CDP
DISCLOSURE INSIGHT ACTION

Strengthening the Climate Resiliency of Cities and their Communities in Asia

CLIMATE RISK AND VULNERABILITY ASSESSMENT

Training guide for cities

MAY 2022

CONTENTS

CLIMATE RISK AND VULNERABILITY ASSESSMENT – TRAINING GUIDE FOR CITIES

BACKGROUND

Cities around the world are already feeling the impacts of climate change, facing severe hazards such as floods, wildfires, droughts and heat waves. With two-thirds of the global population expected to live in cities by 2050 and most climate-related hazards set to intensify and become more frequent, it is vital for cities to take critical action to build resilience against climate change.

A fundamental first step for local authorities to build resiliency to climate change is to conduct a city-wide climate risk and vulnerability assessment (CRVA) as a basis to developing necessary solutions through a suite of plans, programmes and policies. A city-wide CRVA is a requirement of the Global Covenant of Mayors, a key component of the CDP-ICLEI Cities Questionnaire and incentivised through CDP Scoring.

Recognising the need for cities to develop comprehensive CRVAs and build their resilience, especially in Asia where many cities are particularly vulnerable to climate hazards such as flooding and extreme heat, CDP conducted a capacity building programme in 2021 supported by the Bank of America Charitable Foundation for local authorities in Asia to increase their understanding of climate risks and vulnerability at the city-level.

The objectives of this programme were to provide city government officials with:

- Increased understanding of climate hazards, risks and vulnerability at the city level
- Increased ability to conduct CRVAs and report them
- Increased knowledge of the significance of CRVAs as part of wider city climate adaptation and resilience planning, action and financing

This document provides a summary of the key learnings from CDP's capacity-building programme, additional case studies and resources, and is intended as a training guide for cities on conducting their climate risk and vulnerability assessment. Three city case studies from Quezon City, Surat, and Trondheim have been selected as best practise examples from Southeast Asia, South Asia and Europe respectively, to provide a regional and global perspective. While the programme was focussed on cities in Asia, this training guide may be utilised by cities globally.

CDP would like to acknowledge the following cities for their participation in the programme:

- Ahmedabad, Chennai, Coimbatore, Dehradun, Kochi, Panaji, Tiruchirapalli, Vadodara (India)
- Bogor, Tanjungpinang, Tarakan (Indonesia)
- Narayanganj, Singra (Bangladesh)
- Ormoc, Puerto Princesa, San Jose Del Monte (Philippines)
- Shah Alam (Malaysia)

KEY DEFINITIONS

ADAPTATION
The process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities.

ADAPTIVE CAPACITY
The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

CLIMATE
Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.

CLIMATE CHANGE
Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use. Note that the Framework Convention on Climate Change (UNFCCC), in its Article 1, defines climate change 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 UNFCCC thus makes a distinction between climate change attributable to human activities altering the atmospheric composition and climate variability attributable to natural causes.

EXPOSURE
The presence of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets in places and settings that could be adversely affected.

HAZARD
The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.

IMPACTS (CONSEQUENCES, OUTCOMES)
Impacts generally refer to effects of climate-related hazards (including extreme weather and climate events) on lives; livelihoods; health and well-being; ecosystems and species; economic, social and cultural assets; services (including ecosystem services); and infrastructure. Impacts may be referred to as consequences or outcomes, and can be adverse or beneficial.

LIKELIHOOD (PROBABILITY)
The chance of a specific outcome occurring, where this might be estimated probabilistically.

MITIGATION (OF CLIMATE CHANGE)
A human intervention to reduce emissions or enhance the sinks of greenhouse gases.

RESILIENCE
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.

RISK
The potential for adverse consequences where something of value is at stake and where the occurrence and degree of an outcome is uncertain. In the context of the assessment of climate impacts, the term risk is often used to refer to the potential for adverse consequences of a climate-related hazard, or of adaptation or mitigation responses to such a hazard, on lives, livelihoods, health and well-being, ecosystems and species, economic, social and cultural assets, services (including ecosystem services), and infrastructure. Risk results from the interaction of vulnerability (of the affected system), its exposure over time (to the hazard), as well as the (climate-related) hazard and the likelihood of its occurrence.

RISK ASSESSMENT
The qualitative and/or quantitative scientific estimation of risks.

RISK MANAGEMENT
Plans, actions, strategies or policies to reduce the likelihood and/or consequences of risks or to respond to consequences.

SENSITIVITY
The degree to which a system or species is affected, either adversely or beneficially, by climate change.

VULNERABILITY
The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

IPCC, 2018: Annex I: Glossary [Matthews, J.B.R. (ed.)]. *In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)].

INTRODUCTION TO RISK MANAGEMENT AND CLIMATE RISK

RISK MANAGEMENT PROCESS

All organizations inevitably face risks and should have processes in place for managing these risks, including risks due to climate change. A typical risk management process consists of the following steps: Identify, Measure, Monitor and Control.

IDENTIFY

- Risks must be clearly defined and proactively identified.
- Risk identification is an ongoing process.
- Designed to be forward-looking.

MEASURE

- Risks must be accurately measured through a systematic risk quantification process.
- Consider how risk exposures might evolve under a variety of stress scenarios.

MONITOR

- Risk levels must be monitored regularly.
- To know when risk limits are breached, and have processes in place to report and escalate exceptions.

CONTROL

- Controls are established and communicated.

WHAT IS CLIMATE RISK?

Climate Risk can be broadly defined as the potential for adverse consequences due to climate change on lives, livelihoods, health and well-being, ecosystems and species, economic, social and cultural assets, services (including ecosystem services), and infrastructure.

From an organizational point of view, climate risk is often separated into two types: **Physical Risk** and **Transition Risk**.

- **Physical Risks** are related to the physical impacts of climate change, driven by acute weather events such as floods and storms, and chronic long-term shifts such as temperature increase and sea level rise.
- **Transition Risks** are related to the transition to a lower-carbon economy, which may entail extensive policy, legal, technology and market changes.

HOW TO MANAGE CLIMATE RISK?

It is important that all organizations, including city governments, manage both the physical and transition risks imposed by climate change. Organizations should use the following three levers to manage climate risk:

ASSESS AND MANAGE CLIMATE RISKS (TO YOUR ORGANIZATION)

For cities, this is primarily managing the **Physical Risks** on your city e.g., floods, storms. Cities should conduct a **climate risk and vulnerability assessment** to ***identify*** and **measure** key climate risks, **monitor** them, and implement adaptation actions and plans to **control** the risk.

MINIMIZE YOUR IMPACT ON THE ENVIRONMENT

Cities have a responsibility to mitigate their contribution to global GHG emissions, as well as local impacts on the environment e.g. air and water pollution, waste.

- Preparing and getting ahead of the low-carbon transition helps to minimize **Transition Risk** on your city and city government.
- Mitigation of global climate change also helps reduce **Physical Risk** of climate hazards in your city.

SUPPORT STAKEHOLDERS (E.G. COMMUNITY, BUSINESSES) IN THEIR LOW-CARBON TRANSITION

City governments can also have a powerful role in influencing behavioral change in the community and working with business to support their low-carbon transition. Engaging all stakeholders in this process will help reduce the overall **Transition Risk** on the city.

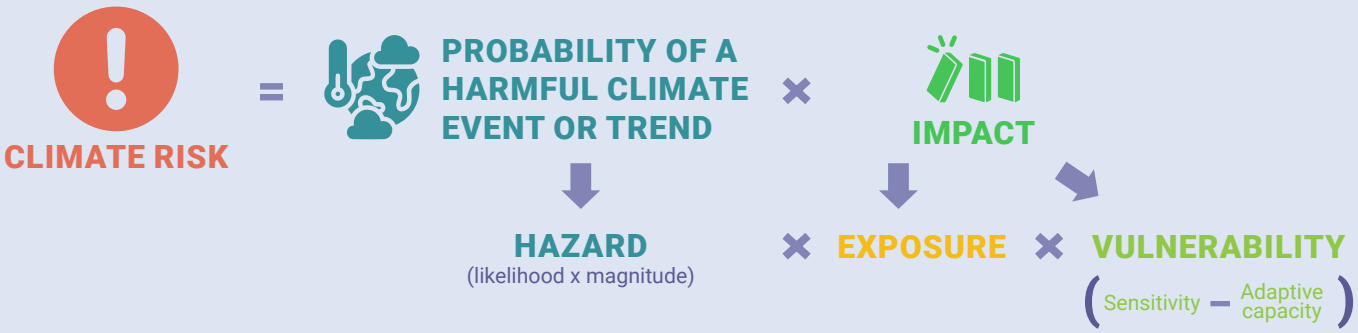
CITY-LEVEL CLIMATE RISK AND VULNERABILITY ASSESSMENT

Climate risk and vulnerability assessments (CRVAs) are a critical component of a city's climate risk management strategy and form the basis for developing adaptation actions and climate action plans.

