Climate-Resilient Water Services Masterclass

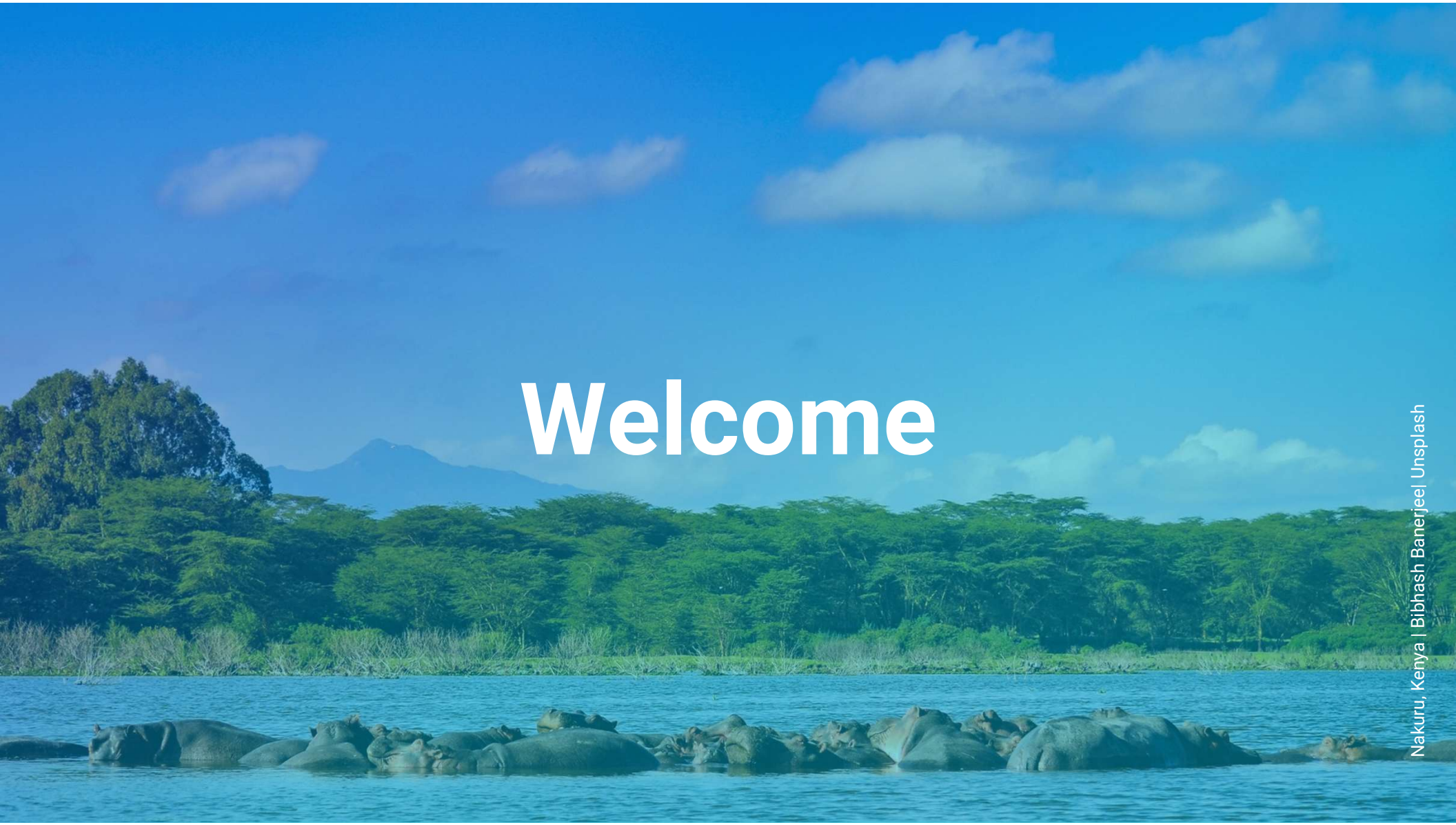
Course overview



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IRC

Supporting water sanitation and hygiene services for life



Nakuru, Kenya | Bibhash Banerjee| Unsplash

Today’s focus

01	Introductions
02	Masterclass overview
03	Overview of Trainer of Trainer’s program
04	Accessing all materials

01 | Introduction



Your trainers



Arjen Naafs



Jeske Verhoeven



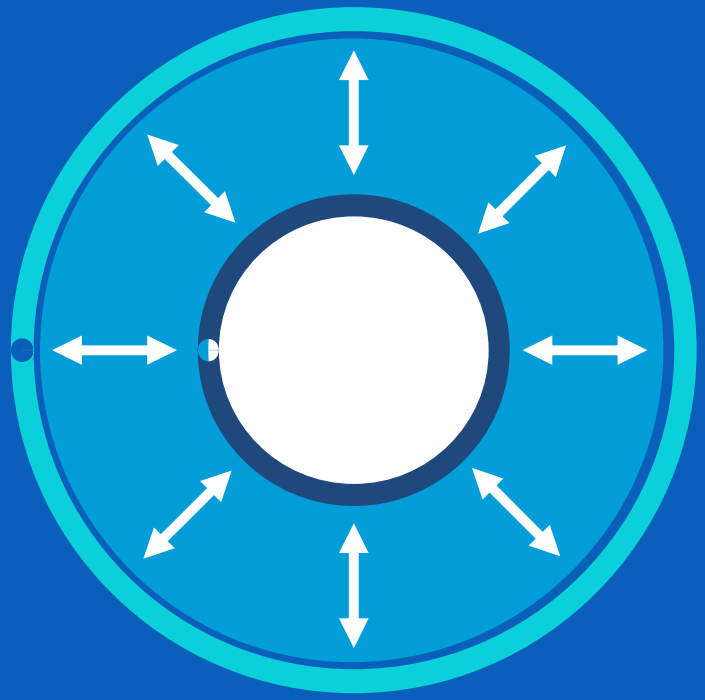
Ismaël Ousmane



Sanata Théra

Introduction

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.



Acknowledgements

We would like to acknowledge the following partners and funders involved in designing and delivering the Climate Resilient Water Services Masterclass:

The Modules were developed with

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02 | Masterclass overview

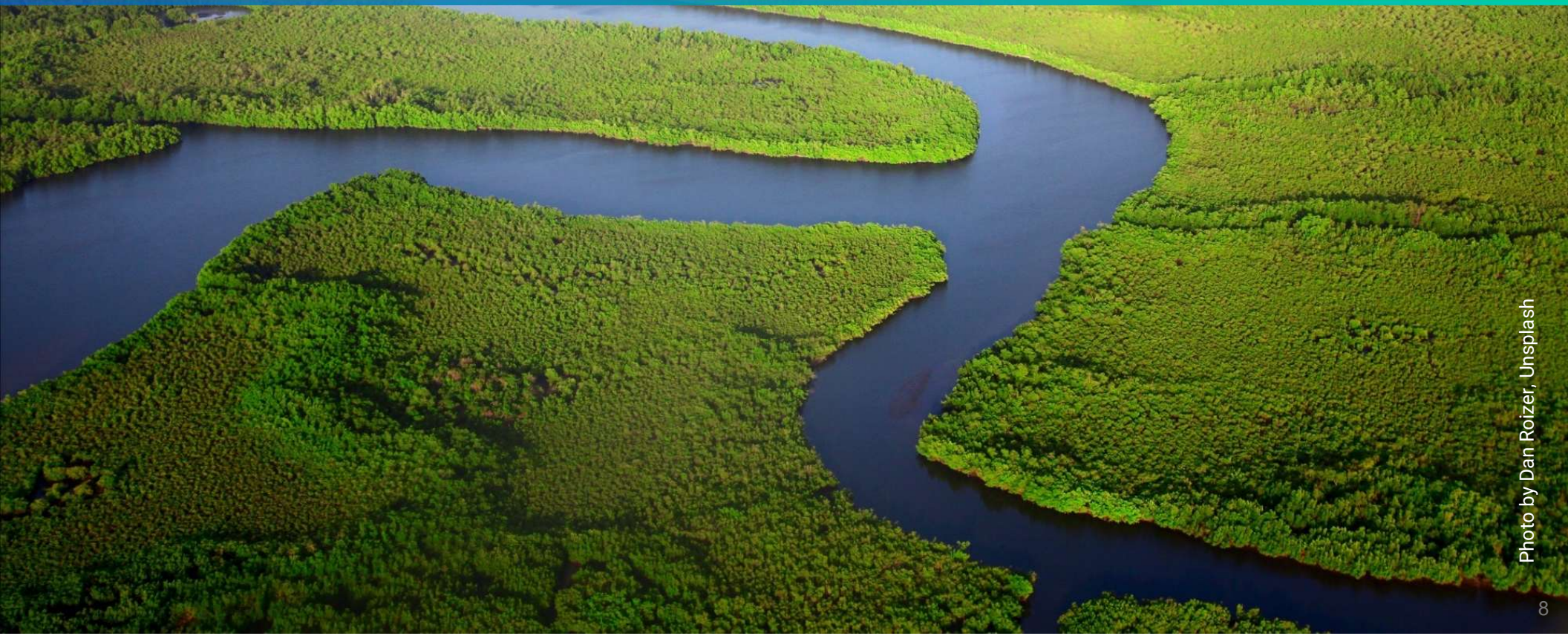
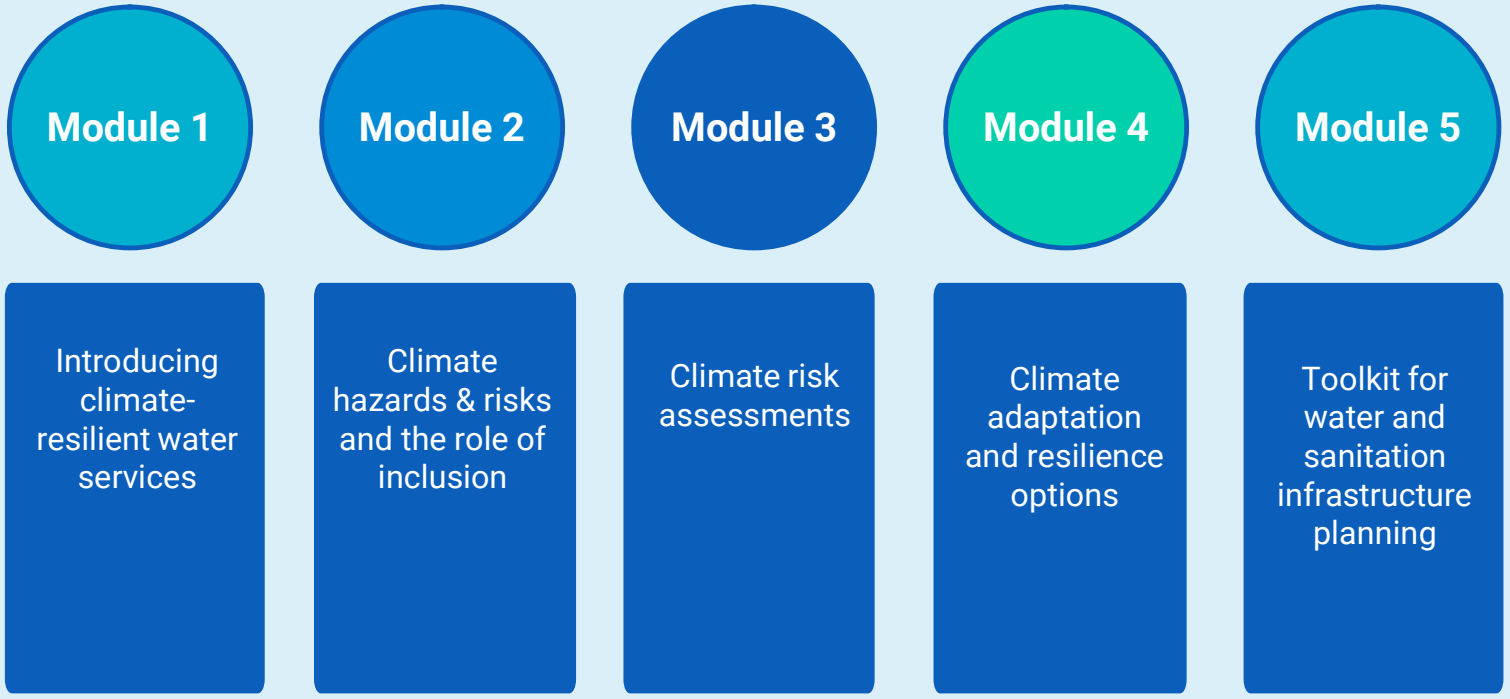


Photo by Dan Roizer, Unsplash

Masterclass objectives

1. National and local governments are better equipped to integrate high-impact climate adaptation into their water infrastructure and investment plans.
2. Adaptation tools, methods, and approaches are continuously reflected upon and improved.
3. Government officials are able to address climate-related challenges that affect water and sanitation services.
4. Capacity-building tools and trainers exist to strengthen capacity.

