improved air quality ▶ Increased land value

LOCAL-LEVEL MEL ON UPD MAINSTREAMED IN THE CLUP PROCESS

M&E for UPD climate actions must be integrated with the M&E for CLUP and CDP, given the existing Guidance from DHSUD and DILG. As it gets integrated, however, it is crucial for the UPD adaptation actions to be particularly monitored, reported, and evaluated for its contribution to climate resilience building and disaster risk reduction and not only as development activity. LGUs and local planning actors must recognize that not all development is climate adaptation and that not all adaptation leads to development for there is potential for development activities to exacerbate the effects of climate change unintentionally leading to increased risks and worsened vulnerability[16].

The processes used, results delivered (or not), and the learnings (the why and how come) from UPD projects for climate change adaptation should be tracked and assessed to inform decision-makers on the necessary adjustments to development activities. The MEL for the UPD adaptation will need to look at adaptive urban design elements implemented across the scale of the urban system because there is often an interdependence of actions among climate resilient UPD projects.

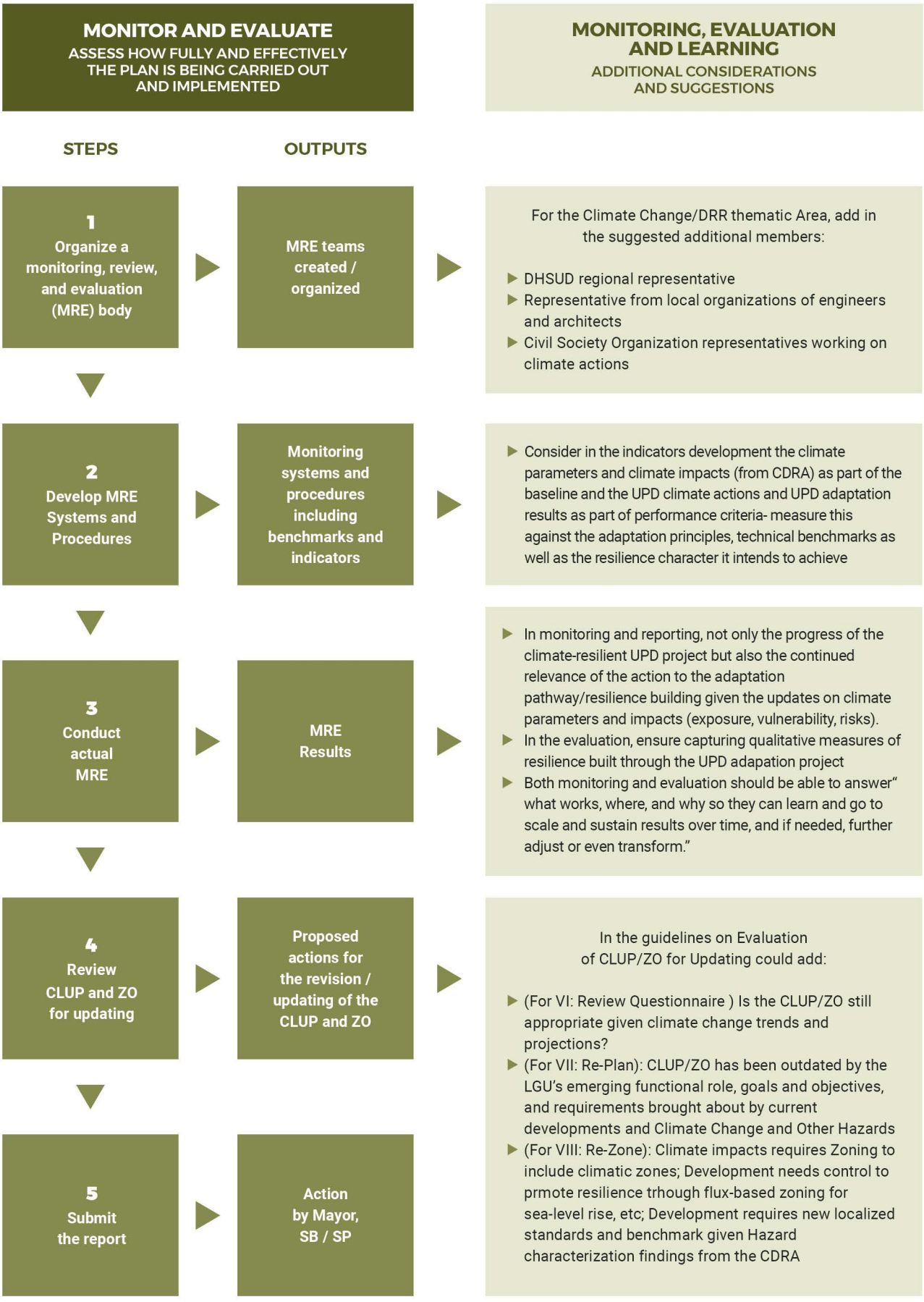
This interdependence could impact the results that one project may yield. For instance, at the neighborhood scale, a streetscape project was improved with bioswales and reduced paved surfaces to address urban flooding, and yet no adjustments on the overall drainage system (natural and built) were implemented at the urban structure and grain levels of design. The impact of the bioswales and pavers could become limited and over time could even lose relevance as change becomes greater.

