



Climate & Development
Knowledge Network

Planning for Climate Resilience Strategy in Nepal Municipalities

20/9/2021- 24/9/2021

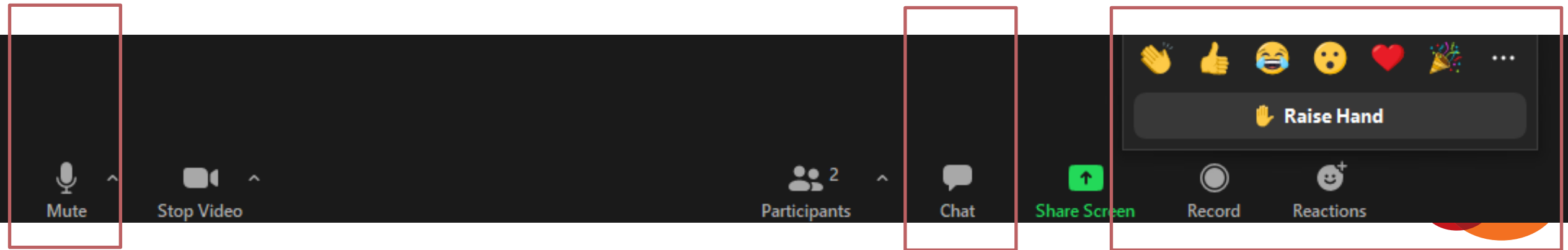


Local Governments
for Sustainability
SOUTH ASIA



Housekeeping

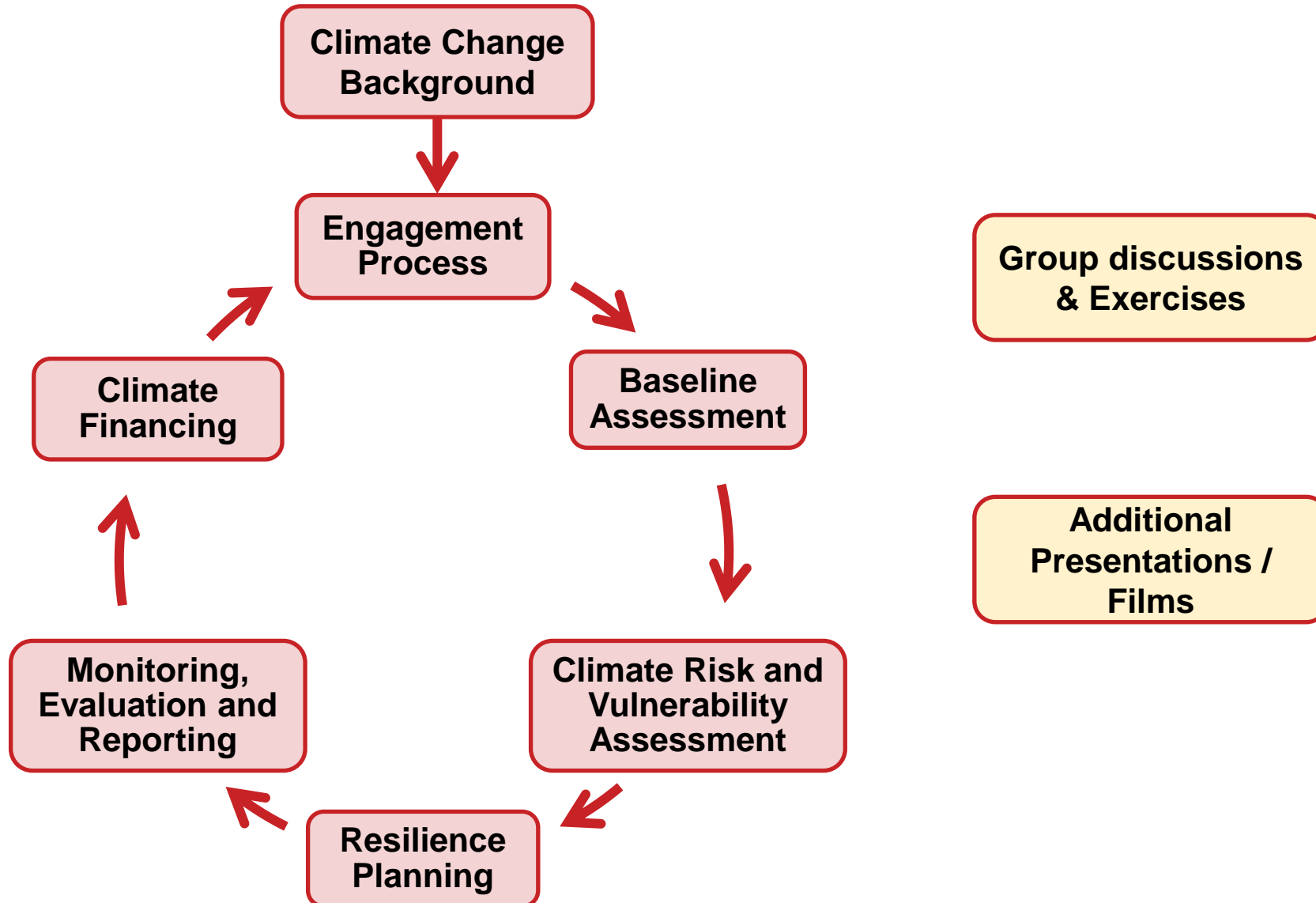
- This session is being RECORDED. Presentations will be shared.
- Feel free to talk in your NATIVE LANGUAGE; we will translate for others.
- You are requested to FOLLOW trainers' speech/inputs without interruption; if you have questions, please click the RAISE HAND icon, and the trainer will give you time to speak.
- For technical difficulties, please send a message via the CHAT BOX.
- Avoid multi-tasking and using messaging apps such as Skype.
- The sessions include polls to engage with the participants and for you to assess your understanding. Please complete all polls for monitoring and evaluation purposes.
- Keep your videos ON when you speak and keep your microphone MUTED when you are not speaking
- Summary of the day will be made by the different groups on each day.



Agenda

Day 1	Key Concepts of Climate Change and Resilience Engagement with Municipality
Day 2	Baseline Assessment Climate Risk and Vulnerability Assessment
Day 3	Development of Climate Resilience Strategy Monitoring , Evaluation, Reporting and Scaling
Day 4	Financing Resilience Way forward

Course Content & Methodology



Expectations from the workshop

Understanding about climate change and resilience building

Be able to identify adaptation and mitigation measures in a participatory setting

To learn climate risk and vulnerability assessment

Focus on technical and practical issues.

To learn process to develop and implement local level climate resilience planning

Let's get to know each other

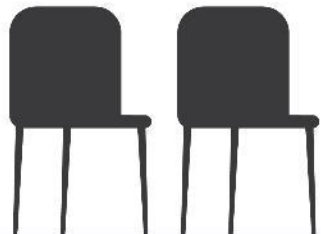
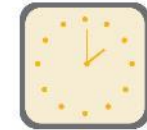
Please tell your and your organization name ?

Name

Designation

City and Organization Name

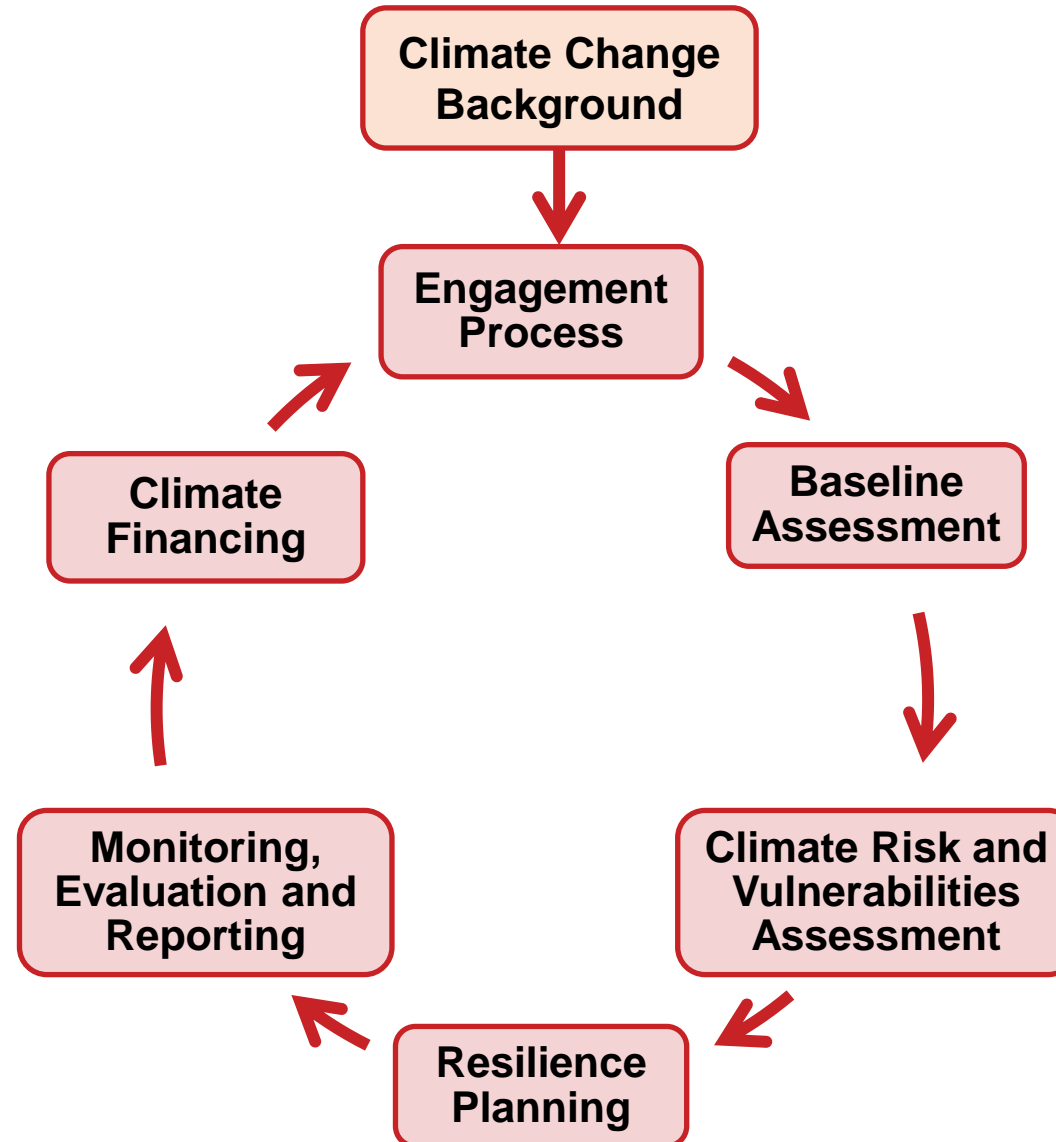
Something about yourself that you would like to share with everyone



Module - 1

Introduction to Climate Resilience

Key Concepts



Objective

- To understand key concepts and commonly used terminology related to climate change and climate resilience
- To understand the linkage of municipalities with climate change – causes/impacts
- To understand the need for local climate resilience strategy



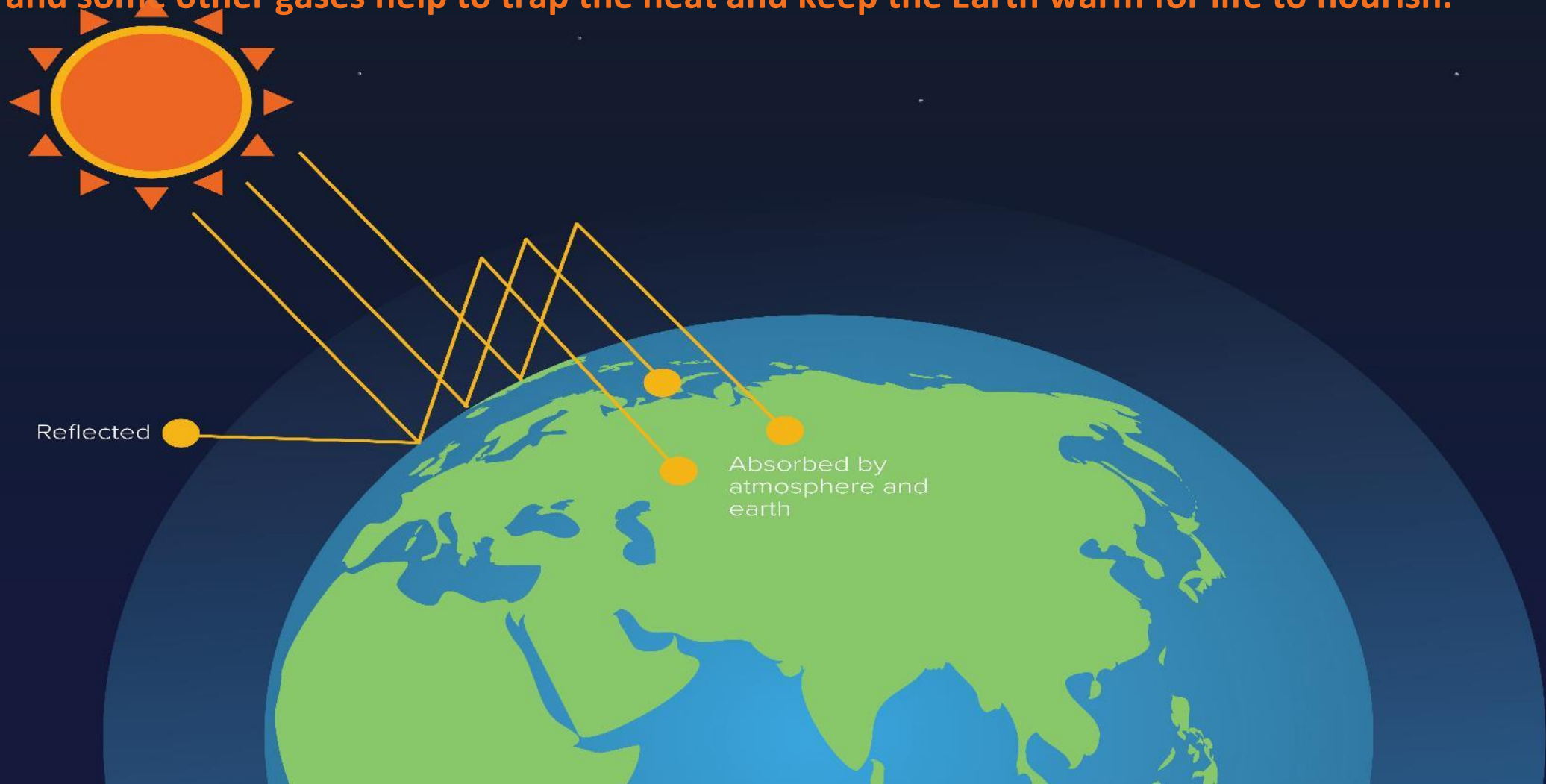
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Key Concepts

Greenhouse Gas Effect

Some of the Sun's rays that hit the Earth are reflected and some become heat.