Masterclass overview



03 | Overview of the Trainer of Trainer’s programme



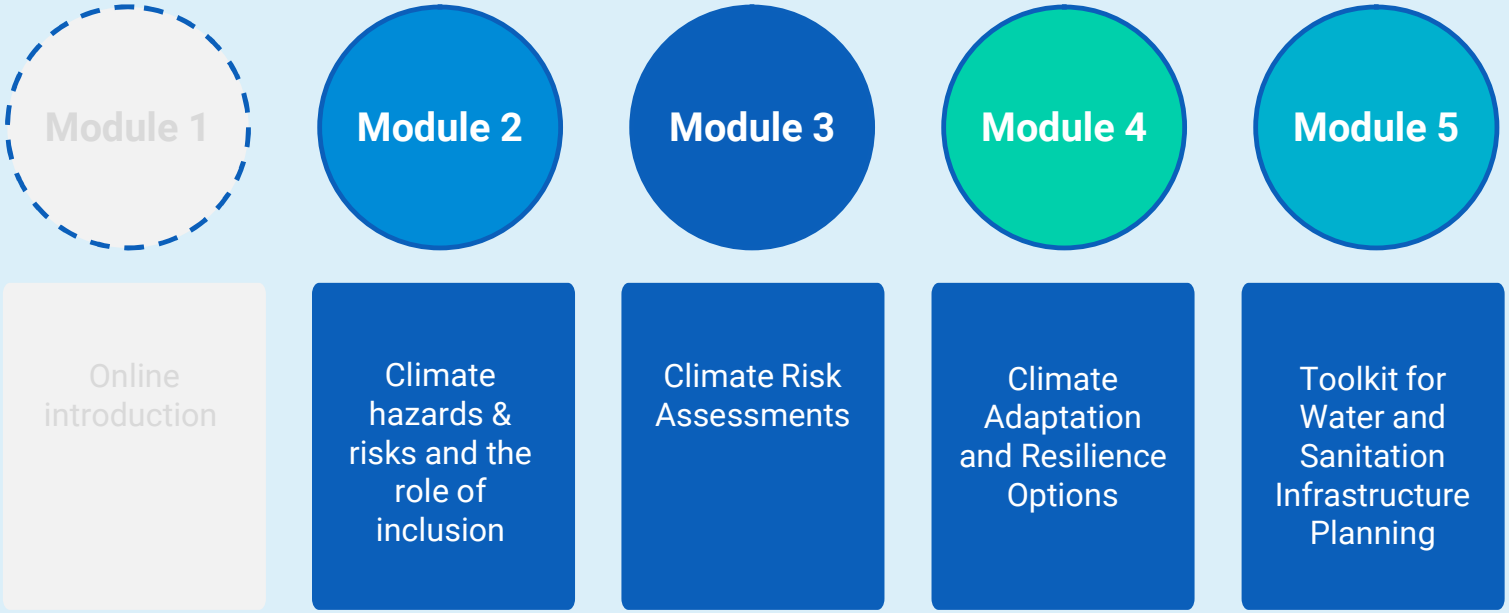
Photo: Inle Lake | Mega Caesaria | Unsplash

Training of Trainers programme

The objectives are to ensure that trainers:

- Are introduced to relevant knowledge and materials
- Have the knowledge and tools methods to roll-out the trainings themselves.

Masterclass overview



Five day, in-person Masterclass

Modules 2 – 5 aim to enhance capacity to integrate high-impact climate adaptation interventions in water infrastructure and water investment planning.

Training of Trainers programme

- **Day 1 - Module 2:** Climate Resilient Water and Sanitation
  - This day includes an introduction and discussion on adult learning techniques and principles.
- **Day 2 - Module 3:** Climate Risk Assessments
- **Day 3 - Module 4:** Climate Adaptation and Resilience Options
- **Day 4 - Module 5:** Toolkit for Water and Sanitation Infrastructure Planning
- **Day 5 (half day) -** Good practices for adult learning, reflection and assessment

Objectives for the programme

1

Content mastery
Trainers will gain an in-depth understanding of the master class materials.

2

Skill development
The masterclass will build presentation and facilitation skills to lead interactive activities and discussions.

3

Trainer cadre
Prepare 15-20 competent trainers who are ready to roll out the master class to county and local-level officials.

Contact hours

09:00 – 12:00	Group session
12:00 – 13:30	Lunch
13:30 – 17:00	Group session



Training of Trainers programme

Available materials

- **5 Power Point Presentations** with detailed notes
- **Facilitators handbook**
- **Participant handbook**
- **Online introduction** available on the WASH Systems Academy
- **Glossary**

How to access materials?

- GCA and IRC websites
- Available to download on the WASH Systems Academy

Certificate

- Pass quiz at the end of each module
- Complete a feedback survey

Difference between the Masterclass and the Training of Trainers

Before the face-to-face meeting, participants of the Training of Trainers need to:

- Complete the online introduction module
- Go through facilitators handbook and the participant handbook
- Attend a 1-hour virtual preparatory meeting



Special focus Training of Trainers compared to Masterclass

- The facilitators handbook will have a chapter on adult learning techniques.
- At the end of each module, participants of the ToT will be asked to make notes in their facilitators handbook on what went well or needs to be improved on both content and learning techniques.
- Day 5 of the ToT is dedicated to go through the facilitators manual to address and practise any improvements needed.

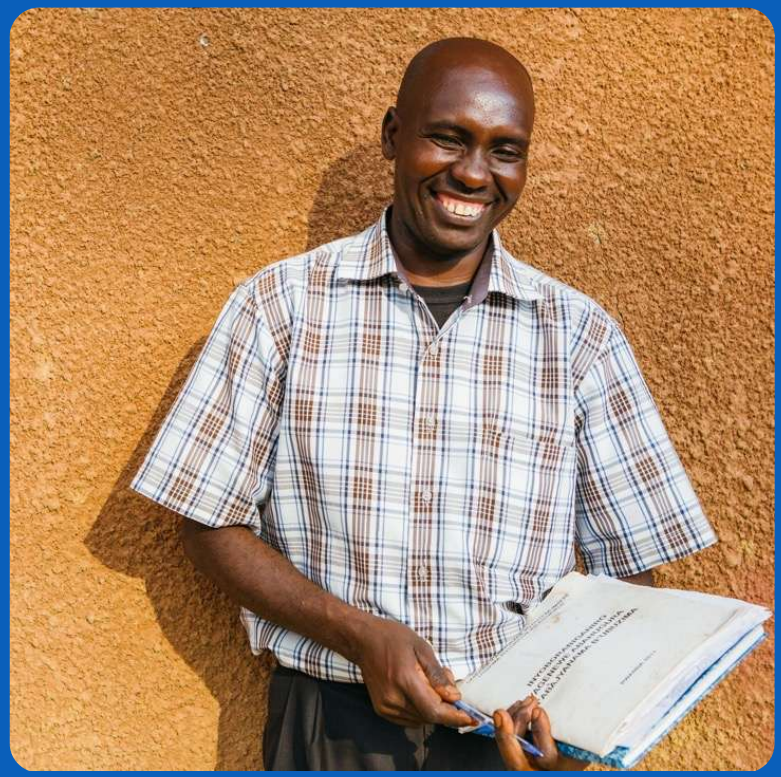
Good practices for adult learning

Key adult learning principles:

- **Relevance**
- **Experience**
- **Autonomy**
- **Practicality**
- **Experience as a resource**

Emphasise facilitation over lecture

Evaluate and reflect



An interactive Masterclass

- Questions? Ask at any point. But there is dedicated time for reflection and feedback.
- Many examples are shared.
- Exercises throughout to apply learnings to your context.
- Mutual respect, open dialogue and collaboration.



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

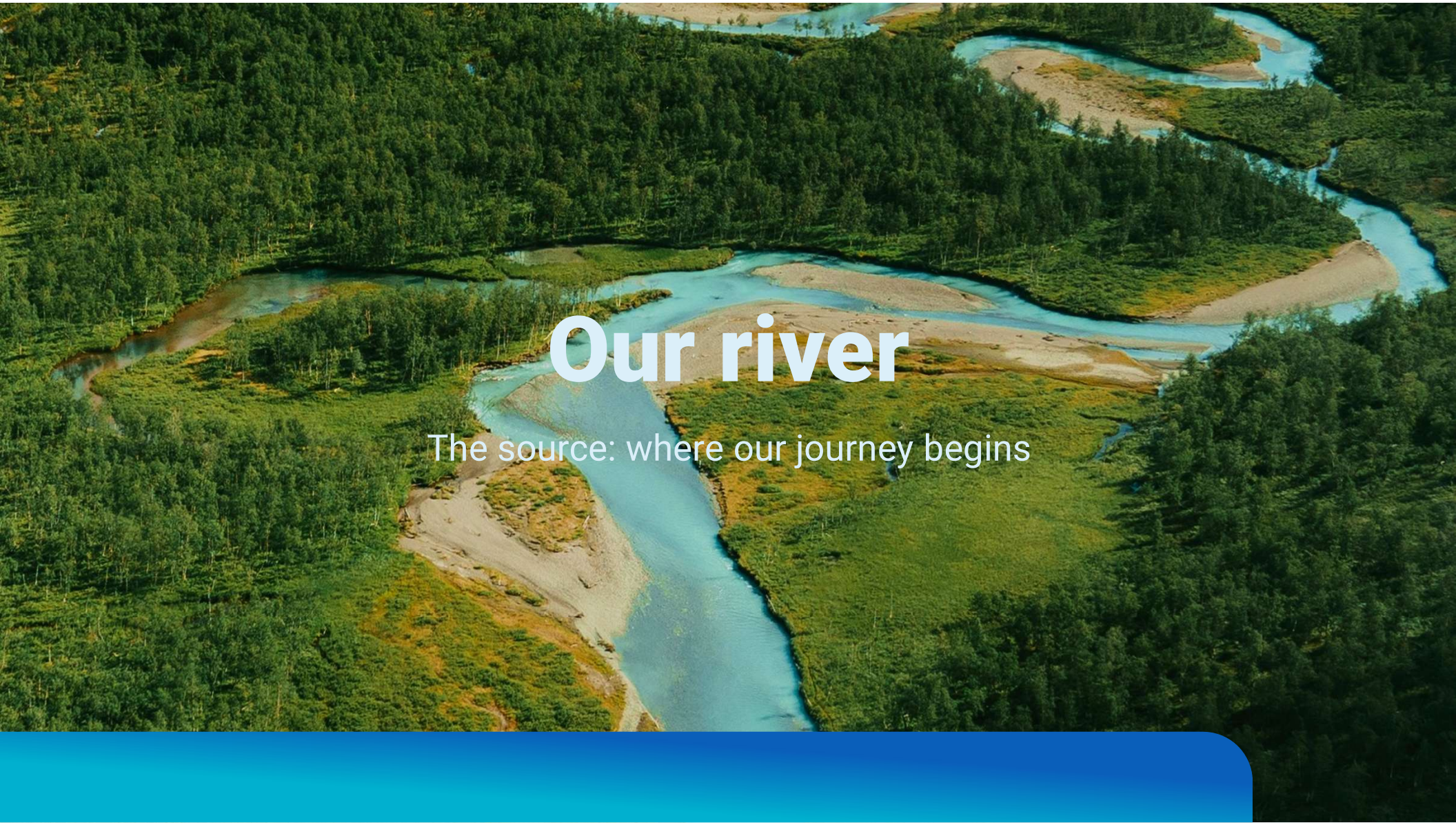


Share and discuss with others during exercises, breaks and reflections.

Code of conduct

To ensure all everyone can enjoy this Masterclass, please adhere to this simple code of conduct:

- Do not judge the ideas of others.
- Be respectful of other points of view.
- Let ideas flow – be imaginative.
- Free wheel – build on other people’s ideas.
- Mobile phones away and laptops closed
- Time keeping – Respect the time indicated by the facilitator
- Have Fun!

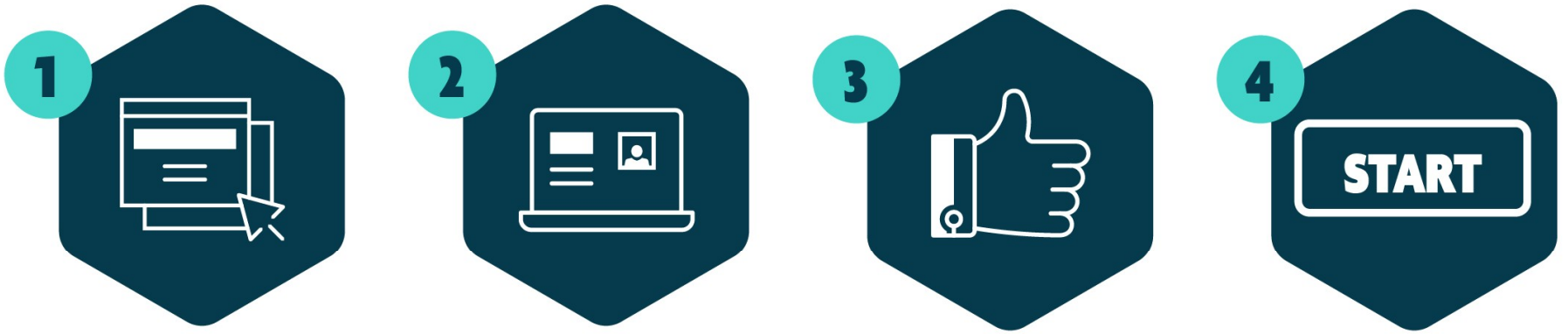

Our river
The source: where our journey begins

04 | Accessing all materials



Photo by Jachan DeVol on Unsplash

Starting Module 1 is easy!



