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ADAPTATION

Urban Climate Resilience Masterclass

Module 1

Introduction to Climate Change & Urban Resilience

UCRMC Course Overview

Welcome to the Urban Climate Resilience Masterclass! You are about to start **Module 1**.



Module 1

Introduction to
Climate
Change and
Urban
Resilience



Module 2

Understanding
Climate Risks
in Your City



Module 3

Locally Led
Adaptation for
Urban
Resilience



Module 4

Ensuring
Climate
Resilience of
Urban
Infrastructure



Module 5

Step-by-Step
Guidelines for
Delivering
Climate
Resilient
Infrastructure



Module 6

Financing
Climate
Resilient Urban
Infrastructure

Acknowledgements

The Urban Climate Resilience Masterclass (UCRMC) Modules were developed by the Global Centre on Adaptation (GCA), in partnership with the International Institute for Environment and Development (IIED) and the Nuvoni Centre for Innovation Research, under the Africa Adaptation Acceleration Program (AAAP), with the generous support of Denmark.



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International Institute
for Environment
and Development



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FOREIGN AFFAIRS
OF DENMARK
Danida

GCA gratefully acknowledges the technical assistance provided by World Bank through the Quality Infrastructure Investment Partnership (QII), in close collaboration with the Government of Kenya and the Kenya School of Government (KSG), in support of the development of the UCRMC Modules.

The content and structure of the UCRMC Modules were further informed by the Resilient Urban Infrastructure Guidelines and the Guidance Note on Mainstreaming Resilience into Urban Planning, developed through the Japan–World Bank Program for Mainstreaming Disaster Risk Management in Developing Countries. This program is financed by the Government of Japan and benefits from the technical expertise of the World Bank Tokyo Disaster Risk Management Hub and the Global Facility for Disaster Reduction and Recovery (GFDRR).



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JAPAN GOV
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GFDRR
Global Facility for Disaster Reduction and Recovery



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Acknowledgements

We also extend our sincere appreciation to the institutions that constituted the Sounding Board and provided critical guidance and expert feedback throughout the review process:

State Department of Housing and Urban Development (SDHUD) / Second Kenya Urban Support Program (KUSP2) | Council of Governors | Kenya School of Government – Mombasa | Kenyatta University – Department of Spatial & Environmental Planning | The Architectural Association of Kenya (AAK) | Environment Institute of Kenya (EIK) | Institution of Engineers of Kenya (IEK) | The Kenya Institute of Planners (KIP)



The Institution of Engineers of Kenya



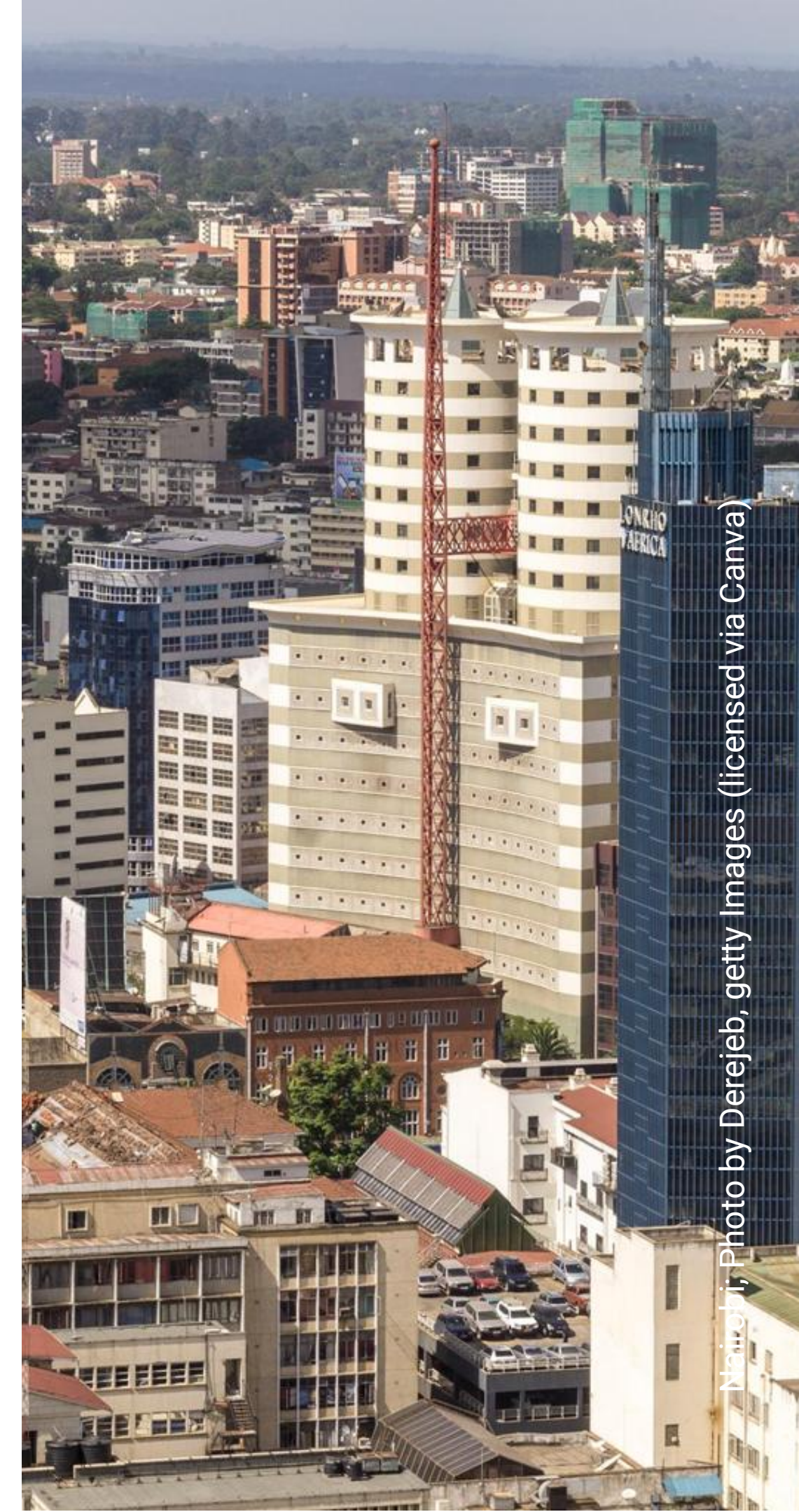
These contributions were instrumental in ensuring the relevance and quality of the UCRMC Modules.

Kenya Urban Support Program (KUSP II)

The World Bank's KUSP II aims to strengthen the capacities of urban institutions to: (i) improve the delivery and resilience of urban infrastructure and services; (ii) enhance the private sector engagement in urban planning; and (iii) support the transition of refugee camps into integrated host community and refugee settlements.

Eligible infrastructure categories:

- Connectivity, mobility and accessibility (e.g. roads, walkways and bicycle paths, universal access adaptations in main transport stations)
- Municipal Solid waste management (e.g. collection equipment, collection bins, transfer stations, collection points, community sensitization campaigns)
- Wastewater and fecal sludge management (e.g. safe public toilets, community septic tanks, emptying and transportation services and equipment)
- Water supply (e.g. community connections (kiosks and storage tanks), water reticulation systems)
- Storm water drainage
- Urban drainage systems (e.g. flood control methods, rehabilitation of storm water drainage)
- Urban social and economic infrastructure (e.g. urban greenery and public open spaces, social retail markets, community halls, childcare facilities)
- Fire and Disaster Management (e.g. fire control stations and disaster management equipment)



Agenda

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Summary



Dhaka; Photo by N.A. Omolo, Flickr

Housekeeping

Listen



Listen carefully, follow along and make your own notes.

Ask



Ask the trainers questions or clarifications at any time.

Share



Your own experience is valuable and we encourage you to share it.

Discuss

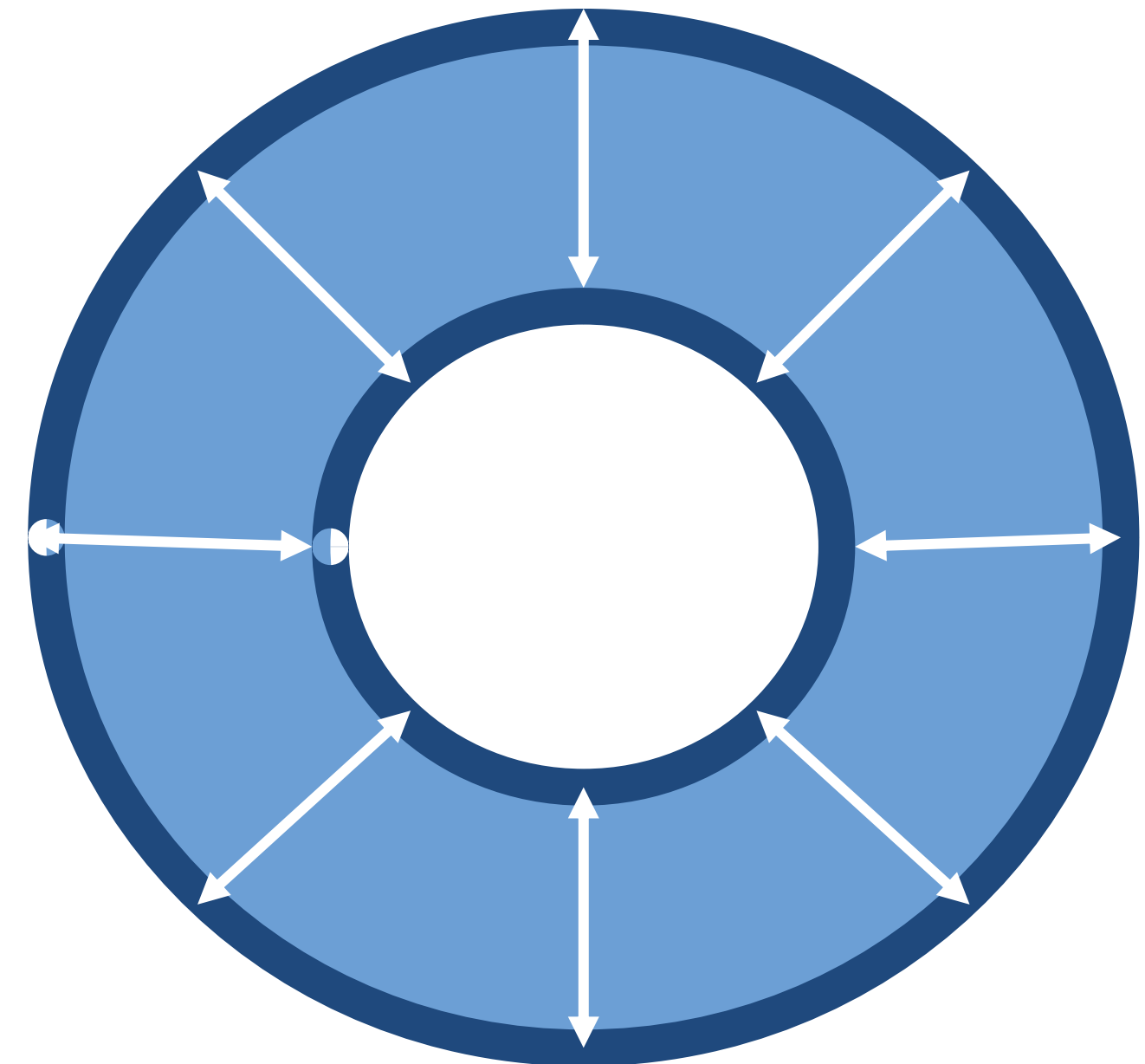


Share and discuss with others during exercises, breaks and reflections.