CO₂ and some other gases help to trap the heat and keep the Earth warm for life to flourish.



Weather and Climate

WEATHER: Short-term local atmospheric conditions, generally measured on the scale of hours, days and months

Example: It is a hot and humid day



CLIMATE: Average of weather conditions over a long period and can be assessed for a single, large area.

Example: The region has a tropical climate.



Climate Variability and Climate Change

Climate Variability

Slow changes in climate showing short-term seasonal fluctuations every year.

Example: Variations in precipitation during the monsoon

Climate Change

Shift in weather conditions that occurs and persists for an extended period, typically decades or longer.

Example: Winters are not as cold as they used to be

UNFCCC

«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 period»

Hazards and Disasters

Hazard

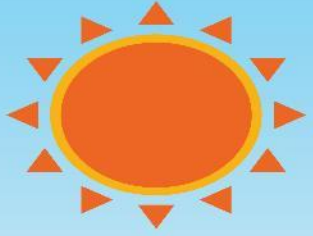
Threat of a naturally occurring event that may have a negative effect on humans

Disaster

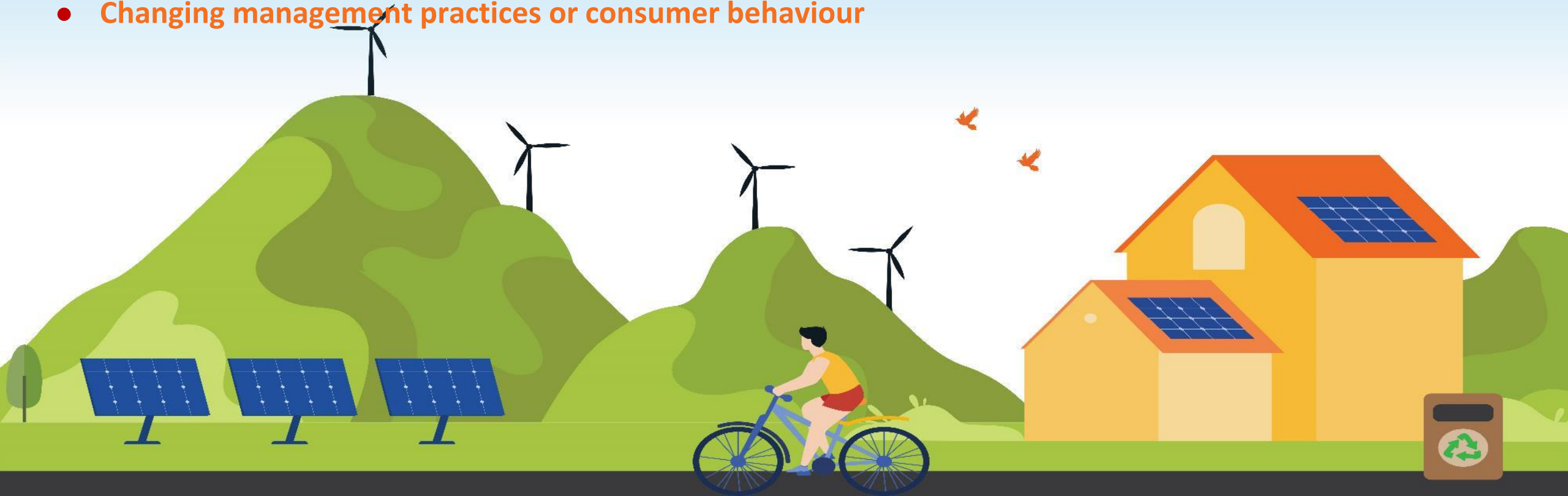
The negative effect of a hazard after the hazardous event happens and harms humans



Climate Mitigation



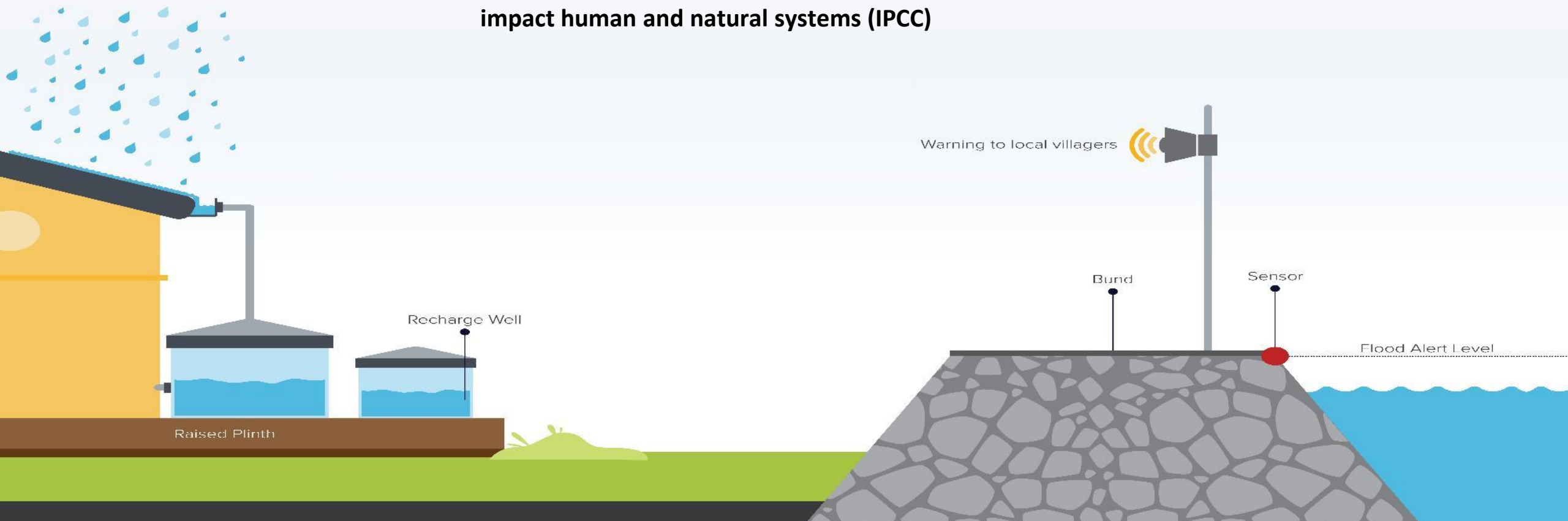
- Reduction in sources or enhancement of sinks of greenhouse gases
- Using low emission technologies and renewable energies
- Changing management practices or consumer behaviour



Climate Adaptation

- Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects
- Reduces harm or increases beneficial opportunities

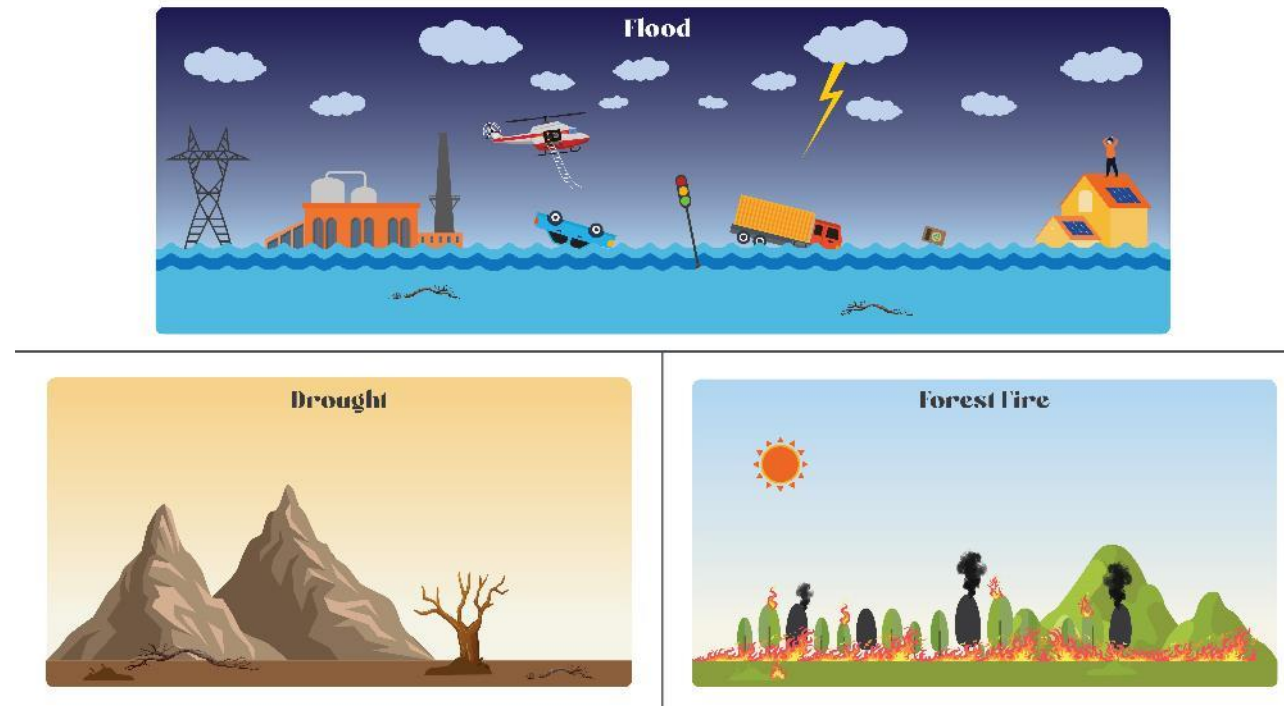
Anticipate and plan for unusual weather and climate events and how they impact human and natural systems (IPCC)



Disaster Risk Reduction

Set of activities to minimize vulnerabilities and disaster risks in a society, and to avoid (prevention) or limit (mitigation and preparedness) the adverse impact of hazards within the broad context of sustainable development.

Example: Earthquake-proof buildings / bio-shields against tsunamis



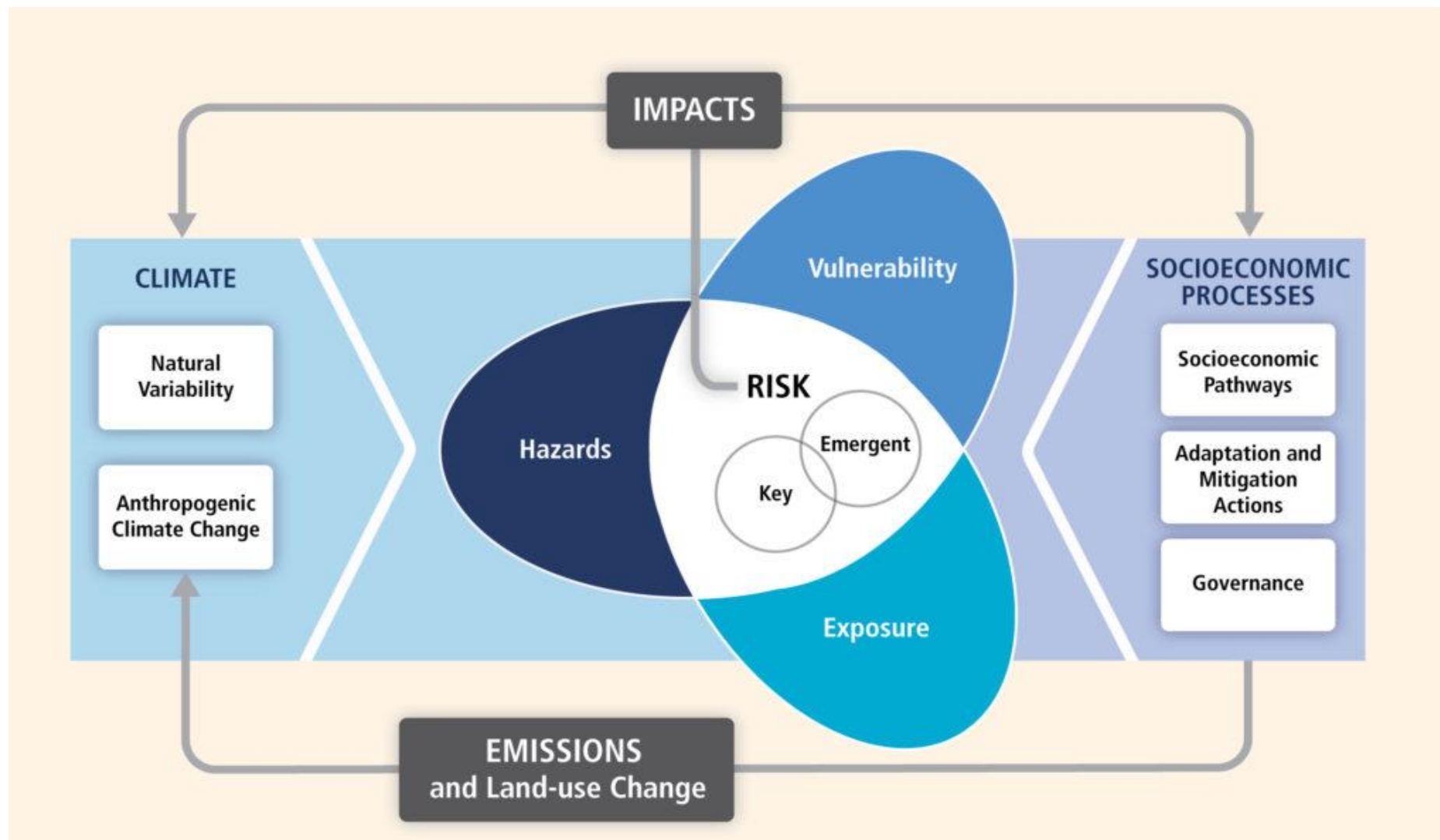
Vulnerability

Vulnerability is defined as the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and the lack of capacity to cope and adapt. A broad set of factors such as wealth, social status and gender determine vulnerability to climate-related risks.