That example points out another crucial element of MEL, which is timeliness. The regular conduct of monitoring and evaluation of adaptation actions is important to keep the relevance of interventions and to ensure that emerging needs, including the need for systemic change and transformation to be able to adapt to climate change, are timely identified and addressed. The timeliness of MEL could significantly reduce losses and help avert the negative impacts of both acute and chronic climate-related hazards.

Figure 40 illustrates how inputs of this section on MEL for Climate Adaptation especially for the adaptation actions through UPD could be incorporated by LGUs into the M&E section of the CLUP Guide Step 12.

[16] Spearman and McGray, 2011

Figure 42: Integration of MEL for Climate Adaptation in the Step 12 of Comprehensive Land Use Plan



ANNEXES

ANNEX A:
SAMPLES OF MULTI-CRITERIA ANALYSIS, COST-EFFECTIVENESS ANALYSIS, AND COST-BENEFIT ANALYSIS SPECIFIC TO CLIMATE CHANGE ACTIONS

MULTI-CRITERIA ANALYSIS

Multi-criteria analysis (MCA) allows assessment of different adaptation options against a number of criteria. Each criterion is given a weighting. Using this weighting, an overall score for each adaptation option is obtained. The adaptation option with the highest score is selected. MCA offers an alternative for the assessment of adaptation options when only partial data is available, when cultural and ecological considerations are difficult to quantify and when the monetary benefit or effectiveness are only two of many criteria. MCA essentially involves defining a framework to integrate different decision criteria in a quantitative analysis without assigning monetary values to all factors. MCA was the method of choice for least developed countries (LDCs) in preparing their national adaptation programmes of action (NAPAs).

Source: Assessing the Costs and Benefits of Adaptation Options, United Nations Framework on Convention on Climate Change (2011)

The table below shows an example of a scoring chart depicting various criteria wherein urban adaptation options can be assessed upon. The table also shows a description of each score per criterion.

SCORE	BENEFITS TO ECO-SYSTEM PROTECTION AND CONSERVATION	BENEFITS TO THE POOR AND VULNERABLE GROUP	STAKEHOLDER ACCEPTABILITY	TECHNICAL FEASIBILITY	URGENCY OF IMPLEMENTATION	EASE OF IMPLEMENTATION	RELATIVE EFFECTIVENESS	RELATIVE COST	ALIGNMENT TO LCCAP AND NATIONAL AND LOCAL URBAN DEVELOPMENT PRIORITIES	MULTI-SECTORAL RELEVANCE
3	3 = High (yes, fully)	3 = Benefits for the poor and vulnerable groups are direct and clearly defined	3 = High (more than 70% of the residents in the area	3 = High (Design already available to the city)	3 = Highly urgent, project benefits need to take effect in one year	3 = High (city can implement this without external support)	3 = High (needed in order to deliver objectives and other options)	3 = High (city could afford)	3 = High (yes, fully)	3 = High (yes, other sectors depend on it)
2	2 = Medium (yes, partly)	2 = Benefits for the poor and vulnerable groups are direct but is yet to be determined	2 = Medium (50 -70%)	2 = Medium (city has resources to develop design, implement and maintain)	2 = Urgent, project benefits need to take effect within 2 to 3 years	2 = Medium (City can implement this with some support)	2 = Medium (would contribute to other options)	2 = Medium (city could afford with some help / support)	2 = Medium (yes, partly)	2 = Medium (would contribute somewhat to other sector)
1	1 = Low (yes, but requires additional studies / actions)	1 = Benefits for the poor and vulnerable groups are indirect	1 = Low (<50%)	1 = Low (City has no available resources to develop design, implement and maintain)	1 = Moderately Urgent, project benefits need to take effect 3 to 5 years	1 = Low (city can't implement this without external support)	1 = Low (would contribute to other options somewhat)	1 = Low (city could not afford without help / support)	1 = Low (yes, but requires additional activities)	1 = Low (other sector is not linked with it)