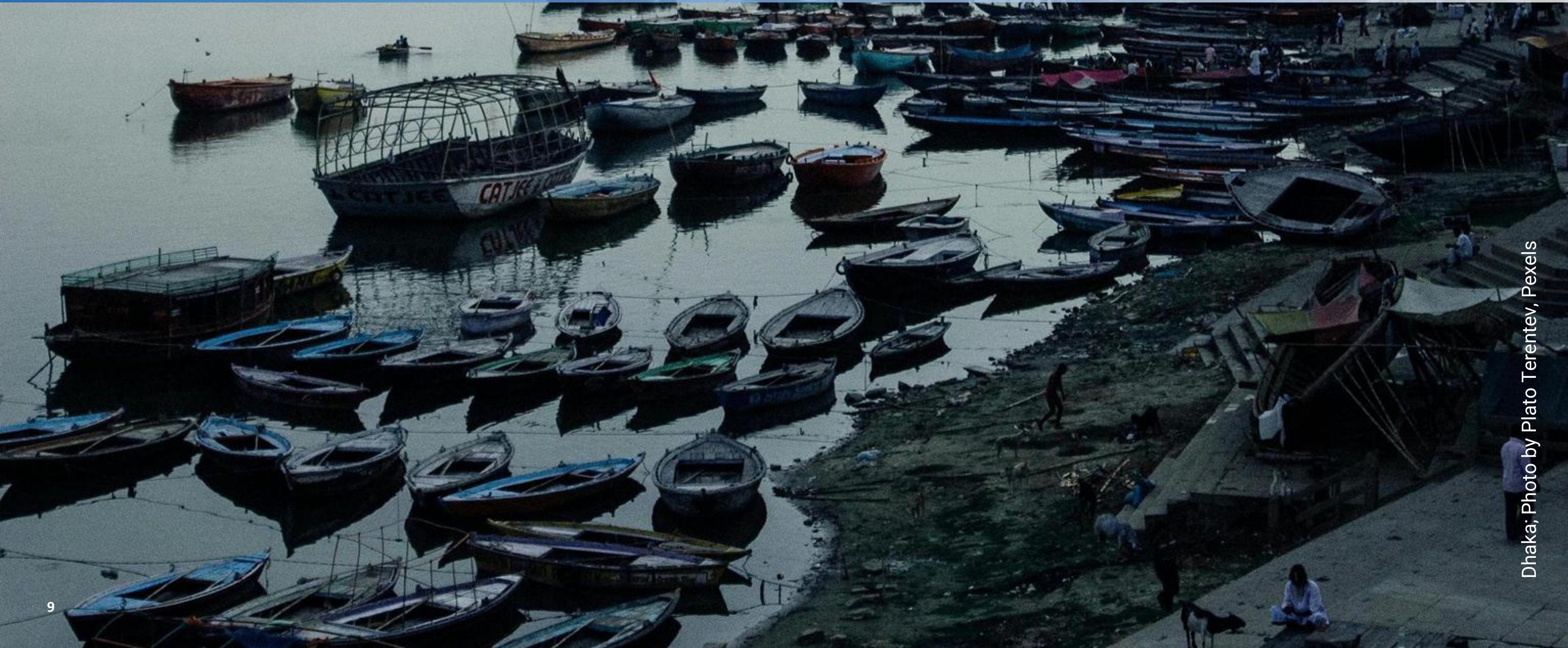
Participant Introductions

Icebreaker Exercise:

1. Split the group in half.
2. Form two circles, one inside the other (Everybody in the outer circle should be facing a person in the inner circle).
3. Introduce yourselves.
4. Every minute the outer circle moves clockwise.
5. Keep moving round every minute.



01 | Why This Topic Matters

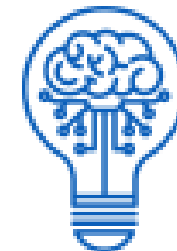


Dhaka; Photo by Plato Terentev, Pexels

Why this Topic Matters



This module serves as a foundation for your UCRMC course journey by introducing key concepts and definitions that will be used throughout the course.



It introduces the concepts of climate change, climate risk and climate resilience. It then starts to outline how these concepts can be applied to cities like yours in Kenya.



Module 1 also provides an introduction to the concepts of equity and inclusion. This will help you understand how work to promote resilience should support vulnerable and marginalized groups of people.

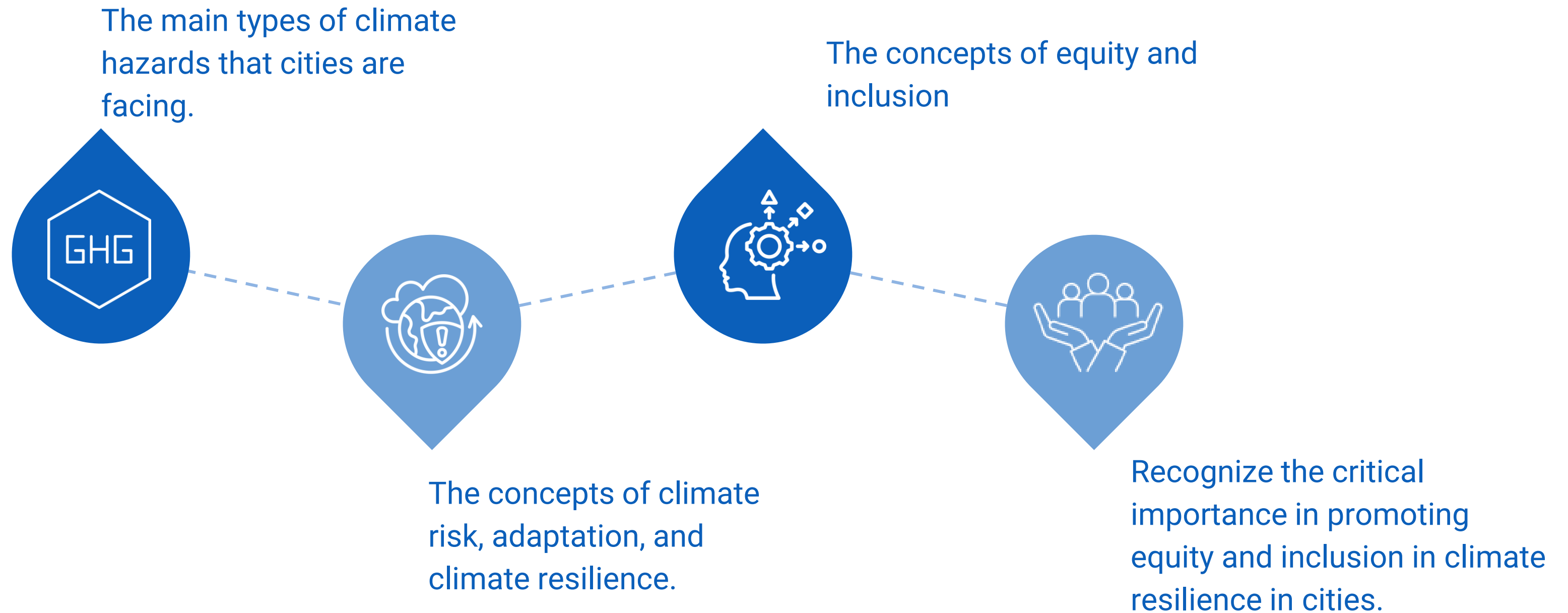
02 | Learning Objectives



Photo by Dami Akinbode, Unsplash

Learning Objectives

By the end of Module 1 participants will be able to understand:



03 | Concepts & Definitions



Dhaka; Photo by Shahriar Tonmoy, Pexels

Concepts & Definitions



The Greenhouse Effect

Think of the greenhouse effect like a natural blanket for our planet. The Sun sends warmth to Earth, and some of it stays trapped by gases in the air (e.g., H_2O , CO_2 , CH_4 , N_2O). Human activities emit (make) more of these gases, making the blanket thicker. This extra warmth makes the Earth heat up: global warming.



Climate Change

Long-term changes in the weather because of human activities. This refers to changes over several decades or longer, and is different from the **day-to-day changes** we see in the **weather**.



Hazard

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. Hazards include increased temperatures, flooding, and sea level rise.

Climate Hazards

Physical events or trends linked to climate change, such as heat, extreme weather events (e.g., floods and droughts) and sea level rise, that may cause damage and loss.



Climate Risk

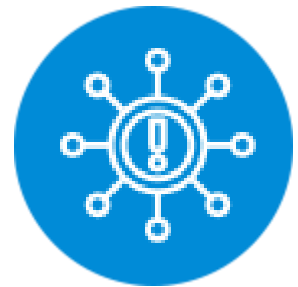
The chance of negative consequences for people and nature because of climate issues. Risks happen when climate hazards affect exposed and vulnerable people, communities or systems.

Concepts & Definitions



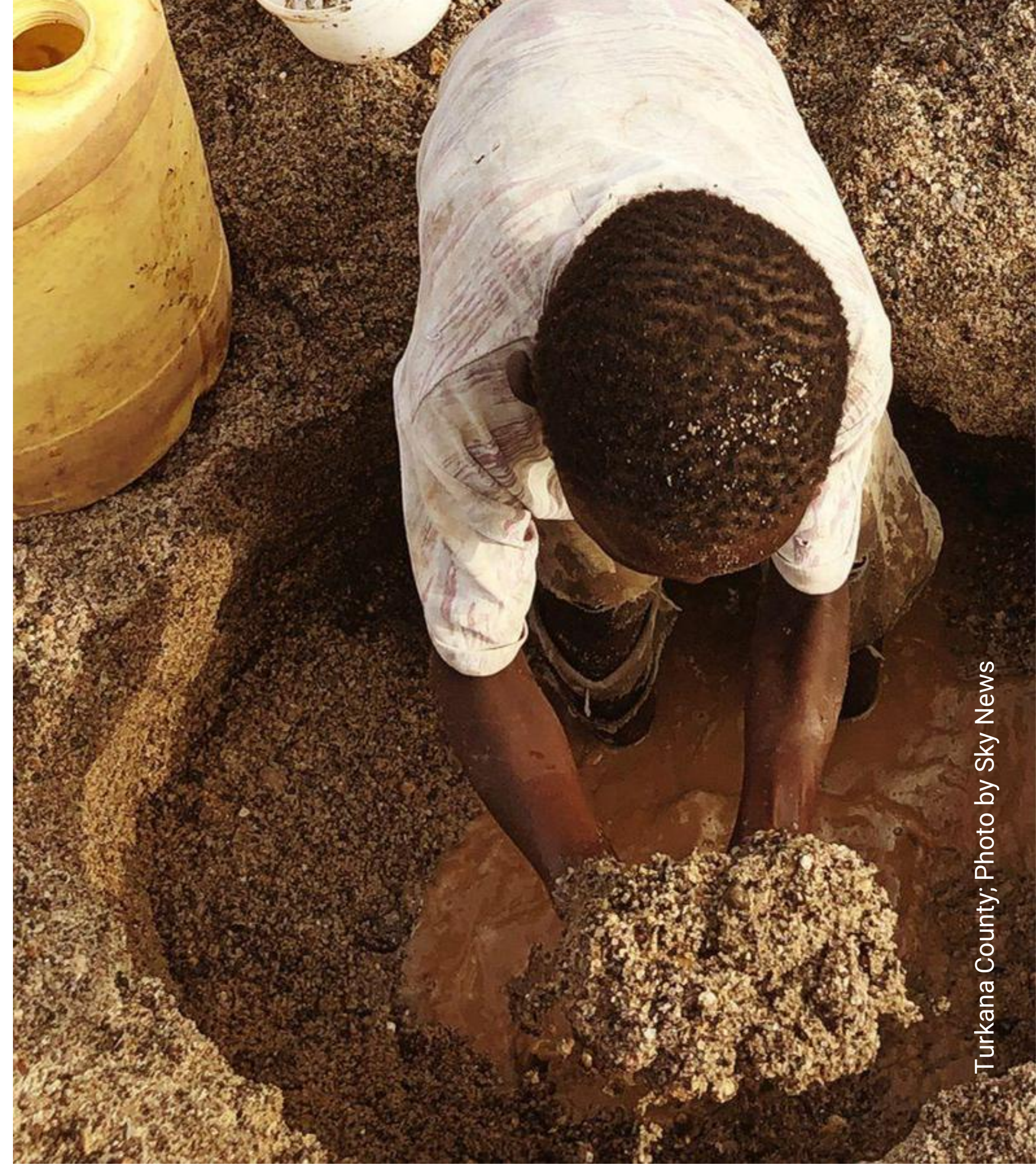
Vulnerability

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. This can be influenced by factors like economic status, access to resources, quality of infrastructure, governance, and the ability to adapt to changes.