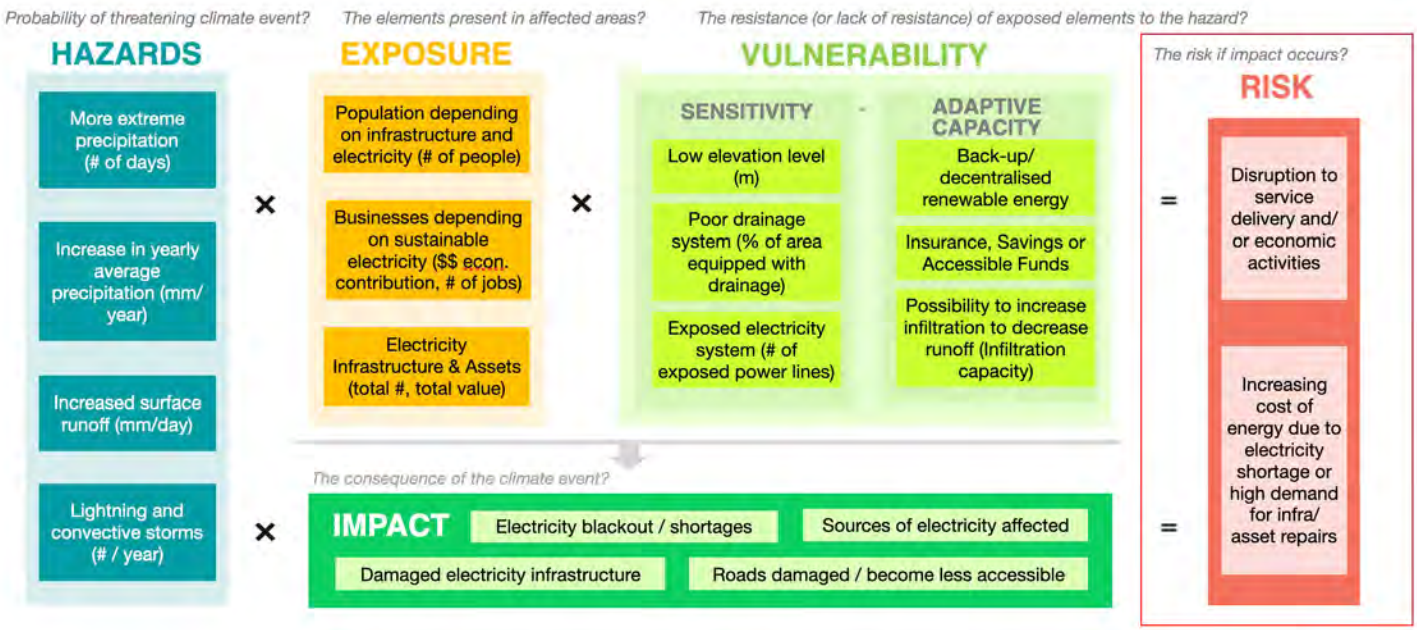
Climate risk assessments identify the **likelihood of future climate hazards** and their potential **impacts for cities and their communities**, both of which contribute to overall **climate risk**.

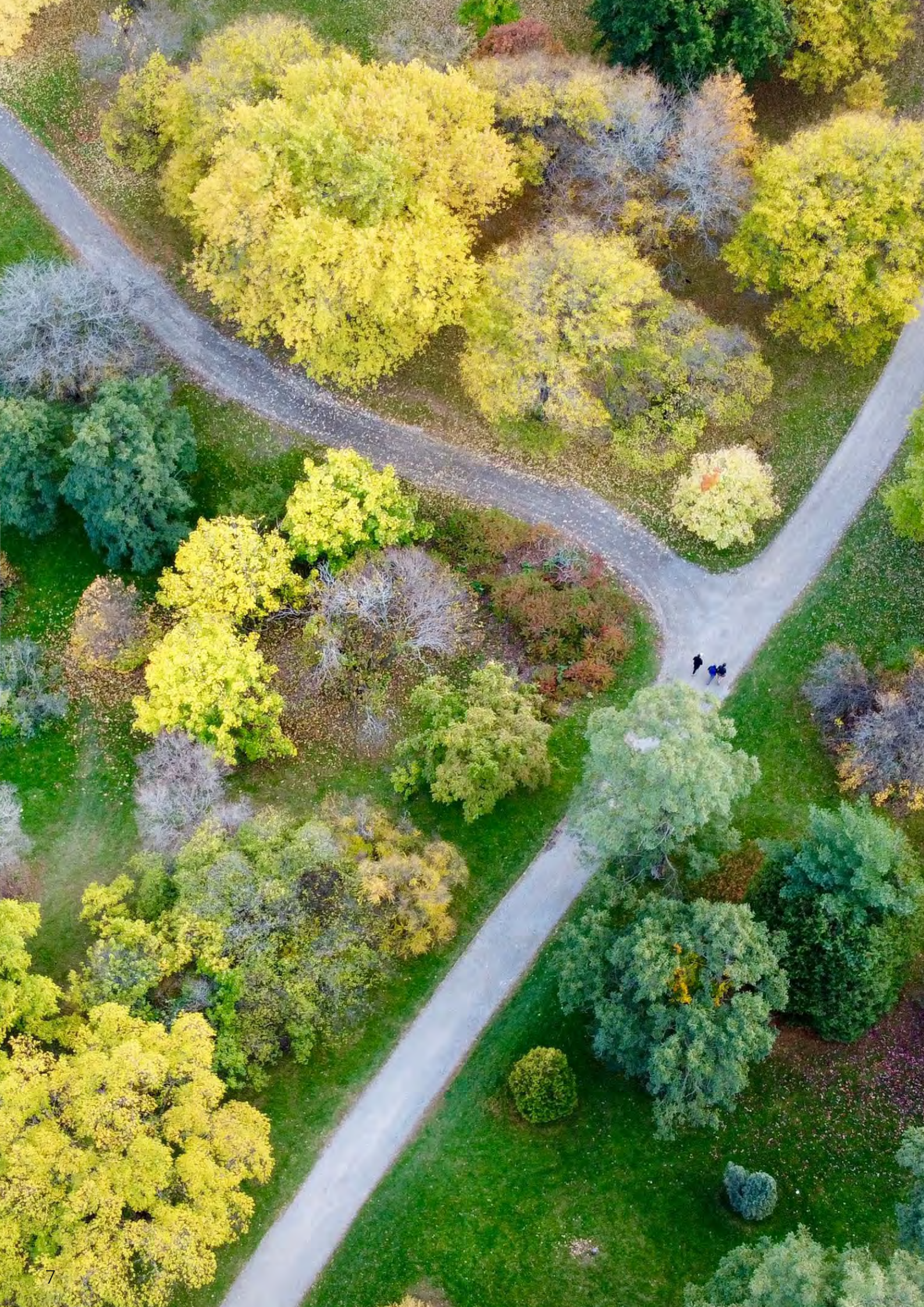
A useful framework for city-level climate risk assessments, developed by C40 Cities Climate Leadership group, consist of the following key steps:

- **Hazard assessment**: identifies the probability, intensity and timescale of key current and future climate hazards in a city and where these hazards are prevalent / are likely to manifest (2050 and beyond where possible).
- **Impact assessment**: looks at the potential impacts of those climate hazard events on people, asset, services, and the natural environment.
- **Risk assessment**: determines the keys risks based on the interplay of hazards and impacts.



EXAMPLE: Energy sector





HAZARD ASSESSMENT

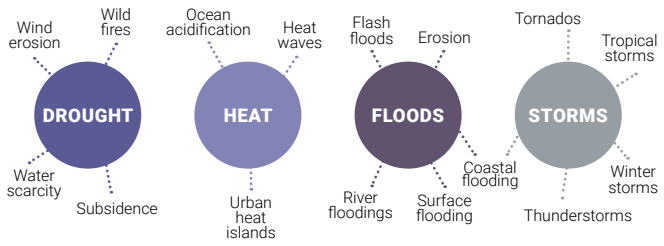
1. DETERMINE THE RELEVANT CLIMATE HAZARDS

Which climate hazards affect your city?

Identify the climate hazards relevant to your city. Several resources are available to help your city identify these hazards:

- CDP-ICLEI questionnaire – Use the "climate hazards" section as a framework to select your climate hazards and associated details, such as probability, magnitude, and vulnerable groups exposed to the hazard.
- C40 Excel Tool Step 1.1 – Climate Hazard Identification – Use the Excel template to input your city's relevant climate hazards, categorised by themes such flood, storms, heat, drought.
- City Climate Hazard Taxonomy (C40 and Arup)

For summary and communication purposes, it is often helpful to group the hazards into key climate themes, as below. A template is available from C40's CCRA Reporting Template (Appendix A).



2. SELECT RELEVANT CLIMATE INDICATORS

What data do you need to measure each hazard?

Create a data collection sheet summarising relevant data associated with each of the hazards identified. A template is available from C40's CCRA Reporting Template (Appendix A).

1.2 DATA COLLECTION SHEET

Hazard theme	Hazard	Data Type	Data Source
Floods & Storms	Input are the results of 1.1B	List all collected indicators and describe the data type (e.g. precipitation data – climatology data, flash flood map – hazard map, erosion map – hazard map, crucial electricity infrastructure – sector map).	Link to the data source
Heat			
Drought			
Other themes (e.g. winter storms, sea-level rise)			

Types of data may include:

- **Climatology data** (or "**primary effect**" indicators) – the physical effect of climatic events, e.g., **rainfall intensity, temperature, wind speed**, etc.
- **Hazard maps** (or "**secondary effect** indicators) – showing the changes to the city systems caused by the climatic event, e.g., **floods maps, erosion maps, subsidence maps, biodiversity loss**, etc.
- **Sector maps** (or "**tertiary effect**" indicators) – showing the changes to the human system caused by the climatic event. They are closely related to the ***impacts*** caused by climatic events, e.g., **land use maps, infrastructure maps, damage maps**, etc.

Where can you collect this data?

Sources of data may be at the local, regional, national, or global level. Cities should explore all available data sources, e.g.:

- City departments, e.g., planning department, water department, transport department, disaster risk reduction
- Meteorological office
- Universities
- Other institutions (e.g. hydrological, geological, disaster management)
- Newspaper
- Online resources, e.g., international data sources and tools

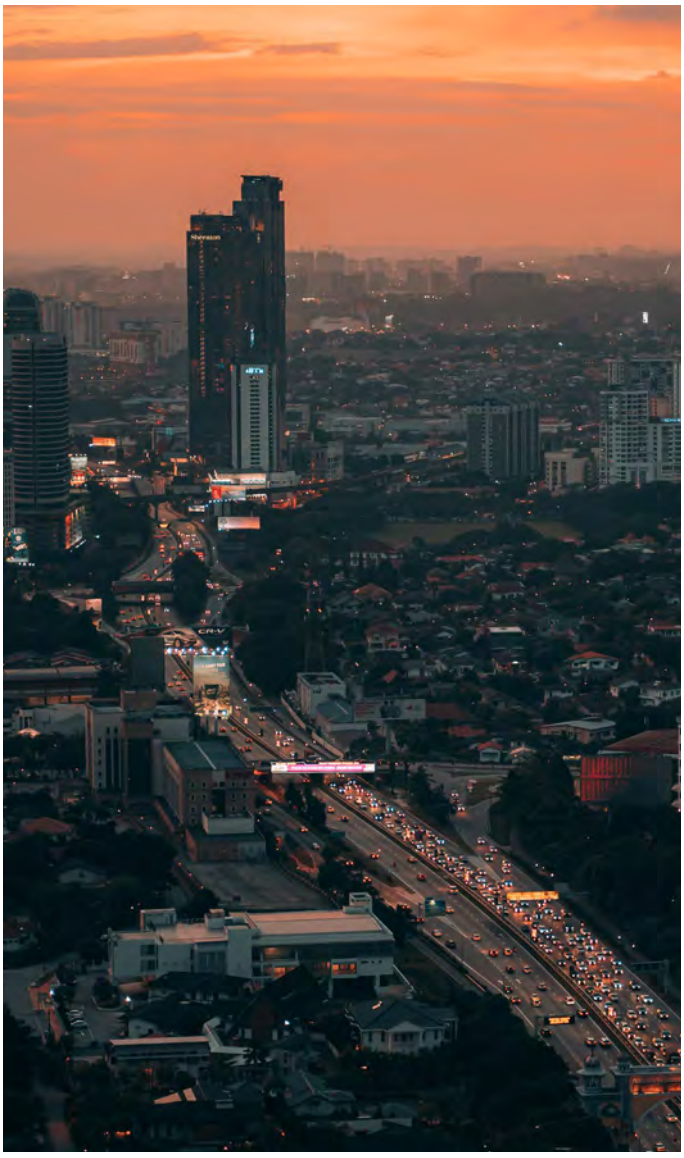
3. ANALYSE HISTORICAL TRENDS AND EVENTS

How has each hazard affected your city in the past?