The MCA table samples below show various urban climate adaptation projects scored according to the sample criteria above. The last column reflects the ranking of each project, prompting for possible prioritization for decision makers.

MCA TABLE SAMPLE 1

PROJECT / OPTIONS	BENEFITS TO ECOSYSTEM PROTECTION AND CONSERVATION	BENEFITS TO THE POOR AND VULNERABLE GROUP	STAKE-HOLDER ACCEPTA-BILITY	TECHNICAL FEASIBILITY	URGENCY OF IMPLEMEN-TATION	EASE OF IMPLEMEN-TATION	RELATIVE EFFECTIVE-NESS	RELATIVE COST	ALIGNMENT TO LCCAP AND NATIONAL AND LOCAL URBAN DEVELOPMENT PRIORITIES	MULTI-SECTORAL RELEVANCE	TOTAL	RANK
Ecopark development from decommissioned city-controlled dumpsite	2	3	3	1	1	1	2	2	2	2	14	10
Resettlement project	2	3	2	1	2	1	2	3	2	2	15	8
Installation of sustainable wave breakers in strategic coastal areas	3	3	2	3	3	1	2	2	3	2	18	4
Adoption of sustainable transport system: implementation of sustainable mobility solutions from a transport study	3	2	1	2	2	1	3	1	3	2	15	8
Integration of green pocket parks design and open spaces in available spaces in the city	3	3	3	2	2	2	2	2	3	2	18	4
Ordinance for the conversion of flood danger zones into ecoparks and retention ponds	3	3	3	3	3	3	3	3	3	3	24	1
Construction of water impounding structure, rainwater harvesting facilities (small farm reservoirs), and concrete irrigation canals	3	3	2	3	2	1	3	1	3	3	18	4
Improvement of the streetscape and landscape, including a walkable and bikeable neighborhood	3	3	3	3	2	1	2	2	3	3	19	3
Development of central park and open space at town center	3	3	2	3	3	2	2	3	3	3	21	2
Riverside development	3	3	1	2	3	2	3	1	3	3	18	4

MCA TABLE SAMPLE 2

PROJECT / OPTIONS	BENEFITS TO ECOSYSTEM PROTECTION AND CONSERVATION	BENEFITS TO THE POOR AND VULNERABLE GROUP	STAKE-HOLDER ACCEPTA-BILITY	TECHNICAL FEASIBILITY	URGENCY OF IMPLEMEN-TATION	EASE OF IMPLEMEN-TATION	RELATIVE EFFECTIVE-NESS	RELATIVE COST	ALIGNMENT TO LCCAP AND NATIONAL AND LOCAL URBAN DEVELOPMENT PRIORITIES	MULTI-SECTORAL RELEVANCE	TOTAL	RANK
Comprehensive Parks Development Program	2	2	3	2	3	2	2	1	3	2	18	3
Installation of Rainwater Harvester / Collector (new building applications)	2	3	2	2	2	2	2	2	2	2	16	6
Improvement of Water Network System (Utilities)	2	3	3	2	3	2	2	1	3	3	19	2
Installation of Solar Panels (for LGU-owned buildings)	2	2	2	2	2	1	2	1	3	2	15	8
Lot Acquisition for Housing / Comprehensive Shelter Plan Implementation	2	3	3	1	3	1	3	1	2	3	17	4
Improvement of school facilities and public offices	2	3	3	1	2	1	2	1	2	2	14	9
Improvement of drainage, sewerage system, and roads	3	3	2	2	2	1	3	1	3	2	16	6
Waste to Energy Program (Deployment of W2E Technology)	3	3	3	2	2	3	3	2	3	2	20	1
E-jeepney Program (Procurement and Deployment of E-jeepneys)	3	2	2	2	2	2	3	1	3	2	17	4

COST-BENEFIT ANALYSIS

Cost-benefit analysis (CBA) is often used to assess adaptation options when efficiency is the only decision making criteria. A CBA involves calculating and comparing all of the costs and benefits, which are expressed in monetary terms. The comparison of expected costs and benefits can help to inform decision makers about the likely efficiency of an adaptation investment. CBA provides a basis for prioritising possible adaptation measures. The benefit of this approach is that it compares diverse impacts using a single metric.