Exposure

The presence of people, livelihoods, assets, infrastructure, services, etc. in locations that could be adversely affected by hazards. This could include, for example, living on a flood plain, a steep slope, or in a neighbourhood with poor drainage.



Turkana County; Photo by Sky News

Concepts & Definitions



Risk Reduction

Taking actions to make sure bad things related to disasters happen less often and cause less harm. This involves doing things to lower the chances of disasters, making sure we're less vulnerable to them, and being better prepared to handle them when they occur. the goal is to prevent new risks, lessen existing ones, and become more resilient overall.



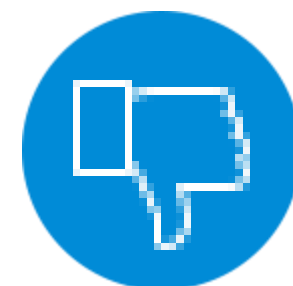
Adaptation

Making changes to cope with the actual or expected changes linked to climate change. It helps us reduce the harm and make the most of any good things that can come from it.



Mitigation & Low Carbon Development

Mitigation means taking actions to reduce or absorb the emissions of greenhouse gases that cause climate change. Low-carbon development means finding ways to reduce the gases causing climate change without harming our well-being and economic growth.



Maladaptation

Actions that attempt to address climate change but that might make the problems caused by climate change worse. This could include increasing emissions, becoming even more vulnerable to climate change, creating unfair outcomes, or making things worse for our well-being, both now and in the future.

Concepts & Definitions



Climate Resilience

The ability of people and nature to manage difficult situations caused by climate change. It's about ensuring that physical infrastructure, economic systems and livelihoods, human health, ecosystems, and social systems can function well, even when faced with challenges from the changing climate.



Urban Resilience

Urban resilience means how well a city and all the things in it, like people, buildings, and systems, can prevent problems, handle them when they occur, bounce back to normal after something goes wrong, and build back better.



Photo by Brazzo, Getty Images (licensed via Canva)

Concepts & Definitions



Equity

Equity means making sure that everyone, including marginalised and vulnerable people, communities and districts, gets the support that they need. In the context of climate change, it means recognizing and addressing the unequal burdens that are made worse by climate change, whilst ensuring that all people share the benefits of climate protection efforts.



Social Inclusion

Social inclusion is about making sure everyone, no matter who they are, including marginalised and vulnerable people, communities and districts, can be part of society in a better way. It means giving everyone a chance to join in, have opportunities, and be treated with respect, especially if they've been at a disadvantage because of who they are.



REALITY

Few get more than they need
Some get just what they need
Many get less than they need



EQUALITY

Everyone gets the same support, this works better for some than for others



EQUITY

Everyone gets the support they need



JUSTICE

The structural & systemic cause of inequality is addressed; Everyone can come as they are

04 | Climate Change, Risks & Hazards



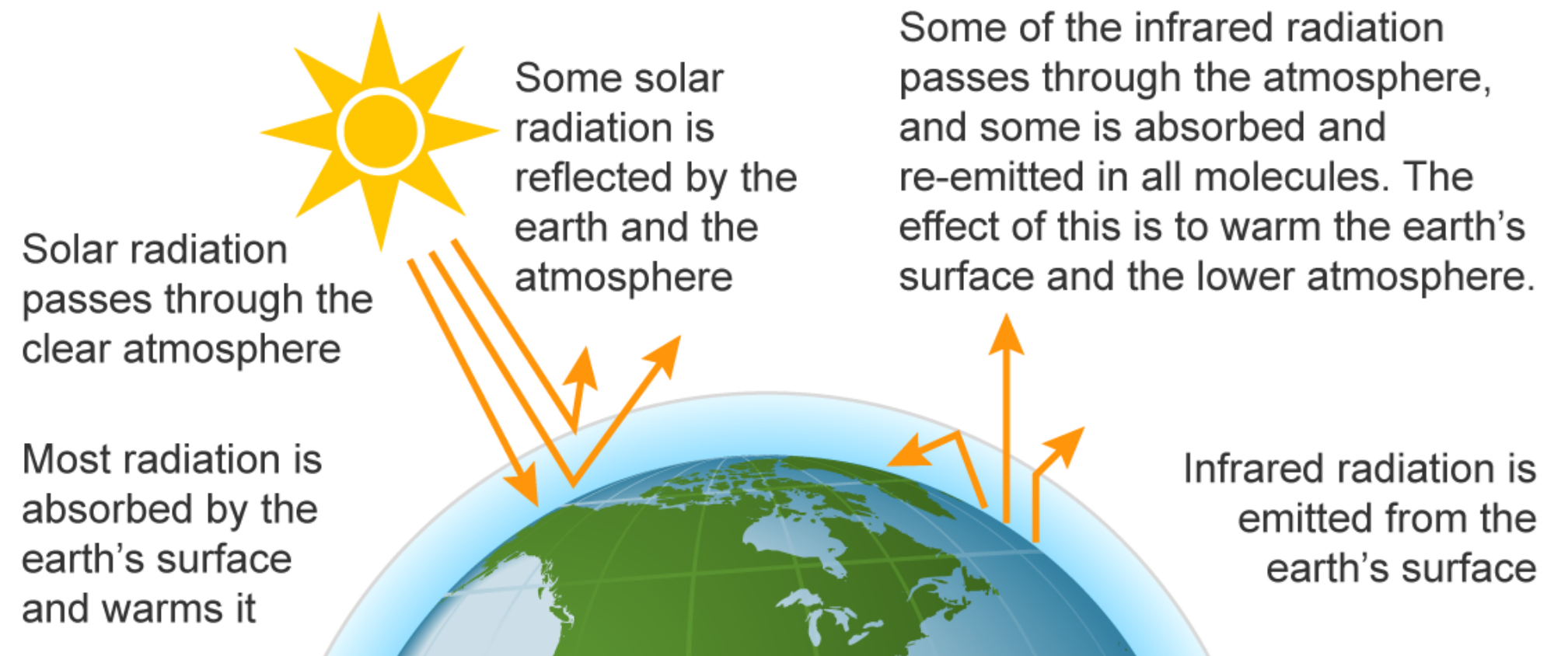
Dhaka; Photo by Ferdous Hasan, Pexels

What is climate change?

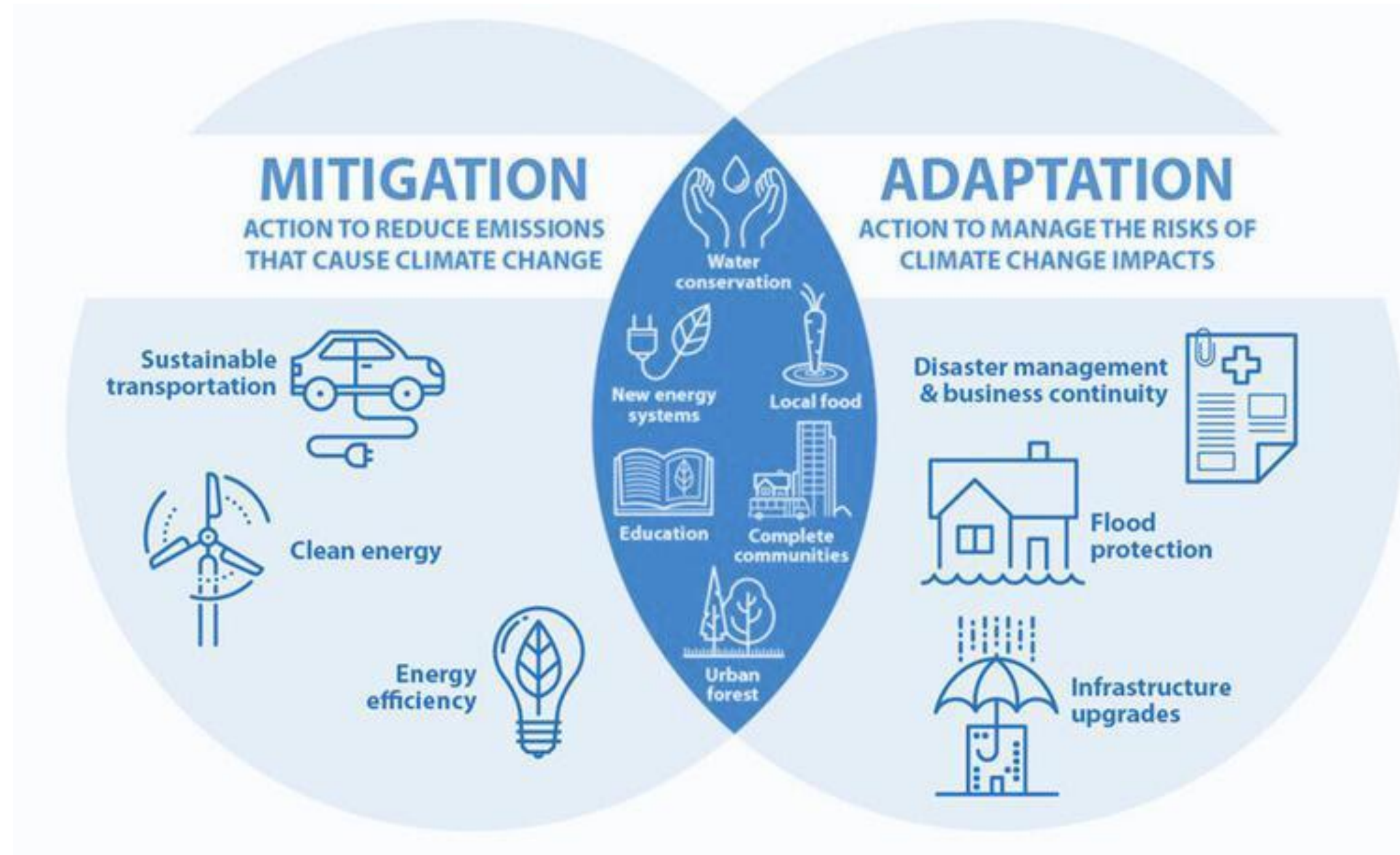
- Greenhouse gases (incl. CO₂, CH₄, N₂O, H₂O) trap solar energy, warming the atmosphere.
- Human activities, such as transport, energy use and industrial processes, have increased the concentration of greenhouse gases enhancing the greenhouse effect, causing global warming.
- This causes climate change: changes in long-term climate.
- Impacts include hotter temperatures, more severe storms, intense rainfall, droughts, sea level rise, flooding and land/mudslides.

Urban areas are responsible for 70% of global CO₂ emissions, and climate change can affect cities in many ways, including by damaging infrastructure, causing food and water insecurity, impacting livelihoods, and increasing health risks, poverty, displacement and inequality.

The greenhouse effect



Mitigation and Adaptation



Mitigation means reducing emissions of greenhouse gases that cause climate change i.e., **addressing the cause of climate change.**



Adaptation means adjusting to actual or expected climate change to minimise harm or exploit beneficial opportunities i.e., **adjusting to the impacts of climate change.**

Both need to respond to issues of **inequality, social exclusion and injustices.**

What is climate risk?

Climate risk is the chance of negative consequences for people and nature because of climate change.

Risks happen when climate hazards affect exposed and vulnerable people, communities or systems.

Climate risk is therefore closely linked with issues of equity and inclusion – since risks are made worse by vulnerable and marginalized groups.

Climate risks occur as a results of three inter-linked elements:

- **Hazard:** climate event e.g., drought, flood, landslide
- **Exposure:** being in places that could be negatively affected
- **Vulnerability:** likelihood of being negatively affected. This is often made worse by inequality and social exclusion.