Sensitivity	Adaptive Capacity
Degree to which a system is affected, either adversely or beneficially, by climate-related stimuli <i>Example: infants / children and elderly are more sensitive</i>	Ability to adjust to climate change, its harmful or beneficial impacts, to cope with its consequences. <i>Example: Inability to move to a safer location</i>

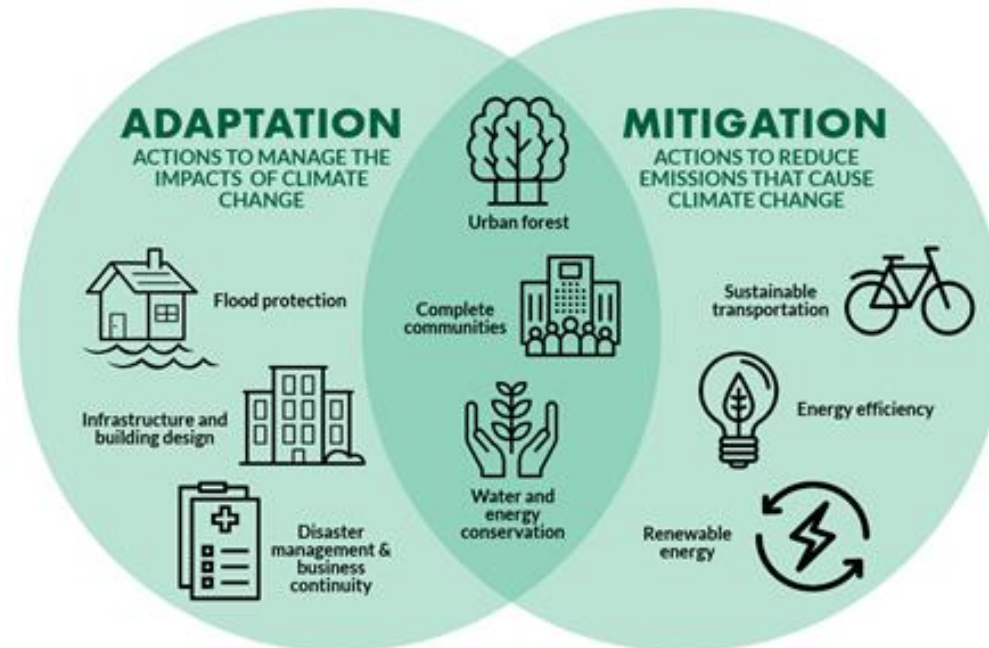
Source: IPCC fifth assessment report

Link between Vulnerability and Risk



Climate Resilience

To anticipate, prevent, absorb and recover from shocks and stresses, in particular those brought about by rapid environmental, technological, social and demographic change, and to improve essential basic response structures and functions



Source: ICLEI Canada

Characterics of Resilient Municipalities



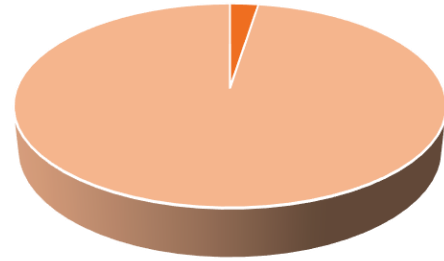
Zoom Poll



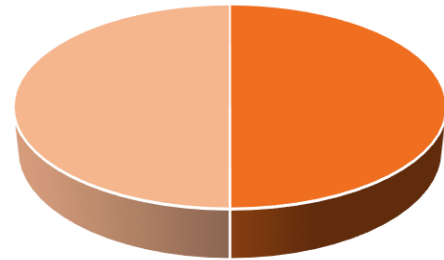
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Local Governments and Climate Change

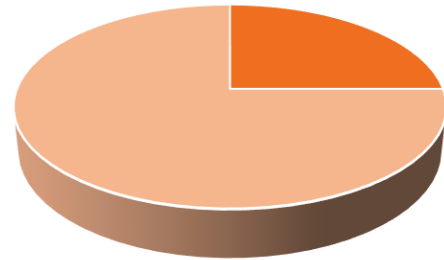
Why should urban areas work on climate change?



- <3% land area



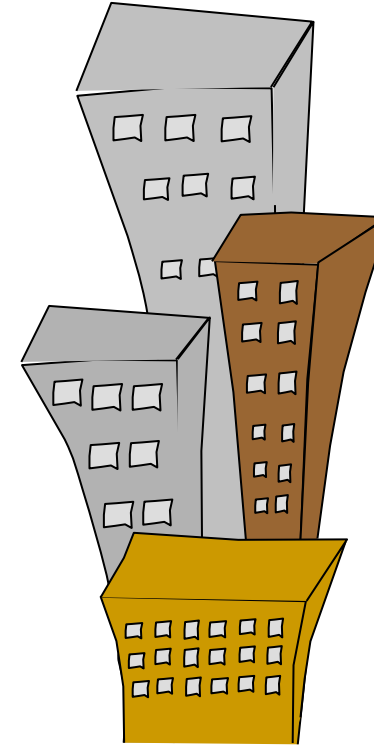
- >50% population



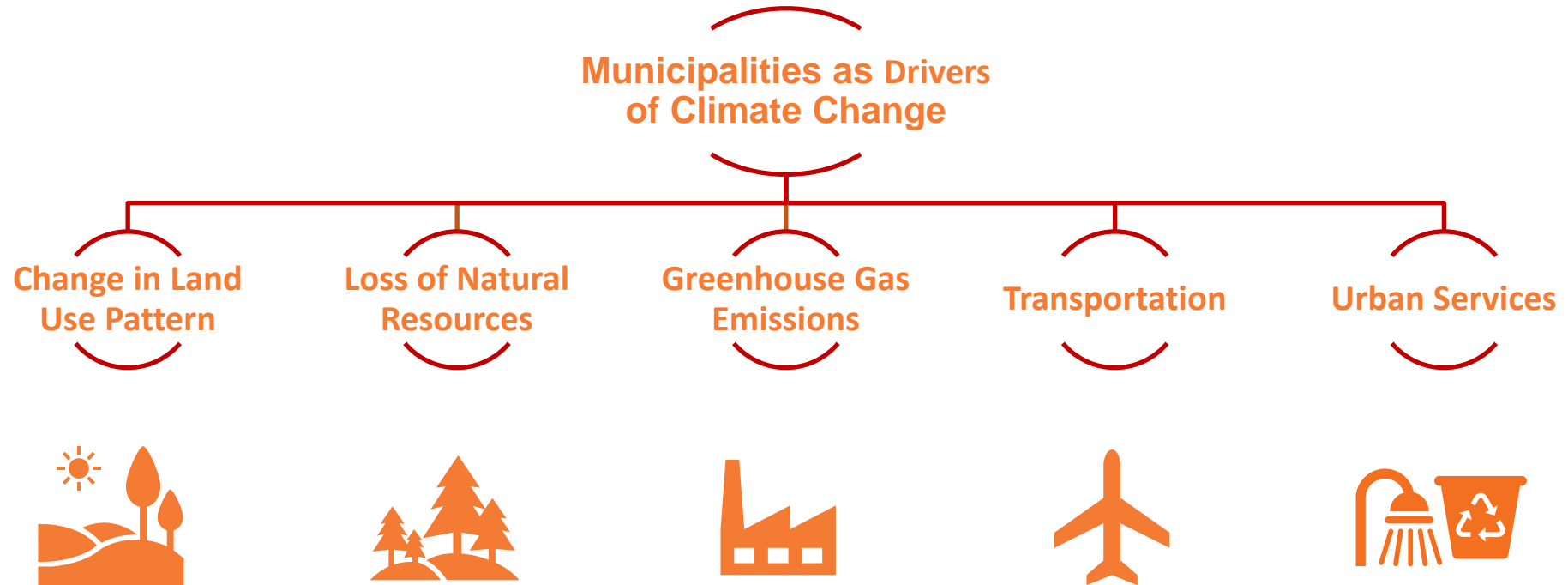
- 75% resources

Why should municipalities work on climate change?

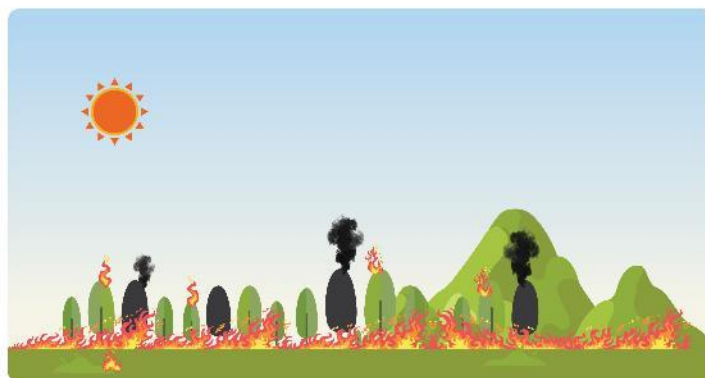
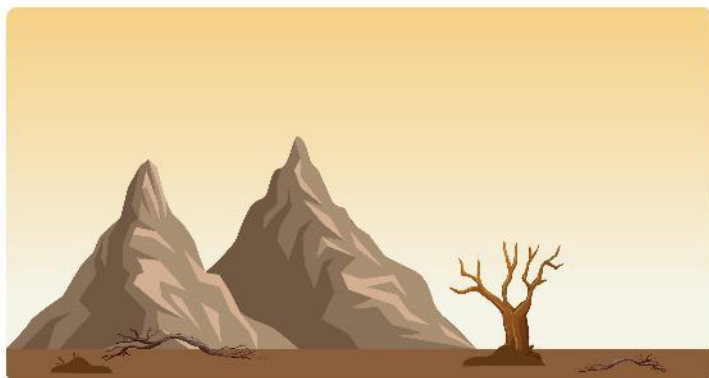
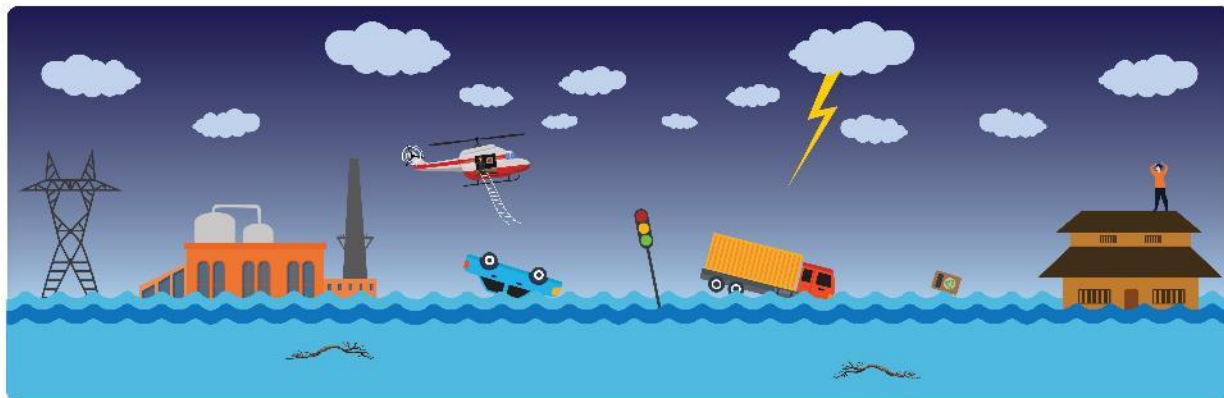
- **Urbanisation contributes to drivers of climate change –**
 - land use change,
 - demand for energy
 - demand for resources
- **Opportunity for awareness generation and action on CCA**
 - most people
 - most power
 - significant climate risks



Municipalities as Drivers of Climate Change



Impacts of Climate Change on Municipalities



Dengue



Malaria



Kala-azar



Chikungunya

Remember Intersectionality

People's individual characteristics make them more or less climate-vulnerable and may have a bearing on how exposed to the climate hazard they are.



Adapted by CDKN from IWDA (www.iwda.org.au)

Equality:

Different behaviours, aspirations and needs of different social groups are valued equally.

Equity:

Fairness of treatment for different social groups, different but equivalent concerning rights and opportunities.

Inclusive Participation:

A way for people of all ages, backgrounds and identities to voice their opinions, concerns and experiences resulting in meaningful action.

Equity is the process and Equality is the goal



Social Inclusion in Climate Resilience



Adapted from: CDKN Gender Toolkit

Clarification and questions



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Global Agreements on Climate and DRR

Sendai Framework For Disaster Risk Reduction - 2015-2030

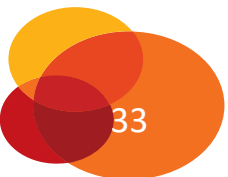
Adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015.

Applies to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters caused by natural or man-made hazards, related environmental, technological and biological hazards and risks.

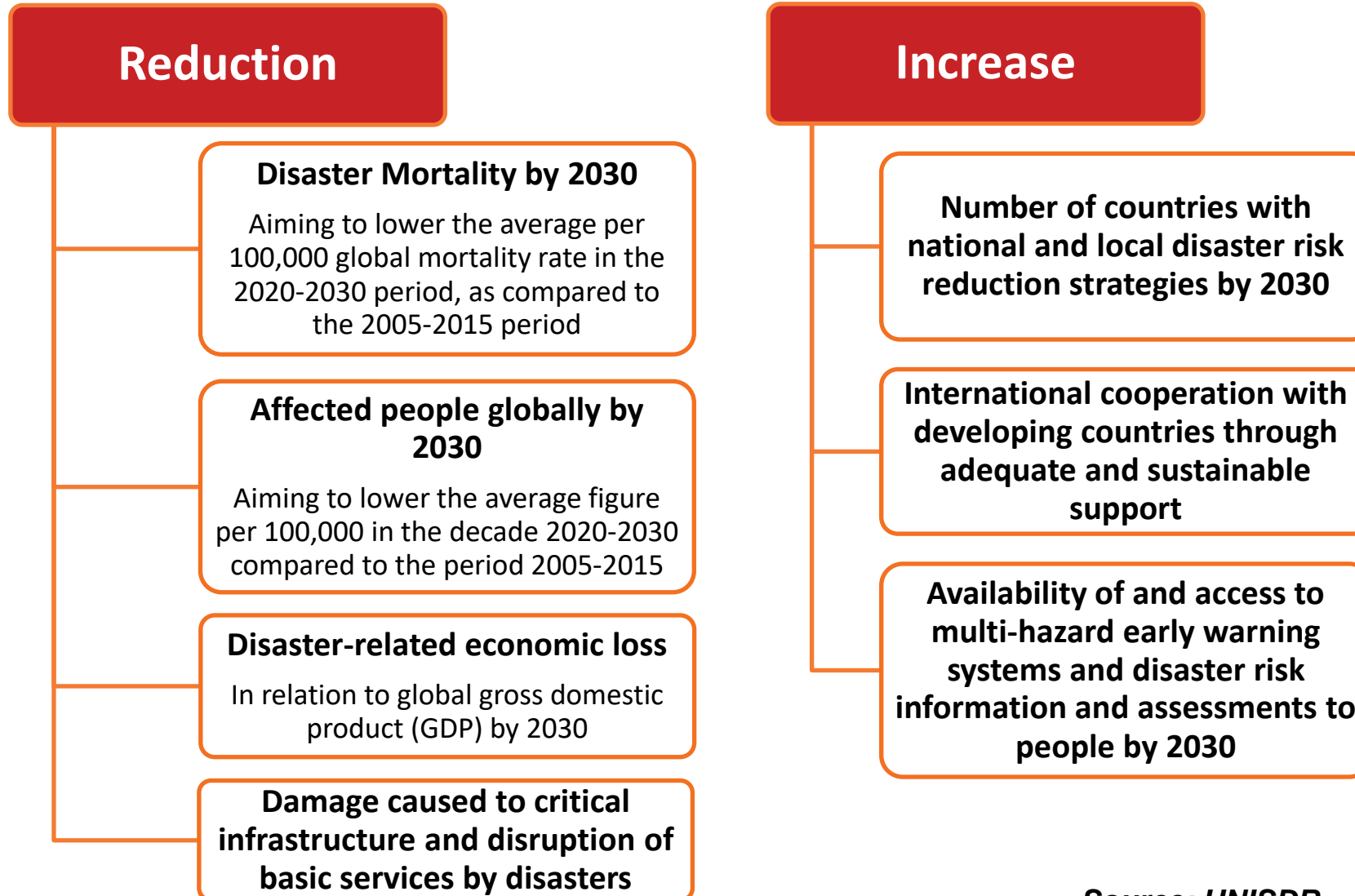
The framework has

- 1) **7 global targets,**
- 2) **13 guiding principles**
- 3) **4 priorities for action**

Source: UNISDR



Sendai Framework: Global Targets



Source: UNISDR

Sendai Framework: Four Priority Actions

- 1 **Understanding** disaster risk.
- 2 **strengthening** disaster risk governance to manage disaster risk.
- 3 **Investing** in disaster risk reduction for resilience.
- 4 **Enhancing** disaster preparedness.