However, it is important to be explicit about how the costs and benefits are distributed, in addition to their aggregate values. In addition, it can be challenging to include reliable estimates of things that are valuable but not valued in markets: for example, the costs and benefits often associated with issues such as environmental goods and services and social or cultural values. This can mean that non-market costs and benefits are excluded, and consequently the results of the analysis are misleading.

Source: Assessing the Costs and Benefits of Adaptation Options, United Nations Framework on Convention on Climate Change (2011)

SAMPLE TABLE OF COST-BENEFIT ANALYSIS

PROJECTS / OPTIONS	PROJECT COST IN PHP	AVOIDED DAMAGES FROM FLOODING PER YEAR (IN MILLIONS)	ANNUAL LGU SAVINGS ON DISASTER RESPONSE (IN MILLIONS	ANNUAL ENERGY COST SAVINGS (IN MILLIONS)	INCREASE IN LAND VALUE (IN MILLIONS)	TOTAL	RANK
District 2 Integrated Drainage System Project	80M	20	8	1	4	33	1
Mangrove Conservation Program	12M	4	3	0	1	8	8
Public Facilities Greening Project, Phase 1	45M	5	2	3	2	12	6
Public Open Spaces Climate Adaptation Project	60M	8	3	2	2	15	5
City Center Bike Lane Project	24M	0	1	6	2	9	9
Poblacion Climate Smart Street Design Project	40M	12	3	2	3	20	3
Rainwater Harvesting Facilities for City Housing Projects	18M	10	4	2	1	17	4
Zone VI Solar Street Light Project	15M	0	0	2	1	3	10
Riverbank Nature-Based Design Redevelopment Project	26M	14	6	1	2	23	2

COST-EFFECTIVENESS ANALYSIS

Cost-effectiveness analysis (CEA) is used to find the least costly adaptation option or options for meeting selected physical targets. Given that CEA is performed when the objectives of the adaptation measures have been identified and the remaining task is to find the lowest-cost option for meeting these objectives, it does not evaluate whether the measure is justified (e.g. by generating a certain benefit-cost ratio or IRR).

CEA is applied in assessing adaptation options in areas where adaptation benefits are difficult to express in monetary terms, including human health, freshwater systems, extreme weather events, and biodiversity and ecosystem services; but where costs can be quantified. For example, given the necessity for water, the aim of an assessment is not to find alternative adaptation options that might yield higher adaptation benefits, but to find those options that ensure sustainable water quality and quantity for vulnerable communities (see sample below).

Source: Assessing the Costs and Benefits of Adaptation Options, United Nations Framework on Convention on Climate Change (2011)

CASE STUDY: PACIFIC ISLANDS - ASSESSING ADAPTATION OPTIONS FOR FRESHWATER RESOURCES USING COST-EFFECTIVENESS ANALYSIS[17]

Overview

Climate change is already having major impacts on many small islands in the Pacific. As part of the Capacity Building to Enable the Development of Adaptation Measures in Pacific Island Countries project (CBDAMPIC), adaptation measures were implemented at nine pilot sites on four islands in the Pacific (Cook Islands, Fiji, Samoa and Vanuatu) following intensive community consultations and CEAs. Communities in the pilot sites identified water resources as their greatest concern. Vulnerabilities were noted not only in terms of immediate quality and quantity, but also in terms of the sustainability of supply. Fresh water resources are threatened by increasing salinity of mains water due to up-welling and saltwater-intrusion and the length of dry periods. Communities are suffering because inhabitants, in particular women and children, have to spend a considerable amount of their day fetching water. Health problems are also increasing and agricultural yield is decreasing.