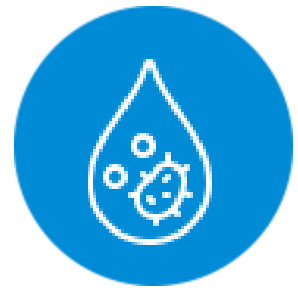
$$\text{Risk} = \text{Hazard} \times \text{Exposure} \times \text{Vulnerability}$$

What climate risks do cities face?

Cities face a wide range of potential climate risks. These risks can have negative impacts on people, social structures, infrastructure, and the natural environment. Risks are unevenly distributed, with disproportionate implications for vulnerable and marginalised groups, such as women. This drives climate inequity.



Increased water stress and scarcity



Degraded water and sanitation infrastructure



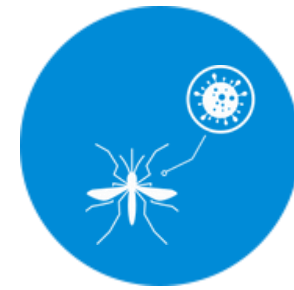
Damages to infrastructure



Disruptions to essential services



Food insecurity and livelihood disruptions



Increased transmission of vector borne diseases



Displacement and shelter needs



Economic, social and community stress

Climate Hazards in cities

Cities face a range of **climate hazards**, which can lead to the climate risks highlighted in the previous slide. This section presents a closer look at the different types of climate hazards that cities are exposed to.

Rapid-onset climate hazards refer to sudden and intense environmental events, such as floods, landslides and wildfires, which unfold rapidly, often with little warning, and result in immediate and severe impacts on communities and ecosystems.

Slow-onset climate hazards, such as sea level rise, droughts, and gradual temperature increases, and changes in rainfall patterns, develop gradually over time, progressively worsening environmental conditions and posing long-term challenges to adaptation and resilience efforts.



Climate Hazards

Changing Precipitation Patterns

Climate change disrupts historical precipitation patterns, leading to alterations in the frequency, intensity, and duration of rainfall events. This presents a slow-onset hazard with significant implications for cities worldwide.

Some regions experience increased rainfall and flooding, while others face prolonged droughts and water scarcity.

Altered precipitation patterns have social and economic implications for cities. Flood damage displaces residents, disrupts businesses, and strains emergency response systems, exacerbating social inequalities.

Drought-induced water shortages impact agriculture, industry, and tourism, leading to economic losses and unemployment.



Photo by Daoudi Aissa, Unsplash

Climate Hazards

Flooding

Flooding is the most common climate hazard. As a result of climate change the number of people impacted by floods is expected to double by 2030.

Cities face river (fluvial) flooding and extreme rainfall (pluvial) flooding, as well as coastal flooding. Cities are vulnerable to floods due to their proximity to rivers, lakes and seas, but also due to urbanization processes which have reduced natural drainage and increased surface water retention. Flooding can overwhelm both natural and urban drainage systems leading to significant impacts.

Floods cause direct impacts, such as damaging property and infrastructure, disrupting essential services, and loss of life and injury. Indirect impacts include economic losses (from the loss of productivity, business interruption, increased insurance premiums, and decreased property values), health risks (e.g., from waterborne diseases), social disruption (e.g., from displacement or residents and strain on social services) and long-term recovery challenges (e.g., rebuilding infrastructure).



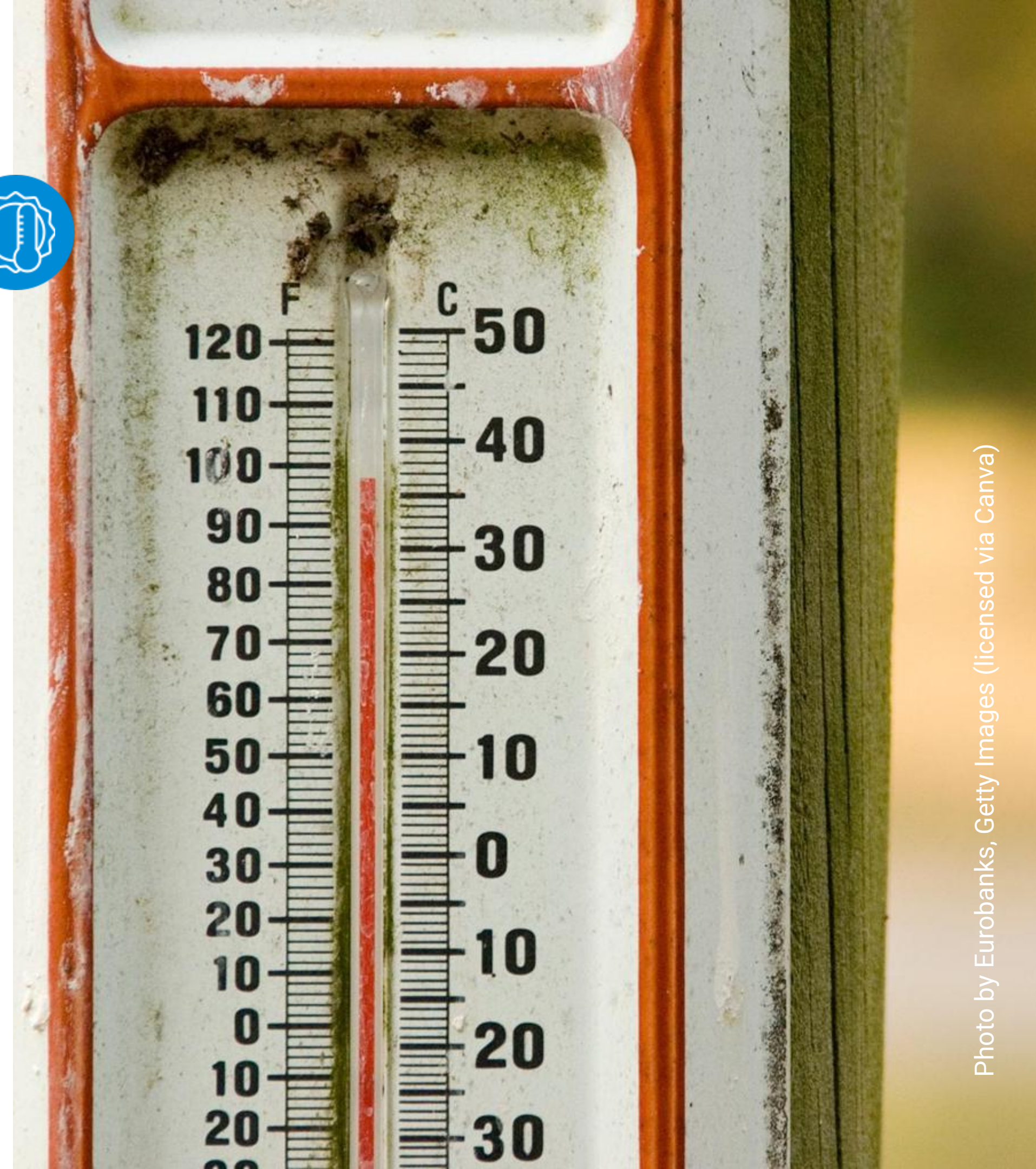
Dhaka; Photo by Dougsyme, Flickr

Climate Hazards

Rising Temperatures

Rising temperatures pose a slow-onset hazard with profound impacts on cities worldwide. These include:

- Higher health burdens from heat-related illnesses and poor air quality.
- Water stress, caused by disrupted water cycles.
- Infrastructure strain e.g., roads and railways can buckle under extreme heat.
- Economic costs due to reduced labour productivity, damage to infrastructure, increased energy consumption for cooling.
- Social vulnerability, as low-income neighbourhoods and marginalised populations bear the brunt of rising temperatures.
- Adaptation challenges, as cities must adapt by retrofitting existing infrastructure, implementing heat action plans, and enhance green spaces to mitigate the urban heat island effect.



Equity & Inclusion

There are a variety of ways that city officials can work to promote equity and inclusion for marginalized groups who are vulnerable to climate risks:



Conduct community-based and gender vulnerability assessments and collect disaggregated data.



Support people who live in informal settlements and work in the informal economy to ensure they are not excluded from formal development processes.



Promote inclusive job creation in green sectors, such as renewable energy, sustainable waste management, and circular economy.



Ensure inclusive participation of all groups of city dwellers, particularly marginalised groups, in the design, delivery & monitoring of climate-resilience infrastructure.



Invest in infrastructure and services that provides benefits to excluded groups.



Communicate in accessible language and formats, such as radio, social media, using visual aids, audio content, alt text and interactive elements.



Provide localized finance that supports excluded groups.

Climate Hazards

Heatwaves



Increased temperatures will lead to a higher frequency of extreme heat days and heatwaves (longer periods of higher than average temperatures) in cities. Extreme heat currently affects 68 million people globally, but this could rise to 1 billion people if global temperatures rise to 2°C.

Extreme heat directly leads to heat stress conditions, such as heat stroke, and even death - particularly in elderly people and those vulnerable to cardiovascular disease, respiratory diseases and diabetes. Extreme heat also disproportionately impacts women, and those whose livelihoods expose them to extreme heat. Heat therefore has implications for public health, particularly in settings with overburdened healthcare systems.

Heatwaves can also lead to disruptions in critical infrastructure services such as energy distribution due to overheating and high consumption, and water shortages. Heatwaves also increase the risk of urban fires.

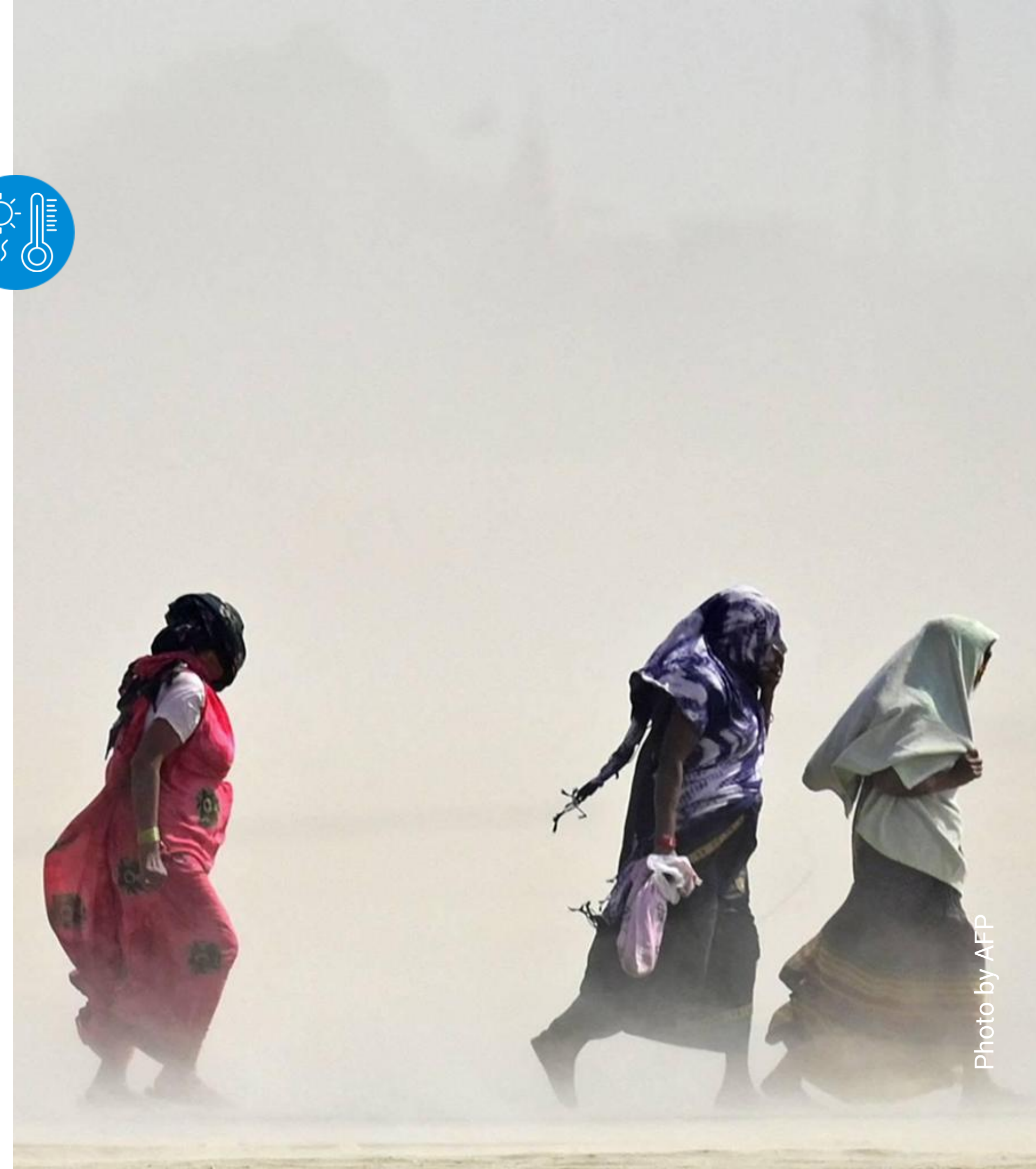


Photo by AFP

Climate Hazards

Drought

Climate-related disruptions in the water cycle will increase the likelihood of drought in many cities. Prolonged dry weather will trigger meteorological droughts, while low water supply in the water system will lead to hydrological droughts.