Source: UNISDR

The Paris Agreement

- Adopted in **December 2015** by a majority of the countries around the world
- Temperature and emission goals: To provide a pathway to **limit the temperature rise ‘well below 2°C** in comparison with the pre-industrial level; the **ultimate goal is to stay below 1.5°C’**
- Countries publicly outlined what post-2020 climate actions they intended to take under the Paris Agreement, known as their **Nationally Determined Contributions or NDCs**.

Source: UNFCCC

Local Governments' Role in Paris Agreement

- The Paris Agreement **recognises the role of non-party stakeholders** in addressing climate change, **including cities and local authorities** to scale up actions to reduce emissions, build resilience and decrease vulnerability.
- **NDC focuses on mitigation and adaptation actions** and towards achieving the UN Sustainable Development Goals.

Sustainable Development Goals

- The Sustainable Development Goals are a compendium of **17 global goals** designed to be a "blueprint to achieve a better and more sustainable future for all".
- The SDGs were set in 2015 by the United Nations General Assembly and are **intended to be achieved by the year 2030**.
- SDGs promote actions to make cities and human settlements inclusive, safe, resilient and sustainable (SDG-11)

Source: <https://sdgs.un.org/goals>

Sustainable Development Goals



SDGs linked to Urban Resilience

Goal 13: Climate Action

- Take urgent action to combat climate change and its impacts
- 5 targets



Goal 11: Sustainable Cities and Communities

- Make cities and human settlements inclusive, safe, resilient and sustainable.
- 10 targets



SDG 13 – Climate Action

TARGET 13-1



STRENGTHEN RESILIENCE AND ADAPTIVE CAPACITY TO CLIMATE RELATED DISASTERS

TARGET 13-2



INTEGRATE CLIMATE CHANGE MEASURES INTO POLICIES AND PLANNING

TARGET 13-3



BUILD KNOWLEDGE AND CAPACITY TO MEET CLIMATE CHANGE

TARGET 13-A



IMPLEMENT THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE

TARGET 13-B



PROMOTE MECHANISMS TO RAISE CAPACITY FOR CLIMATE PLANNING AND MANAGEMENT

SDG 11 – Sustainable Cities and Communities

TARGET 11-1



SAFE AND AFFORDABLE HOUSING

TARGET 11-2



AFFORDABLE AND SUSTAINABLE TRANSPORT SYSTEMS

TARGET 11-3



INCLUSIVE AND SUSTAINABLE URBANIZATION

TARGET 11-4



PROTECT THE WORLD'S CULTURAL AND NATURAL HERITAGE

TARGET 11-5



REDUCE THE ADVERSE EFFECTS OF NATURAL DISASTERS

TARGET 11-6



REDUCE THE ENVIRONMENTAL IMPACT OF CITIES

TARGET 11-7



PROVIDE ACCESS TO SAFE AND INCLUSIVE GREEN AND PUBLIC SPACES

TARGET 11-A



STRONG NATIONAL AND REGIONAL DEVELOPMENT PLANNING

TARGET 11-B



IMPLEMENT POLICIES FOR INCLUSION, RESOURCE EFFICIENCY AND DISASTER RISK REDUCTION

TARGET 11-C



SUPPORT LEAST DEVELOPED COUNTRIES IN SUSTAINABLE AND RESILIENT BUILDING

Zoom Poll

10 Minutes Break

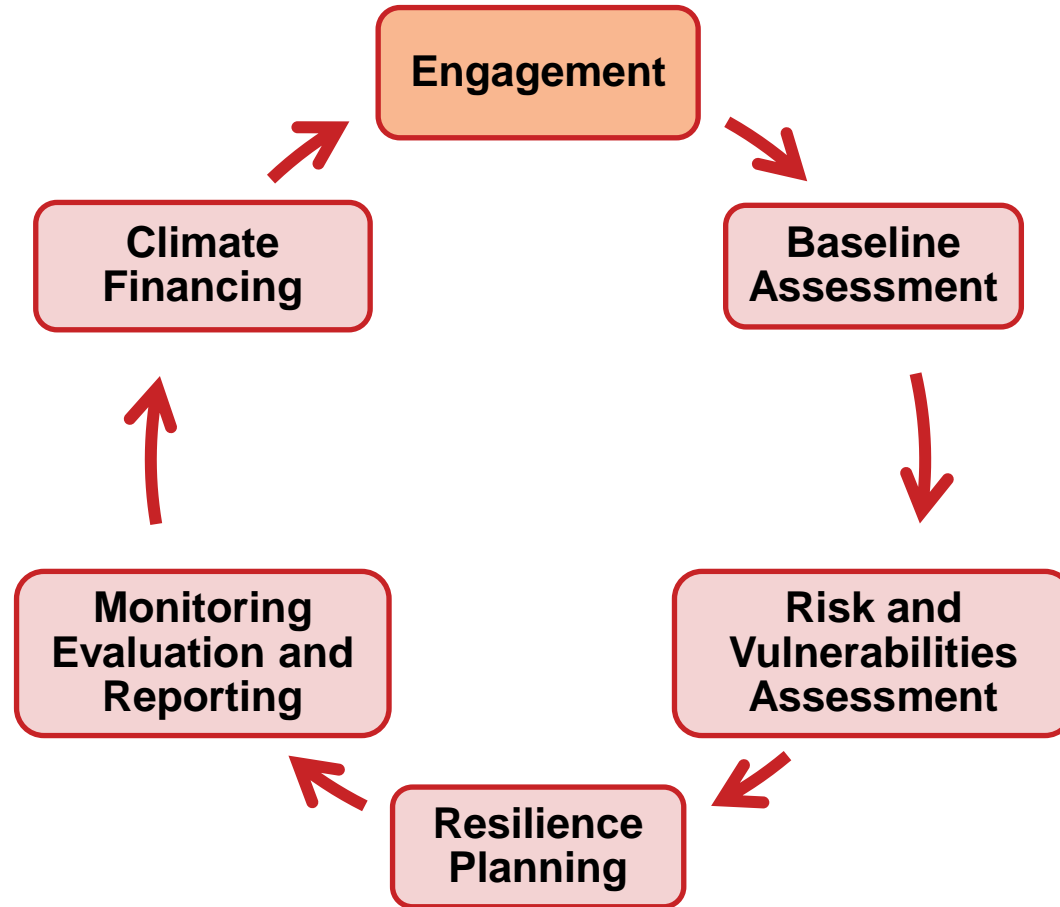
Module 2A

Engagement Process

Objectives

- To understand the need for stakeholder engagement
- To understand the stakeholder landscape for climate resilience planning
- To engage with stakeholders in a systematic manner

Engagement Process



Why there is a need to engage with municipalities and stakeholders?

Who can municipalities engage with and how?



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Stakeholder Engagement

City Engagement Process

- Climate change is a **cross-sectoral issue**.
- **Engagement with key stakeholders** is a part of developing a climate resilience strategy .
- The engagement process provides an opportunity to **bring all relevant stakeholders in a single platform** for a comprehensive and robust climate resilience strategy.

Step 1 – Formulating a climate core team

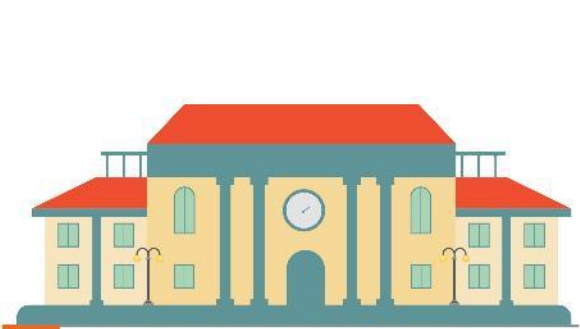
- Engaging staff from different municipal departments with **different vantage points and areas of expertise.**
- Ensure **gender inclusion** in climate change decision making - must have representation (preferably 50%) of women.
- **Modify pre-existing committee** as Core Team if possible.

Name	Position	Responsibility
Ms. X	Chairperson	Supervising the working of the Core Team and providing management support
Mr. Y	Project Nodal Officer	Coordinating all the activities of the Core Team and ensuring its smooth functioning
Ms. Z	Member	Coordinating activities with the Water Resources department

Step 2 – Stakeholder Group

- Representation from a **range of sectors and issues** that need to be considered when developing resilience plans
- Energy use, pollution, waste, food security, water security, public health, local economic development, infrastructure, transportation and development planning.
- **Include local women and other marginalised and vulnerable populations** (disabled, elderly, indigenous), and engage them in resilience planning process to understand their climate vulnerability, risk and adaptive capacity.

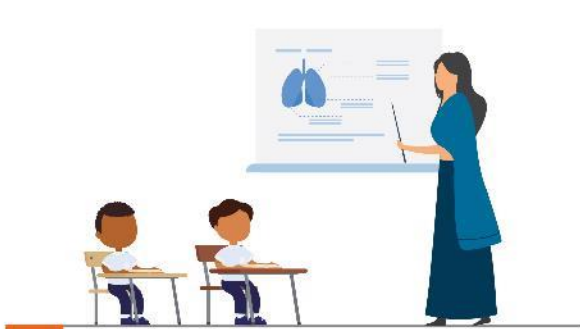
Stakeholder Group Members



▶ Government



▶ Local NGOs /CBOs



▶ Academia



▶ Community Representatives



▶ Private Sector

Why Social Inclusion Matters

- People experience climate change differently - **differences in adaptive capacity**
- **Gendered roles and responsibilities** in households & communities - gender-based differences in economic opportunity
- Differences in voice and power mean that everyone's **priorities** may not be recognised – from local to global climate action - inequality in rights, resources and voice - unequal legal status, property rights, education & literacy, health, access to assets

How are people differently impacted by climate change?



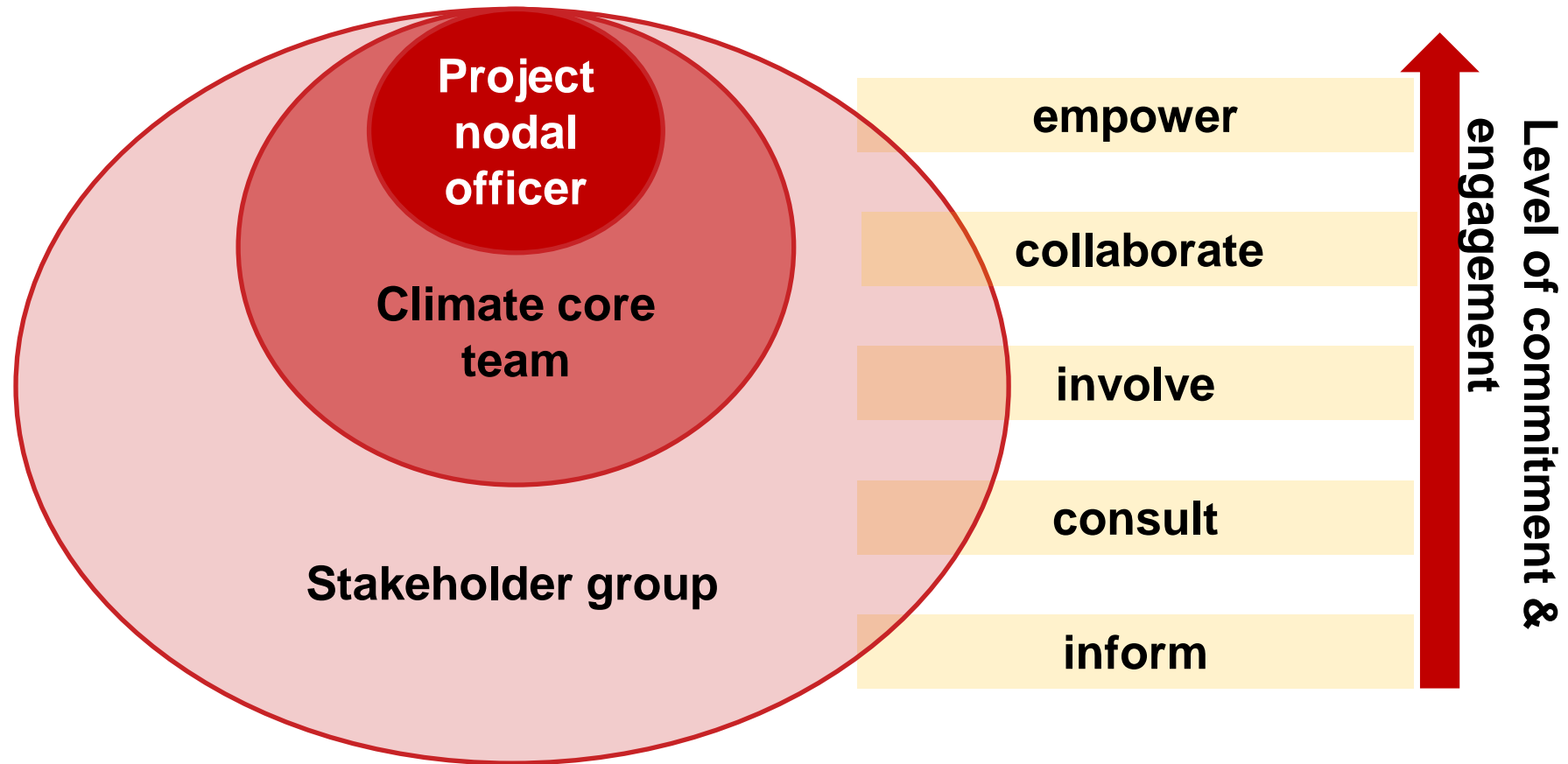
Gendered Impact of Climate Change

Climate change indicator	Impact of CC	Impact on women	Impact on men
Increase in temperature	Extreme drought/ heat stress leading to water scarcity among slum dwellers	Increased burden of collecting water for their family by spending several hours each day to line up for free water. Allocating much of their income to buy clean water	Allocating extra resources for purchase of water
	Heat waves leading to increasing demand for electricity	Women-headed households may not have access to electricity or ability to pay for increased prices.	
Increase in precipitation or sudden rainfall	Cyclones or flooding leading to destruction of livelihoods and homes	Living in temporary shelters causes concern for security and safety. Increased domestic burden for women, such as clearing and repair their homes & accessing clean water.	Additional burden of repair of homes. Loss of income opportunities and loss of jobs
		Women have to let go of productive work to look after the house and family	Migration