Go to
washsystemsacademy.org

Create an account

Confirm your email address

Start anytime, anywhere

After you create an account, module 1 is available under ‘Partner courses’.

Alternatively, get started with one of our selected Learning Journeys:



The basics

New to systems strengthening?

Start here



The complete experience

All our courses in suggested order.

Start here



Finance

Financing universal services.

Start here



Sanitation and hygiene

Changing minds and behaviours.

Start here



Building resilience

Climate and crisis-proof services.

Start here



Partner courses

Courses for specific contexts and partners.

Start here

Just click on the link.



Introducing Climate-Resilient Water Services

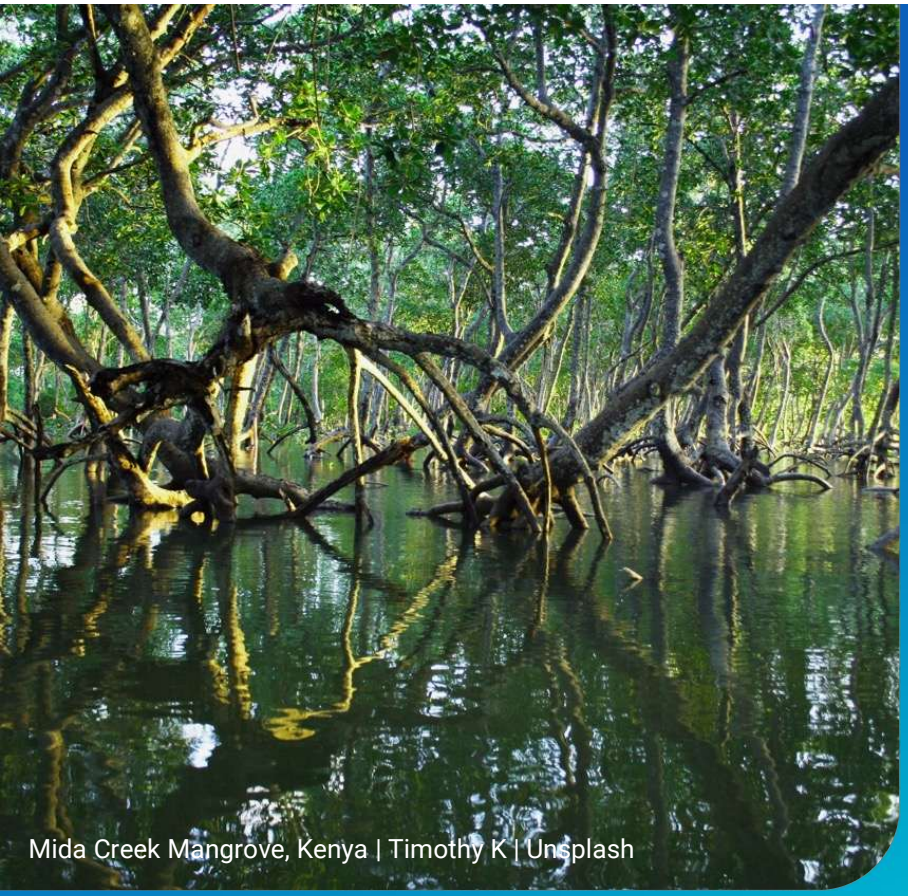
This 1.5 hour course covers the basics of climate resilience to improve water services for everyone.

This course is part of the Climate Resilient Water Services Masterclass. Completing this course is a pre-requite before joining the Masterclass.

Accessing all materials

Through IRC WASH

Dhaka; Photo by Michael Foley, Flickr



Mida Creek Mangrove, Kenya | Timothy K | Unsplash

MODULE 1

Introducing Climate-Resilient Water Services

Online module

Accessing Module 1 as a self-paced and guided course

Dhaka; Photo by Michael Foley, Flickr

Today’s focus

01	Overview Module 1
02	Learning objectives
03	Module 1 outline

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The Modules were developed with

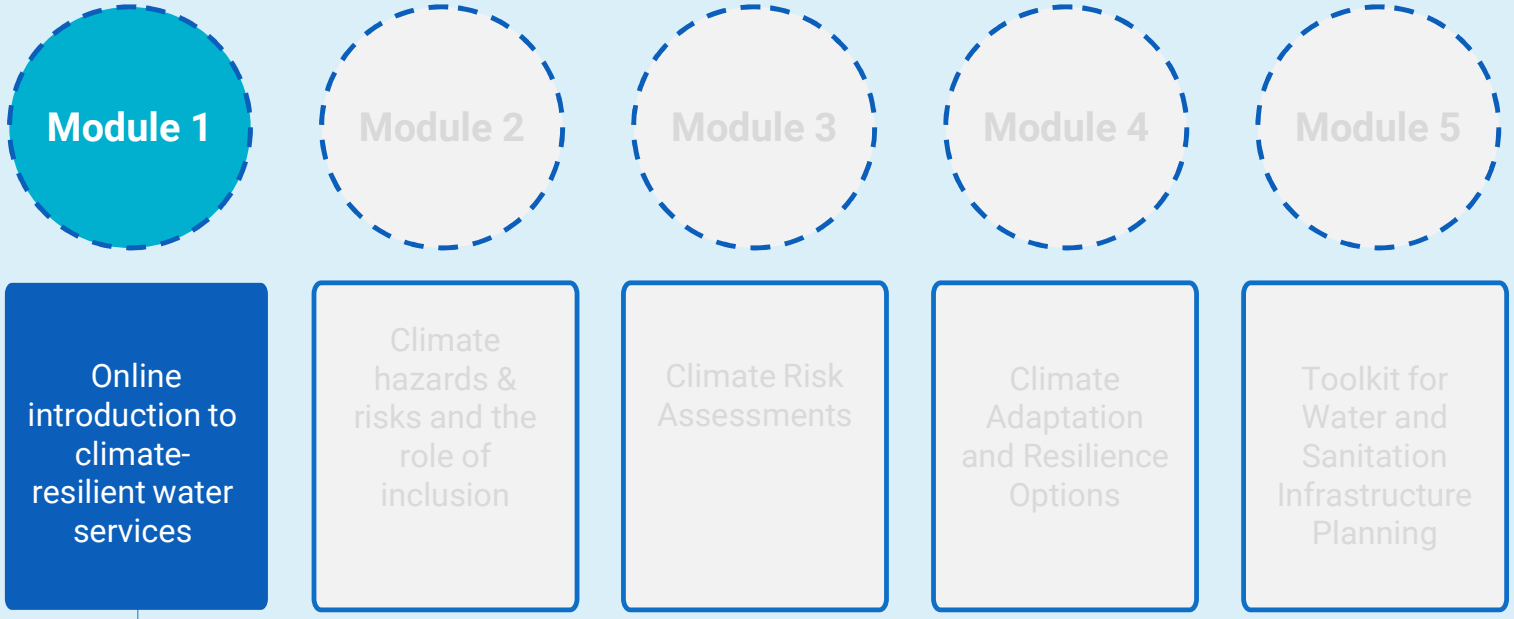
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IRC Supporting water sanitation and hygiene services for life

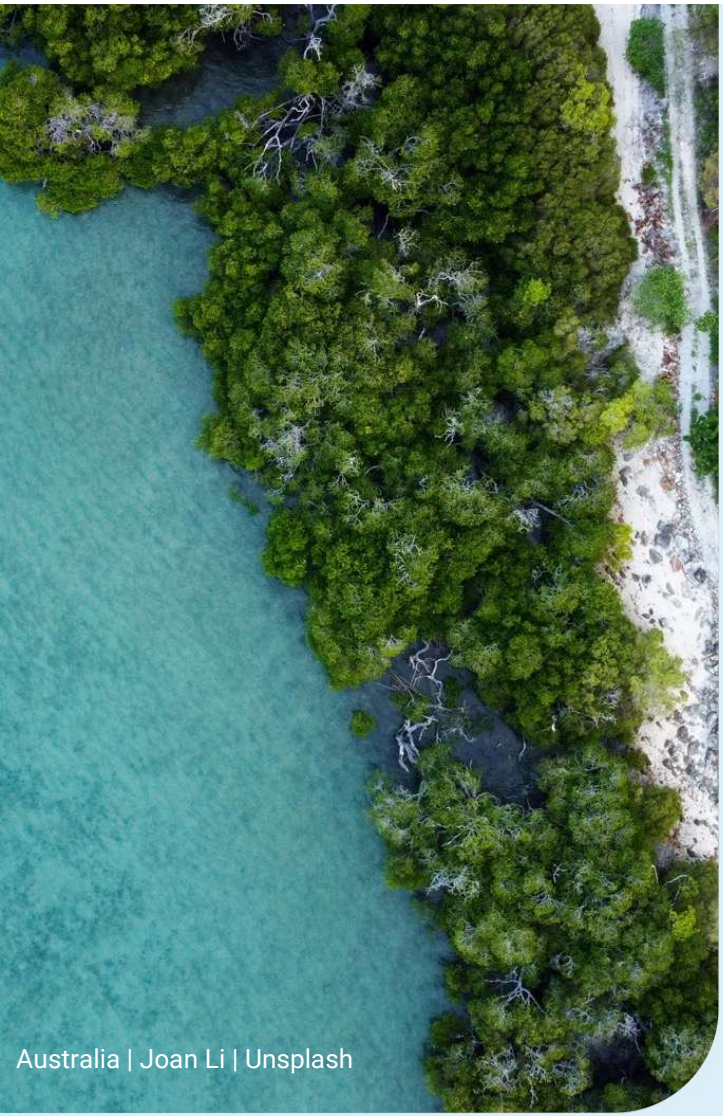
01 | Overview Module 1



Masterclass overview



Self-paced learning module of 1.5 hours is pre-requisite to participating in the in-person training.
It introduces core concepts and terminology.



Australia | Joan Li | Unsplash

MODULE 1

Introducing Climate-Resilient Water Services

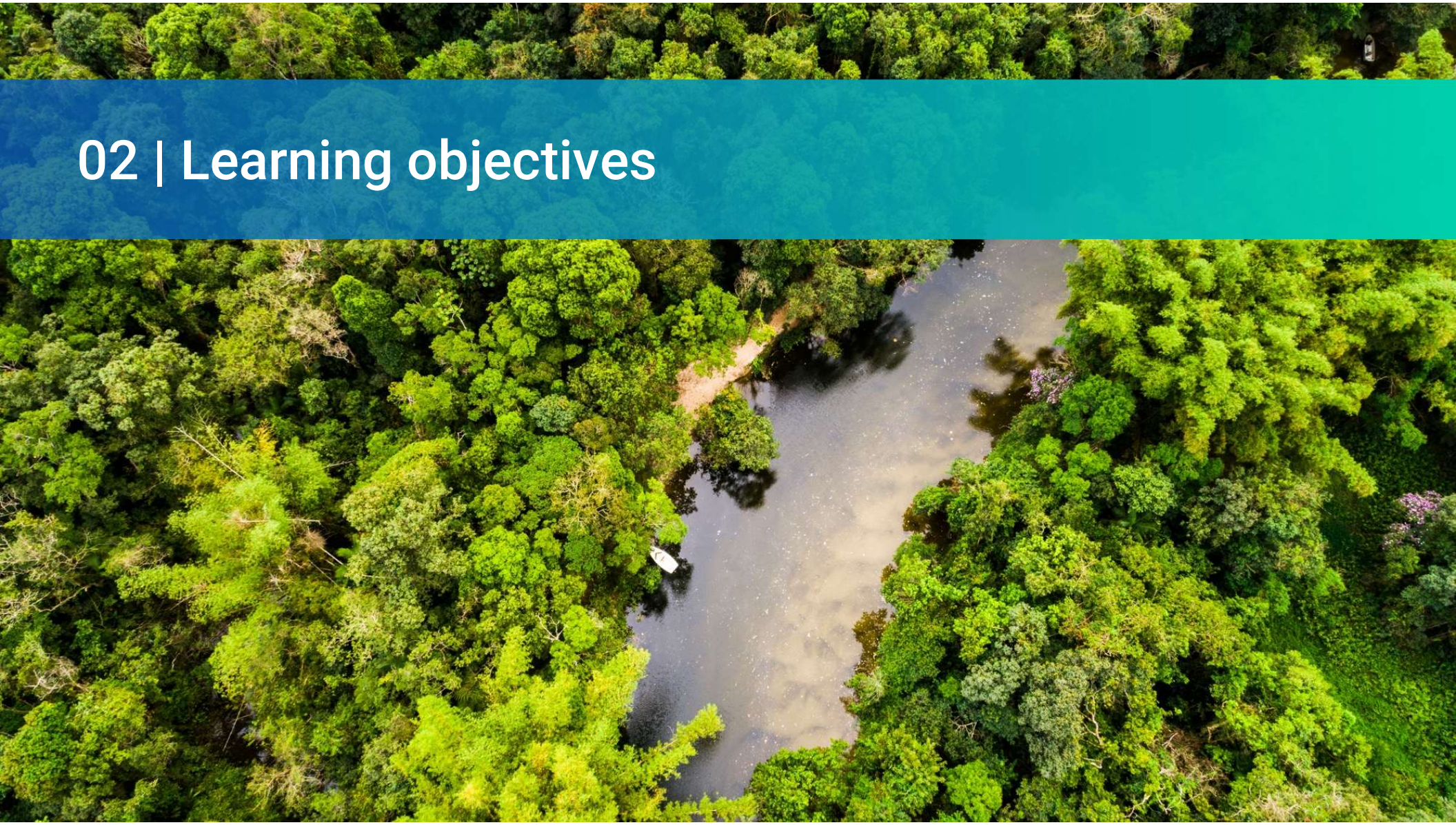
This module introduces:

- Core concepts of climate change, water adaptation and resilience.
- Climate resilient water services.