Heightened water scarcity from droughts will intensify water shortages, undermine water quality, and enhance competition over water resources, impacting household water usage and reducing availability for crucial sectors like energy production, agriculture, industry, and sanitation infrastructure. Socioeconomic droughts will affect the supply and demand of various commodities, while agricultural droughts will impact crops.

Vulnerable groups, such as women, children and the elderly, particularly those residing in informal settlements without reliable water distribution infrastructure, will face heightened risks due to increased drought occurrences. women and girls inordinately bear the impacts of water insecurity particularly in low-income households.



Photo by Yoda Adaman, Unsplash

Climate Hazards

Wildfires

Wildfires are set to become more frequent and intense in the coming years as temperatures rise and droughts worsen. Fires can be started by human activities, such as burning waste or discarded cigarettes, as well as natural factors, such as lighting strikes. The risk of fire is higher in hot, dry and windy climate conditions, which can be made worse by climate change.

Wildfires can cause serious damage to urban property and infrastructure, lead to power outages and service disruptions and necessitate evacuations and displacement, as well as causing loss of life and injury. Wildfires also cause economic losses, social disruption and long-term recovery challenges.

Wildfires can degrade air and water quality, leading to public health impacts. For example, smoke from wildfires can also lead to serious respiratory and cardiovascular diseases in people, leading to sickness and death.



Photo by Vladyslav Dukhin, Pexels

Climate Hazards

Storms & Cyclones

600 million people around the world live in coastal zones that are less than 10m above sea level. Coastal cities are particularly vulnerable to the impact of tropical storms and cyclones, which are expected to increase in intensity and frequency as a result of climate change.

Tropical storms and cyclones can lead to significant damage to urban infrastructure because of high-speed winds, extreme rainfall and storm surges causing urban flooding and blowing down buildings and other structures.

Storms and cyclones can also cause loss of life and injury, and power outages and service disruptions. They can cause particular damage to vulnerable groups living in informal settlements or in housing that is not resilient to high winds and lacks appropriate drainage infrastructure.



Photo by [mdesigner125](#), Getty Images (licensed via Canva)

Climate Hazards

Sea Level Rise

Sea levels are already rising and will continue do so for the coming centuries. The melting of polar ice caps, which is accelerating rapidly due to climate change, is expected to lead to significant sea level rise over the next century alone.

600 million people around the world live in coastal zones that are less than 10m above sea level, putting them at high risk from rising sea levels.

Sea level rise leads to an increase in coastal inundation and flooding, coastal erosion, salination of water sources, destruction of crops, and damage to infrastructure in the built environment, such as roads, bridges, utilities and transportation networks, requiring costly repairs, upgrades and adaptation measures.



Bangladesh; Photo by fotomatik, Pixabay

Climate Hazards

Landslides

Climate change will lead to increased rainfall in many cities, which in turn will increase the risk of slow-onset changes, such as erosion, whereby earthen materials like soil and rock are gradually worn away, as well as rapid onset events like landslides.

Many cities are built in hilly and mountainous areas or alongside riverbanks. Housing and informal settlements is often concentrated in these high-risk areas.

Deforestation and loss of vegetation cover, lack of adherence to building codes, and increased rainfall can trigger landslides - leading to direct impacts in terms of damages and losses of property and infrastructure, as well as injuries and deaths.

Landslides can also trigger additional hazards (e.g., floods, debris flows), which can compromise the stability of infrastructure downstream. Landslides lead to economic losses, social disruption and long-term recovery challenges.



Climate Hazards in Kenya

Case study | Nairobi, Kenya

In May 2024, floods killed nearly 300 people in Kenya and displaced 300,000 people.

Extreme rainfall events in Kenya are projected to rise in frequency, duration, and intensity, triggering riverine, coastal, and flash floods, along with mudslides and landslides, exacerbating risks across the country.

Urbanization, particularly in flood-prone areas like Nairobi's informal settlements, amplifies flood risks due to inadequate drainage systems, leading to displacement, loss of housing, and heightened vulnerability for residents with low adaptive capacity.



Kwa Mang'eli settlement, Machakos county
Photo by Thomas Mukoya

05 | Climate Resilient Infrastructure & Services



Climate Resilient Infrastructure & Services

Cities need to make investments to ensure that its infrastructure is resilient to climate hazards and so that infrastructure and services protects citizens from negative climate risks. There are a wide range of urban inter-connected infrastructure systems where cities can prioritise climate resilient action:



What is urban climate resilience?



Resilience refers to the capacity of a system to anticipate, cope with, respond to, and recover from hazards.



Urban resilience is “the ability of urban centers (and their populations, enterprises, and governments) and the systems on which they depend to anticipate, reduce, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner”.



Climate resilience incorporates disaster resilience as well as the ability to anticipate, cope with, respond to, and recover from climate hazards specifically.



Adaptation measures can increase the resilience of cities to climate change. This course focuses on supporting cities to adapt to climate change and build resilience to climate risks.



Downtown Nairobi CBD; Undefined p

Transportation



Transport networks are vulnerable to climate change hazards such as flooding, extreme rainfall and storms.

These hazards can physically damage key transport infrastructure such as roads, bridges, ports and railways and vehicles - leading to expensive investment to repair infrastructure after a hazard.

Disrupted transport networks can also lead to cascading risks, as people are cut off from essential services such as health facilities.

Making urban transport more resilient could involve retrofits to infrastructure with more durable materials, nature-based solutions that minimize surface water retention and better disaster management planning.



Energy



Energy infrastructure can be vulnerable to climate hazards which can lead to damaged energy distribution networks and to service disruptions for urban residents.

Disruptions to energy systems can lead to cascading risks, leading to challenges for people to access basic necessities such as food, water, transportation and healthcare.

Energy service disruptions can also cause serious disruptions to economic activity which can negatively impact the resilience of households and businesses during times of crisis.

Building more resilient energy systems involves climate-proofing energy networks to withstand and adapt climate hazards such as storms, floods, extreme rainfall and extreme heat.



Amla Para, Dhaka: Photo by Erik (HASH) Hersman, Flickr

Telecoms

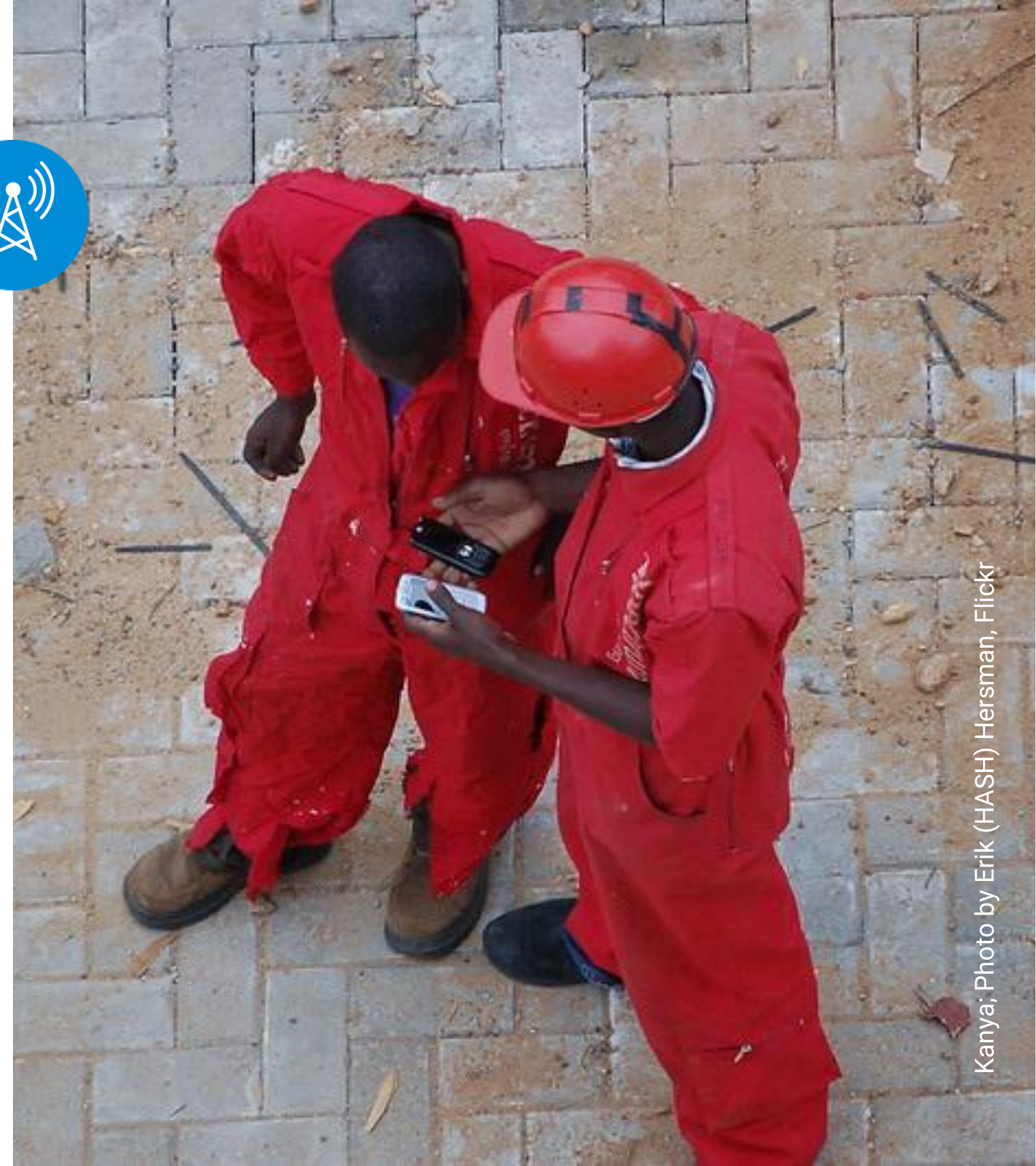


Telecoms networks can suffer from service disruptions due to climate hazards such as storms, landslides, flooding, energy blackouts due to heatwaves and wildfires.

Disruptions to telecommunication infrastructure can also lead to cascading risks, as service disruptions during an emergency mean people struggle to access reliable information, contact emergency services, communicate with loved ones, conduct payments on their phones, etc.

Building resilience in telecoms means creating networks that can withstand, adapt to, and quickly recover from disruptions to maintain reliable communications.

This might involve locating core infrastructure in areas that are less vulnerable to climate hazards such as coastal areas and floodplains, strengthening telecoms infrastructure, diversifying telecoms networks and investing in backup options.