Identification of Stakeholder Group

Category/Sectors	Government	Local NGOs	Research Institutions	Community Representative	Private Sector	Donors/ Multilaterals
Potentially provides information to develop resilience strategy						
Potentially be involved in implementation of resilience strategy						
Whose support will be essential to implement the strategy						
Most affected by proposed strategies						

Potential Engagement Structure



Step 3 – Communication Plan

- Climate resilience and low-emissions development may be new topics and the rationale needs to be carefully explained
- Develop some clear messages at the start about why the local government is undertaking this work and what it hopes to achieve
- Keep stakeholders regularly informed and engaged

Target Audience	Activity	Objective, Message	Communication Medium	Timing	Achieved Yes/No
City Departments	Internal Launch	Inform all city departments that the city government is undertaking resilience planning	Newsletter, staff meetings	October	
Residents, Local Business	External Launch	Inform citizens that the City is participating in the CapaCITIES project	Media release	October	

Communication Plan - Example

Group Exercise

- Divide into groups belonging to 2/3 municipalities
- Each group will identify key stakeholders for their municipality to address a selected climate risk of their choice.
- Identify representatives from various government departments, the private sector, academia, NGOs, CBOs and civil society

Category/Sectors	Government	Local NGOs	Research Institutions	Community Representative	Private Sector	Donors/Multilaterals
Potentially provides information to develop resilience strategy						
Potentially be involved in implementation of resilience strategy						
Whose support will be essential to implement the strategy						
Most affected by proposed strategies						

Summary of Day 1

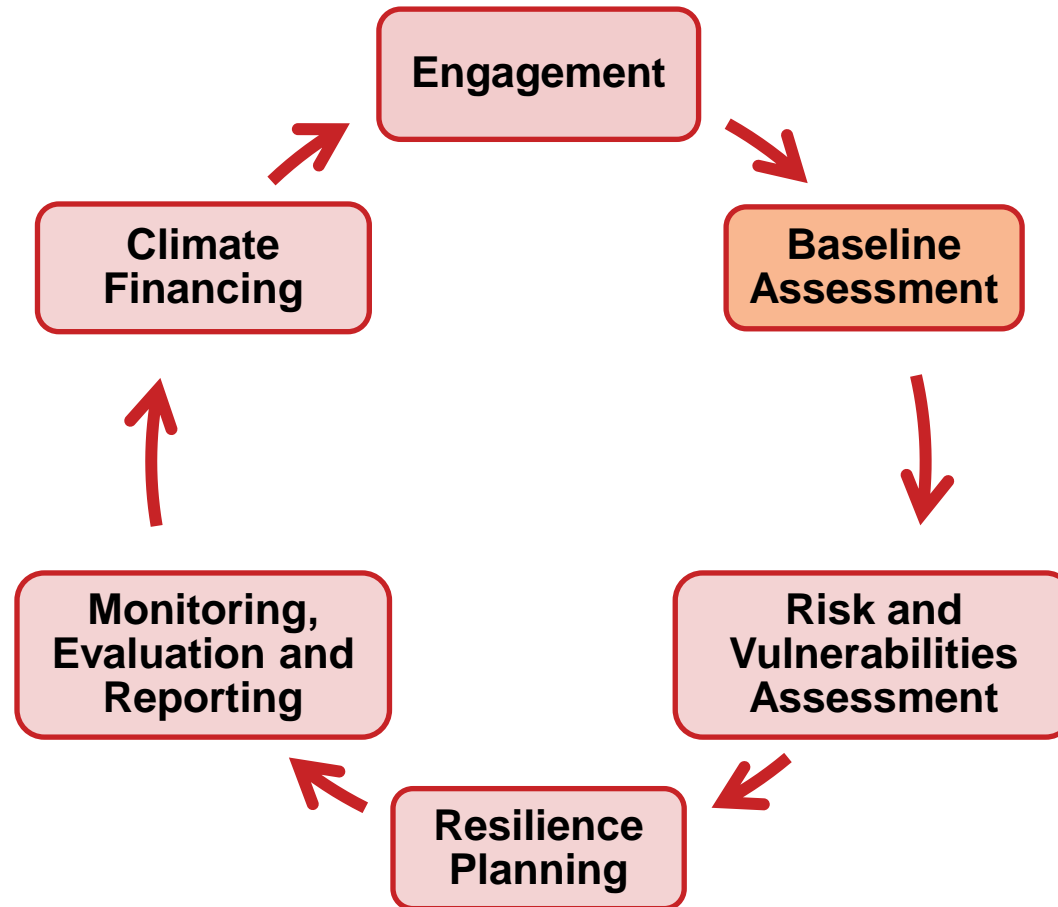
DAY 2

Recap with Zoom Poll

Module 2 B

Baseline Assessment with Climate Lens

Baseline Assessment



Steps

Municipal profile

Greenhouse Gas
Emission
Inventory

Infrastructure and
Socio-ecological
System Analysis

Objectives

- **To enable the municipality to understand the city structure better**
- **To assess existing situation regarding greenhouse gas emissions**
- **To understand infrastructure and socioeconomic aspects through a climate lens**

Step 1 – Preparation of Municipal Profile

- **The profile includes a brief description of the city/village**
 - nature of the city/village
 - location of the city/village with map
 - socio-economic and demographic details
 - details of the local government body: area, number of wards/Tala, other agencies involved, the role of agencies, municipal structure, administrative divisions, governance structure.
 - service performance for all major infrastructural and socio-ecological systems (water supply, sewerage, solid waste management, drainage, transportation, housing, electricity and energy, agriculture, ecology).
- **Existing major initiatives taken up in the municipality in these systems with details of activities, funding and beneficiaries.**

Municipal Profile

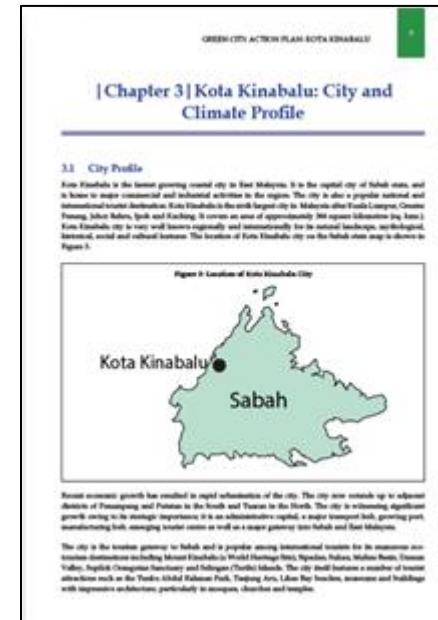
Data Templates

Category	Unit	Data/ information/ file name (please mention NA for data that is not available)	Source of Data/ Relevant department	Time period for which data available
Ecosystems/ Biodiversity				
Category and Type of soil	Type			
Area under green cover	Sq. km			
Types of ecosystems available (wetlands, riverine, forest etc.)	Number / area			
Agricultural resources				
Total area of agricultural land	Sq. km			
Regional crop seasons	Months			
Primary crop	Names			
Secondary crop	Names			
Contribution to local economy	Percentage of total GDP			
Contribution to local food requirement	Percentage			
Water resources				
Number of water bodies	Number, sq. km, Distance from city			

Infrastructure	Year 1	Year 2	Year 3	Comments/ source
Water supply				
Concerned Department Name -				
Name of contact person/ head of department -				
Contact number -				
Email ID -				
Note:				
All data in this datasheet pertains to Water Supply Facilities and Infrastructure supplying water to the city only				
Please add additional data fields based on the number of water supply/treatment stations as applicable				
Please provide supporting data sheets as and where available				
Water supply distribution network	Maps to scale, with ward/zone/area wise breakup, % coverage of network			
Water supply zone	Name, boundary, map, area covered			
Per capita supply of water	Litres per capita per day			
Number of service connections by diameters	Number per water supply zone/ category/ area			

Content

- History
- Demography
- Economic Activities
- Local Government Body
- Urban Systems
- Sustainability Journey
- Budget
- Data availability

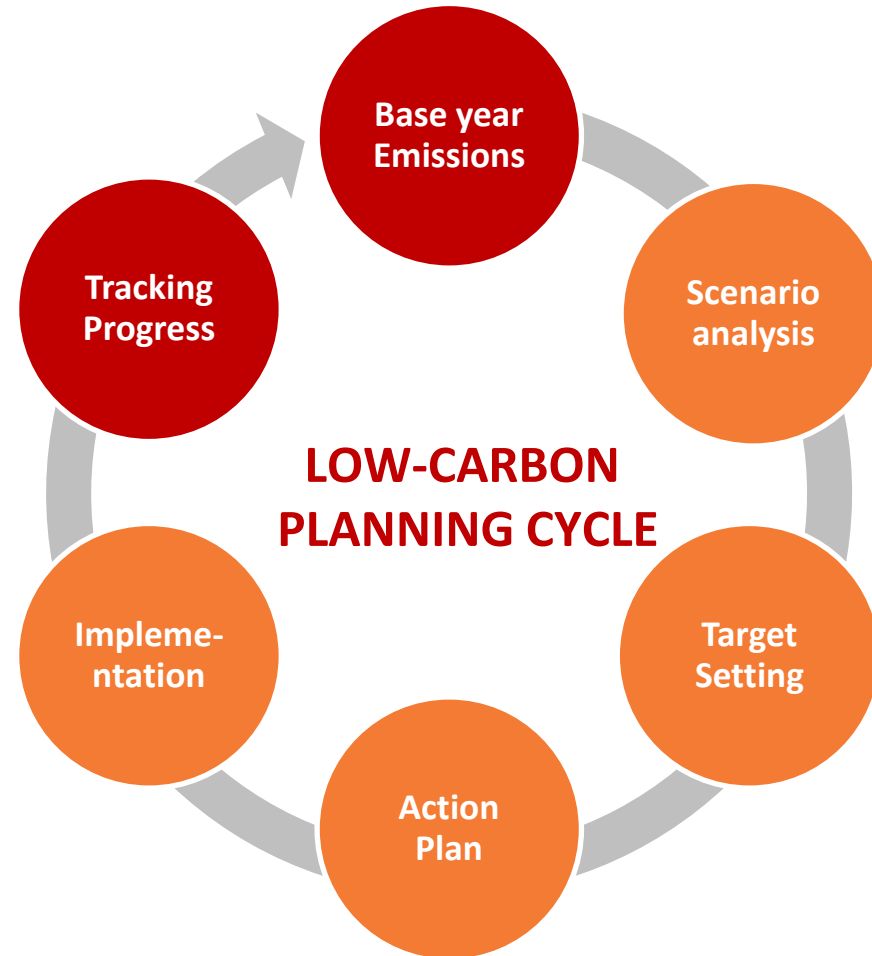


Sample

Step-2 Greenhouse gas inventory

Why Measure Emissions?

- Establish base year emissions
- Identify emission sources and reduction opportunities
- Set target and develop action plans
- Track progress
- Benchmarking



The Global Protocol for Community Scale GHG Emissions (GPC)



First global standard to consistently measure city-level emissions

Flexible accounting framework, easily used for **boroughs, wards within cities, towns, districts, counties, prefectures, provinces and states**



Endorsing Partners:



Cities Alliance Joint Work Program

GHG Emission Sources

IPCC: Intergovernmental Panel on Climate Change

GPC: Global Protocol for Community Scale Greenhouse Gas Emission Inventories

Energy

Industrial Processes and Product Use (IPPU)

Waste

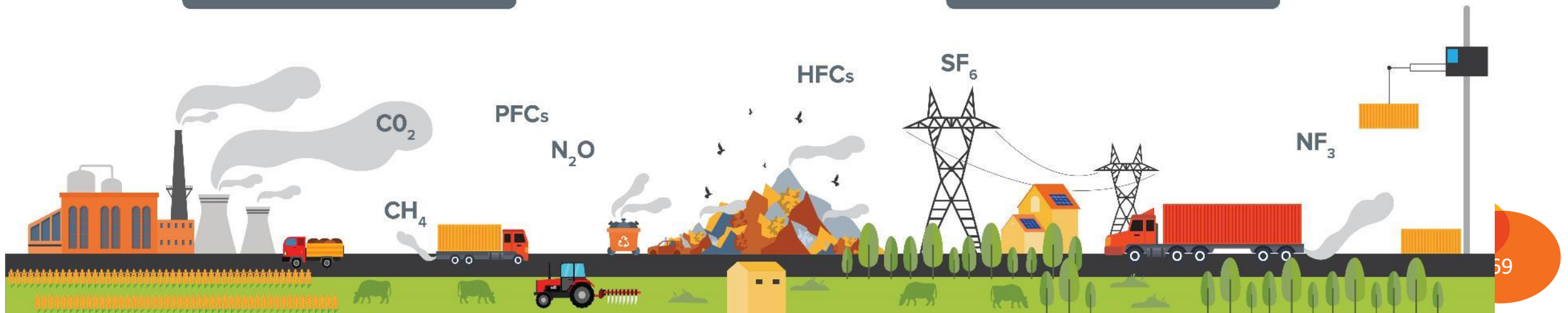
Agriculture, Forestry and Other Land Use (AFOLU)

Stationary Energy Sources | Transportation

Industrial Processes and Product Use (IPPU)