The module includes:

- Reflection on climate hazards that hinder sustainable and universal water services in different contexts.
- A **glossary** of key terms and concepts.

02 | Learning objectives



Module 1 objectives

By the end of this module, you will be able to:

- **Explain** the objectives and structure of the Climate-Resilient Water Services Masterclass
- **Describe** the programme for the Climate Resilient Water Services Masterclass Training of Trainers
- **Explain** the basics of what climate change entails and its impacts on water services
- **Describe** climate-resilient water services
- **Explain** the basics of climate adaptation, mitigation and resilience in relation to water and sanitation services



MODULE 1 outline

Welcome Session

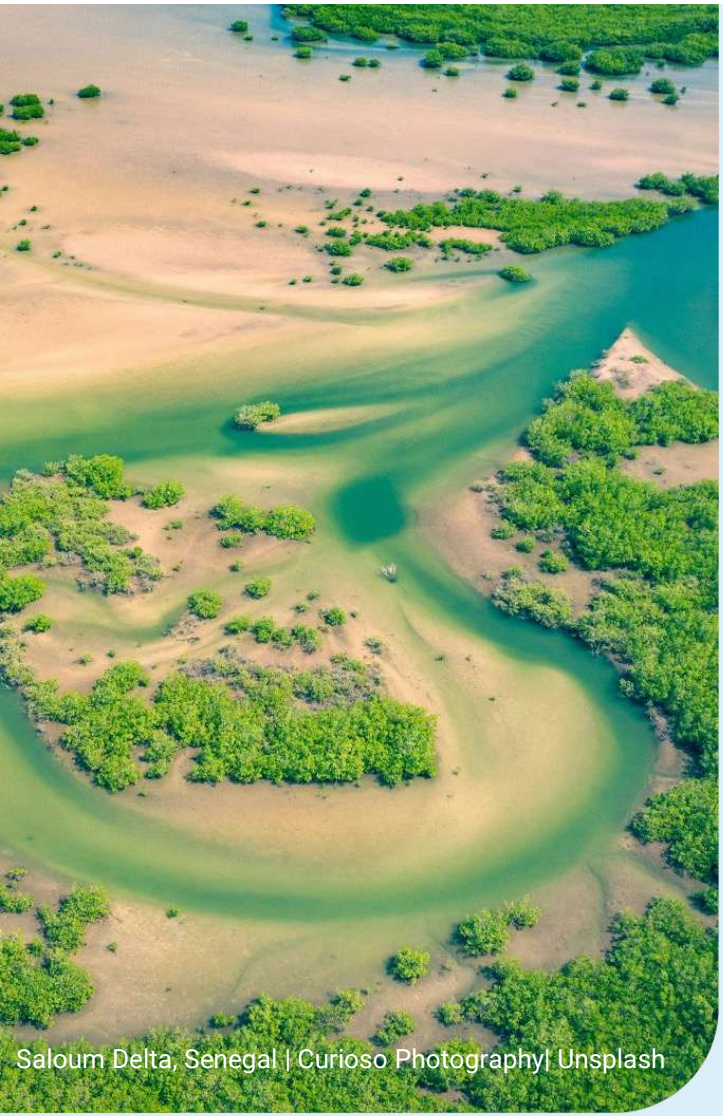
- Pre-assessment
- Overview of Masterclass modules
- Overview of Training of Trainers program

Session 1: Introducing Climate Resilient Water Services

- Key terms and concepts:
  - Climate change
  - Climate hazards
  - Climate adaption and mitigation
  - Climate-resilient water services

Quiz, feedback survey, certification
Extra resources

Duration: 1.5 hours



Saloum Delta, Senegal | Curioso Photography| Unsplash

MODULE 1

Certificate

- Pass the quiz at the end of Module 1
- Complete a feedback survey

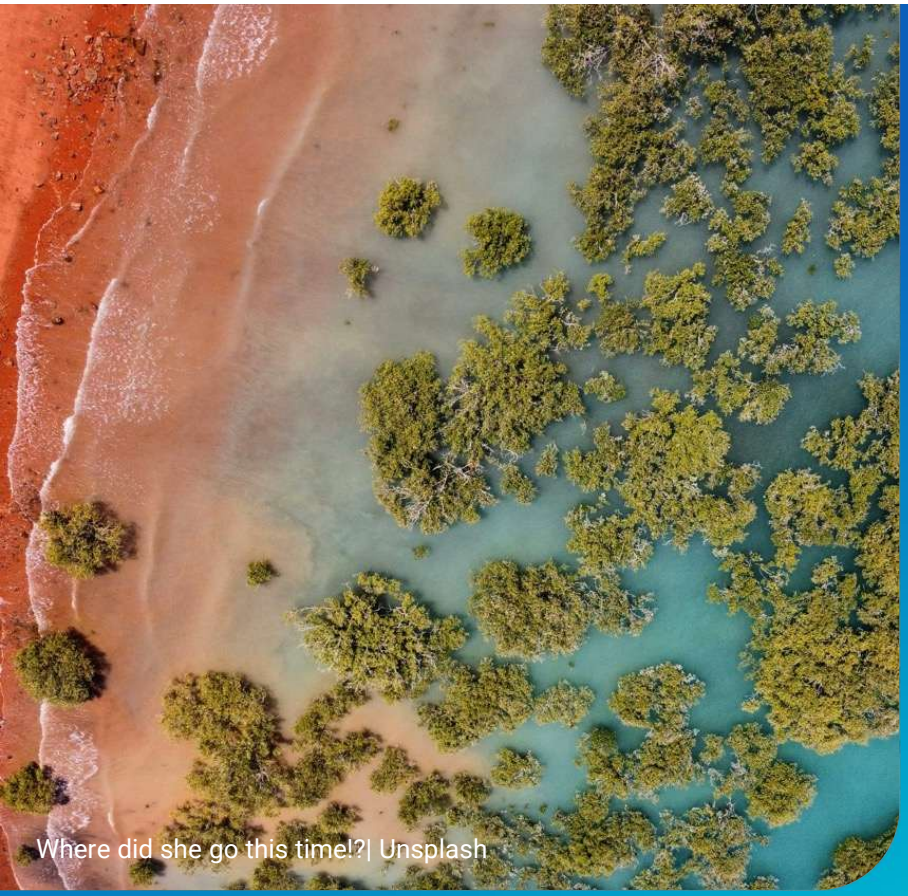
Accessibility

- Available on the WASH Systems Academy as a self-paced and guided online course

Assessing what you know and your interests

1. Fill in a survey before you start Module 1. This helps us to get a good understanding of who you are and what you already know.

2. Did you enjoy Module 1 and what are your expectations for the face-to-face Masterclass? Please fill in the survey.



Where did she go this time!?| Unsplash

MODULE 2

Climate hazards & risks and the role of inclusion

Today’s focus

01	Overview Module 2 including Learning objectives
02	Why this topic matters
03	Climate-resilient water services
04	Climate risk, hazard, exposure and vulnerability
	Lunch
05	Inclusive water services
06	Adaptive approaches
07	A quiz & end of the day reflection

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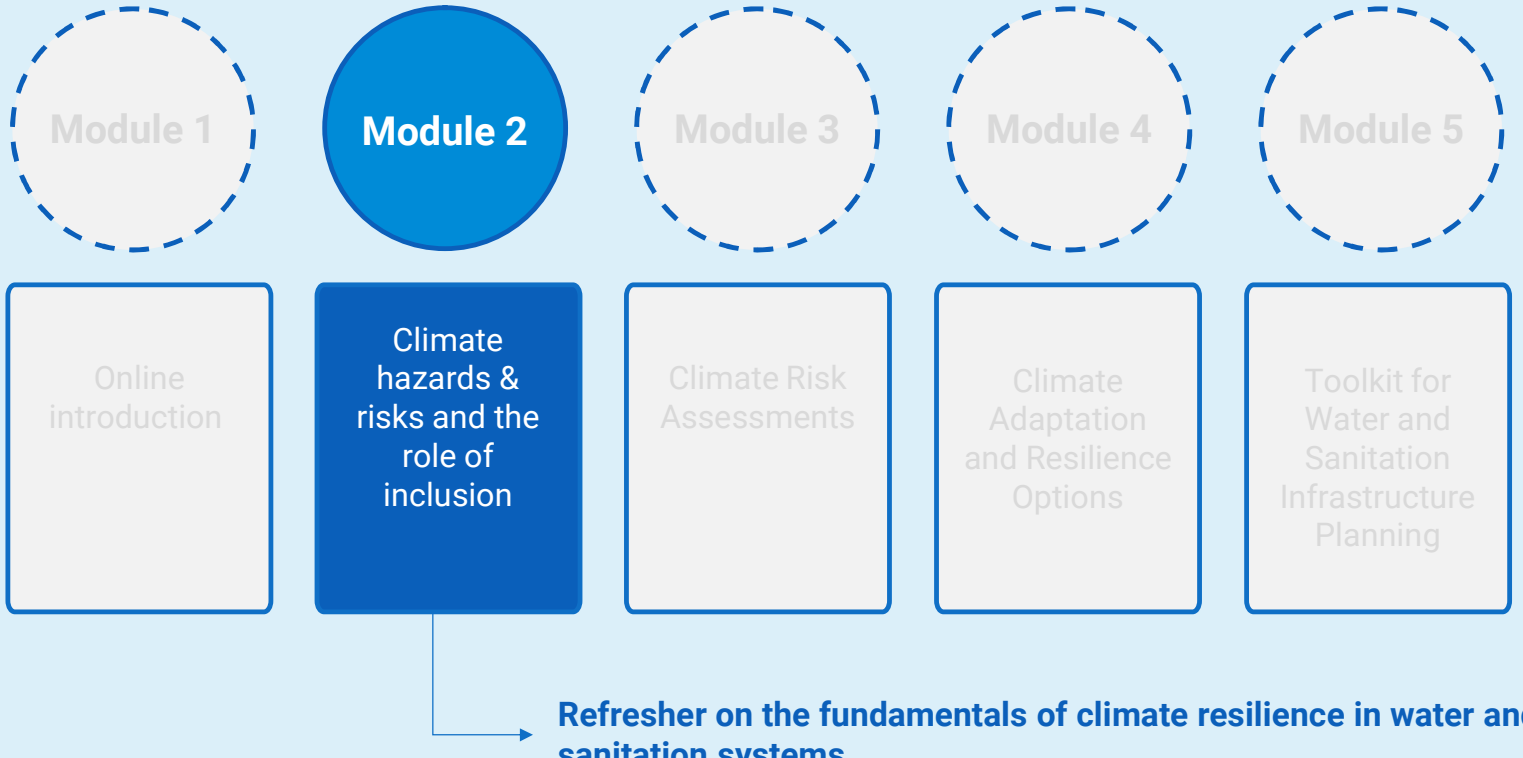
IRC Supporting water sanitation and hygiene services for life

Overview Module 2



Image credit: IRC

Masterclass overview



Refresher on the fundamentals of climate resilience in water and sanitation systems.

MODULE 2 Climate Resilient Water and Sanitation

- Module 2 focuses on the key challenges, frameworks, and adaptive approaches necessary to address climate-related impacts.
- The module revisits the critical linkages between climate change and water services.