Kanya; Photo by Erik (HASH) Hersman, Flickr

Buildings



A city's housing and building stock is vulnerable to a number of climate hazards - including flooding, storms, extreme heat, wildfires, landslides and fires.

Cities need to climate proof existing buildings so that they are resilient to the impact of climate hazards, as well as ensure that new buildings are built to withstand current and future climate hazards.

Building, retrofitting or upgrading housing to be more resilient to climate change means using design, construction, and planning strategies that can withstand and adapt to changing climate conditions. This could include updating building codes/regulations, using durable and sustainable building materials, planning development in areas less prone to climate hazards and incorporating green design elements.

It should also specifically focus on building resilience in housing and buildings in informal settlements that are often highly vulnerable to climate risks.

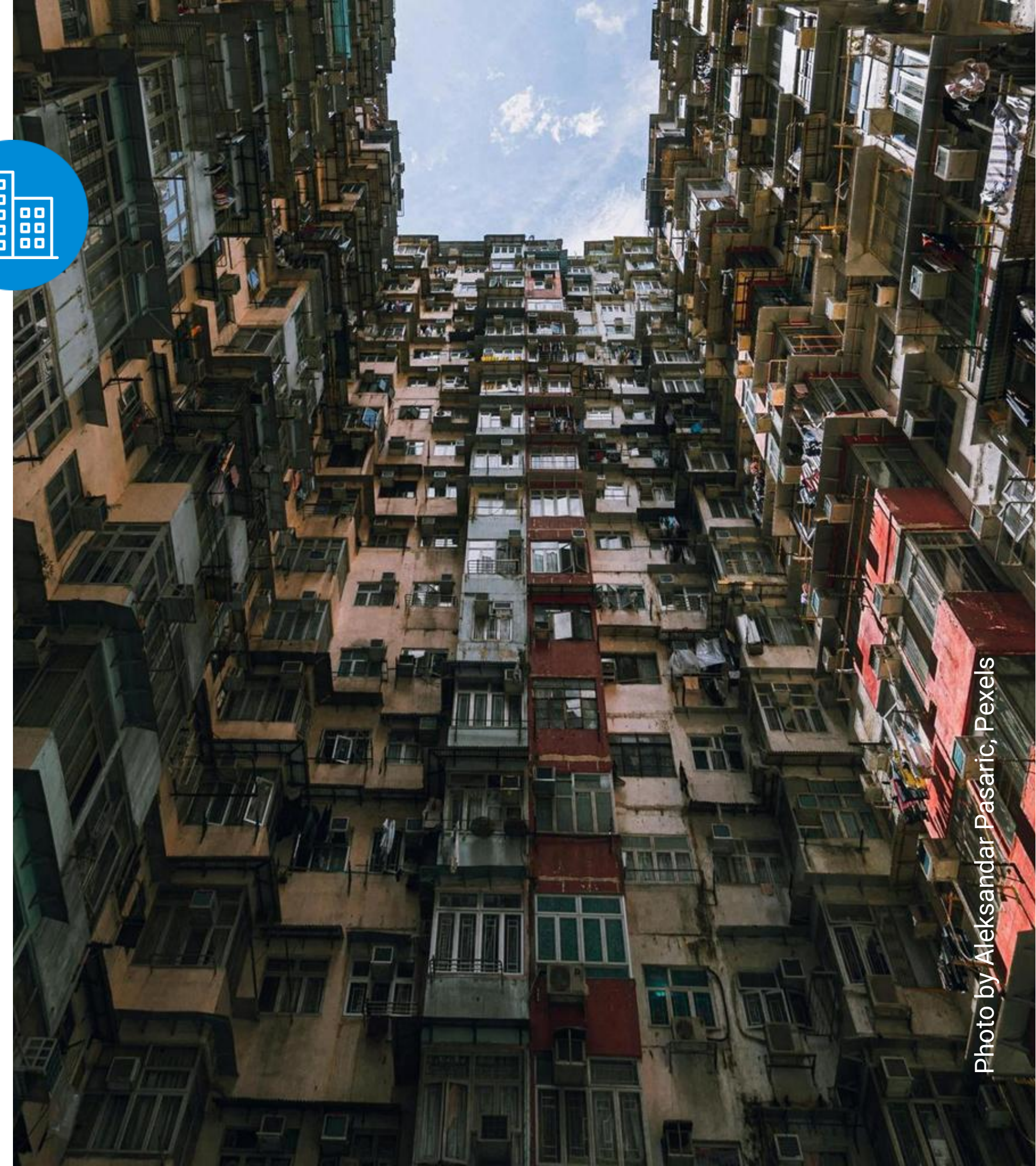


Photo by Aleksandar Pasaric, Pexels

Water



Water supply and distribution networks will become increasingly at risk of climate change over the coming century as temperatures rise and rainfall patterns become disrupted.

Water is a necessity for life and cities will need to ensure sustainable water access for its citizens, as well as resilient piping and distribution water networks across the city.

Making water more resilient means implementing measures to ensure that water supply and distribution systems can withstand, adapt to, and quickly recover from the impacts of various climate-related challenges.

Efforts can focus at the catchment level, to improve water security at a more systemic level. They can also involve improving local access to water to promote equity and reduce inequality for women and marginalized groups.



Kallyanpur slum, Dhaka; Photo by Kibae Park, Flickr

Waste



Waste management services can be vulnerable to service disruptions caused by climate hazards such as flooding, landslides, and storms.

Lack of investment in solid waste management services also contributes to climate risk, as public waste disposal can lead to clogging of waterways and drainage infrastructure, exacerbating the impact of extreme rain and floods.

Without proper solid waste management services, urban residents can be exposed to higher levels of disease and toxins - leading to cascading impacts on health systems.

Making waste management services more resilient includes improving coverage of solid waste management services, improving disposal and treatment of waste, and minimising the impact of disruptions to waste management services and infrastructure.



Photo by The Waste Matters Project

Health & Sanitation



Health & sanitation infrastructure are vulnerable to a range of climate hazards.

Wastewater and sewage treatment facilities can be impacted by floods, storms and landslides. A lack of access to these core services can lead to increased risk of disease during crises.

Access to health facilities such as hospitals and clinics can also be a 'downstream risk' of climate hazards - as disasters such as floods or storms can lead to transport disruptions that inhibit the supply of medicines or limit people's abilities to reach health centres.

Building resilience of health systems involves climate-proofing core health & sanitation infrastructure, as well as ensuring adequate disaster management planning to ensure that all people can access healthcare in times of climate-related disasters.



Photo by Kuntal Biwas, Pexels

Public Spaces



Public spaces such as parks, public gardens, community centers, recreation spaces, and children's playgrounds can be vulnerable to a range of climate hazards including flooding, storms and extreme rainfall.

However, public spaces can promote resilience and community wellbeing by ensuring access to green space which enhances physical and mental health, provides spaces for social interaction, increases urban biodiversity, and provides ecosystem services that minimize the impact of climate hazards.

Nature-based solutions in public spaces are particularly useful for promoting resilience. Solutions such as increasing greenery instead of concrete, improving coverage of mangroves and dunes can protect cities against urban flooding and storm surges, while also providing recreation spaces for citizens.



Bangladesh; Photo by Thinley Dorji, Pexels

06 | Equity & Inclusion

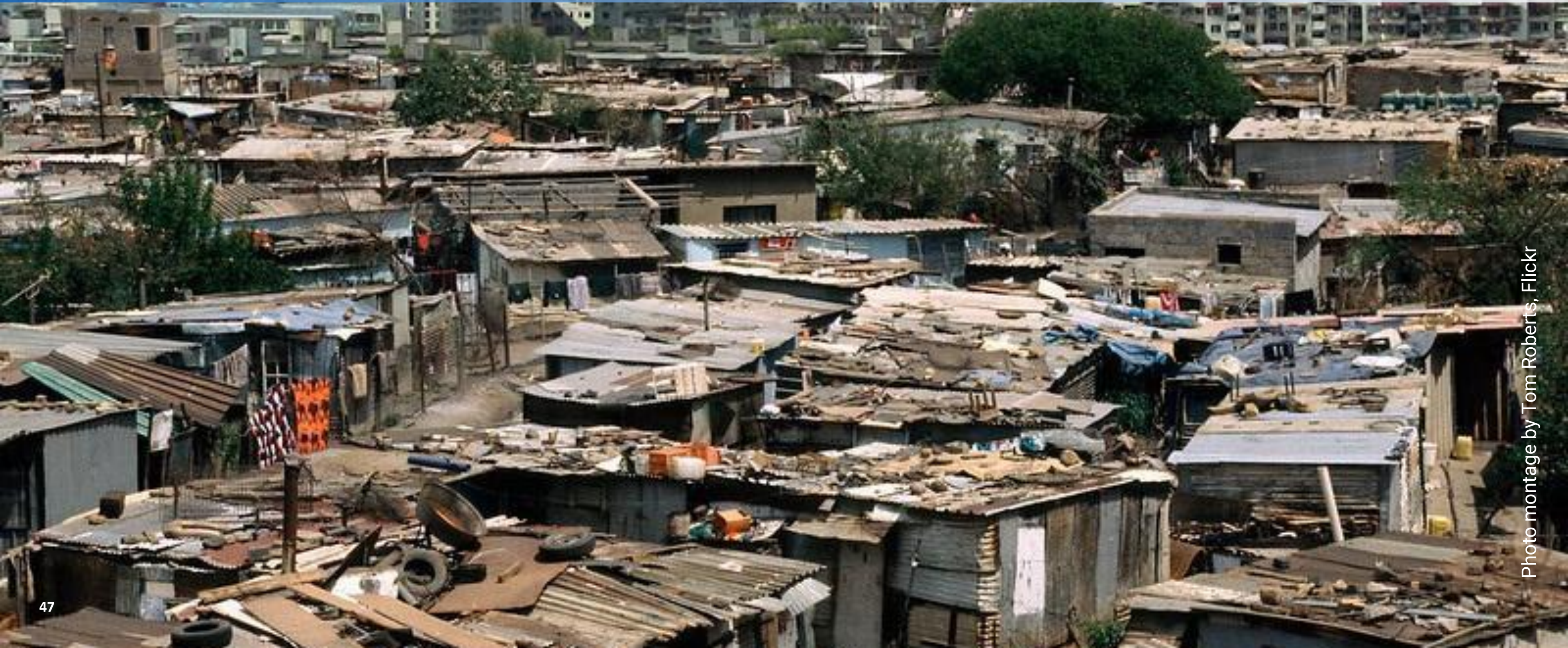


Photo montage by Tom Roberts, Flickr

Equity & Inclusion



Climate impacts are not evenly distributed. They often disproportionately affect marginalised and disadvantaged groups, such as women and girls, youth, low-income communities, people who live and work informally, people with disabilities, the elderly, and minorities due to underlying systemic inequalities. Climate change - and responses to it - can exacerbate these systemic inequalities.



Marginalised and disadvantaged groups, such as women, youth, and migrants often have limited access to information and participation, and may be excluded from decision-making, which limits their ability to build resilience to climate impacts.



Kenyan Refugee Camp

Equity & Inclusion for Resilience

Climate impacts often fall heaviest on marginalized and excluded groups. Cities are home to a wide range of citizens, many of whom can be excluded from accessing the basic necessities of life that can improve their resilience to climate shocks.

Some of the structural inequalities that make people vulnerable to climate change include:



Equality

Equality means that each individual or group of people is given the same resources or opportunities, regardless of their background, identity or circumstances.

Equality means that everyone gets the exact same treatment or support– even if that support works better for some people or groups than others based on their current power or privilege.

In the context of climate change, equality means people have equal access to information and equal input into decision-making to respond to climate risks.

However, in reality different groups have different levels of power which give them more say in decision-making climate and help them prepare better to minimize climate impacts.



Bangladesh; Photo by Asian Development Bank

Equity

Equity is about giving everyone what they need to have an equal chance of success. This can mean providing extra support to vulnerable or marginalized groups to make up for the structural barriers they face so that they can achieve equal outcomes to more privileged groups who don't face such barriers.