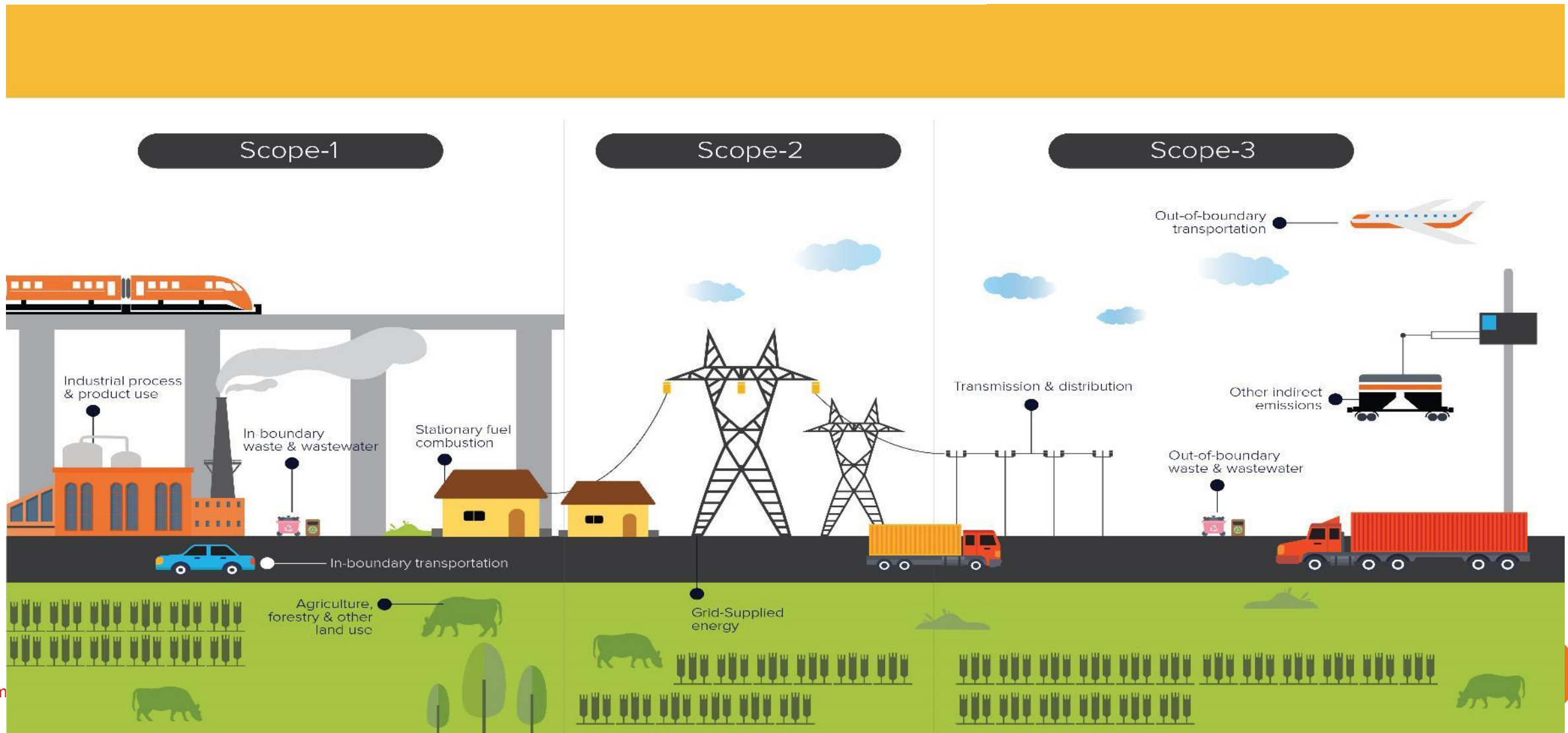
Waste

Agriculture, Forestry and Other Land Use (AFOLU)



GHG Emission Sources

'Scopes' distinguish GHG emissions based on where they physically occur (within or outside a city's boundaries)



Calculation of GHG Emissions

- GHG emissions are (relatively) simple to calculate:

Activity data x emissions factor = GHG emissions

- 1. Activity data:** Amount of energy used (e.g., litres of petrol used) OR amount of other GHG emissions generating activity (e.g. mass of solid waste sent to landfill)
- 2. Emissions factor:** Mass of GHG emitted per unit of activity data (E.g. kg of CO₂ per litre of petrol used) OR (e.g. kg of CH₄ per tonne of waste disposed in landfill)

Key Sectors in Himalayan Region with GHG Emissions Reduction and Vulnerability Risk Reduction Potential



▶ Road & Transportation



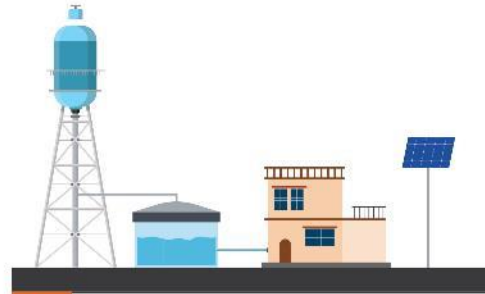
▶ Urban poor & slum



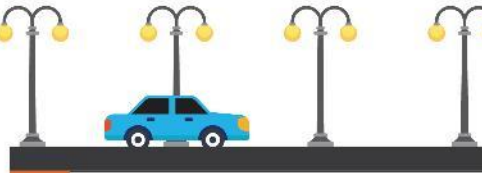
▶ Land use & Development



▶ Building



▶ Water Supply



▶ Street Lighting



▶ Sewerage & Drainage



▶ Solid Waste Management



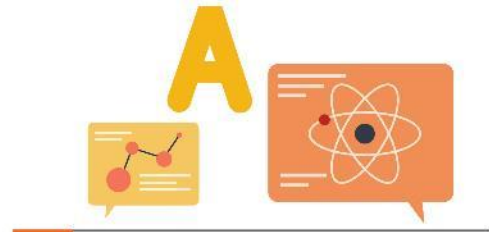
▶ Health



▶ Biodiversity



▶ Finance



▶ Education

Group Exercise – GHG Inventory

- **Divide into groups**
- **Identify different government and private agencies that can provide activity data regarding 2 selected sectors (refer slide above to select two sectors that emit GHG emissions)**
- **Refer to tables below and calculate GHG emissions for the following sectors:**
 - **LPG use in residential buildings**
 - **Electricity use in manufacturing units**

Group Exercise – GHG Inventory

Table 1: Activity Data of a Municipality

Sectors	Energy Source/Activity	Activity Data				
		Unit	2015-16	2016-17	2017-18	2018-19
Residential Buildings	Electricity	MU	369.54	420.72	475.96	559.14
	Kerosene	kL	2,472.00	2,436	1,836.00	1,800.00
	LPG	tonnes	24,375.32	30,804.14	33,579.96	37,149.71
	PNG	cubic m	No supply	365,000	912,500	1,825,000.00
Commercial and Institutional Buildings/Facilities	Electricity	MU	266.20	310.15	329.33	373.57
	LPG	tonnes	1,978.55	2,666.60	2,706.91	3,089.39
	PNG	cubic m	No supply	182,500	365,000	547,500
Manufacturing Industry and Construction (i.e. Industrial sector)	Electricity	MU	1,253.57	1,607.20	1,700.65	1,705.93
	PNG	cubic m	No supply	2,190,000	10,950,000	23,725,000
Agriculture, forestry and fishing activities (i.e. mainly agriculture)	Electricity	MU	2.35	3.03	4.00	2.85
Mobile (Transportation)	LPG	tonnes	1.18	0.87	0.65	0.42
	Petrol	kL	72,358	80,230	82,118.00	82,157
	Diesel	kL	79,770	83,856	95,232.00	94,556
	CNG	scm	330,000	55,168,571.43	73,234,285.71	93,358,571.43

Group Exercise – GHG Inventory

Table 2: Emission Factors

Particulars	Grid electricity Emission Factor (tonnes of CO ₂ e per Million units)			
Year	2015-16	2016-17	2017-18	2018-19
EF	822.7844	802.7844	782.7844	822.7844
Energy Source			Unit	Emission Factor (tonnes of CO ₂ e per unit)
Kerosene			kL	2.5858
LPG			metric tonnes	2.9926
PNG			scm	0.00189
Petrol			kL	2.2965
Diesel			kL	2.8505
CNG			cubic m	0.0021
CNG			metric tonnes	2.9942
Auto-LPG			kL	1.5114
Coking coal (fuelwood based)			tonnes	1.5023

Socio-ecological Systems

Systems, where social, economic, ecological, cultural, political, technological and other components are strongly linked, are known as socio-ecological systems

Core Systems	Higher Level Systems
<ul style="list-style-type: none">• Ecosystems• Land• Energy• Water• Food• Shelter• Transport• Communications	<ul style="list-style-type: none">• Health care• Education• Finance• Markets• Sanitation• Community services• Public security• Taxation• Social networks

Step 3 – Infrastructure and Socio-ecological Systems Analysis

- Identify the systems or services that are already failing or are under great pressure and contributing more to the city's total energy consumption and GHG emissions.
- Fragility is based on the following “resilience characteristics”
 - Flexibility and Diversity
 - GHG emissions
 - Redundancy
 - Safe Failure

Climate Fragility Analysis

Assessment of fragility in terms of:

- **Flexibility and diversity** - whether the sector has a mix of multiple options for service delivery; does it work under different conditions
- **Redundancy** - whether the system has alternatives / back-up systems / contingency plans, multiple pathways and options for service delivery in case one or several options fail
- **Safe failure** - whether the system has the ability to absorb sudden shocks or slow onset stress so as to avoid catastrophic failure
- **Energy consumption and GHG emission** – whether the system has potential for reducing energy consumption and mitigating GHG emissions

Identify Fragile System

Flexibility and diversity	Energy consumption and GHG emissions	Redundancy	Safe failure
<i>A flexible water supply system withdraws water from multiple sources that are sufficient in dry season as well as in rainy weather. Hence, the system can function in different conditions.</i>	<i>The water treatment plants consume a lot of electricity to pump water to different areas of the municipality, resulting in GHG emissions.</i>	<i>The water supply is dependent on a perennial river and there is sufficient groundwater since the municipality is located in the valley. Hence, the system has backups if one source fails.</i>	<i>The water treatment system is extremely old and requires repair for distribution and treatment. There is no assurance of safe failure in case of a disaster.</i>

Estimate Fragility of the System

- Consider the existing and anticipated problems caused by the fragility of the systems.
- Define who is responsible in the city for the system
- Prepare a summary 'fragility statement'.

Socio-ecological system	Why is it critical or fragile?	Existing and anticipated problems caused by the fragility?	Part of city function (Full/ Shared / No)	Fragility statement
Water supply	Centralised water treatment facility from a single source (no redundancy). Pumping water from great distances, using energy (high level of GHG emission and energy consumption). Single source of water that dries up in summer (no flexibility)	Disruption of water supply in case of pipe breakage. Additional costs of purchase of water from water tankers	Shared	System is old and largely dependent on transporting water over large distances, whereby even minor disruptions within the distribution network causes significant shortages; alternatives are not cost effective or sustainable.

Group Exercise – Socio-ecological System Analysis

- Divide into same groups.
- Identify one or two fragile urban systems for a selected municipality based on the following parameters:
 - Flexibility and diversity
 - Energy consumption and GHG emissions
 - Redundancy
 - Safe Failure
 - Next, prepare a fragility statement.

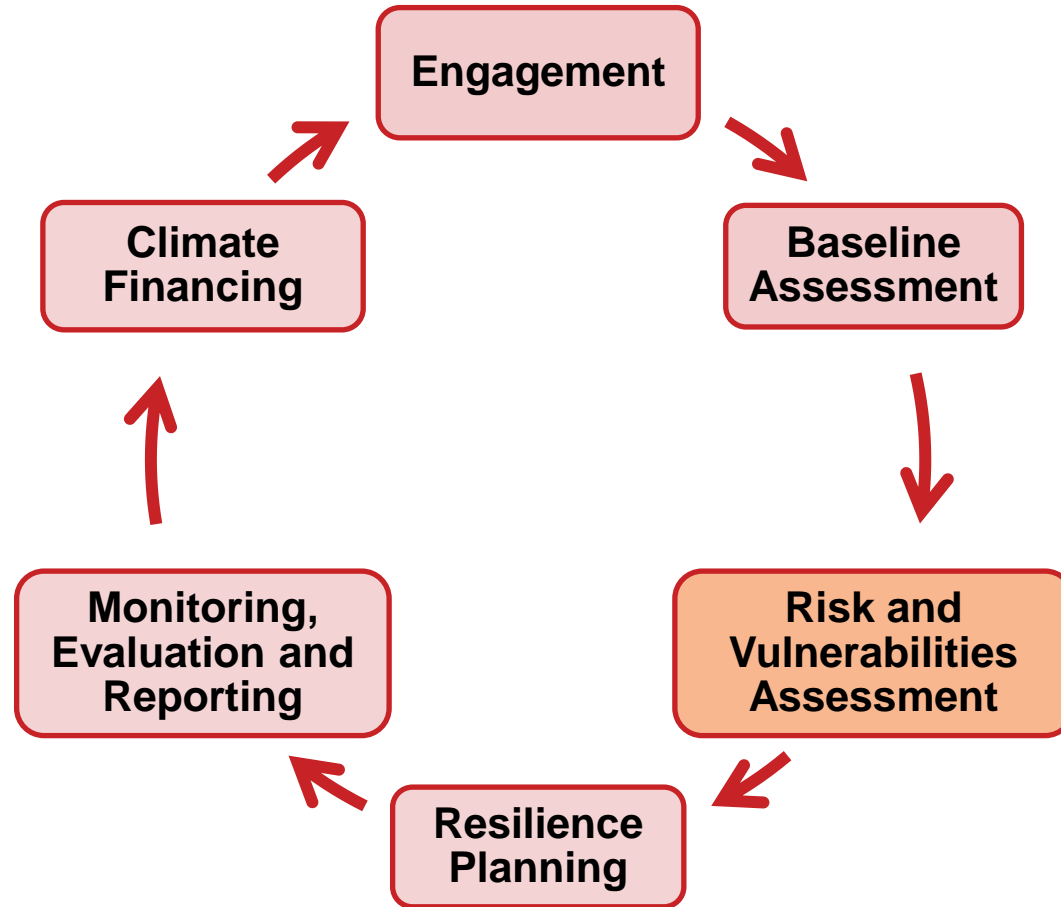
Fragile Socio-ecological System	Indicators				Fragility Statement
	Flexibility and diversity	Energy consumption and GHG emissions	Redundancy	Safe Failure	

10 minutes -Break

Module 2 C

Climate Risk and Vulnerability Assessment

Risk and Vulnerability Assessment



Objectives

- To identify the climate risk and its impact on infrastructure, governance and socioeconomics
- To identify who or what is vulnerable to what and why
- To identify vulnerability hotspot areas and assess the adaptive capacity of vulnerable actors.

Climate Fragility Assessment

- Assess impacts of climate change on fragile systems
- Consider climate scenarios and possible impacts of these climate risks on the fragile systems.