Duration: 1 day

Learning objectives

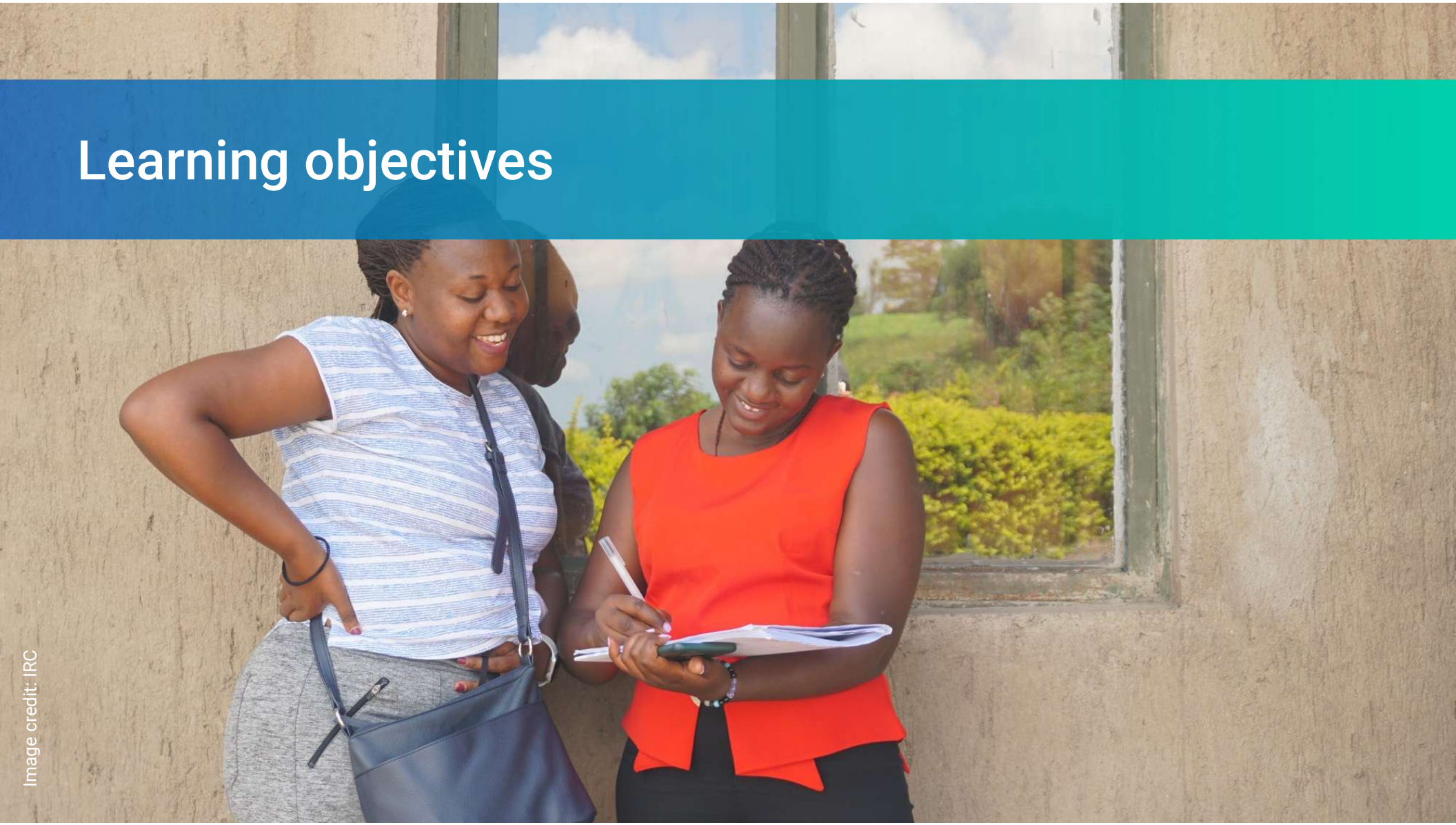


Image credit: IRC

MODULE 2 Learning objectives

By the end of this module, you will be able to:

- **Recap of Module 1**: Describe the key concepts around climate change, climate risk, and climate-resilient water services.
- **Identify and explain** the primary connections between climate risks and the delivery of safe, sustainable water services.
- **Explain** the importance of water resources management, water supply, inclusion, equity and justice aspects linked to climate change.
- **Recognise** the impacts on the water sector caused by climate-related threats, including:
  - Too little water *(e.g., drought, reduced rainfall)*
  - Too much water *(e.g., flooding, sea level rise)*
  - Too dirty water *(e.g., pollution)*
- **Describe** how resilient water systems can strengthen the capacity of households, communities, and economies to withstand broader climate impacts such as extreme heat, displacement, and other indirect effects.

02 | Why this topic matters



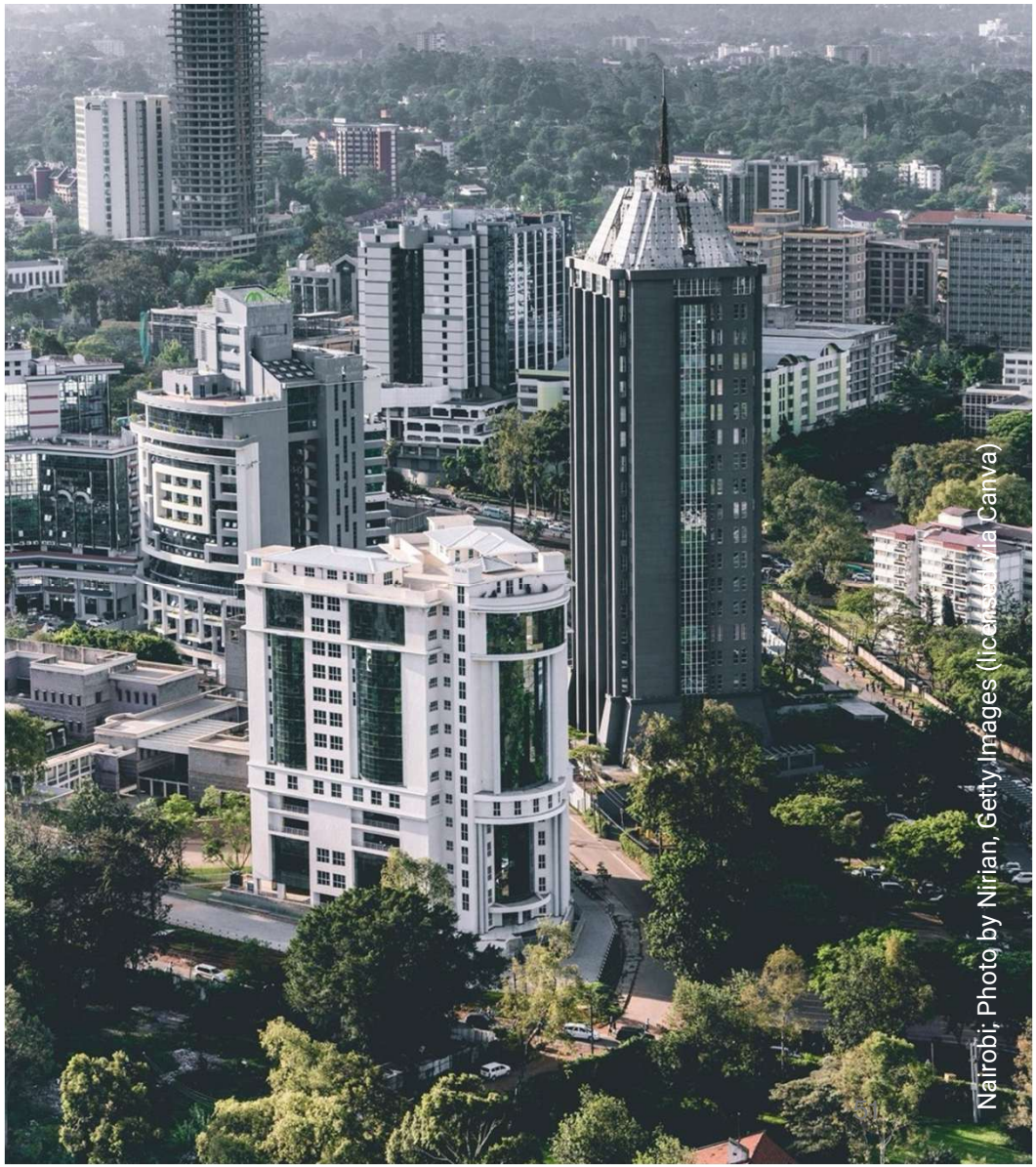
Pre-review exercise

Aha & ask

During the following session, write down at least one thing that **was new to you- an "Aha" moment**

Write down at least one question you would like to ask.

At the end of this module, we will review these.



Nairobi; Photo by Nirian, Getty Images (licensed via Canva)


Climate change is water change.

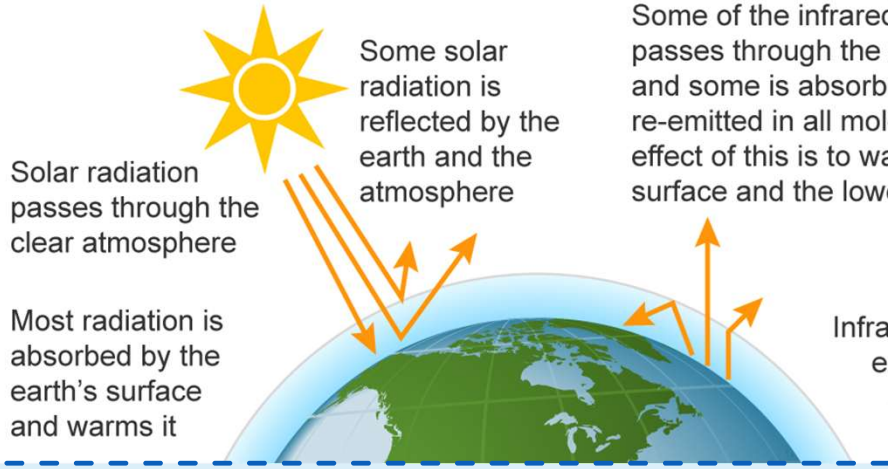
What is climate change?

NEW TERM

- Greenhouse gases (incl. CO_2, CH4, N_2O, H_2O) 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 CO_2 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



What gases cause climate change?



Greenhouse gas	Atmospheric lifetime (cycle duration)	Relative greenhouse strength (GWP Global Warming Potential, CO_2 = 1)	Main contribution to greenhouse process	Main sources
Carbon dioxide (CO_2)	100–1,000+ years (part persists for millennia)	1 (20 yrs); 1 (100 yrs)	Long-term, cumulative warming; sets baseline global temperature	Fossil fuel combustion (energy, transport, industry); cement production; deforestation and land-use change
Methane (CH_4)	~12 years	~80 (20 yrs); ~28 (100 yrs)	Strong short-term warming; drives near-term temperature rise	Livestock and rice cultivation; landfills and wastewater; oil, gas, and coal extraction
Nitrous oxide (N_2O)	~120 years	~280 (20 yrs); ~265 (100 yrs)	Long-lived and powerful warming; also affects ozone layer	Fertiliser and manure use in agriculture; biomass burning; chemical industry
Fluorinated gases (HFCs, PFCs, SF_6)	1–50+ years (some thousands of years)	~100 to >10,000 (100 yrs)	Extremely high warming impact per unit mass	Refrigeration and air conditioning; foams and insulation; electronics and electrical equipment
Water vapour (H_2O)	Days	Not defined (climate feedback)	Amplifies warming as temperatures increase; not a direct driver	Evaporation from oceans, lakes, soils, and vegetation

NEW TERM

Climate change and uncertainty

Climate change uncertainty arises from three main sources:

- Natural variability
- Modelling limitations
- Human actions

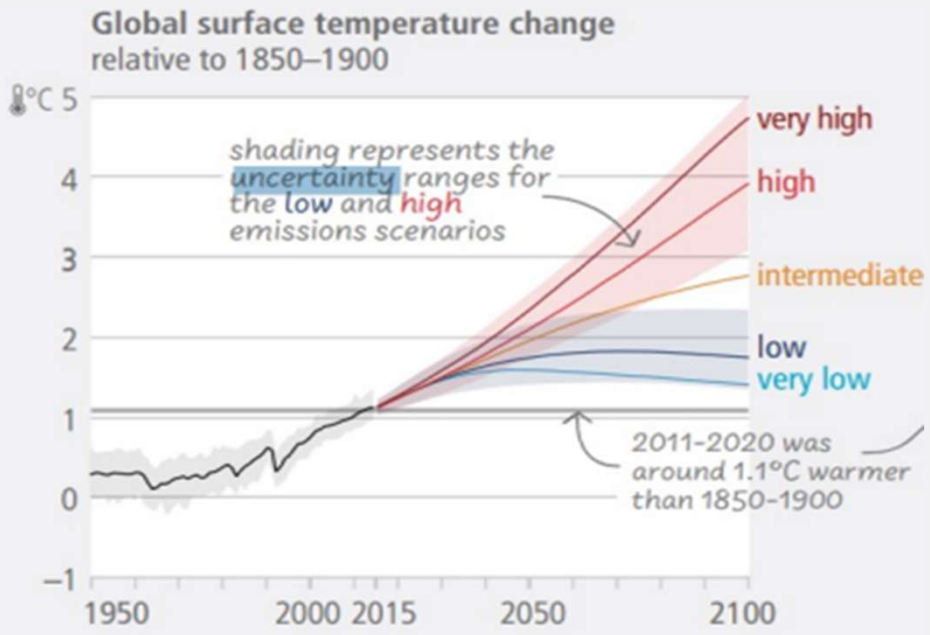


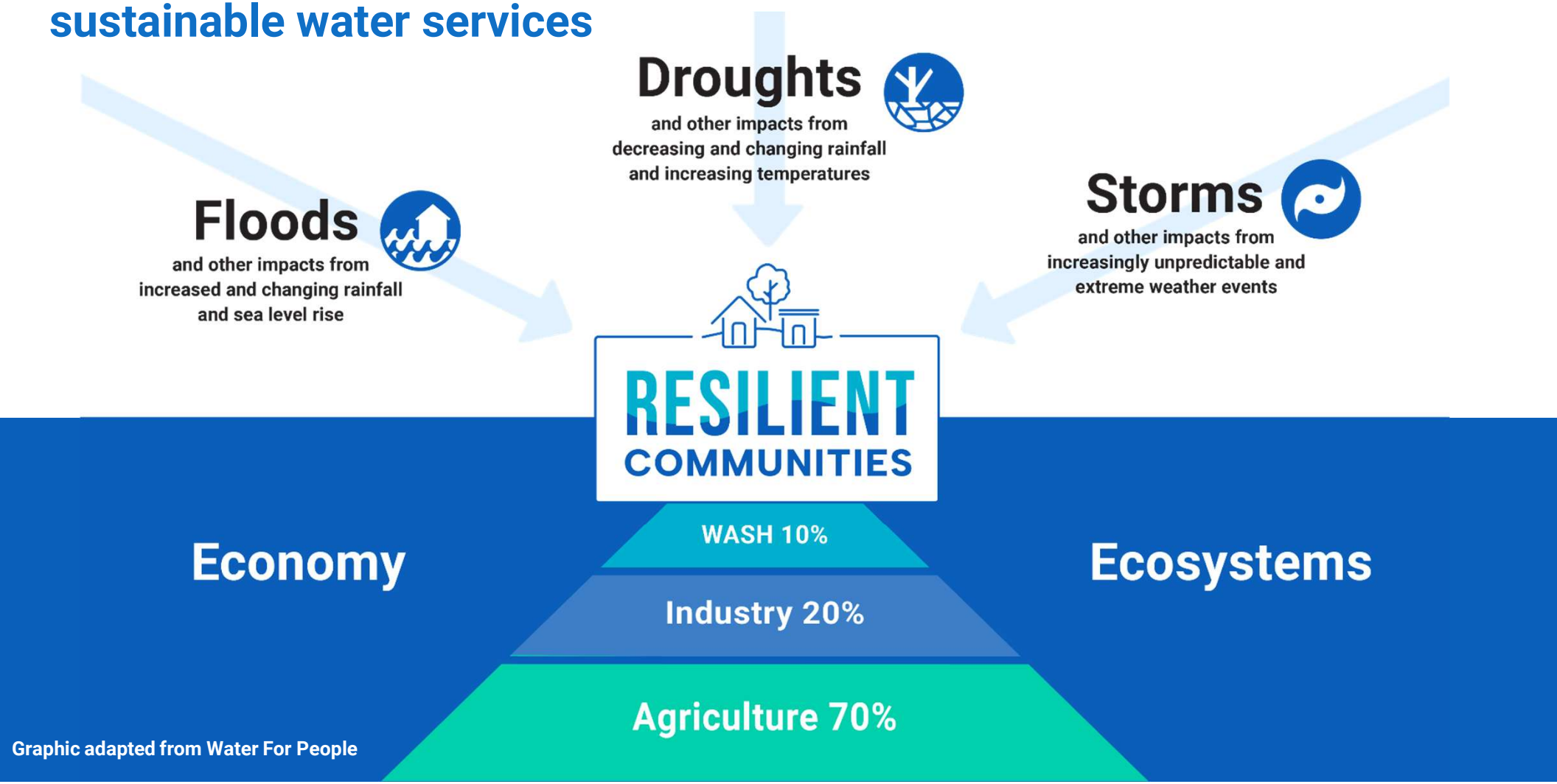
Figure 1.1 Global surface temperature change relative to 1850–1900. (IPCC AR6, 2023). Source: IPCC_AR6_SYR_LongerReport.pdf



Climate hazards

are specific events or conditions that pose a threat to human life, ecosystems, or infrastructure due to atmospheric phenomena.

How climate hazards impact sustainable water services



Graphic adapted from Water For People

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 we will need to ensure sustainable water access for its citizens, as well as resilient piping and distribution water networks.

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

Health, Sanitation and Hygiene

Health, sanitation and hygiene 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.



Climate hazards

Floods

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

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

Droughts

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 Hazard

Climate change creates new challenges, known as climate hazards, like scorching heat, floods, and droughts.

Climate Risk

Potential for negative consequences for people and nature. Risks occur when climate hazards affect exposed and vulnerable communities or systems.



Climate impact

effects or consequences of climate change on various aspects of the environment, society, and economy.

Floods in Bangladesh.

Review Exercise: Climate hazards

Test yourself by ensuring you can answer the following questions:

- How does climate change create new or increased hazards?
- What are the top hazards in your context?

Keep your answers on a paper or document so you can refer to them again.



03 | Climate-resilient water services



What water services do we have in Kenya?



Graphic adapted from Water For People

What does it mean for water services to be climate-resilient?



Too Much Water

Extreme weather events such as floods and hurricanes can cause direct damage to water and sanitation infrastructure such as pipelines, wells, toilets, and treatment facilities.



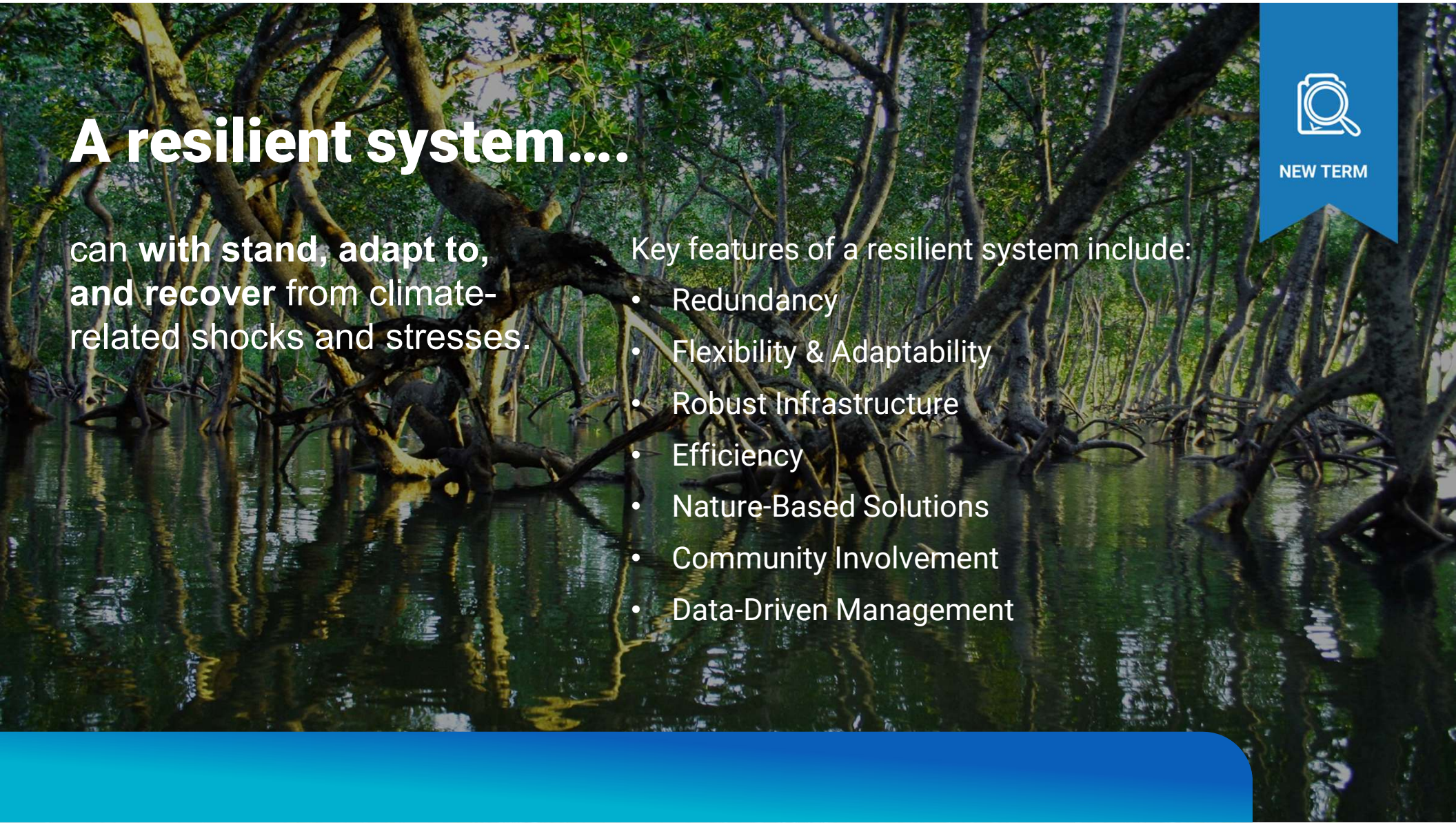
Too Little Water

Rising temperatures results in droughts and less predictable water availability. The destruction of vegetation and tree coverfrom droughts, wildfires, or changes in agriculture intensifies runoff, reducing groundwater recharge.



Too Dirty Water

Flooding, especially in areas with limited safely managed sanitation services, can cause the spread of contaminants and disease. And with rising sea levels, salt water can more easily contaminate freshwater aquifers.



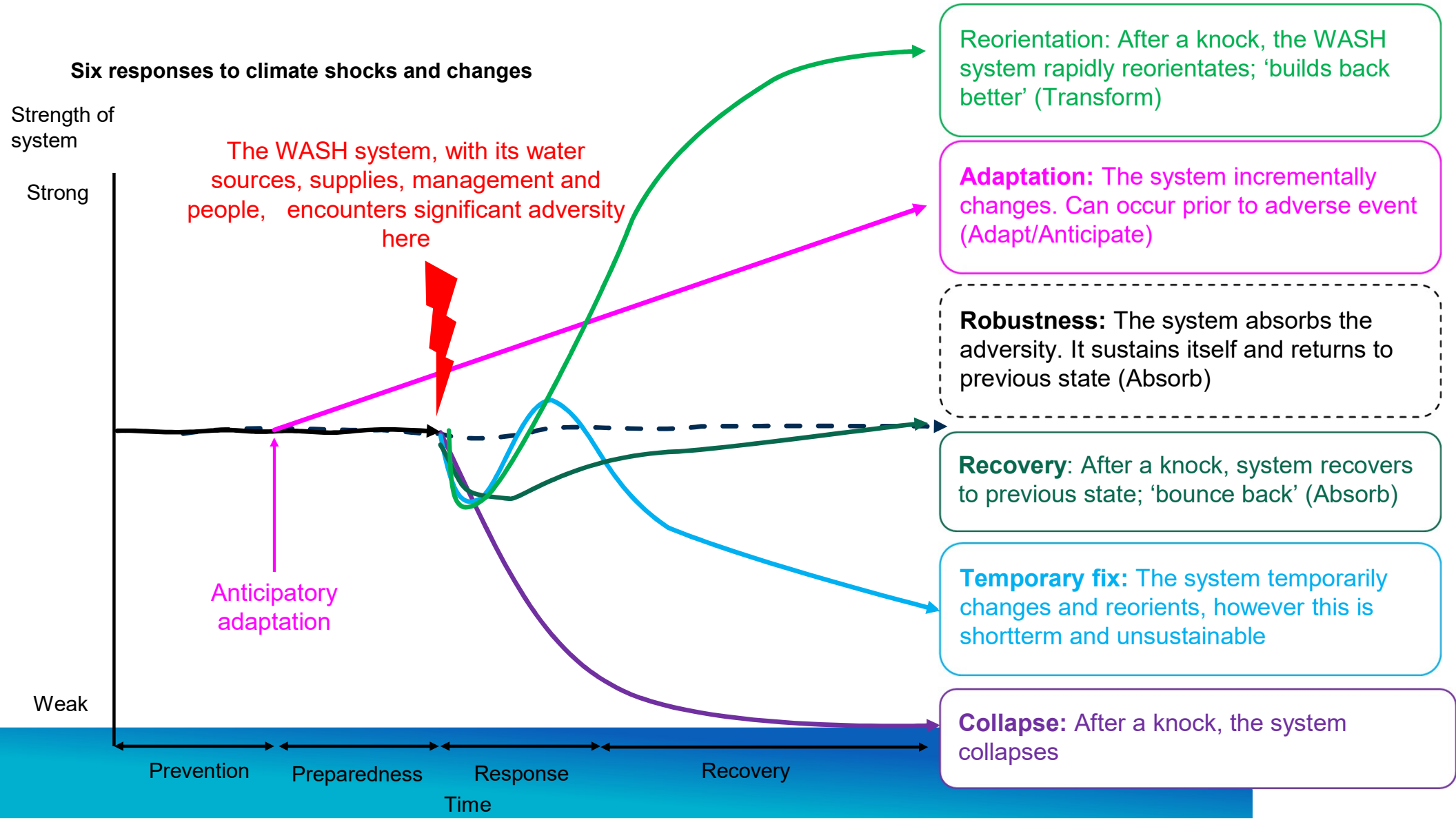
A resilient system....

NEW TERM

can **with stand, adapt to, and recover** from climate-related shocks and stresses.