In the context of climate change, equity means recognizing that vulnerable and marginalized groups face greater climate risks and impacts. It also means addressing these disproportionate climate risks by including these groups in planning and decision-making and by prioritizing actions for vulnerable groups to ensure that equal outcomes are achieved from climate protection efforts.



Photo by Maria Inês Costa, UMinho

Inclusion

Inclusion is the practice of including relevant stakeholders and communities, particularly marginalised groups, in policy making and urban governance processes, in order to ensure a fair policy process with equitable outcomes despite different needs.

Social inclusion means making sure everyone, no matter who they are, including marginalised and vulnerable people, communities and districts, has a chance to be part of climate efforts.



Kibera slum, Nairobi; Photo by Ninaras, Wikimedia

Inequality

Inequality is state of not being equal, especially in status, rights, and opportunities (socially, economically, etc.)

Climate change amplifies existing inequalities. Vulnerable and marginalized groups often face disproportionately higher risks and do not have the same capacity to cope with the impacts of extreme events.

Climate justice means addressing inequality and building a more resilient and more just society. This requires that efforts to build climate resilience in cities, such as through **locally led adaptation**, strive for equality, equity and social inclusion.



Dhaka: Photo by Dibakar Roy, PeDxels

01 | Community-Based Vulnerability Assessments

Communities are often best placed to understand their own environment, resources and historical experiences.

Participatory and bottom-up approach to evaluating the vulnerabilities of excluded groups - including those living in informal settlements and working in the informal economy - can lead to more equitable climate action.

Climate risk assessments (CRAs) should include participatory processes to promote equity & inclusion.

Case Study | N'Djamena, Chad

GCA and the World Bank recently carried out a Climate Vulnerability Assessment to examine how women in the capital city of N'Djamena are vulnerable to floods.

The assessment found that women had lower access to disaster information and were excluded from formal and informal decision-making. Traditional gender roles also meant that women's work burdens are increased during floods.



N'Djamena; Photo by Médecins Sans Frontières

02 | Supporting People Who Live & Work Informally

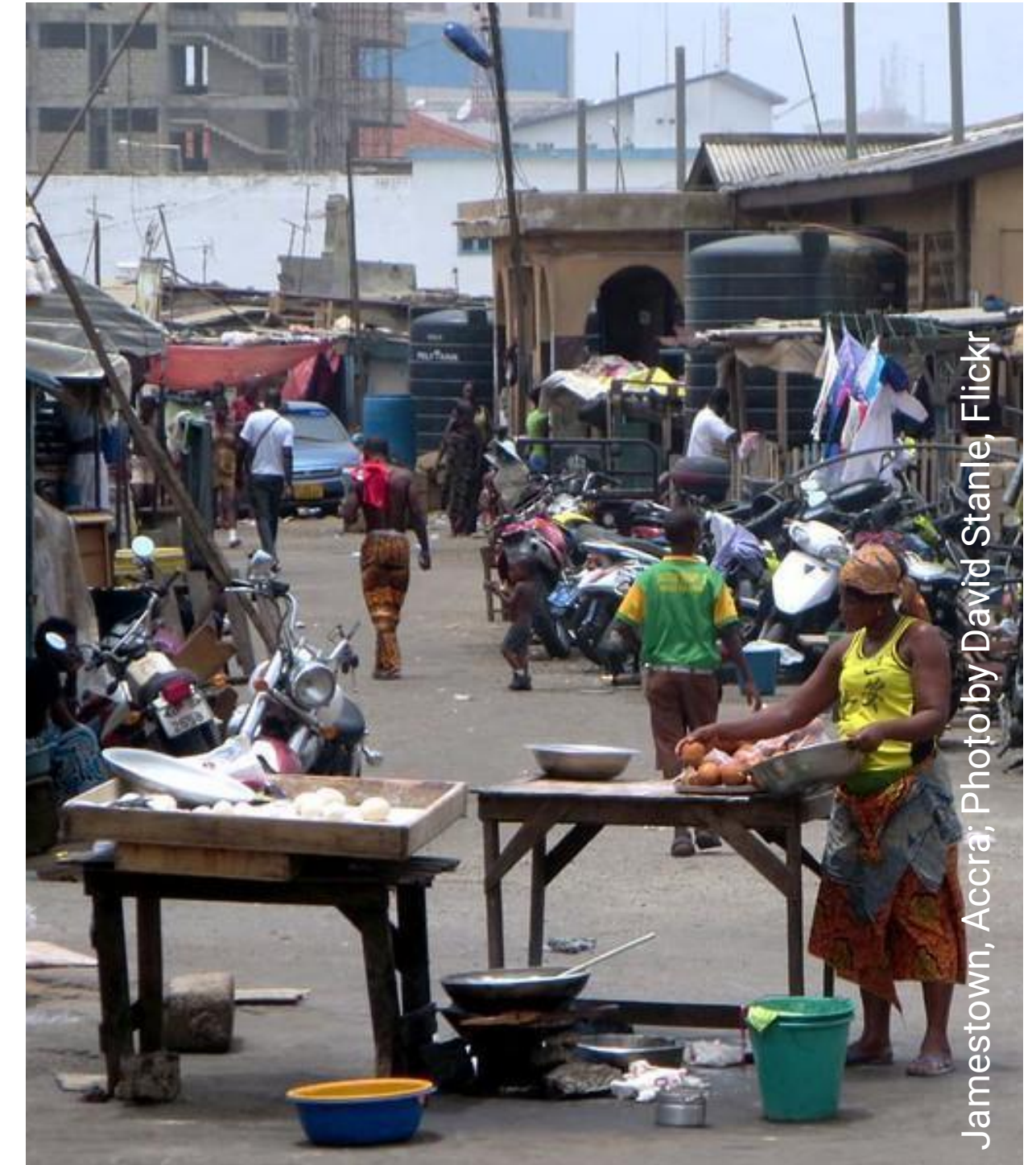
Many urban dwellers live in informal settlements and work in informal employment and sectors. Cities rarely invest in basic infrastructure and services such as water, sanitation and housing in informal settlements because they are not officially recognized by the city. This leads to high levels of vulnerability to climate risks.

Cities should extend investments to informal settlements to support basic needs and build climate resilience. They should also include informal settlements in infrastructure Master Plans.

Case Study | Accra, Ghana

Ghana's capital city Accra is home to 15% of Ghana's population. The city has expanded rapidly, with a high number of people living in informal settlements.

Many areas of Accra are highly vulnerable to flooding. But lack of recognition of informal settlements and lack of city investment in informal neighbourhoods limits the ability of these vulnerable settlements to upgrade housing or drainage infrastructure to build resilience.



Jamestown, Accra; Photo by David Stanle, Flickr

03 | Inclusive Job Creation in Green Sectors

As cities transition to become more low-carbon and resilient, new job sectors are rapidly emerging, including in:

- Renewable energy and energy efficiency
- Green construction
- Adaptation and resilience planning and coordination
- Sustainable food production
- Circular economy

An equity-focused approach ensures that employment opportunities are inclusive, particularly of youth, women, people with disabilities and other marginalised groups.

Case Study | Bogotá, Colombia

Bogotá has a new public transportation operator with a 100% electric fleet.

The city is training women to join the workforce as e-bus drivers, promoting inclusive, green jobs, with a focus on gender equity, and strengthening the city's just and green transition.



04 | Participation & Decentralized Decision-making

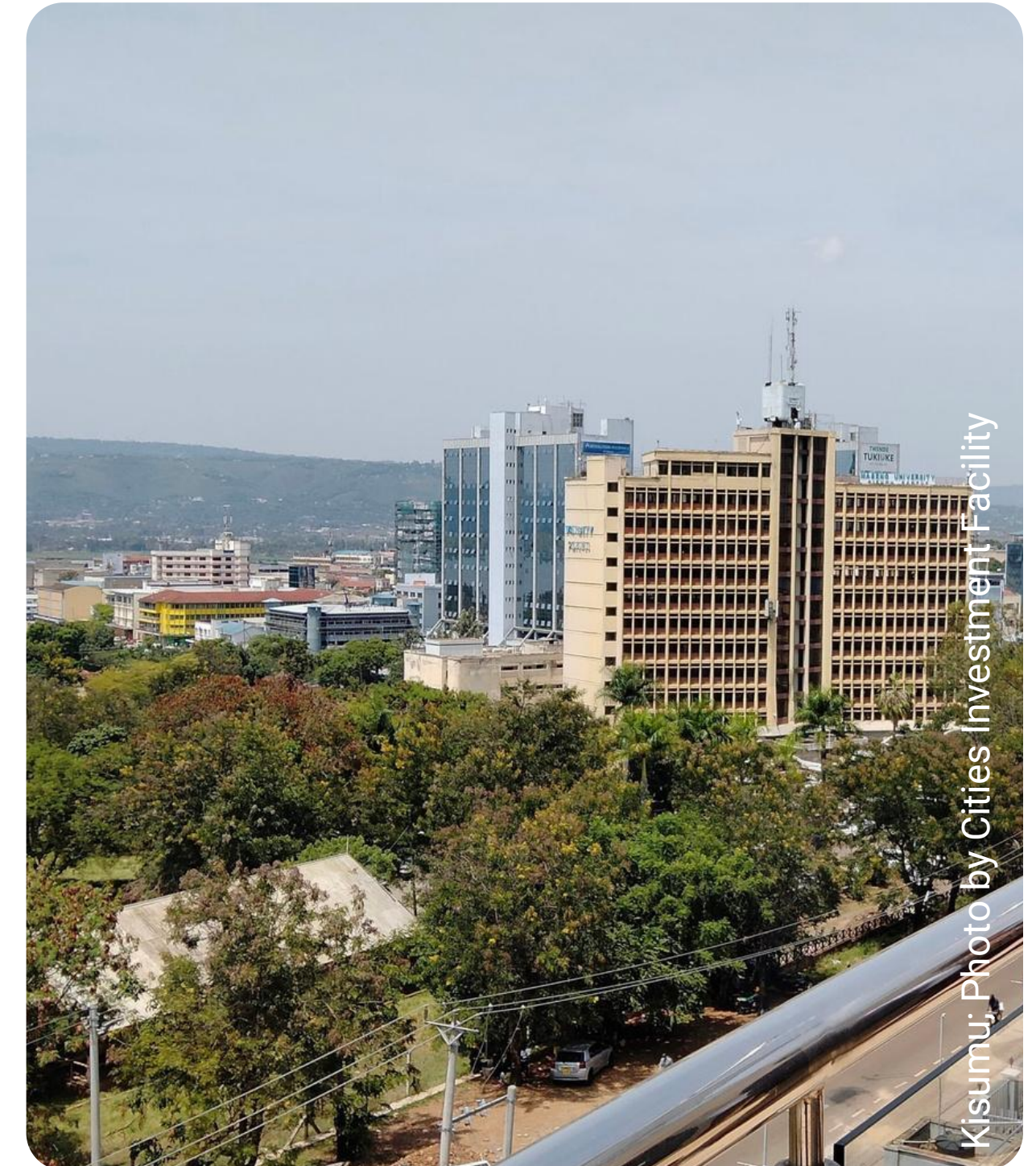
Decentralized decision-making means spreading out decision-making authority and responsibilities across various levels or groups.

This approach allows local groups and government to decide things that directly affect them, making decisions faster and more tailored to their specific needs.

Including vulnerable groups in resilience planning - to both frame the problem and identify solutions to climate risks - can improve resilience.

Case Study | Kisumu, Kenya

Kenya has established decentralized County Climate Change Funds. Ward Climate Change Committees have been set up to oversee climate change action plans at the ward level. These committees are designed to improve community participation and localize decision-making. They include community representatives who are nominated and vetted in a participatory process. The committees ensure that climate funds flow down to the local level in a transparent manner.