Socio-ecological systems	Fragility statement	Climate fragility statement	Climate fragility statement
		Climate risk 1: <i>e.g. Increased precipitation</i>	Climate risk 2: <i>e.g. Increased temperatures</i>
Water Supply	System is old and largely dependent on transportation of water over large distances, whereby even minor disruptions within the distribution network causes significant shortages; alternatives are not cost effective or sustainable.	Increased precipitation disrupts/ damages water supply infrastructure	Increased temperatures will lead to increased demand for water, thereby posing additional stress on the supply system

Risk Assessment

Objectives

- Prioritise the climate fragility statements of fragile systems on the basis of their likelihood and consequence.
- Important to incorporate the views of all stakeholder groups `

Risk Score = Likelihood x Consequence

Compare Risk Score with Risk Matrix Table to get Risk Status

Risk Assessment

- Risk assessment of the identified impacts on socio-ecological systems based on a 'likelihood' and 'consequence' scoring will be undertaken in order to prioritise the impacts
- Risk = Likelihood x Consequence
- Likelihood of occurrence of each of the impact
- Consequence in terms of impact on the socio-ecological system and the municipality if the impact does take place

Risk Assessment- Likelihood

Likelihood rating	Description	Score
Almost certain	Could occur several times per year – likelihood probably greater than 50%	5
Likely	May arise once per year – 50/50 chance	4
Possible	May arise once in 10 years – probability less than 50% but still quite high	3
Unlikely	May arise once in 10 to 25 years - Unlikely but should still be considered – probability significantly greater than zero	2
Rare	Unlikely in foreseeable future – negligible probability	1

Risk Assessment- Consequences

Consequence rating	Impact on system	Impact on poor and other vulnerable groups such as women	Score
Catastrophic	System fails completely; unable to deliver critical services; other connected systems may fail	Severe impacts on poor and vulnerable groups (including women), leading to extreme destitution	5
Major	Serious impact on the system's ability to deliver critical services; not a complete system failure	Loss of confidence and criticism in local government; significant impacts on poor and vulnerable groups that seriously affect their lives and livelihoods	4
Moderate	System experiences significant problems, but is still able to deliver some degree of service	Moderate impacts on the lives and livelihoods of the poor and vulnerable groups (including women)	3
Minor	Minor problems experienced, reducing effective service delivery	Minor impacts on the lives and livelihoods of the poor and vulnerable groups (Including women)	2
Insignificant	Minimal impact on system – may require some review or repair, but still able to function	Minimal impacts on the lives and livelihoods of the poor and vulnerable (Including women)	1

Risk Matrix

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Medium (RS* = 5)	Medium (RS = 10)	High (RS = 15)	Extreme (RS = 20)	Extreme (RS = 25)
Likely	Low (RS = 4)	Medium (RS = 8)	High (RS = 12)	High (RS = 16)	Extreme (RS = 20)
Possible	Low (RS = 3)	Medium (RS = 6)	Medium (RS = 9)	High (RS = 12)	High (RS = 15)
Unlikely	Low (RS = 2)	Low (RS = 4)	Medium (RS = 6)	Medium (RS = 8)	Medium (RS = 10)
Rare	Low (RS = 1)	Low (RS = 2)	Low (RS = 2)	Low (RS = 4)	Medium (RS = 5)

Low – 1-4

Medium – 5-10

High – 11-15

Extreme – 15-25

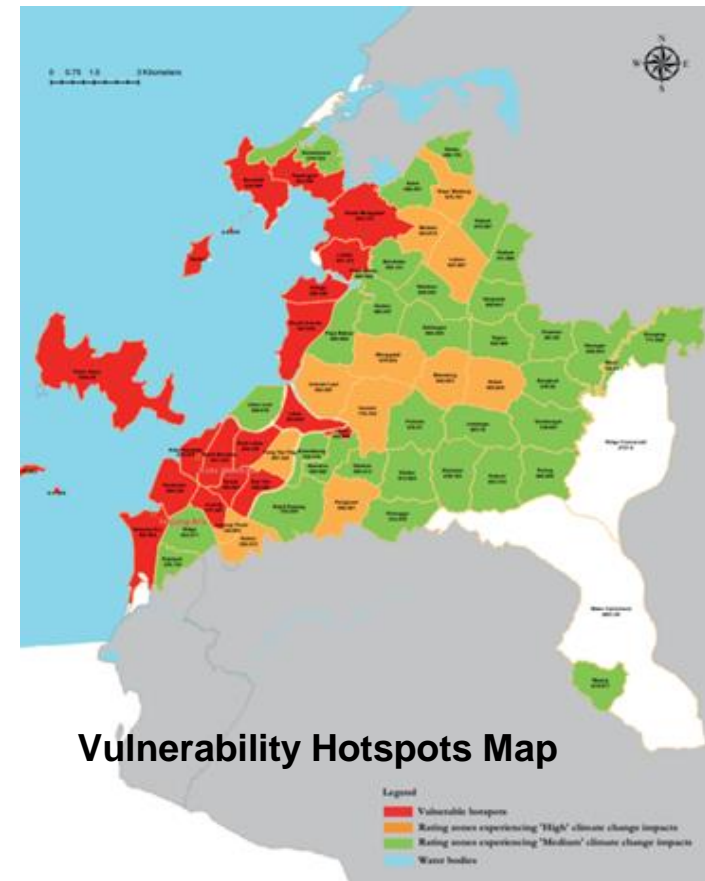
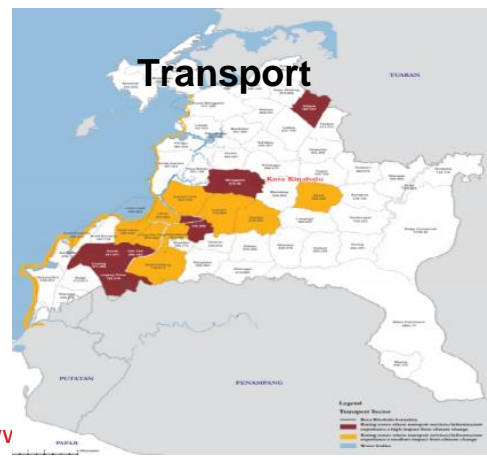
Vulnerability Assessment

- Identify vulnerable areas prone to climate risks in the context of the climate-fragile socio-ecological systems identified above
- Identify social groups/communities/stakeholders who are impacted in these areas.

Output: Vulnerability Hotspots and Vulnerable Actors for targeted intervention

Hotspot Analysis

- The vulnerable areas for each sector can be identified on separate maps
- Superimposing all the maps will create the vulnerability hotspot map



Actor Identification and Analysis

- **Actors: Include individuals, households, and private and public sector organisations**
- **Ability of these actors to contribute to resilience is broadly dependent on the following three key capacities.**
 - **Capacity to organise and respond:** the capacity to organise and re-organise in response to threat or disruption
 - **Resources:** access to the resources necessary to respond (manpower, technology, funds)
 - **Access to information:** availability of data and information necessary to develop effective plans and actions and to improve responses to disruptions.
- **Two types of actors**
 - People vulnerable to the impacts
 - People who can influence the impacts

Adaptive Capacity of Actors

Key Capacities of Actors		Score
Capacity to respond to threat or disruption (a)		
Low capacity to organise and re-organise in response to threat or disruption		1
Medium capacity to organise and re-organise in response to threat or disruption		2
High capacity to organise and re-organise in response to threat or disruption		3
Resource available to anticipate the problem and take action (b)		
Low capacity to identify and anticipate problems and mobilise resources for action		1
Medium capacity to identify and anticipate problems and mobilise resources for action		2
High capacity to identify and anticipate problems and mobilise resources for action		3
Capacity to access information to effectively respond to threat (c)		
Low capacity to avoid repeated failures, and innovate to improve performance		1
Medium capacity to avoid repeated failures, and innovate to improve performance		2
High capacity to avoid repeated failures, and innovate to improve performance		3

Adaptive Capacity Score (a)*(b)*(c)	Level of Resilience
1 – 8	Low
9 – 17	Medium
18 – 27	High

Actor Analysis

Climate Fragility Statements	Area/ward	Actors	Capacity to Organise & Respond (A)	Resources (B)	Access to Information (C)	Adaptive Capacity Score (A)*(B)*(C)	Supporting Notes
<i>Contamination of water supply due to flooding made worse by lack of alternative sources</i>	Ward 5	<i>Farmers</i>	1	1	1	1(Low)	<i>Low education level, low income level</i>
		<i>Private Sector</i>	2	3	2	12 (Medium)	Existing business associations
		<i>Water supply department</i>	3	2	3	12(Medium)	Do not always have sufficient finances

Adaptive Capacity of Socio-ecological Systems

- **Economic resilience:** have financial resources to undertake actions to manage climate impact – e.g. budget allocation, tax base, ability to charge fees, other identified sources like national schemes?
- **Technological/Infrastructure:** have technical knowledge and resources to cope with additional climate stresses? Are major technology changes or new technology needed?
- **GHG Emissions:** have possibility to reduce sectoral emissions based on the contribution of the sector to overall GHG emissions?
- **Governance:** Is responsibility clearly established and the responsible entity has authority to make required changes? Support from higher levels of government, clear policies/regulations?
- **Social:** existing community understanding and resources available? Have mechanisms to incorporate community input and feedback? Addresses the needs of poor and vulnerable groups?
- **Ecosystem Services:** have capacity to protect or restore ecosystem or utilise ecosystem services? Is there adequate understanding and data about the role of the different ecosystems?

Consolidated Table

Fragile Urban System	Climate Fragility Statements	Vulnerable Areas	Urban Actors		Adaptive capacity of the system		
			Vulnerable	Potential Supporting	Low	Medium	High
<i>Water Supply</i>	<i>Increased demand of potable water due to rise in temperature and depleting fresh water sources may lead to further water stress.</i>	<i>Ward Numbers: 1, 3, 4, 5, 8, 10, 11, 12, 24, 28, 31, 33, 34, 36, 37, 39, 42, 51, 54, 58</i>	<ul style="list-style-type: none"> <i>DNN</i> <i>Local Residents</i> <i>Slum Population</i> <i>Schools</i> 	<ul style="list-style-type: none"> <i>PJN</i> <i>Jal Sansthan</i> <i>UDD</i> <i>ADB</i> 	<i>Governance</i>	<i>Economic</i>	<i>Technological/ Infrastructural</i>

Exercise: Vulnerability Assessment

- For the climate fragility statements identified before, identify the areas that are vulnerable in your city. You can mention the names of places or ward numbers.
- For each statement, identify four major actors or stakeholders. Think about who will be impacted or who can support you if you want to take action. Think about stakeholders in the city and beyond, including government and non-government actors.
- Assign scores on a scale of 1 to 3 for each actor's capacity to organise and respond, ability to access resources and ability to access information.

Climate Fragility Statements	Area / ward / village	Actors	Actors			Adaptive Capacity Score (A)*(B)*(C)	Adaptive capacity of the system		
			Capacity to Organise & Respond (A)	Resources (B)	Access to Information (C)		Low	Medium	High

10-Minute Break

Module 3

Development of Climate Resilience Strategy

Objective

- To consolidate analysis and results of previous modules
- To identify adaptation and mitigation measures to deal with climate change and related disasters
- To prioritise and integrate these measures to existing municipal plans

Steps

Step 1 – Identification of intervention

- Develop a list of possible adaptation and mitigation actions or interventions to address the identified climate risk and vulnerability; consider vulnerable areas, vulnerable actors and supporting actors.

Step 2 – Prioritisation of Interventions

- Evaluate the proposed list of actions against a set of resilience indicators, i.e redundancy, flexibility, responsiveness, GHG emission reduction and access to information to ensure their contribution to urban resilience.

Step 3 – Integration into the City Plan

- Align the proposed action with existing city plans or programmes. This will determine whether the required interventions can be integrated with little or no additional resources into an existing departmental program or project.

Step 1: Identifying Resilience Interventions

- The Core Team will develop a **list of possible actions**, or “interventions” to support actions on climate mitigation and adaptation.
- These interventions are **screened and prioritised**, linked to existing city plans, and assembled into a Climate Resilience Strategy.

Climate Fragility Statement	Vulnerable Areas	Actors		Overall Resilience Score	Potential Climate Resilience Interventions
		Vulnerable Actors	Potential supporting actor		
<i>Contamination of water supply due to flooding made worse by lack of alternative sources</i>	<i>Ward 5</i>	<i>Slum Dwellers</i>	<i>Private sector Water Authority</i>	<i>Low</i>	<i>Rooftop water harvesting and safe storage Provision of low-cost, effective water purifiers</i>
<i>High GHG Emissions from water pumping sector</i>	<i>Entire City</i>	<i>Water Supply Department Residents</i>	<i>Water Authority</i>	<i>Low</i>	<i>Improved efficiency of water pumps Reduction in leakage from distribution system</i>

Remember to

- Focus on strengthening the resilience of the most vulnerable groups (especially women and children) and sectors through resource mobilization
- Explore traditional/ local knowledge to deal with changing climate.
- Focus on gender budgeting to strengthen the resilience of local women.
- Aim for a mix of “hard” (i.e. infrastructure related) and “soft” (i.e. non or minor infrastructure related e.g. policy changes, capacity building) solutions
- Focus on critical sectors to reduce energy consumption and hence reduce GHG emissions.

Step 2: Prioritisation of Interventions

Resilience Indicators

- **Redundancy:** Systems function through **multiple paths or nodes** when performance is critical; “single best solution” is not resilient
- **Flexibility:** Systems designed to **work under a variety of conditions**; not rigid or designed only for one specific situation
- **Responsiveness/ re-organisation:** Systems **respond and change to meet unexpected shocks**; flexible organisations and access to resources (information, skills, equipment, knowledge and experience)
- **Access to Information:** Systems **learn from and build on experience**; not repeat past mistakes and integrate lessons from other cities; have monitoring and evaluating mechanisms
- **Energy saving and GHG emission mitigation potential:** Systems can **reduce energy consumption** and mitigate GHG emissions
- **Social resilience:** Systems have potential to **improve the social resilience** of marginalised groups by providing them ability to cope

Resilience Prioritisation of Interventions

Potential Climate Resilience Interventions	Resilience Indicators						Overall Resilience 5-6/6: very high 4/5: High 3/5: Medium 2/5: Average 1/5: Low
	Redundancy (yes/no)	Flexibility (yes/no)	Responsiveness / re-organisation (yes/no)	Access to Information (yes/no)	Energy saving and GHG emission mitigation potential (yes/no)	Potential for Social Resilience	
Rooftop water harvesting to deal with water stress	Yes Supports self sufficiency at the household level	Yes System allows for recharging of groundwater	Yes In case of a shortage, households have stored rainwater for use	No City helplines exist, but responsibility lies with households	Yes Reduction in electricity consumption due to reduced pumping	Yes Can improve the status of women by providing decentralised access to drinking water.	Very High

Feasibility and Impact Assessment

Potential Climate Resilience Interventions	Feasibility			Time required for the intervention to show impacts on climate change (short / medium / long term)
	Technically (high / medium / low)	Politically (high / medium / low)	Financially (high / medium / low)	
<i>Rooftop water harvesting to be made mandatory to deal with water stress due to anticipated increase in temperatures and decrease in precipitation</i>	<i>High (technology is easily available)</i>	<i>Medium (would require a change in building by-laws and building codes)</i>	<i>High (not an expensive option to implement with substantial results)</i>	<i>Short term</i>

Step 3: Integration into City Plan

Resilience Interventions	Relevant Programmes	Ongoing/upcoming/planned	Can the programme be leveraged – yes/no; if yes how?
Rooftop water harvesting to be made mandatory to deal with water stress due to anticipated increase in temperatures and decrease in precipitation	Housing Scheme for the Urban Poor	Upcoming (following financial year)	Yes. Design of buildings can be modified to include a rooftop water harvesting and safe storage system

Exercise: Prioritisation of solutions

- For the climate fragility statement used in previous exercise, identify 2 interventions.
- Identify whether the intervention addresses the resilience indicators.
- Count and calculate the number of instances when these indicators are addressed – mark yes.
- Prioritise the indicators in terms of technical political and financial feasibility and in terms of timeframe for implementation (long term, mid term, short term)
- Identify if there are any existing/ongoing or proposed development actions in the city with which these interventions can be integrated for implementation.