After identifying relevant indicators for each hazard, analyse the trends in these indicators over time, and identify major historical climate events related to each hazard. Record the findings for each hazard in a table such as the template shown below (Appendix A):

1.4B QUANTIFICATIONS OF CLIMATE HAZARDS FOR HISTORICAL TRENDS AND FUTURE PROJECTIONS

Hazard theme	Hazard	Data Type	Data Source
Floods & Storms	Input are the results of 1.1B	How did the hazard change over time? (e.g. more/less frequency, higher/lower intensity, duration)	What is the projection for the future? (e.g. more/less frequency, higher/lower intensity, duration)
Heat			
Drought			
Other themes (e.g. winter storms, sea-level rise)			



4. ANALYSE FUTURE PROJECTIONS

How will each hazard affect your city in the future?

Select climate scenarios and a time horizon for evaluating future climate hazards.

- **Climate scenarios**: These are typically defined as different future emissions pathways or warming levels, depending on actions taken to reduce global GHG emissions. The IPCC defines several possible modelled scenarios in their most recent report ranging from limiting warming to 1.5°C, in line with the Paris Agreement, to a worst-case scenario projecting warming of up to around 5°C. It is good practise to evaluate a worst-case or high emissions scenario, to understand the most extreme potential effects of a city's climate hazards.
- **Time horizon**: when modelling future climate effects, cities should select a time horizon to communicate the expected effects at a selected time point. It is best to select a time horizon aligning with the city's long-term plans, e.g., 2050.

Record the projections for each hazard in the table alongside the historical trends, such as the template 1.4B shown on the left (Appendix A).

Cities are also encouraged to visualise the future projections for communication purposes, using hazard maps or simple graphics, e.g.:

Kuala Lumpur showing an indicator for the current climate and RCP 8.5

IMPACT ASSESSMENT

1. DETERMINE RELEVANT CITY SECTORS

Which sectors are relevant to your city?

List the sectors relevant to the city – these could be based on a city's sectoral plans, city departments, national ministries, city/state budget allocation per sector, city income per sector, or other sources which help define relevant sectors in the city. Examples of sectors include:

- Agriculture
- Forestry
- Fishing
- Mining and quarrying
- Manufacturing
- Electricity, gas, steam and air conditioning supply
- Water supply
- Waste management
- Administrative and support service activities
- Ecosystems / natural environment / conservation
- Construction
- Transportation and storage
- Information and communication
- Financial and insurance activities
- Real estate activities
- Professional, scientific and technical activities
- Education
- Arts, entertainment and recreation

2. ANALYSE NON-CLIMATIC DATA AND TRENDS

What other factors determine the impact of hazards?

The impacts of climate hazards on a city depend largely on the city's demographic, socio-economic, financial, and other non-climate-related factors. It is therefore important for cities to understand key non-climatic data and trends in their city as part of their CRVA.

Create a table such as the one below (you may use template 2.2A in Appendix A) of the key non-climatic data and trends within your city. Examples of key data, trends and subjects are listed in the table below – cities should add any additional non-climatic data relevant to their city:

- Population growth
- Economic growth
- Urbanization
- Poverty/inequality
- Livelihoods
- Land use change
- Agricultural trends
- Industrial trends
- Energy demand/access
- Housing
- Health
- Food systems
- Others

3. ASSESS IMPACTS OF THE CLIMATE HAZARDS ON EACH SECTOR

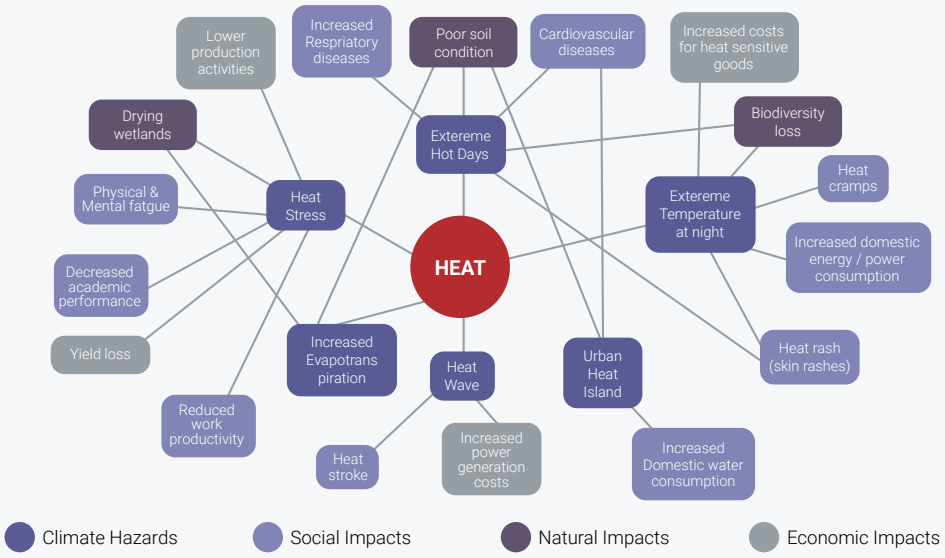
How does each hazard impact each city sector?

Using the hazards identified in the Hazard Assessment step, identify the main impacts of the hazards on your city sectors. Describe impacts that have occurred in the **past**, and the impacts you expect to occur in **future**, considering the demographic, socio-economic and other **non-climatic trends identified**, and the **future projections of the climate hazard.** Make sure to consider impacts on **people, planet** and **profit**:

- **Social impact (People)**: What are the impacts on people and their livelihoods, particularly vulnerable groups most exposed to the hazard? Does it affect community health and wellbeing?
- **Environment impact (Planet)**: What impacts could the hazard have on the local environment e.g., biodiversity, air and water quality?
- **Economic impact (Profit)**: What are the impacts on the city's economy? Which industries and assets will be impacted?

Start by brainstorming the key impacts from each hazard in a **bubble diagram**, as shown in the below example. For this exercise, gather as many different departmental staff, experts and representatives in the city as possible, to obtain a diverse range of perspectives. For each **hazard theme** (heat, floods and storms, drought, etc):

1. Place the **hazard theme** in the centre of the page and each identified **hazard** in a bubble around it.
2. Identify **impacts** of each hazard on the various city sectors and add a bubble for each impact.
3. Add **connecting lines** between the hazards and associated impacts – some impacts may be linked to multiple hazards, and impacts may also be linked.
4. **Categorise** the impacts: social, environmental or economic.



Review and validate the hazard impact bubble diagram with a range of city stakeholders. Make sure all relevant impacts are captured.

After determining the key social, environment, and economic impacts of the main climate hazards, consolidate these impacts in a table format. Use the C40 Excel Tool Step 2.3 – Sector Impact Identification as a template to input the sector impacts.

4. PRIORITISE IDENTIFIED IMPACTS

Using the validated bubble diagrams from the previous step, gather a diverse range of city stakeholders. Ask each stakeholder to select the top 3-4 impacts that they consider the most important – this can be done interactively using stickers or other creative methods. The result will be a prioritised set of impacts for each hazard theme, which should then be listed in a table such as the one below (you may use the template 2.4 in Appendix A).

2.4 LIST OF PRIORITISED KEY IMPACTS		
Hazard theme	**Key impacts**	**Rank / prioritsation**
Floods & Storms	Write down the prioritised impacts from the impact diagrams.	The impacts with the most stickers get the highest rank. Depending on the amount of impacts, make a top 5 or top 10.

RISK ASSESSMENT

1. ASSESS THE CLIMATE RISK

What is the overall risk of each of the impacts identified?

Using the prioritised impacts from the previous step, assign a **probability** and **severity** for each:

- **Probability**: how likely is the impact to occur?
- **Severity**: how serious would the consequences be if the impact did occur?

Default values and definitions for probability and severity may be found in C40's Climate Action Prioritisation Process Guide. Note that these values are qualitative, intended to prioritise impacts relative to each other, and should be based on expert judgement. Cities should modify the probability and severity scales according to their local context.

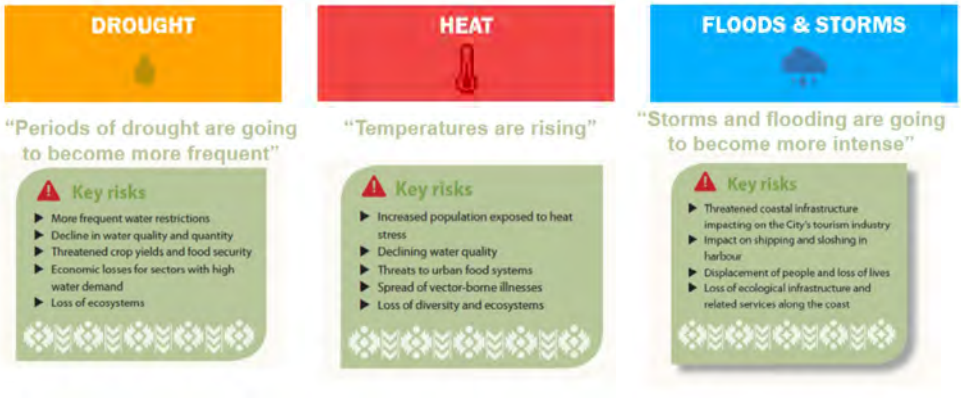
Place each impact into a risk matrix (example below) based on these two factors – cites may use template 3.1 in Appendix A. The more likely impacts will be towards the right, and the more devasting impacts will be towards the top.