Kisumu; Photo by Cities Investment Facility

05 | Equitable Access to Infrastructure & Services

Women and other vulnerable and marginalized groups often lack access to basic infrastructure and services.

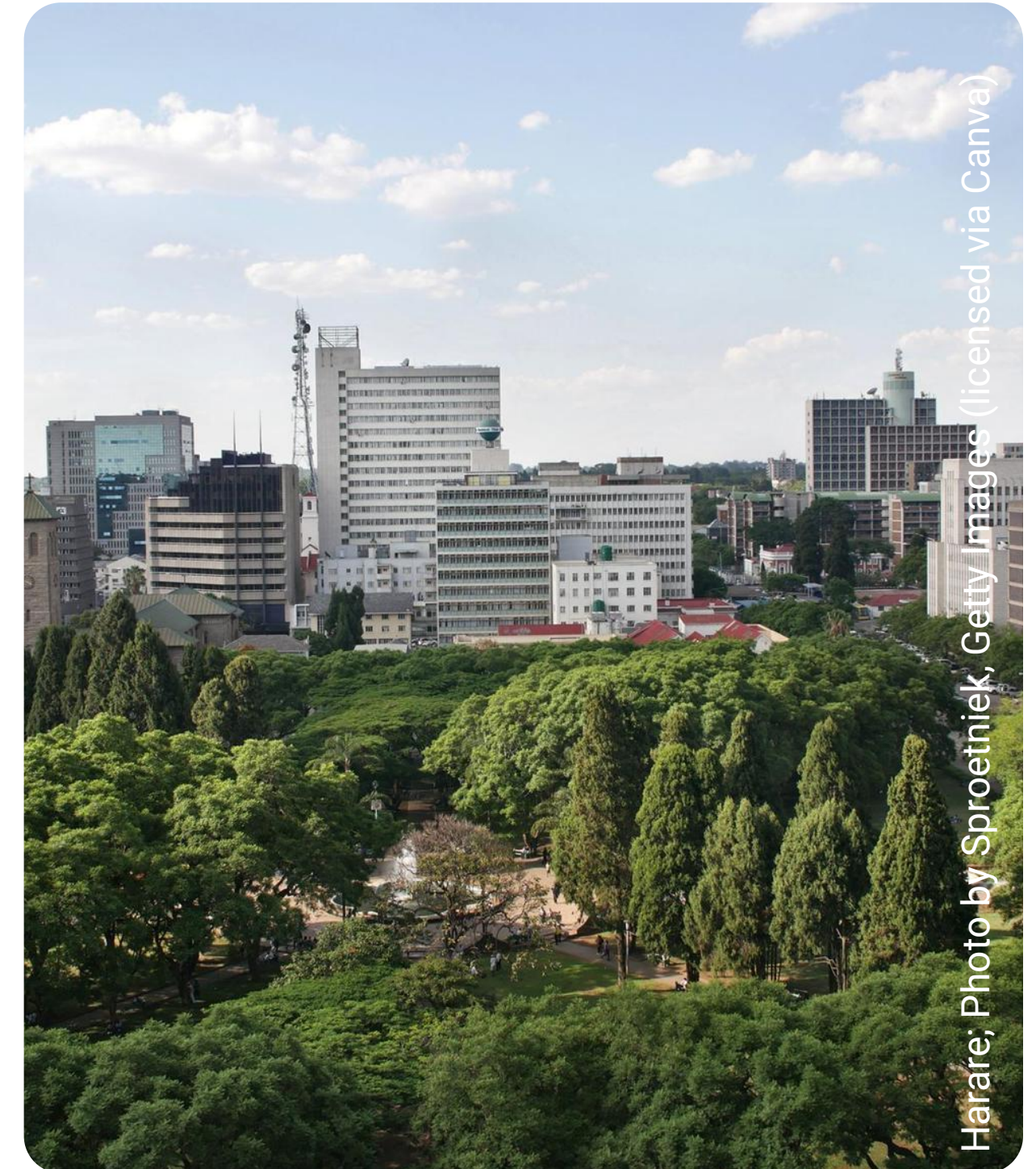
This includes affordable housing, transport, water, healthcare, education, and sanitation that is appropriate to the unique needs of different vulnerable and marginalized groups.

Cities can work to provide better access to key infrastructure and services so that they are accessible to excluded groups.

Case Study | Harare, Zimbabwe

The Harare Slum Upgrading Project, jointly implemented by Dialogue on Shelter, Zimbabwe Homeless People's Federation and City of Harare provides both housing and services.

As a first step, the project identified and documented current challenges relating to housing delivery, allowing the partners to revise the systems, practices and regulations that hinder the delivery of low-income housing at a scale that addresses the delivery gap.



Harare; Photo by Sproetniek, Getty Images (licensed via Canva)

06 | Accessible Communication

Accessible communication means designing and delivering information in a way that is easy to understand, navigate, and use by different audiences, including people with various abilities, disabilities, and linguistic preferences. This means using diverse language and formats (e.g., written, audio, visual, oral; radio, social media etc.)

This makes sure that information about climate change risks, actions and adaptation strategies reaches different audiences.

Accessible communication encourages engagement and empowers people to take action.

Case Study | Quezon City

Quezon City, Philippines, is developing an interactive storybook that translates the City's Enhanced Local Climate Action Plan for young people, who account for 45% of the population.

The storybook will feature a children's version of the city's climate action plan. It will also be available in braille and audiobook formats for children with hearing or visual impairments.

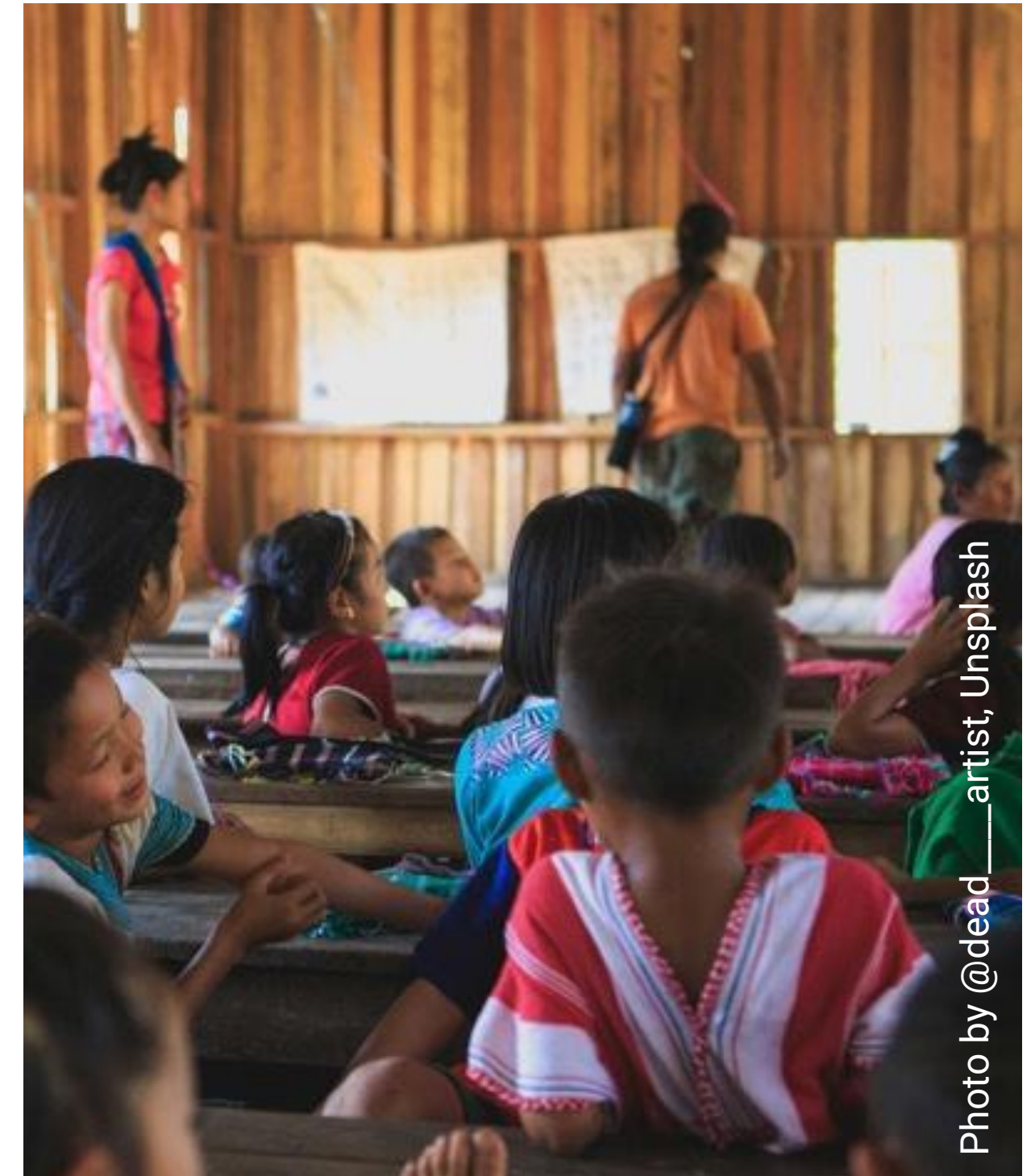


Photo by @dead__artist, Unsplash

07 | Localized Finance

Localised finance means delivering money to the local level so that local actors can make investments in climate resilience that are tailored to their own needs.

Localised finance can be managed and spent by city governments, neighbourhood associations, cooperatives and households.

This ensures investments are designed for the needs and projects of that specific area, addressing localised climate risks.

Case Study | Urban Poor Funds

A new kind of finance agency, Urban Poor Funds, managed by Slum and Shack Dwellers International (SDI) and its affiliates, are working with federations of savings groups formed by slum or shack dwellers or homeless people. These funds provide finance systems that suit the needs of their members, supporting them to obtain better quality shelter with basic services, which helps to make them more resilient. Federations often seek local government support in scaling their initiatives.



Dhaka, Photo by Bondens Marknad Foton

We will return to issues of equity & inclusion throughout the Urban Climate Resilience Masterclass, so that we find ways to make cities more equitable and inclusive for marginalized groups.



Lake Victoria, Kenya; Photo by AFP

07 | Summary



Summary & Review

Module 1 covered the following topics:

03

Concepts & Definitions

04

Climate Change, Risks & Hazards

05

Climate Resilient Infrastructure & Services

06

Equity & Inclusion



Quickly review your learning from each section:

- Can you remember the 14 new concepts and definitions from section 03?
- Section 04 considered hazards and risks, take a moment to review your city specific list.
- Section 05 considered climate resilient infrastructure, take a moment to review your city specific list.
- Section 06 introduced key concepts for equity and inclusion, take a moment to review your city specific needs.

Now go to the next slide for your final Review Exercise.

Review Exercise

Definition Bingo

Write down any three of the words on the screen.

The definitions will be read out, if a definition matches your word then you can check it.

The first person who has both of their words checked is the winner.



Climate Hazard



Adaptation



Climate Risk



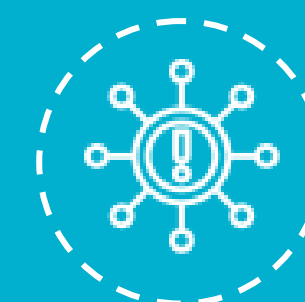
Climate Resilience



Vulnerability



Equity



Exposure



Social Inclusion

Summary & Next Steps

Congratulations on completing Module 1: Introduction to Climate Change & Urban Resilience!



Module 1

Introduction to
Climate
Change and
Urban
Resilience



Module 2

Understanding
Climate Risks
in Your City



Module 3

Locally Led
Adaptation for
Urban
Resilience



Module 4

Ensuring
Climate
Resilience of
Urban
Infrastructure



Module 5

Step-by-Step
Guidelines for
Delivering
Climate
Resilient
Infrastructure



Module 6

Financing
Climate
Resilient Urban
Infrastructure

The next module in the UCRMC is **Module 2: Understanding Climate Risks in Your City.**



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