Adaptation Options Considered

Given the necessity of water resources, the aim of the project was not to find adaptation options that might yield higher adaptation benefits, but to find options that will ensure sustainable water quality and quantity for vulnerable communities. The following options were identified by three communities:

- Installation of desalinisation systems;
- Upgrading of existing mains systems;
- Rainwater harvesting;
- Using brackish or seawater for appropriate systems;
- Watershed protection measures, including contour farming, planting trees on hillsides, planting fruit trees within crop plots to provide shade for the plants or reinforcing salt tolerant vegetation buffers;
- Improving sanitary condition, for example by installing compost or flush toilets (however, the latter would increase water consumption);
- Awareness-raising on water issues and installation of radio and internet communications.

Cost and Effectiveness Considered Options

All three communities selected rainwater harvesting as their preferred adaptation option. It was deemed to be the most cost-effective option (i.e. yielding the desired quantity and quality of water at the least cost). In addition, rainwater harvesting was determined to be the most practical, easily implemented, and sustainable measure. Other measures were either too expensive, such as desalination systems, or did not promise the desired quality and quantity of water, such as watershed protection measures. The size of tanks for storing harvested rainwater in different communities was determined by annual rainfall, water use per person, available funds and the number of households (expected) to be served.

[17] Assessing the Costs and Benefits of Adaptation Options, United Nations Framework on Convention on Climate Change (2011)

SUMMARY OF THE COST-EFFECTIVENESS ANALYSIS

COMMUNITY	RAINWATER HARVESTING EQUIPMENT	TOTAL PROJECT COST	COST-EFFECTIVENESS (COST PER PERSON / WATER HARVESTING POTENTIAL IN LITRES PER PERSON)
Aitutaki, Cook Islands	246 household tanks of 2,000 litres and 12m of gutters for each household	USD 233,155	USD 259 / 547 litres
Tilivalevu, Fiji	Two communal tanks, a new piping system, and upgraded dams	USD 63,431	N.A.
Luli, Vanuatu	24 household tanks of 2,400 litres, each combined with a catchment area of ca. 20m^2	USD 100,480	USD 334 / 192 litres

ANNEX B:

MEL SAMPLE INDICATORS FOR CLIMATE CHANGE TRENDS AND HAZARDS, CLIMATE CHANGE ADAPTATION ACTIONS, AND IMPACTS DELIVERED BY THE ADAPTATION ACTION

The following indicator examples were taken adapted from Measuring Progress in Urban Climate Change Adaptation (2019) by the The C40 Cities Climate Leadership Group and Ramboll Foundation.

STORM SURGE AND SEA-LEVEL RISE

ACTION	OUTPUT	OUTPUT INDICATOR	OUTCOME	OUTCOME INDICATOR	IMPACT	IMPACT INDICATOR
Installing floodgates	Floodgates installed	Number of floodgates installed	Reduced storm surge flooding	% of storms leading to floods	Reduced exposure to flooding	**People:** Displaced, injured, or deaths **Assets:** Number of assets affected / damaged, Cost of repairs, Cost to services, Cost to economic productivity
Relocation of assets	Assets at risk relocated	Number of assets relocated	Protection of assets from storm surge flooding	% of assets protected in storm surge flooding	Reduced exposure to flooding	**People:** Displaced, injured or deaths, number of A&E admissions from injuries
Permanent coastline protection	Dikes or seawalls built	Area of coastline protection created (m^2 / km^2)	Reduced storm surge flooding	% of storms leading to floods	Reduced exposure to flooding	**People:** Displaced, injured or deaths **Assets:** Number of assets affected / damaged, Cost of repairs, Cost to services, Cost to economic productivity

RAINFALL

ACTION	OUTPUT	OUTPUT INDICATOR	OUTCOME	OUTCOME INDICATOR	IMPACT	IMPACT INDICATOR
Convert recreational and open spaces towater squares and parks	Additional water retention areas	Volume of water retention capacity created (m^3)	Reduced flooding from heavy rainfall	% of heavy rainfall leading to flooding	Reduced exposure to flooding	**People:** Displaced, injured, or deaths **Assets:** Number of assets affected / damaged, Cost of repairs, Cost to economic productivity
Implementing permeable surfaces (bioswales / rainbeds / pervious pavement)	Additional permeable surface area	Volume of water retention capacity created (m^3)	Reduced flooding from heavy rainfall	% of heavy rainfall leading to flooding	Reduced exposure to flooding	**People:** Displaced, injured, or deaths **Assets:** Number of assets affected / damaged, Cost of repairs, Cost to economic productivity
Stabilize slopes and sediment on hilled areas (vegetation: seeded, transplanted and matted / non-vegetation: reinforced with concrete)	Slopes stabilized	Area of slopes stabilised (m^2 / km^2)	Reduced landslides / erosion from heavy rainfall	% of heavy rainfall leading to landslides / erosion	Reduced vulnerability to erosion/mass movement	**People:** Displaced, injured, or deaths **Assets:** Number of assets affected / qdamaged, Cost of repairs, Cost to economic productivity