2. SUMMARISE AND COMMUNICATE RISK

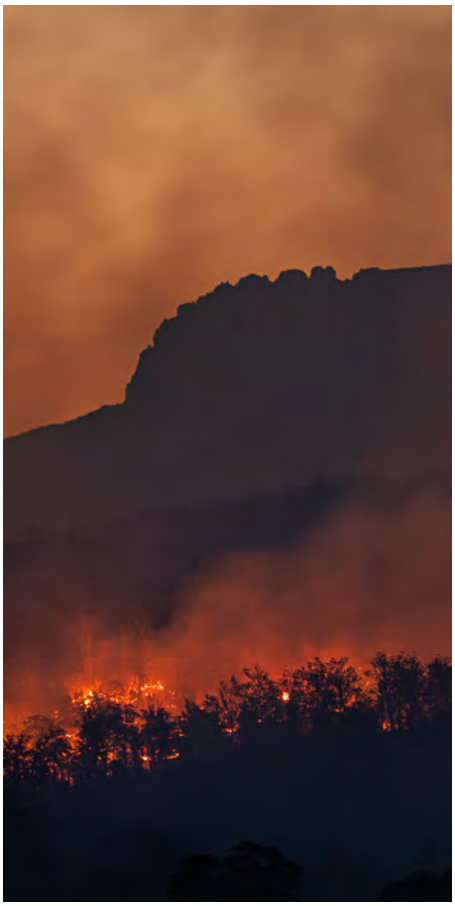
How to communicate key risks to citizens and city stakeholders?

To get policy traction on climate change adaptation, climate information needs to be summarised and clearly communicated to the city government and other city stakeholders, so that adaptation can be mainstreamed into the city's decisions, activities and services.

Group the key risks by hazard themes and develop a key message for each theme, as per the example below:



Cities are encouraged to develop maps and other creative visual storytelling methods to communicate the key climate risks effectively.



3. ASSESS ADAPTIVE CAPACITY

Which factors will affect your city's ability to adapt?

Identify relevant factors which will affect your city's ability to adapt to the impacts of climate change – these factors may **support** or **challenge** your city's adaptive capacity.

It is important for cities to identify these factors and understand how they are influencing the city's ability to adapt, so that supporting factors can be leveraged (e.g., community engagement) and challenging factors can be worked on (e.g., budgetary capacity).

Examples of factors:

SOCIO-ECONOMIC	GOVERNMENTAL	PHYSICAL & ENVIRONMENTAL	SERVICES
Cost of living	Political stability	Rapid Urbanization	Acces to basic services
Housing	Political engagement	Resource availability	Access to healthcare
Poverty	Government capacity	Environmental conditions	Access to education
Inequality	Budgetary capacity	Infrastructure condition	Public health
Unemployment	Safety and security	Infrastructure maintenance	
Migration	Land use planning	Infrastructure capacity	
Economic health	Access to quality / relevant data		
Econonomic diversity	Community engagement		

NEXT STEPS

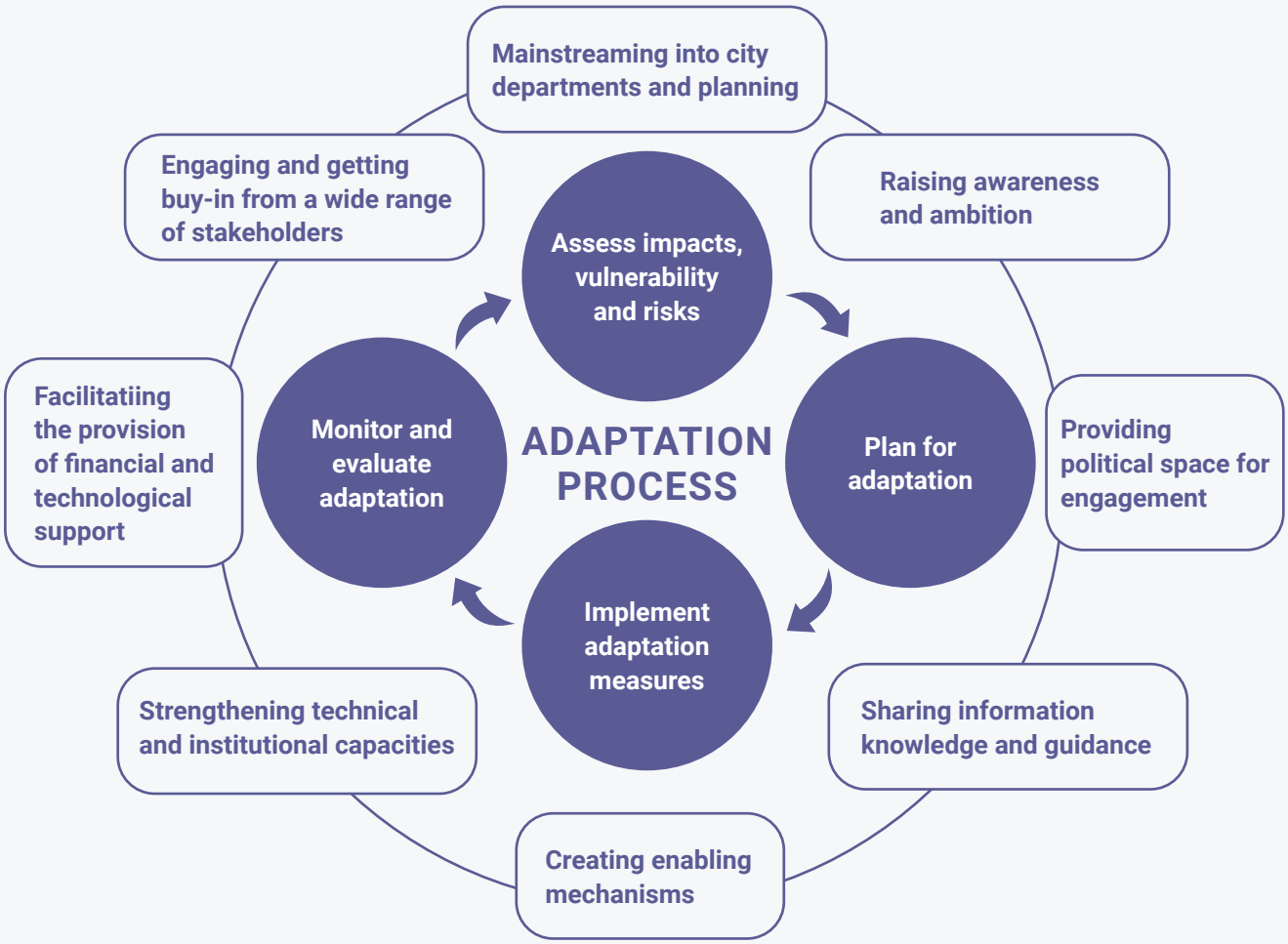
A comprehensive CRVA is fundamental for informing the prioritisation of climate action and investment in adaptation. Some of the key next steps that cities should take after conducting a CRVA are:

- Adaptation planning
- Embedding climate action into policy and governance
- Financing climate action

1. ADAPTATION PLANNING

Adaptation planning is a process of adjustment to the impacts of climate change, including actions taken to reduce the negative impacts of climate change, or to take advantage of emerging opportunities. Adaptation planning should be based on evidence which can then inform a set of priorities and actions. This evidence might relate to climate change impacts, vulnerabilities and risks, ideally in the form of a comprehensive city-level climate risk and vulnerability assessment, but should also account for the needs of different stakeholders, and the capacity of those who will implement the plan. As well as reducing negative impacts or leveraging opportunities from climate change, adaptation actions should aim to address gaps identified while assessing adaptive capacity, to ensure that the city and its stakeholders are able to effectively build long-term resilience.

The figure shown below graphically represents the adaptation cycle, based on the UN climate change regime:



2. EMBEDDING CLIMATE ACTION INTO POLICY AND GOVERNANCE

Despite developing robust adaptation plans based on comprehensive CRVAs, cities may face institutional and operational barriers to implementing these plans. For cities to be able to implement adaptation actions in practise, cities must mainstream climate action into their policy and governance systems. Four key enablers for mainstreaming urban climate action are:

	POLICY AND REGULATORY FRAMEWORKS	PLANS AND PROGRAMS	INSTITUTIONAL STRUCTURES	GOVERNANCE MECHANISMS
Examples:	◥ Policies, laws, bylaws, development regulations and guidelines which mandate, incentivize or prioritise climate action. ◥ Integrate climate change into applicable existing policies, bylaws, regulations and guidelines.	◥ Technical support and capacity building programmes for cities and private sector partners. ◥ Infrastructure plans that incorporate climate action. ◥ Financial incentives and funding for city climate action.	◥ Clear roles, climate change mandates and incentives for different departments and levels of government. ◥ Participatory approaches to decision-making.	◥ Systems that help cities collect and manage data, and utilize it for effective climate-related decision making e.g. CRVA and adaptation planning. ◥ Apply a climate lens to all existing processes, e.g., building consents.

A city can strengthen its climate governance through the following actions:

- **Conduct a governance assessment** – identify governance challenges and opportunities impacting climate action implementation, develop priority or immediate - long term actions, and track parameters over time.
- **Create a supportive policy framework for your city's adaptation plan** – make the adaptation plan binding as far as possible, integrate and align to national, subnational and city level plans, policies and legal frameworks, and establish monitoring, reporting and verification (MRV) systems.
- **Build government structures and processes to support your city's adaptation plan** – allocate roles and responsibilities, create coordination mechanisms, convergence with existing funding programs.
- **Enhance enabling conditions for adaptation plan implementation** – build sustained leadership beyond electoral cycles through cross-party political leadership and coalitions of influential non-state actors. Develop transparent and participatory approaches to decision making.