Key features of a resilient system include:

- Redundancy
- Flexibility & Adaptability
- Robust Infrastructure
- Efficiency
- Nature-Based Solutions
- Community Involvement
- Data-Driven Management


Six responses to climate shocks and changes
Strength of system
Strong
Weak
The WASH system, with its water sources, supplies, management and people, encounters significant adversity here
Anticipatory adaptation
Prevention
Preparedness
Response
Recovery
Time
Reorientation: After a knock, the WASH system rapidly reorientates; 'builds back better' (Transform)
Adaptation: The system incrementally changes. Can occur prior to adverse event (Adapt/Anticipate)
Robustness: The system absorbs the adversity. It sustains itself and returns to previous state (Absorb)
Recovery: After a knock, system recovers to previous state; 'bounce back' (Absorb)
Temporary fix: The system temporarily changes and reorients, however this is shortterm and unsustainable
Collapse: After a knock, the system collapses

Climate-Resilient Water Services

Core factors:

- Prevention
- Preparedness
- Response
- Recovery

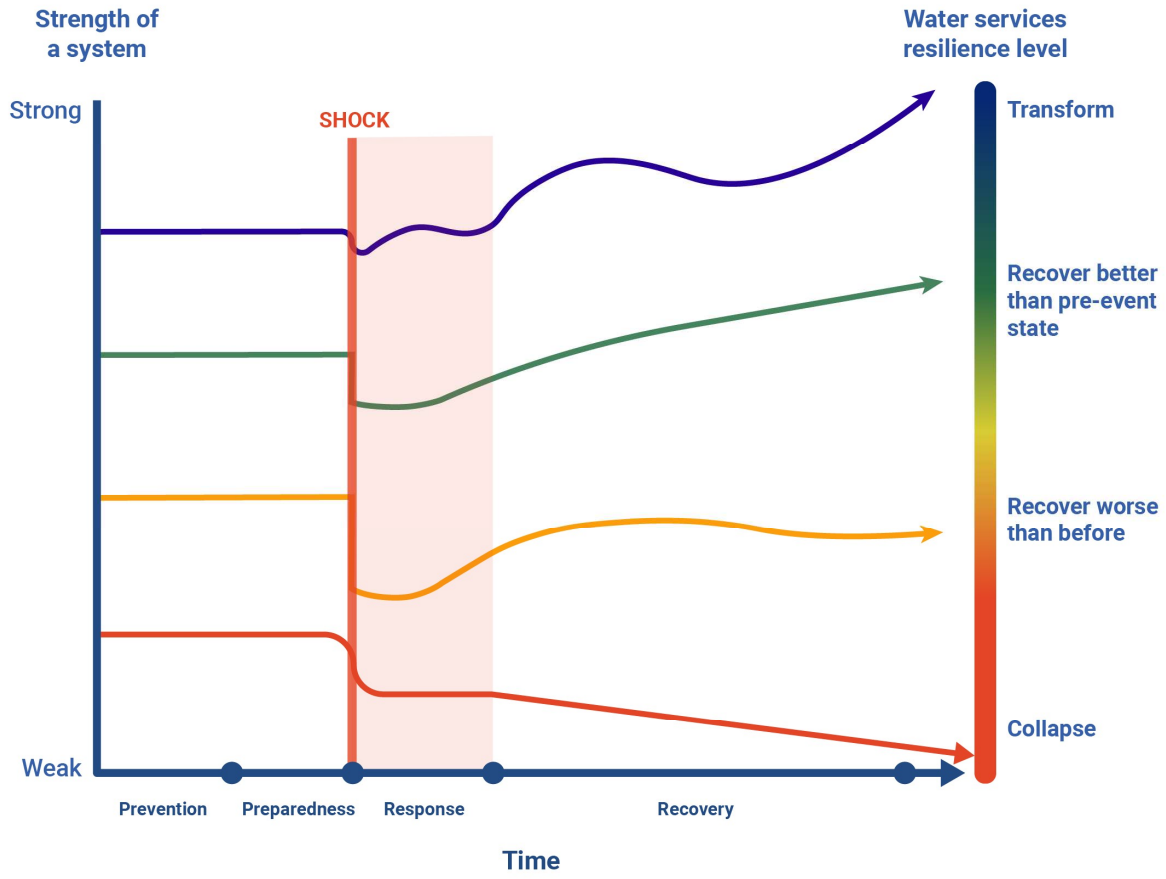
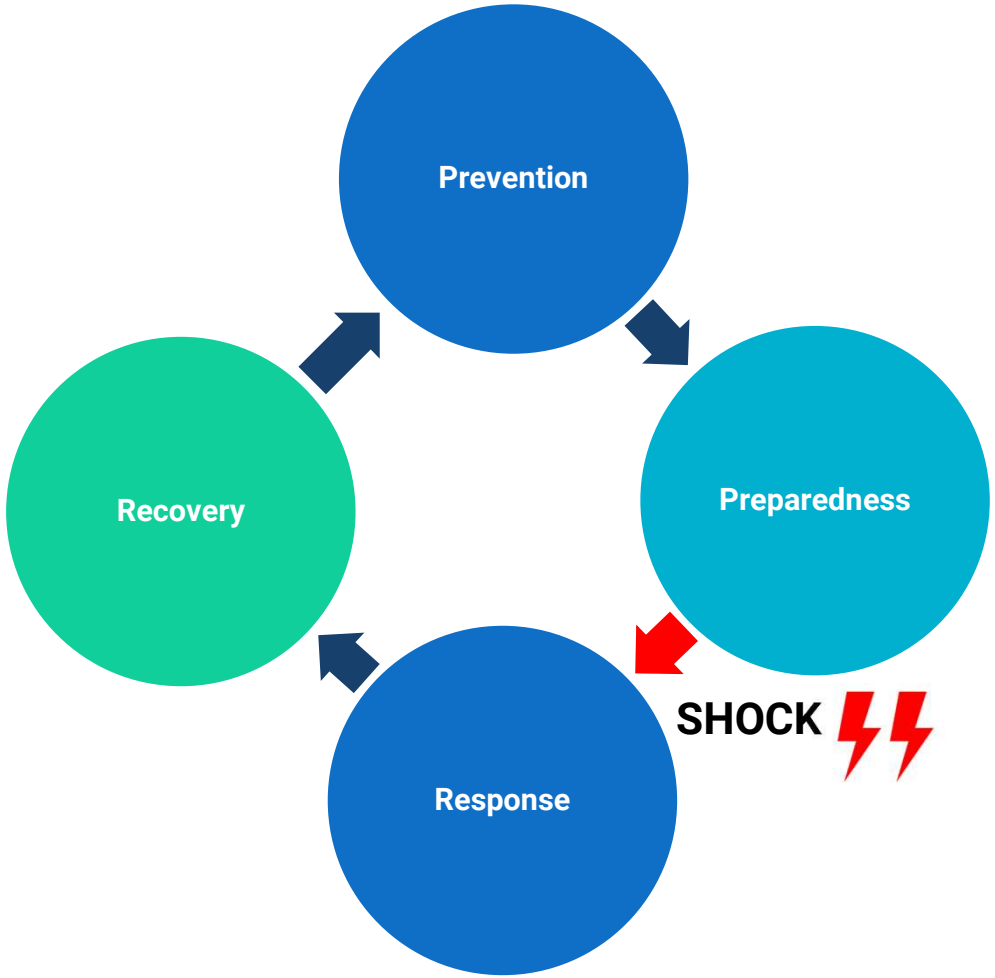


Figure: How the existing strength of a system can influence the outcomes of services

Resilience is a never-ending cycle.

It is a gradual process and not a quick fix or a one-off action.



The benefits

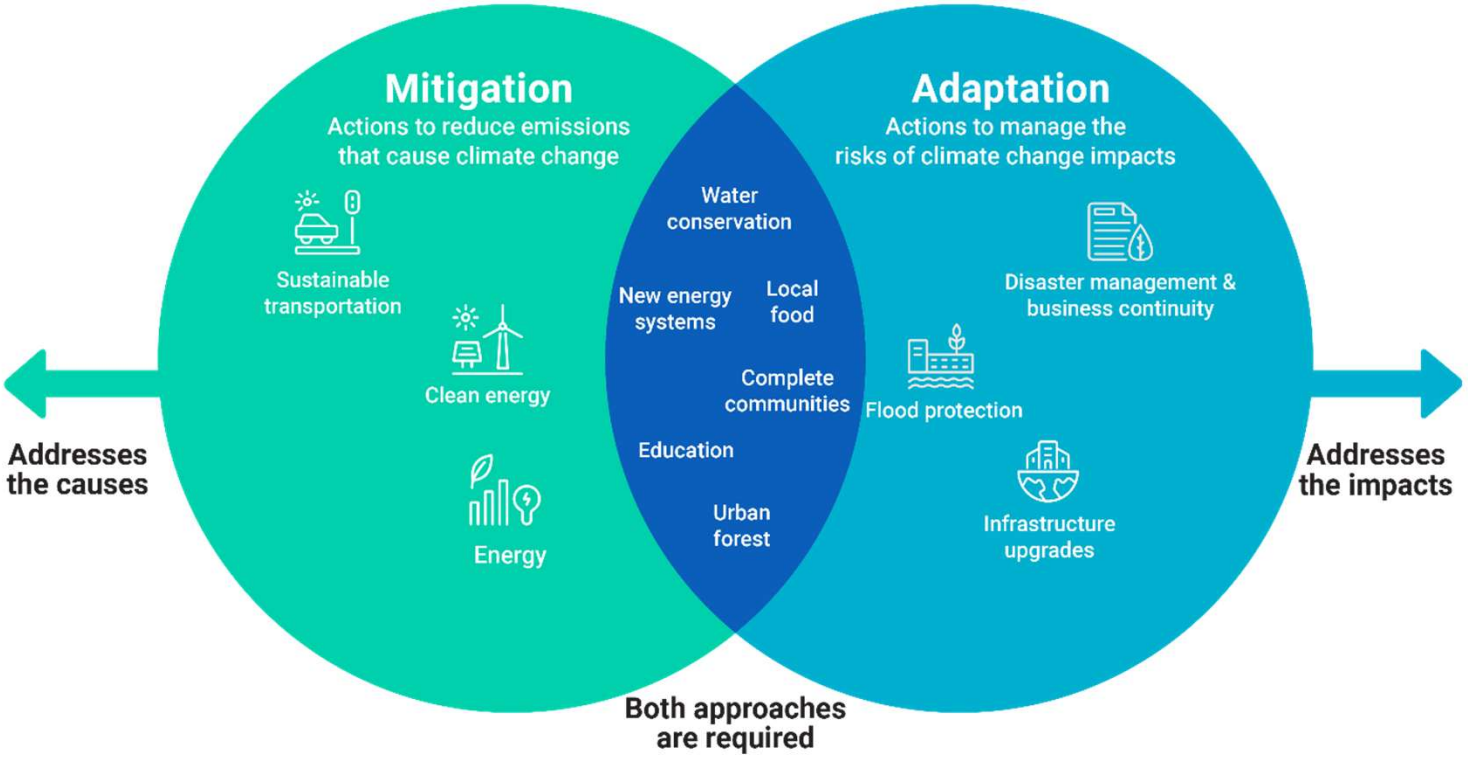
Resilient water and sanitation systems can strengthen the capacity of households, communities, and economies to withstand broader climate impacts:

- Support during displacement and migration
- Economic stability and livelihood protection
- Social and community resilience
- Systemic risk reduction
- Cost-saving
- Protection against extreme heat
- Reduced social inequalities/injustice

Climate mitigation and adaptation



Mitigation and adaptation

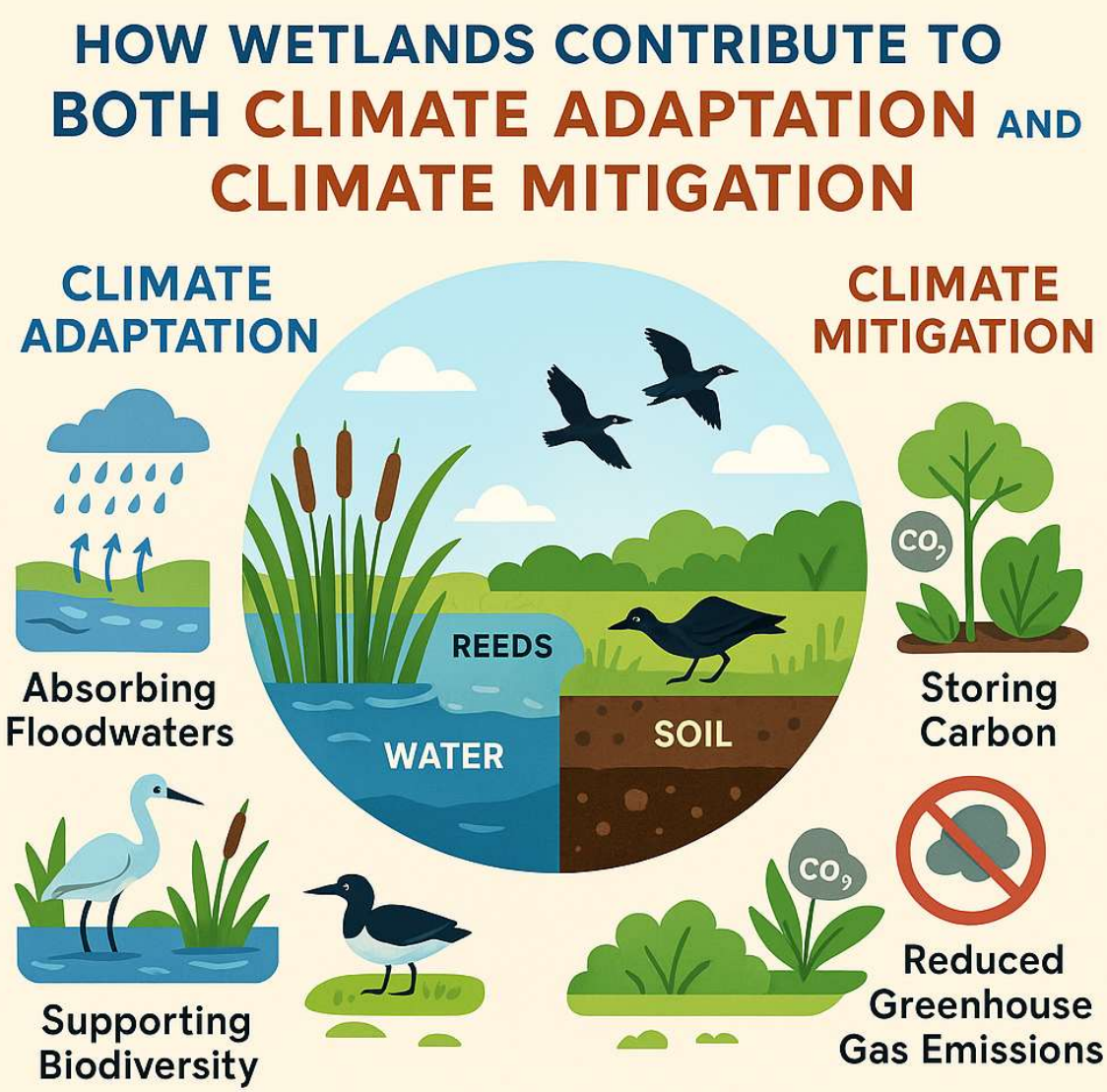


Mitigation means reducing emissions of greenhouse gases that cause climate change i.e., **addressing the cause of climate change.**