EXTREME HEAT

ACTION	OUTPUT	OUTPUT INDICATOR	OUTCOME	OUTCOME INDICATOR	IMPACT	IMPACT INDICATOR
Green infrastructure (Plant beds, green roofs, green walls, street trees, canopy cover etc.)	Vegetation planted	Area of vegetated area created (m^2)	Improved temperatures from vegetation during extreme heat / heatwave	°C °F Temperature difference between vegetated and non-vegetated areas	Reduced exposure to extreme heat / heatwaves	**People:** number of A&E admissions from heatstroke; number of ambulance dispatch calls in extreme heat/heat stroke; number of heat mortality cases **Assets:** Number of assets affected / damaged, Cost of repairs, Cost to economic productivity
Implement cooling centres across city (cooling centres, shelters, cool routes)	Cooling centres, shelters and routes implemented across the city	Number of cooling centers / shelters created per capita Length of cooling routes	Increased access to areas with moderated temperatures Increased access to routes with moderated temperatures	% of population within (15min) reach of a cooling centre % of population using cooling centres	Reduced exposure to extreme heat / heatwaves Reduced vulnerability to extreme heat / heatwaves	**People:** number of A&E admissions from heatstroke; number of ambulance dispatch callsin extreme heat / heat stroke; number of heat mortality cases **Assets:** Number of assets affected / damaged, Cost of repairs, Cost to economic productivity
Increase shade in public spaces (vegetation, retractable roofs, tensile structures, etc.)	Shading structures implemented	Area of canopy cover created (m^2) Area of shaded cover created (m^2)	Improved temperatures from shading structures during extreme heat / heatwave	°C °F Temperature difference between shaded and non-shaded areas	Reduced exposure to extreme heat / heatwaves	**People:** number of A&E admissions from heatstroke; number of ambulance dispatch calls in extreme heat / heat stroke; number of heat mortality cases **Assets:** Number of assets affected / damaged, Cost of repairs, Cost to economic productivity

MULTIHAZARD ACTIONS

ACTION	OUTPUT	OUTPUT INDICATOR	OUTCOME	OUTCOME INDICATOR	IMPACT	IMPACT INDICATOR
Implement building codes (Codes to protect and prevent multi-hazard effects, e.g. heat insulation, flood resistent materials etc.)	Codes implemented in building	Number buildings with code implemented % of buildings with codes implemented	Building code appropriately addresses the climate hazard	(Dependent on hazard) Number of coded buildings protected from flood Temperature difference between coded / non-coded buildings	Reduced exposure to hazards	**People:** Displaced, injured, or deaths **Assets:** Number of assets affected / damaged, Cost of repairs, Cost to economic productivity
Implement emergency management and evacuation plans (Flash floods, storms, and wildfires)	Emergency management and / or evacuation plans prepared / mapped out	% city covered under the plan	People safely evacuated people from risk areas	% emergency situations where emergency services responded safely and timely	Increased adaptive capacity to respond to hazards	**People:** Displaced, injured, or deaths **Assets:** Number of assets affected / damaged, Cost of repairs, Cost to economic productivity
Land-use planning policy (Freeze or restrict city development in risk prone areas)	Building freeze ordinance adopted for areas at high risk	% high risk areas under building freeze ordinance	Decrease of new dwellings in areas at high risk	% decrease of new dwellings in areas at high risk	Reduced vulnerability to hazards	**People:** Displaced, injured, or deaths **Assets:** Number of assets affected / damaged, Cost of repairs, Cost to economic productivity

ANNEX C:

DHSUD MEMORANDUM CIRCULAR ADOPTING THE REFERENCE TOOL ON URBAN PLANNING AND DESIGN FOR CLIMATE RESILIENCE

REPUBLIC OF THE PHILIPPINES
Department of Human Settlements and Urban Development
Kagawaran ng Pananahanang Pantao at Pagpapaunlad ng Kalunsuran

MEMORANDUM CIRCULAR NO. 2023-001
Series of 2023

ADOPTION OF THE URBAN PLANNING AND DESIGN FOR CLIMATE RESILIENCE: A REFERENCE TOOL FOR LOCAL GOVERNMENTS AND PLANNING ACTORS IN THE PHILIPPINES

WHEREAS, Section 7 of the Implementing Rules and Regulations (IRR) of Republic Act No. 11201 directs DHSUD to formulate national housing and urban development policies, strategies, and standards that are consistent with the Philippine Development Plan to promote social and economic welfare, in coordination and in consultation with national and local stakeholders, local government units (LGUs), and other government agencies;

WHEREAS, Section 19.5. of RA 11201's IRR mandates DHSUD to prepare and prescribe land use planning and zoning standards and regulations to guide LGUs in the formulation of their respective Provincial Physical Framework Plans (PPFPs), Comprehensive Land Use Plans (CLUPs), and Zoning Ordinances (ZOs), which shall employ effective and integrated land use planning and management strategies including ridge to reef planning, mainstreaming disaster risk management and climate change adaptation, and integrating new urban development strategies, whenever necessary;

WHEREAS, the Philippines ranked fourth worldwide among the most affected countries to climate change and its impacts from 2000 to 2019 based on the 2021 Global Climate Risk Index. The report highlights that the Philippines belongs to the group of climate hotspots, which are being affected by extreme events on an ongoing basis. With climate change, and owing to its geographical location, the country is at risk from more destructive and frequent typhoons, higher temperatures and intense drought, and worse flooding;

WHEREAS, the Urban Planning and Design (UPD) for Climate Resilience is a Reference Tool for LGUs, practitioners, communities, and institutions working in local planning and development. It aims to equip technical staff, decision-makers, and stakeholders with information, approaches, and tools to ensure that climate resilience is considered as a fundamental principle of and basis for local plans and designs;

WHEREAS, the Reference Tool supplements the Urban Design and Development Special Area Studies of the CLUP Guidebook Volume 2. It covers urban planning and design at the sub-national level, particularly physical framework and development plans anchored and consistent with regional development plans. It advances the use of urban planning and design as a means for localities to achieve climate resilience;

NOW, THEREFORE, this Memorandum Circular is hereby issued adopting the use of the Urban Planning and Design for Climate Resilience: A Reference Tool for Local Governments and Planning Actors in the Philippines.

All relevant offices of DHSUD and its Regional Offices are directed to use and promote the Reference Tool in assisting LGUs in the formulation or updating of their PPFP/PDPFP, CLUP and Zoning Ordinance.

This Memorandum Circular shall take effect immediately.

JOSE RIZALINO L. ACUZAR
Secretary
(January 23, 2023)