3. FINANCING CLIMATE ACTION

Climate finance is critical for cities to address climate change, to both reduce emissions and to build resilience to the impacts of climate change. The economic benefits of taking action on climate change has been widely shown to outweigh the costs, according the latest IPCC report. Cities can also reap multiple co-benefits of climate action, which can help to build the case for funding action.

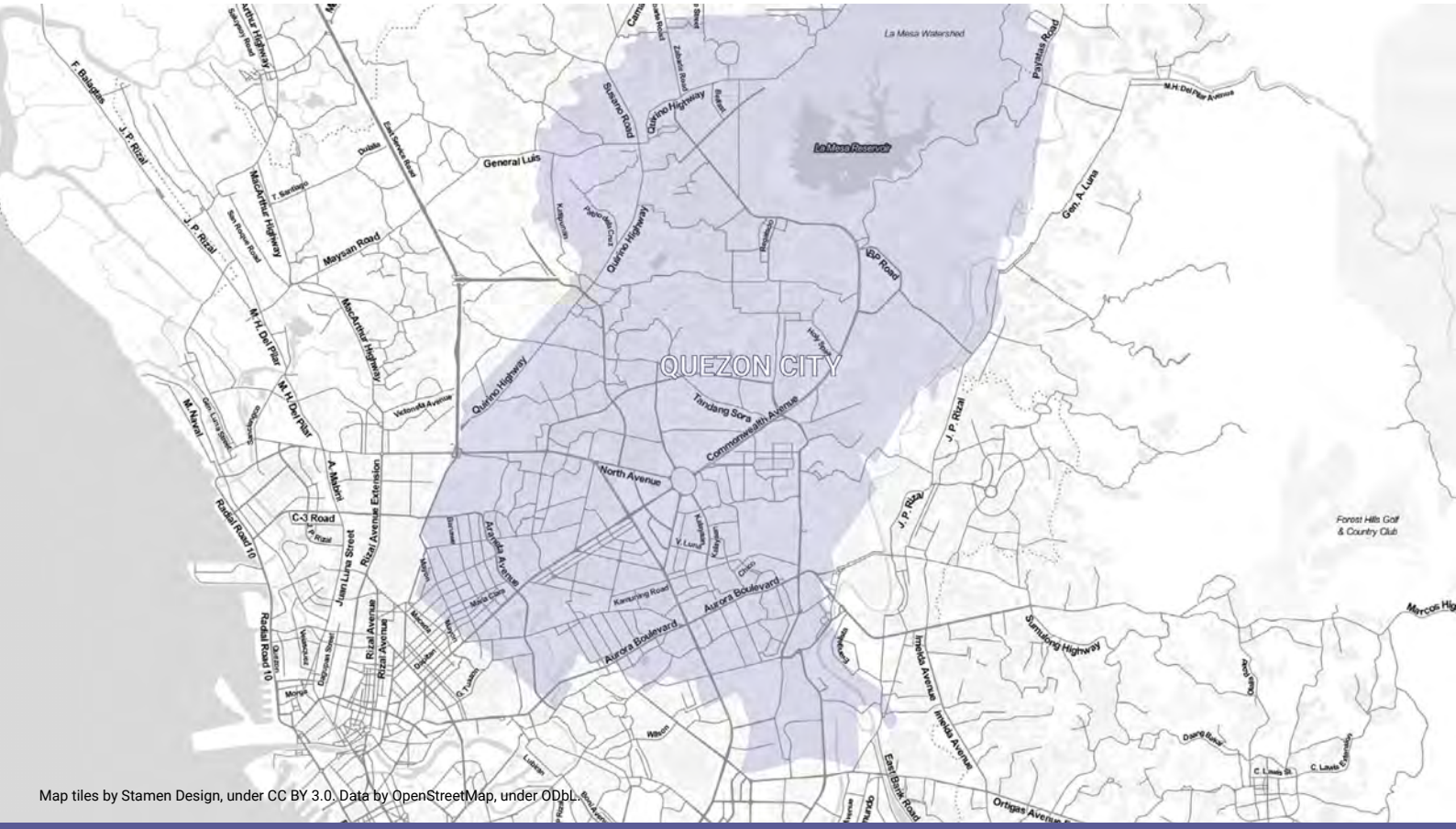
Some climate finance options available for cities to explore are:

- The City Climate Finance GAP Fund provides cities with free technical assistance to support early-stage climate project development (often before a project's financing source is clear). It aims to support cities to turn their climate ambitions into finance-ready projects.
- CDP Matchmaker is designed to leverage CDP's global stakeholders to accelerating investment in urban climate action.
  - Cities disclose information through CDP – ICLEI Track.
  - CDP analyses the data and connects cities to global resources and financing opportunities such as the GAP Fund.
  - CDP showcases city projects seeking funding to potential partners and investors through a dedicated dashboard.

Disclosing cities in Asia interested to learn more about adaptation and resilience planning may reach out to us at citiesapac@cdp.net to enquire about joining the capacity building programme in 2022.

CASE STUDIES
QUEZON CITY

Quezon City is the most populous city in the Philippines. It is one of the cities that make up Metro Manila, the National Capital Region of the Philippines. It is currently the largest city in Metro Manila in terms of land area. The city lies on the Guadalupe plateau in the northeast corner of the metropolis – between the lowlands of Manila to the southwest and the Marikina River valley to the east. The city's topography is largely rolling with alternating ridges and lowlands.



Map tiles by Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

QUICK FACTS

3 MILLION
POPULATION (2020)

161.1 KM²
AREA

$93.8 BILLION
GDP

TROPICAL MONSOON, WITH WARM WEATHER AND DRY AND WET SEASONS.
CLIMATE

MAJOR CLIMATE HAZARD AFFECTING QUEZON CITY

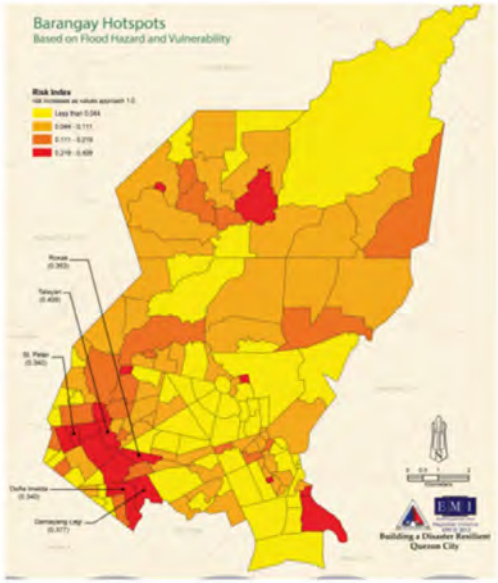
FLOODING

Quezon City sits at a higher elevation than Manila and other Metro Manila cities, but still experiences regular flooding. The city has undulating terrain and is within the catchment area of five river systems - San Juan River, Tullahan River, Marikina River, Pasig River and Meycauayan River - with a total length of almost 200 km. These river systems receive tremendous amounts of water during heavy rainfall and have immense potential to flood low-lying areas. With elevation ranging from 2 meters above sea level (a.s.l.) on the south near Manila up to 232 meters a.s.l. on the northernmost tip of the La Mesa Reservoir, the city is not affected by tidal flooding.

The low-lying areas along San Juan River in barangays Dona Imelda, Damayang Lagi, Talayan, Roxas and Kalusugan are prone to overflow flooding usually when the San Juan River backflows from the junction with Pasig River. The areas near Manila like Simon, Maria Clara, Calamba and Cuenco Streets and Matimyas and Mindanao Streets where the Galas drainage culverts are located are also prone to backflow flooding.

In built-up areas, the drainage, consisting of concrete piped and box culverts, empty into the river or creek, failing when there is a lack of drop-inlets or insufficiently sized drainage pipes get silted or clogged. The result is flash flooding in many places.

QUEZON CITY'S CLIMATE RISK AND VULNERABILITY ASSESSMENT (CRVA)



Source: QC DRRM Plan (2014-2020)

Barangay Hotspots Based on Flood Hazard and Vulnerability Population affected by floods

Quezon City is one of the first cities that adopted the C40 CCRA framework to conduct its climate risk and vulnerability assessment, the first step being identification of the most relevant hazards the city may face. In 2013, the Quezon City Disaster Risk Reduction and Management Plan (QCDRRMP) 2014-2020 was formulated by the Quezon City Disaster Risk Reduction and Management Council (QCDRRMC) in partnership with Earthquake and Megacities Initiatives (EMI). This included the Hazards, Vulnerability and Risk Assessment Report (HVRA) and the Disaster Risk Reduction and Management Plan (DRRMP) 2014-2020 for managing earthquake and flood risks, which identified the barangays most at risk from these natural disasters. The city's flood assessment indicated that a total of 700,000 people are currently estimated to be affected by potential floods, with 16% in low, 30% in moderate and 54% in high flood susceptibility areas. However, the Japan International Corporation Agency (JICA) model estimated that climate change can increase the affected areas in Quezon City by 2050 by as much as 7%. A once-in-a-century scale flood would cause an estimated 111 casualties in the city, with one extra casualty being added for every 1,500 informal settlement buildings. Around 68,600 people are expected to be displaced in such a scenario, and a high disease incidence rate could be expected, alongside systemic failures in healthcare systems, and parallel infrastructure such as the water and sanitation system. Considering a 100-year flood return period, the total economic loss resulting from this study comes out to be $319 million, of which about $245 million is capital stock related.

Maps are very effective in linking climate science with city priorities and concerns. **Hotspot-maps** like the one above make it easier to involve the different city sectors or departments, creating a sense of urgency.

Based on Quezon City's CVRA, the local government identified the initiatives that are required to make the city safer and more resilient against climate change. On adaptation, these were the development of a disaster and climate risk monitoring system and the installation of Early Warning Systems, as well as the construction of social and low-cost housing, and other living spaces built to climate-resilient standards. The QCDRRMP and the City's Enhanced Local Climate Change Action Plan 2021-2050 recommended mitigation measures such as initiatives that help reduce greenhouse gas emissions; waste diversion programmes; energy efficient street lighting, urban greening and gardening projects; traffic management and a Green Fund Summit to develop policies to mobilise carbon finance. Other significant suggestions include the construction of climate hazard-resilient schools and the demolition of illegal structures in high-risk areas, with the relocation of those who live in them.