Potential Climate Resilience Interventions	Resilience Indicators						Overall Resilience 5-6/6: very high 4/5: High 3/5: Medium 2/5: Average 1/5: Low
	Redundancy (yes/no)	Flexibility (yes/no)	Responsiveness / re-organisation (yes/no)	Access to Information (yes/no)	Energy saving and GHG emission mitigation potential (yes/no)	Potential for Social Resilience	
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Potential Climate Resilience Interventions	Feasibility			Time required for the intervention to show impacts on climate change (short / medium / long term)
	Technically (high / medium / low)	Politically (high / medium / low)	Financially (high / medium / low)	
<i>Rooftop water harvesting to be made mandatory to deal with water stress due to anticipated increase in temperatures and decrease in precipitation</i>	<i>High (technology is easily available)</i>	<i>Medium (would require a change in building by-laws and building codes)</i>	<i>High (not an expensive option to implement with substantial results)</i>	<i>Short term</i>

Summary of Day 2

DAY 3

Recap with Zoom Poll

Module 4

Monitoring, Evaluation, Reporting and Scaling

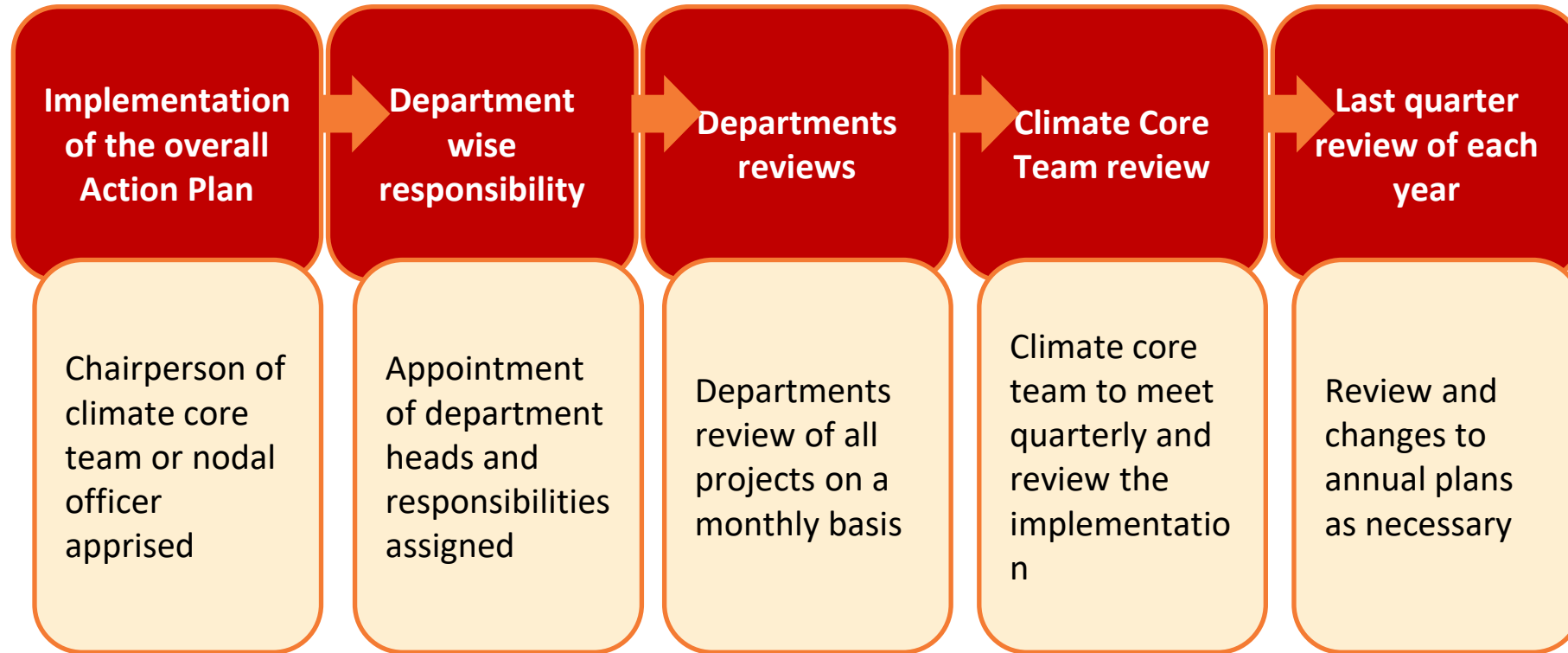
Objectives

- **To encourage municipalities to conduct a systematic and comprehensive assessment of targets/Interventions/actions through a monitoring and evaluation process**
- **To encourage local governments to collaborate with other cities and agencies**

Monitoring and Evaluation Framework

- **The M&E framework can help municipalities keep track of the activities that are scheduled for implementation periodically. It should include:**
 - An institutional framework for monitoring and evaluation.
 - Performance indicator to measure the achievement of the objective
 - Periodicity of Review
 - Process for review of the Annual plan of implementation.
 - The mechanism for collating and reporting results from project-specific implementation and impact monitoring.

Process of Monitoring by Climate Core Team



Monitoring and Evaluation Framework

Sector	Resilience Intervention	Timeline	Allocated budget	Milestones for implementation process	Status	Climate Change Impact: Annual Mitigation Potential			Climate Change Impact: Annual Mitigation – Reported based on the actual implementation
						Potential energy saving (Million KWh)	Potential fuel saving (unit)	Potential emission reduction (tCO ₂ e)	Reported energy saving (Million KWh)

Importance of reporting



Measure and monitor progress in meeting your climate objectives



Understand data gaps to inform what resources and support is needed



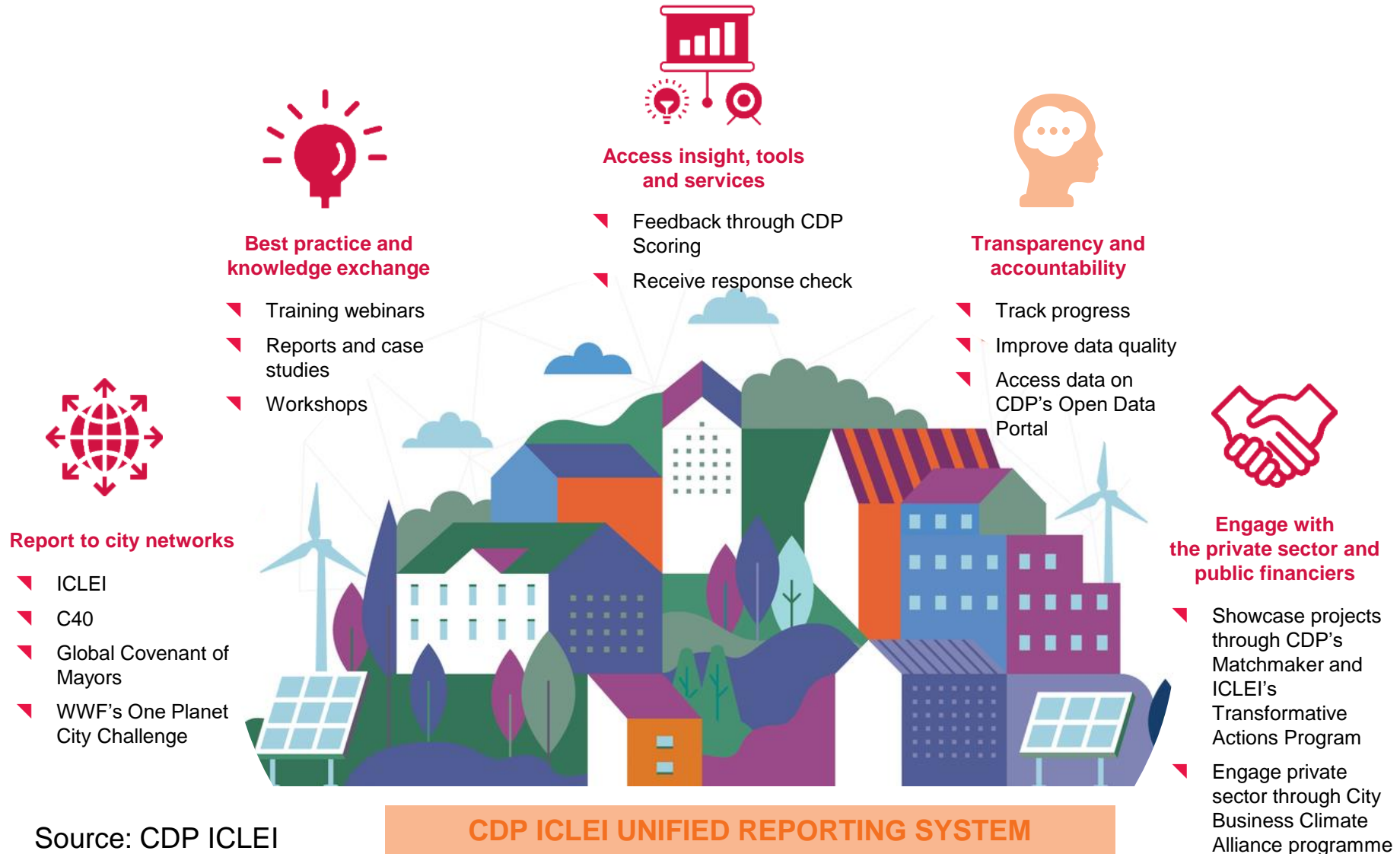
Learn about climate actions that are working and **best practice** globally and locally



Show leadership and impact that local authorities can achieve

Source: CDP ICLEI

Benefits of reporting



Source: CDP ICLEI

Questions and answers

Summary of Day 3

DAY 4

Recap with Zoom Poll

Module 5

Financing Climate Resilience Initiatives

Objectives

- **To provide guidance on the various sources for financing climate-resilient initiatives.**
- **To provide information on the potential opportunities available for cities and subnational authorities to mobilise technical and financial resources for implementation of climate-resilient initiatives.**

Public Channel for Climate Funds

- **Funds operating under the UNFCCC umbrella**
 - The Green Climate Fund (GCF) (Adaptation and Mitigation)
 - The Global Environmental Facility (GEF) (Mitigation).
- **Through institutions that are not directly under the guidance of the UNFCCC like UN REDD Programme, which provides funding to reduce emissions from deforestation and forest degradation in developing countries.**
- **Development banks at the multilateral, regional, and national level**
 - Within this framework, the \$8 billion Climate Investment Funds play a crucial role in fostering climate change mitigation and adaptation projects.
 - In 2017, climate financing from the main Multilateral Development Banks (MDB) alone had reached \$35.2 billion.

Climate Finance in Nepal

- Nepal will require an additional USD 2.4 billion by 2050 for climate resilience.
- **Multilateral finance channels**
 - Scaling Up Renewable Energy Programme (SREP) in Low-Income Countries
 - Pilot Programme for Climate Resilience (PPCR)
 - Least Developed Countries Fund (LDCF)
 - Adaptation Fund
 - Global Environment Facility (GEF)
 - Forest Fund
 - Green Climate Fund
- **Bilateral funds**
 - The United Kingdom
 - The European Union, primarily through the National Climate Change Support Programme (NCCSP).
- The government accepts grants, soft loans and co-financing. Of all the funds received till 2014, 69% were grants and 31% concessional loans .

Platform and Tools for Municipalities

Transformative Actions Program (TAP)

- A project pipeline and project preparation facility developed by ICLEI and partners; acts as an incubator that supports local and regional governments by catalysing capital flows for low-to-no emission and climate-resilient development. Through the TAP, local and regional governments receive support to develop climate project concepts into low-risk, high-feasibility, high-impact sustainable infrastructure projects

<https://tap-potential.org>

Global Climate City Challenge (GCCC)

- Provides technical assistance that helps prepare and fast-track financing of urban climate action projects. Basic eligibility criteria is to have project/programme investment volume of over EUR 30 million or with an engagement in a facility, including smaller projects in different municipalities, totalling EUR 30 million.

<https://www.eib.org/en/projects/sectors/urban-development/city-call-for-proposal/index.htm>

Platform and Tools for Municipalities

The Leadership for Urban Climate Investment (LUCI)

- LUCI offers a comprehensive approach in sealing gaps in the investment value chain by establishing a global financing framework through synergies between countries, international and national financial institutions, international organisations, climate institutions and funds, and other partners. The initiative also seeks to achieve subnational financing by supporting bankable projects, capacity building of national and subnational development banks, and improving financing options.

<https://climateaction.unfccc.int/views/cooperative-initiative-details.html>

The Green Cities Development Bank (GCDB)

- GCDB addresses the need for additional financing directly to cities for high-impact projects. The GCDB aims to address market failures through a combined green- and development-bank model that can rapidly deploy capital and replicate successful transactions in cities of different sizes. It will work where a sovereign guarantee is not available and will crowd-in private sector capital.

Platform and Tools for Municipalities

Global Covenant of Mayors for Climate & Energy

- GCoM is the largest global alliance for city climate leadership, built upon the commitment of over 10,000 cities and local governments. These cities hail from 6 continents and 138 countries. In total, they represent more than 800 million people. GCOM is supported by the former New York City Mayor and Philanthropist Mr Michael Bloomberg. By 2030, Global Covenant cities and local governments could account for 2.3 billion tons CO₂e of annual emissions reduction, matching yearly passenger road emissions from the U.S., China, France, Mexico, Russia, and Argentina combined.

<https://www.globalcovenantofmayors.org>

Zoom Poll

Open Session for Clarification and Doubts

Post-Training Assessment



www.cdkn.org

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