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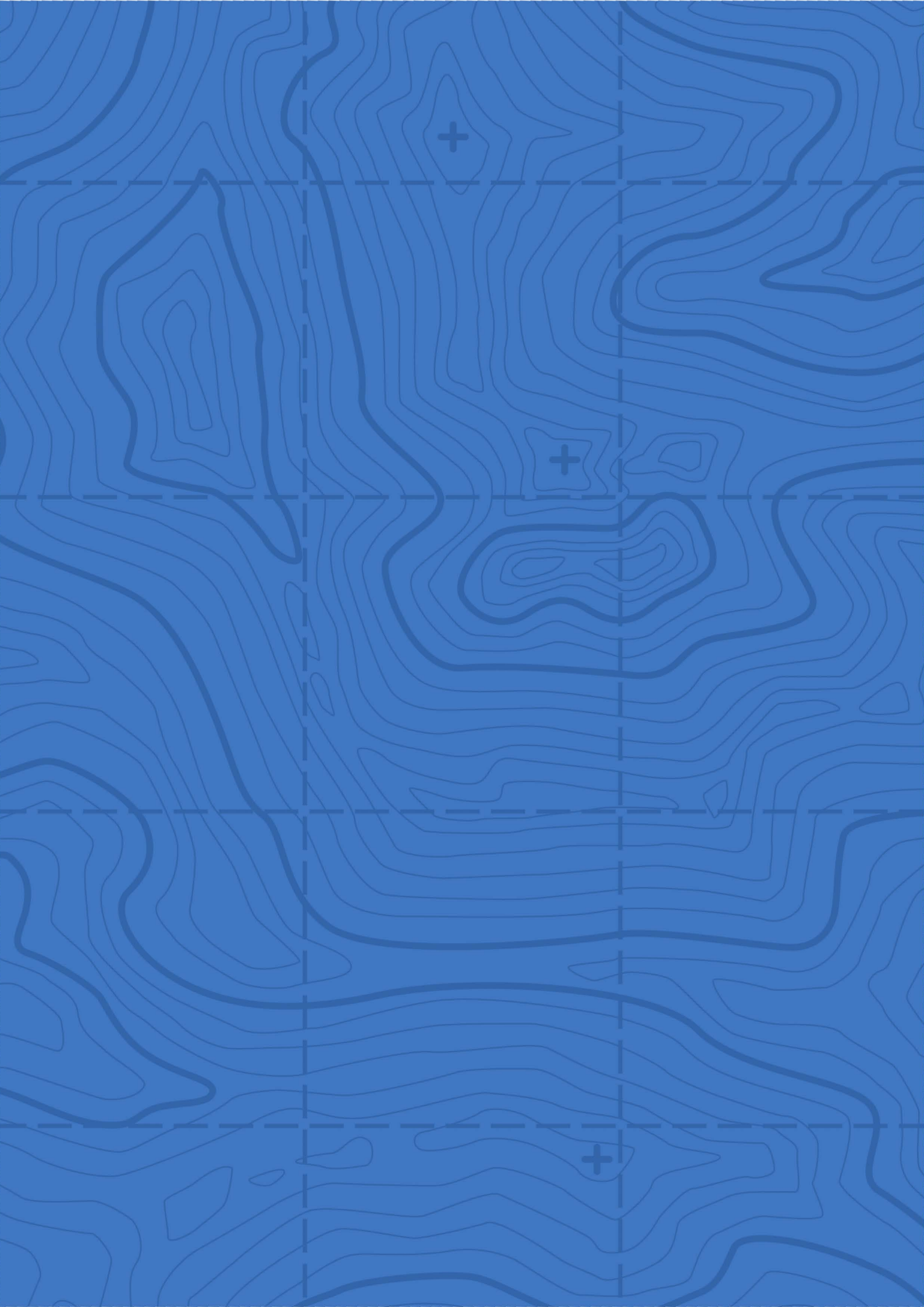

CLIMATE RESILIENCE FOR CITIES AND SETTLEMENTS

Globally, urbanization has been consistently growing throughout the years and it is projected to increase to 58% in the next five decades. Alongside this growth are intertwined challenges that cities and communities face – economic recession, public health crisis, and most especially, climate change.

With urbanization continuously increasing in the country, cities must be prepared to address climate risks to nurture a better safe, inclusive, and resilient future for the Filipinos.

Building resilience must be at the core of planning and designing our cities. Aligned with the Philippine New Urban Agenda vision "Better, Greener, Smarter Cities in an Inclusive Philippines", this guide provides a platform to equip users with concepts and technical information on urban planning and design (UPD) for climate resilience.

WHO CAN USE THIS REFERENCE TOOL?

This reference tool can serve as guide for local government units, practitioners, communities, and institutions working in local planning and development. It aims to equip technical staff, decision-makers, and stakeholders with information, approaches, and tools to ensure that climate resilience is considered as a fundamental principle of and basis for local plans and designs.

Building Climate Resiliency through Urban Plans and Designs

A WORK OF COLLABORATION

The Department of Human Settlements and Urban Development (DHSUD) spearheaded the creation of this reference tool on Urban Planning and Design for Climate Resilience.

This is made possible via the technical support of the **Building Climate Resiliency through Urban Plans and Designs (BCRUPD)**, a project implemented by **UN-Habitat Philippines** and funded by the German government's International Climate Initiative. This initiative is also supported by members of BCRUPD's Project Steering Committee including the Climate Change Commission (CCC), Department of Interior and Local Government (DILG), National Economic and Development Authority (NEDA), and the League of Cities of the Philippines (LCP).

UN-HABITAT

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Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

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based on a decision of the German Bundestag