THE BENEFITS OF QUEZON CITY'S SOCIAL HOUSING

One example of concrete action the city has taken is its social housing programme, which was developed to provide a better quality of life to residents through affordable and secure housing. Vulnerable families are assured well-built accommodation in safe locations, mostly in the city, helping avoid disruption also to their economic life and enabling them to continue to earn an income. The programme has led to the successful relocation of 5,698 families, who now reside in communities that adhere to the Green Building Codes, (standards for safe, sustainable, and resilient structures),

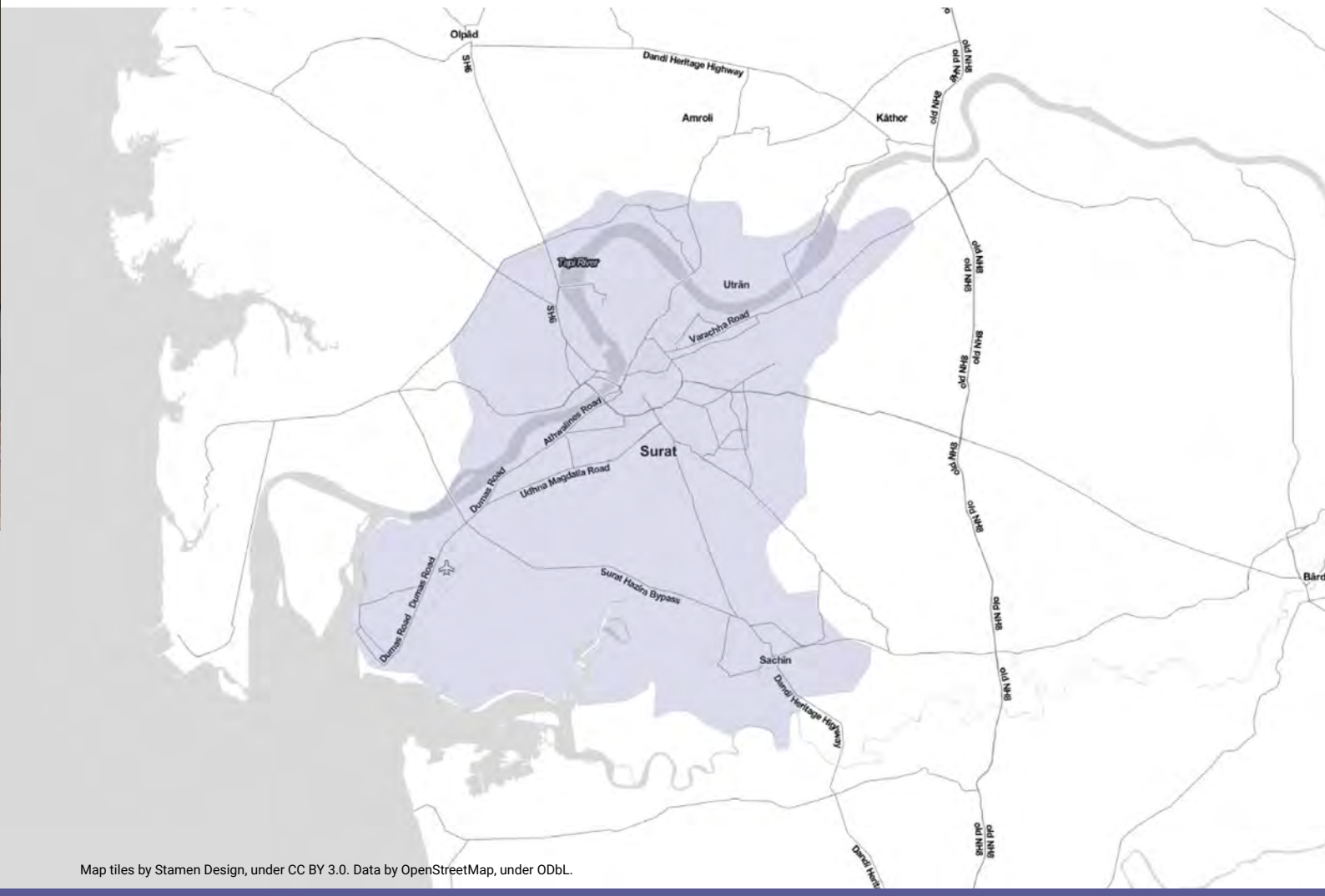
These thousands of families can now feel safe in their homes, free from worries about eviction or the demolition of their house and enjoy the economic advantages and mental and emotional well-being that comes with home ownership and the ability to pass it on to future generations. And they now live in areas with sanitation facilities, better air quality, and safer surroundings, instead of near waterways with the risk of flooding and disease, or busy roads with heavy traffic.

Moreover, by increasing access to public transportation, schools, and workplaces, more people are able to receive a formal education, take advantage of better economic opportunities, and become part of the job market.

With many families having been moved away from the riverbanks and waterways, the city is able to further mitigate urban flooding by restoring original river boundaries and clearing the waterways, thereby improving both the resilience of the city and the lives of its residents.

CASE STUDIES
SURAT CITY

Surat is a city located on the western part of India in the state of Gujarat. It is one of the most dynamic cities of India. Surat is one of the cleanest cities and is also known by several other names like "The Silk City", "The Diamond City", "The Green City", etc. It has the most vibrant present and an equally varied heritage of the past. The economic base of Surat consists of textile manufacturing, trade, diamond cutting and polishing industries, intricate Zari works, chemical industries and the petrochemical and natural gas-based industries.



Map tiles by Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

QUICK FACTS

7.5 MILLION
POPULATION (2021)

462 KM²
AREA

$59.8 BILLION
GDP

TROPICAL MONSOON, WITH AVERAGE TEMPERATURE BEING AROUND 28 DEGREES CELSIUS AND AVERAGE ANNUAL RAINFALL IS APPROXIMATELY 1,200 MILLIMETRES (MM.) (IMD, 2016).
CLIMATE

CLIMATE HAZARDS AFFECTING SURAT CITY

Surat is highly vulnerable to climate change due to its ecological background and geographical location. Different areas and sections of the population in Surat are exposed to different climate hazards at different frequencies and intensities.

The critical hazards are temperature rise, humidity rise, and flooding.

Surat experiences high relative humidity throughout the year so temperature values by themselves will not provide the best indicator of how hot it feels in summer. The analysis of temperature and humidity indicates that dangerous periods of extreme heat with more frequent maximum temperature spikes and rising humidity are likely to occur more often, meaning measures will be needed to protect the city's population, especially as regards health. The temperature increase is likely to cause an increase in the amount of time and energy needed to cool workspaces and homes. Since Surat is a high humidity environment, energy demands – such as to keep cool – are likely to be quite significant. The heat might also impact the economy, deterring workers and impacting productivity.

Surat also faces local creek flooding (called Khadi floods) from two streams that pass through the southern part of the city. These streams flood during heavy rains and can cause serious damage to settlements located near their banks. This happened in 2004, 2005 and 2007. In the 2004 floods, nearly 400,000 people were affected; there was a power failure lasting two days, water supply lines were disrupted for a week and many city neighbourhoods were inaccessible.

The Resilience Strategy for Surat (2017) showed the city is highly vulnerable to multiple hydrometeorological hazards such as river floods, creek floods, and storm surges, with reclaimed land in the sea adding the further risk of high tidal effects. Due to major industrial activities, fire incidents are also not uncommon.

The city has a long history of floods, with them occurring every two and a half years between 1869 and 1884, and once every four years between 1949 and 1979. Since then, there have been five major floods (1979, 1990, 1994, 1998, and 2006), with the floods of 2006 inundating 75% of the city at a very high cost to lives (estimates of the death toll range from 150 to 500) and the economy (running to several hundred billion rupees).

The probability of a flash or surface flood in Surat is currently medium high, and the frequency of such events is anticipated to rise. It would be expected to lead to an increased overall demand for public and health services, with the city's water supply and sanitation being affected and already vulnerable people, especially children and young people, suffering increased risks.

SURAT'S CLIMATE RISK AND VULNERABILITY ASSESSMENT (CRVA)

To map these hazards, vulnerabilities, and their impacts, Surat prepared the Surat City Resilience Strategy in 2011, under Phase II of the Asian Cities Climate Change Resilience Network (ACCCRN). The city also prepared its Resilience Strategy in 2017 under the 100 Resilience Cities (now Resilience Cities Network) program.

Primary methodology used: ICLEI ACCCRN Process Toolkit (regional - Southeast Asia)

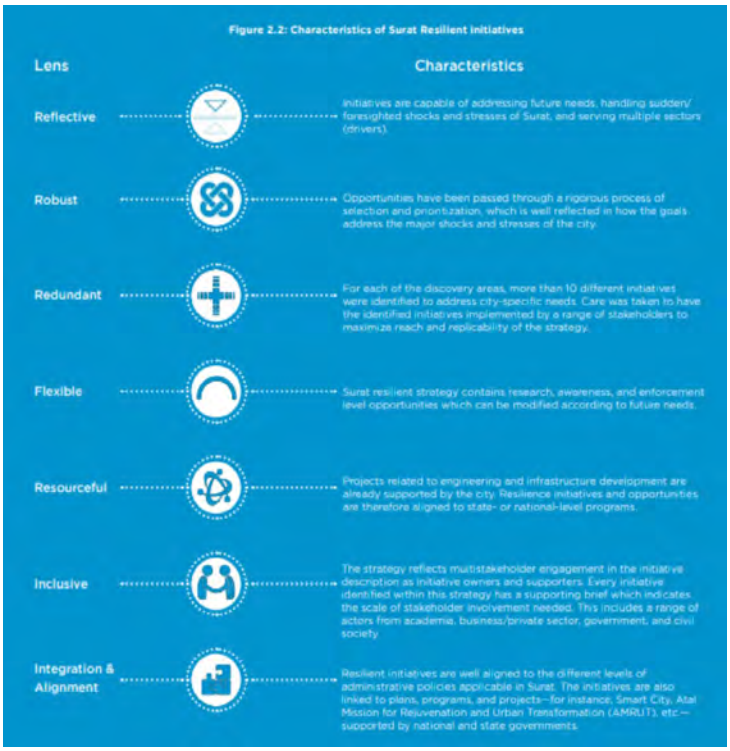
The strategy development process was started by identifying and engaging with relevant stakeholders and city champions. Seven "discovery groups" were formed to study the impacts of climate change on the city, comprising decision makers, planners, municipal engineers, academics, entrepreneurs and businessmen, builders' associations, water resource managers, public health practitioners, and energy suppliers. Some of the key highlights from this process, which established the Surat Climate Change Trust to develop a resilience strategy for the city, were:

- Consultations with policy makers and decision makers at the city/municipal administration.
- Focus group discussions (FGDs) with city steering committee members and discovery group members.
- Consultations with subject matter specialists.
- Research studies to understand different aspects of the current situation and obtain information from secondary literature and primary surveys.
- Engagement with a new generation of planners/engineers/ researchers via the Urban Transport and Infrastructure Design (UTID) Studio (with transport planning students).
- Participation in community engagement events to capture the perceptions of citizens.

RESILIENCE ORIENTATION

The Resilience Strategy for Surat identifies 7 pillars (discovery areas), 20 goals, and 63 initiatives—the lattermost will create a resilient impact on all the pillars, thus increasing their resilient value - such as around the environment and ecosystems (14), water availability and quality (13), connectivity and mobility (11) and affordable housing (7).

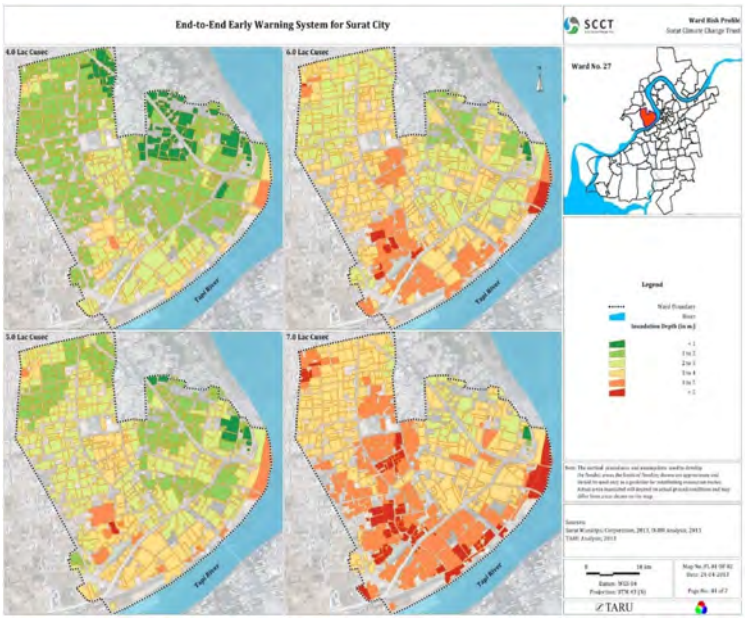
The strategy has had a number of key achievements, including the establishing of the Surat Climate Change Trust, with members from national, state and city institutions; the development of reservoir inflow and outflow prediction models; the installation of 10 automatic weather stations and 2 water level measurement unites to provide detailed weather, tide and water flow information; the development of flood preparedness, response and mitigation plans; and the creation of city-level spatial data for flood management.



The strategy was funded by the Rockefeller foundation under Phase II of the Asian Cities Climate Change Resilience Network (ACCCRN) initiative, and the Surat Municipal Corporation received technical support from TARU Leading Edge, a research and consultancy company working on disaster management and climate change.

SURAT'S FLOOD PREVENTION ADAPTATIONS

The combined volume of river and coastal flooding has made it difficult to reduce the impact of flooding through hard, fixed infrastructure developments like flood barriers and walls. Instead, the city has turned to integrated systems such as developing an end-to-end early warning system to reduce the intensity of flood damage and improved information and data management, mapping of flood-risk areas and the regulation of construction in floodplains. Extensive public awareness campaigns and education was done to increase understanding of the impacts of flood warning systems. Many risks resilient workshops were conducted with the key stakeholders to develop the strategy for the city.



The combined cost of initiating the flood management strategies - including vulnerability mapping, enhanced weather stations, the early warning system and community programmes such as the Surat Climate Change Trust - has been around $500,000. Set against the estimated cost of the 2006 flood ($4.5 billion), this is an extremely valuable adaptation measure for the city that will pay dividends for years to come.

(Source: ACCCRN, 2017)

CASE STUDIES
TRONDHEIM CITY

Trondheim, a Norwegian city steeped in history, is an excellent example of how some developed cities in Europe are leading the way in achieving climate resilience through robust adaptation planning and community engagement.

Trondheim is Norway's third most populous municipality, with estimates that the population will grow to around 225,000 in 2030 and approximately 250,000 in 2050.

In Trondheim, the population growth over the past 20 years has been greatest in the younger age group (18-34 years), where the proportion of the city's population has increased from 25.7% in 2001 to 28.5% in 2018.

QUICK FACTS

207,595
POPULATION (2021)

527.48 KM²
AREA

$11.0 BILLION
CITY GDP

CLIMATE HAZARDS FOR TRONDELAG

On behalf of the Norwegian Environmental Agency, the national climate service centre has developed climate profiles of all the country's regions, showing how the climate is expected to change in the various regions until the end of the century. The climate in the Trondelag region is characterised by large variations, with a mild and humid climate along the coast and a more continental climate further inland.

Today, the annual precipitation is the highest near the coast and lowest in the inland of Trondelag. In the future, the climate will become significantly wetter. The climate profile for Sor-Trondelag projects a 20% increase in the annual precipitation, which also includes the coastal community of Trondheim. The increase in temperature will be highest in the summer and autumn. At the same time, there will be a decrease in snow level and in the number of snowy days, and a trend of stronger and more frequent winds

An increase in temperature can already be observed today. Trondheim municipality has seven weather stations that monitor short-term precipitation, which show an increase of 20-40% in recent years, compared to the period of 1967-2009.

The average yearly temperature of Trondelag is about 0 degree Celsius, while the temperature can drop very low in the inland. Summer can be warm, with a temperature of up to 30 degrees. In 2020, Trondelag recorded the warmest temperature ever in January, measuring up to 9 degrees above average. The average yearly temperature is expected to increase by more than 4 degrees by 2100, with the biggest increase in the winter.

TRONDHEIM'S CLIMATE RISK VULNERABILITY ASSESSMENT (CRVA)

Climate change - themes		Climate vulnerability - risk (Probability x consequence = risk)		
Main cause	**Climate-related event**	**Life and health**	**Environment and biodiversity**	**Material values** (Infrastructure, service production)
Increasing precipitation	Extreme precipitation and rain flood			
	Rock fall			
	Debris flow			
	Quick-clay landslides			
Increasing wind	Strong winds			
	Storm surge			
Increasing temperature	Drought			
	Forest fire			
	Sea level rise			

High risk
Medium risk
Low risk

The highest risks related to climate change in Trondheim - categorised by consequence areas.

Three-step strategy for stormwater management

1. Infiltration: Smaller precipitation volumes are infiltrated locally to the ground through vegetation and permeable surface.

2. Attenuation: Larger precipitation volumes are retained and released slowly to reduce the peak discharge. Depressions in the terrain, e.g. swales, can be used to retain stormwater.

3. Safe flood ways: For extreme precipitation levels, the stormwater runoff is led via safe flood ways to a nearby recipient, so that damage on buildings and infrastructure is avoided.

The three-step strategy for stormwater management

The built environment is especially vulnerable to climate change and therefore adaptation is an important consideration when planning Trondheim's development. Planning and building application processes are key to making Trondheim a climate robust city. New land development and transformation and densification of existing areas must be well adapted to future climates. Densification in existing areas will increasingly strain the capacity of storm water drainage system. Stormwater should therefore be filtered locally, according to a three-step strategy as outlined above. Preservation of vegetation and nature-based solutions is also important to secure good stormwater management.

Due to rising sea levels, larger areas along the coast and river estuaries risk being flooded during storm surge events and extreme sea levels. It is therefore important that buildings and other infrastructure in these areas are designed to withstand temporary flood events and permanent sea level rise. A wetter climate will also result in increasing wear on existing buildings and buildings will need to be maintained more frequently and incorporate more robust materials. In a city like Trondheim, which has a significant share of wooden buildings, wood decay will become a growing problem.

NATURE BASED SOLUTIONS

Use of nature-based solutions for climate change adaptation can be resource efficient and have many co-benefits for the urban environment. Many nature types of help make society more climate resilient. For example, bogs are an important nature type that help retain water. The additional benefits can be environmental (e.g., recreation and conservation of biodiversity), social (e.g., improved quality of outdoor areas), or economic (e.g., increasing the property value). Nature-based solutions should be designed to secure such positive synergies between environmental and social effects.

Example: Ilabekken
The reopening of *Ilabekken* stream in 2006 has been a success story and the reestablished park and nature area is appreciated by the people who live nearby and pass through the area.

Nature-based solutions

COOPERATION AND PARTICIPATION

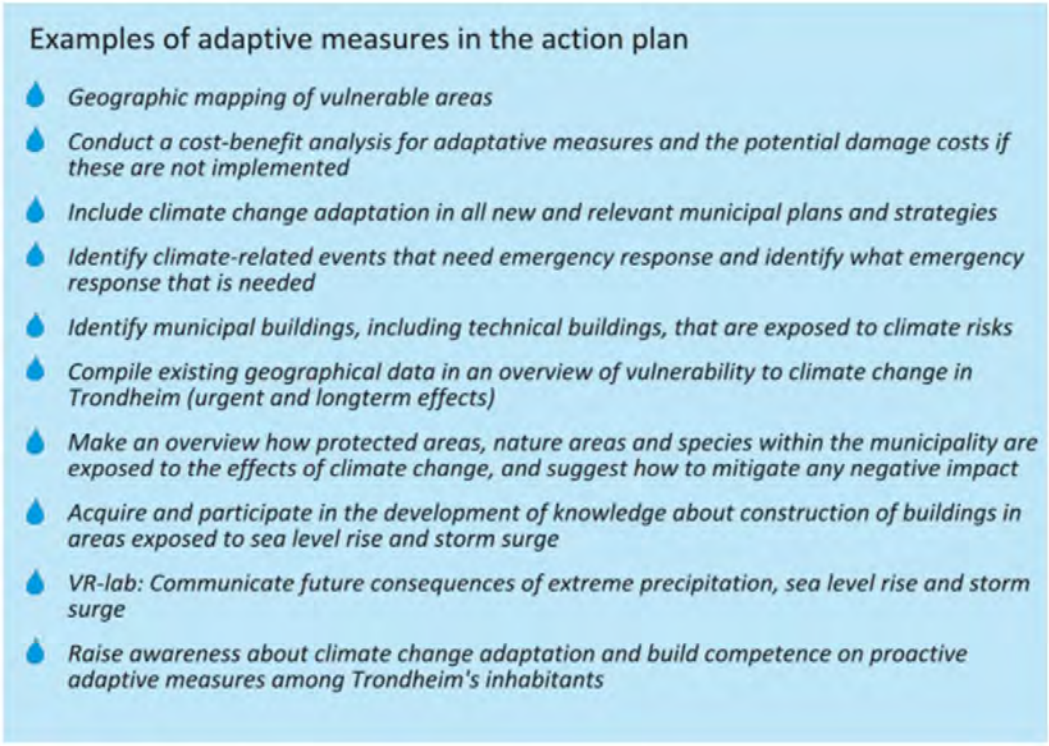
The people of Trondheim play an important role in implementing adaptative measures. Information about climate risks, climate change adaptation, and how civil societies and individuals can contribute in the adaptation process, will be communicated to the city's population, and the municipality should provide information on adaptive measures that can reduce climate-induced damage on private property. It is important to include the local community and secure local interest in the adaptation process.

ACTION PLAN FOR CLIMATE CHANGE ADAPTATION IN TRONDHEIM 2021-2023

Achieving the goal of making Trondheim sufficiently robust to face climate change by 2025, will require extensive collaboration, both among municipal bodies and with wider society. The action plan was constructed through intersectoral collaborations with relevant bodies in Trondheim municipality and coordinated with the environmental unit.

The plan consists of 67 adaptive actions for 2021-2023. A selection of the proposed actions is presented in the figure below. Each of the proposed measures in the action plan is connected to a municipal unit that has the main responsibility for that action, with any collaboration partners also identified. To ensure the adaptation process is followed and reported on, the possibility of incorporating the action plan into the climate budget together with mitigation measures, will be considered.

The actions vary in extent and resource needed. A simplified evaluation has been made of whether the cost of the action is covered within the existing budget and human resources for the responsible unit, or whether there is need for additional funding to implement the measure. The chief executive officer considers that the current budget is not sufficient to initiate the implementation of these measures and will continuously look for opportunities to implement these actions, for example by applying for external funding. The status of the implementation of the action plan will be assessed in the annual report on the municipality's work related to climate change. The report will evaluate the sum of actions, rather than each individual action.



A selection of the adaptive measures proposed in the action plan

Frequently Asked Questions

WHY IS THERE A NEED FOR CAPACITY BUILDING OF CITY LOCAL AUTHORITIES TO STRENGTHEN CLIMATE RESILIENCY IN ASIAN CITIES?

In Asia, cities are especially exposed to the negative impacts of climate change. There are a high number of coastal cities with populations above 10 million that are projected to experience at least 0.5 metres of sea level rise by the 2050s. Additionally, cities in Asia are already experiencing life-threatening heat extremes, which caused 3,500 deaths in 2015, and these are only expected to become more frequent and more extreme in the coming decades[1]. Data disclosed to CDP in the year 2020 by 95 Asian cities showed that there is a basic knowledge gap around the climate risks cities are facing, which stifles the ability of local authority to take the necessary actions to adequately adapt to climate impacts on their residents and businesses and build long-term resilience.

WHAT IS THE SIGNIFICANCE OF A CLIMATE RISK AND VULNERABILITY ASSESSMENT (CRVA) IN CITY CLIMATE ADAPTATION ACTION AND PLANNING?

A Climate Risk and Vulnerability Assessment is the first critical step towards climate adaptation that helps cities understand their current and future climate hazards. A CRVA typically indicates the current probability and magnitude of occurrence of the hazards, social, environment and economic impacts, and the future changes in the frequency and intensity of these hazards. It should inform the development of adaptation goals and prioritization of actions in the city's climate action plan.

HOW CAN A CITY MANAGE ITS CLIMATE RISKS BY CONDUCTING A CRVA?

Climate risk is a function of hazards, exposure, and vulnerability to impacts. A climate hazard becomes a climate risk when people and/or assets are exposed to the hazard and these exposed group of people or assets are vulnerable to it. The city can enhance its adaptive capacity and resilience to these climate hazards by measuring them. A CRVA allows a city to first understand and measure these climate hazards, which forms a baseline for implementing climate adaptation actions to deal with overall climate risk.

WHAT ARE THE RECOMMENDED METHODOLOGIES A CITY CAN ADOPT TO CONDUCT A CRVA?

Please refer to the "Resources" section for available CRVA methodologies, tools and other resources.

WHO ARE THE KEY LOCAL STAKEHOLDERS INVOLVED IN A CITY-LEVEL CRVA?

Climate action planning should be an inclusive process with diverse stakeholder engagement e.g., vulnerable groups, experts, officials, citizens, etc. A city-level CRVA should similarly include a network of key local stakeholders to make it relevant, implementable, and equitable. These stakeholders include residents,especially those adversely impacted by climate change and inequality, as well as civil-society groups, private companies, business associations, delivery partners, universities and other experts, other levels of government, city government agencies and departments.

HOW DOES CDP SUPPORT CITIES' CRVA DEVELOPMENT?

CDP runs a global environmental disclosure system for cities, states and regions as well as companies and investors, to measure and manage their climate change impacts. For cities, CDP's questionnaire requests data on climate hazards, vulnerability and adaptive capacity, providing a framework for cities to evaluate their climate hazards and collect relevant data. CDP also offers scoring and free tailored feedback on their reported data to help cities improve their climate data and overall strategies to reduce emissions and build resilience. For selected cities in Asia, CDP is delivering in-depth capacity building that aims to address knowledge gaps around climate risk and adaptation strategies.

WHAT ARE THE POSSIBLE CHALLENGES A CITY MAY FACE WHEN DEVELOPING A CRVA?

City may face institutional and operational barriers while conducting a CRVA. Collection of relevant, quality data is one of the most important aspect of CRVA development, but cities often face challenges in terms of lack of required information, data availability in useful formats, and sometimes a high degree of variability in spatial and temporal scale. Lack of coordination and communication across different related departments often contributes to this issue. Cities should establish regular communication and data-sharing processes between relevant departments to minimize this issue, especially in the face of the COVID-19 pandemic where operations of various city department tend to be disrupted.

Another common issue is a lack of dedicated resources (experts, officials, stakeholders etc.,) to actively develop the CRVA. Cities should establish a climate action or similar working group, with dedicated representatives ideally across multiple relevant departments e.g., planning, water, waste, energy, transport, etc., who will actively contribute to the CRVA throughout the process.

1 The Future We Don't Want, Urban Climate Change Research Network, February 2018, https://c40-productionimages.s3.amazonaws.com/other_uploads/images/1789_Future_We_Don't_Want_Report_1.4_hi-res_120618.original.pdf

RESOURCES

LINK TO RESOURCE	SOURCE	DESCRIPTION
C40 Rapid Climate Change Risk Assessment Module	C40 Cities	A thorough step-by-step module on conducting a "Rapid" Climate Change Risk Assessment.
C40 Climate Change Risk Assessment Guidance	C40 Cities	A concise guide on the basic principles and components of a city-level climate risk assessment.
CDP-ICLEI cities questionnaire climate hazard taxonomy	CDP/ICLEI	A comprehensive list of common climate hazards faced by cites (see question 1.2)
ICLEI ACCCRN Process Toolkit	ICLEI	ICLEI ACCCRN Process (IAP) enables local governments to assess their climate risks in the context of urbanisation, poverty and vulnerability and formulate corresponding resilience strategies.
IPCC climate change impact assessment guidance	IPCC	Guidance on assessing the impacts of potential climate change and of evaluating appropriate adaptations.
Information Source to Support ADB Climate Risk Assessment and Management	Asian Development Bank	A technical note to support climate risk assessment experts, those undertaking the early stages of project development. It provides a compendium of open access resources that could assist experts carrying out CRAs.
Risk Supplement to the Vulnerability Sourcebook	GIZ	The sourcebook offers a concept and step-by-step guidelines for standardised assessments of vulnerability to climate change.
Climate Change 2022: Impacts, Adaptation and Vulnerability	IPCC	The Working Group II contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC WGII AR6) considers climate change impacts, adaptation, and vulnerability. It provides a comprehensive, up-to-date picture of the current state of knowledge and level of certainty, based on the available scientific, technical, and socio-economic literature.
Making Cities Resilient 2030 Resilience Roadmap	United Nations Office for Disaster Risk Reduction (UNDRR)	Making Cities Resilient 2030 (MCR2030) is a cross-stakeholder initiative for improving local resilience providing a three-stage roadmap to urban resilience, including tools, access to knowledge and monitoring and reporting tools.

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ABOUT CDP

CDP is a global non-profit that runs the world's environmental disclosure system for companies, cities, states and regions. Founded in 2000 and working with more than 680 financial institutions with over $130 trillion in assets, CDP pioneered using capital markets and corporate procurement to motivate companies to disclose their environmental impacts, and to reduce greenhouse gas emissions, safeguard water resources and protect forests. Over 14,000 organizations around the world disclosed data through CDP in 2021, including more than 13,000 companies worth over 64% of global market capitalization, and over 1,100 cities, states and regions. Fully TCFD aligned, CDP holds the largest environmental database in the world, and CDP scores are widely used to drive investment and procurement decisions towards a zero carbon, sustainable and resilient economy. CDP is a founding member of the Science Based Targets initiative, We Mean Business Coalition, The Investor Agenda and the Net Zero Asset Managers initiative.

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