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.**

An example:


HOW WETLANDS CONTRIBUTE TO BOTH CLIMATE ADAPTATION AND CLIMATE MITIGATION
CLIMATE ADAPTATION
CLIMATE MITIGATION
REEDS
WATER
SOIL
CO_2
CO_2
Absorbing Floodwaters
Storing Carbon
Supporting Biodiversity
Reduced Greenhouse Gas Emissions

Three aims of climate adaptation:



Robust infrastructure



Just, equitable and dynamic services



Healthier freshwater ecosystems

Monitoring and tracking adaptation

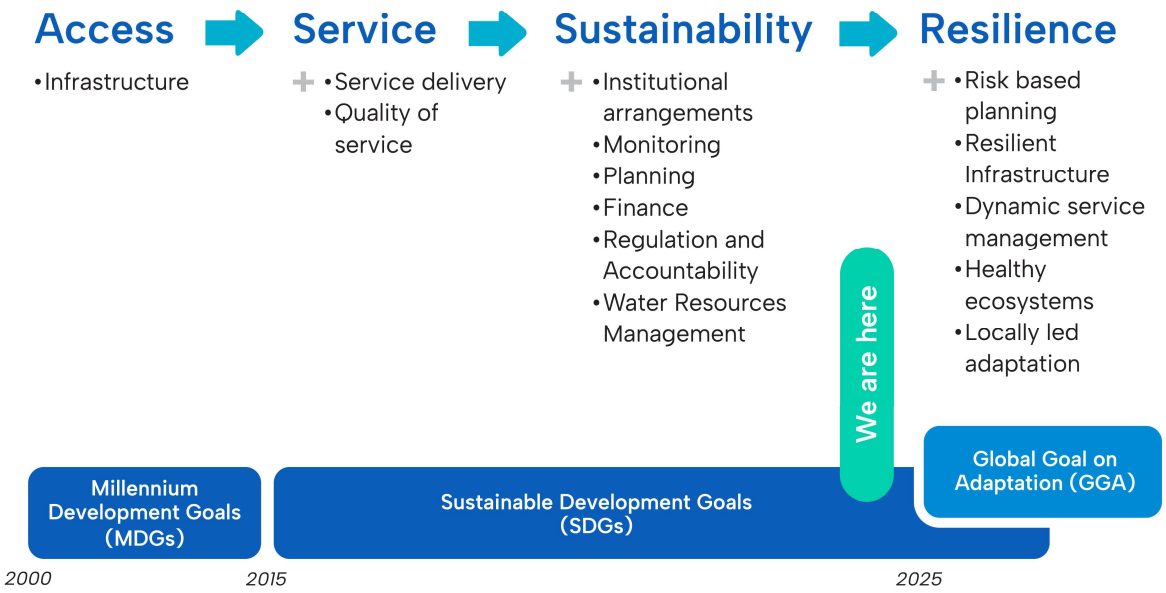


Figure: The transition from infrastructure to resilience

10 indicators aim to measure Global Goal on Adaptation:

1. Water Stress Level
2. Water-Use Efficiency
3. Access to Climate-Resilient Water and Sanitation Services
4. Integrated Water Resources Management
5. Ambient Water Quality
6. Coverage of Early Warning Systems for Water Hazards
7. Investment in Climate-Resilient Water Infrastructure
8. Cryosphere and Glacier Monitoring
9. Water Governance and Institutional Capacity
10. Exposure and Vulnerability Mapping

Quiz: Is it climate mitigation, adaptation or both?

1. Improving energy efficiency and converting from fossil fuels to solar for pumping.

2. Elevating a well platform to allow for access during a flood.

3. Reducing the time untreated waste is stored and retrofitting treatment plants with carbon capture to reduce emissions from sanitation services.

4. Planting native plants and trees in the source area catchment to improve infiltration and reduce runoff.

5. Increasing availability of hardware and other materials that are likely to be damaged in the case of extreme weather events from climate change.

QUIZ: Is it climate mitigation, adaptation or both?

1. Improving energy efficiency and converting from fossil fuels to solar for pumping. **Mitigation**

2. Elevating a well platform to allow for access during a flood. **Adaptation**

3. Reducing the time untreated waste is stored and retrofitting treatment plants with carbon capture to reduce emissions from sanitation services. **Mitigation**

4. Planting native plants and trees in the source area catchment to improve infiltration and reduce runoff. **Both**

5. Increasing availability of hardware and other materials that are likely to be damaged in the case of extreme weather events caused by climate change. **Adaptation**

LUNCH



Review exercise

Aha & ask

→ A show of hands who wants to share an Aha moment

→ Second part: show of hands who has a question



Nairobi; Photo by Nirian, Getty Images (licensed via Canva)

04 | Climate risk, hazard, exposure and vulnerability



Photo by Kuntal Biwas, Pexels

What is climate risk?

NEW TERM

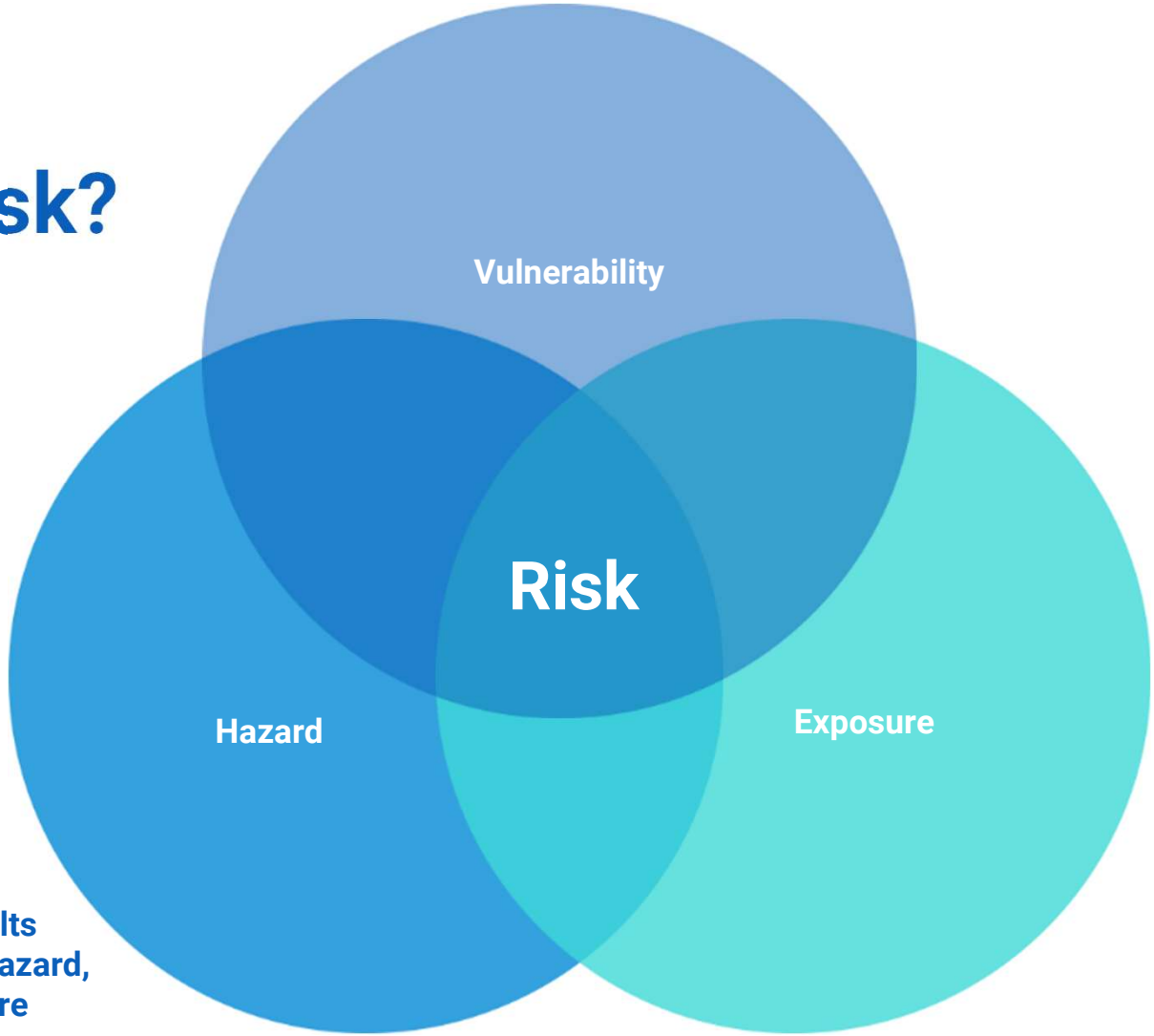
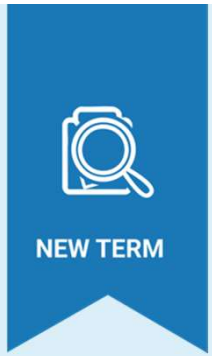


Figure: Climate risk results from the interaction of hazard, vulnerability and exposure



Climate risk assessment

Risk = Hazard x Exposure x Vulnerability

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 all three of their words checked is the winner.


Climate hazard


Risk assessment


Climate risk


Climate impact


Vulnerability


Resilient


Exposure


Climate scenario

05| Inclusive water services



Image credit: IRC

Energizer

- Stand up and form a circle.
- Rules:
  Each person says the next number in sequence (1, 2, 3, 4…).
  BUT—whenever a number is a multiple of 3 (like 3, 6, 9, 12…), the person must clap instead of saying the number. This includes **13, 23** as well
  No speaking allowed on multiples of 3—just a single clap.

Vulnerability assessment

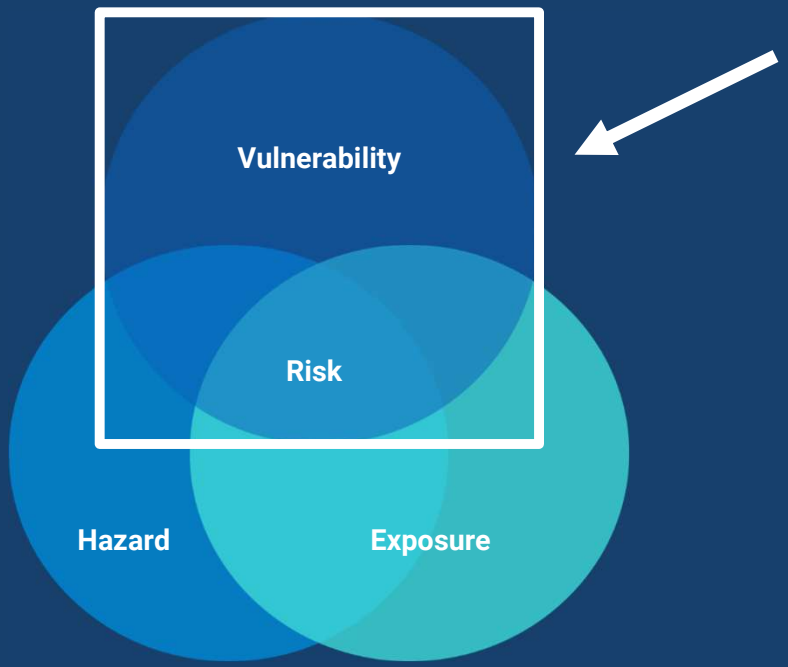


Figure: Climate risk results from the interaction of hazard, vulnerability and exposure

Social: Increased vulnerability in some groups

Everyone is affected by climate change, with some groups being more vulnerable:

- Women and girls
- Youth
- Indigenous peoples
- Persons with disabilities
- Older people
- People living in fragile and conflict situations

Equity, equality & inclusion for resilience

Climate impacts often fall heaviest on marginalized and excluded groups

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



Equity, equality, and inclusion are not isolated goals.

They need to be integrated across all aspects of climate resilience planning and action.



Equality

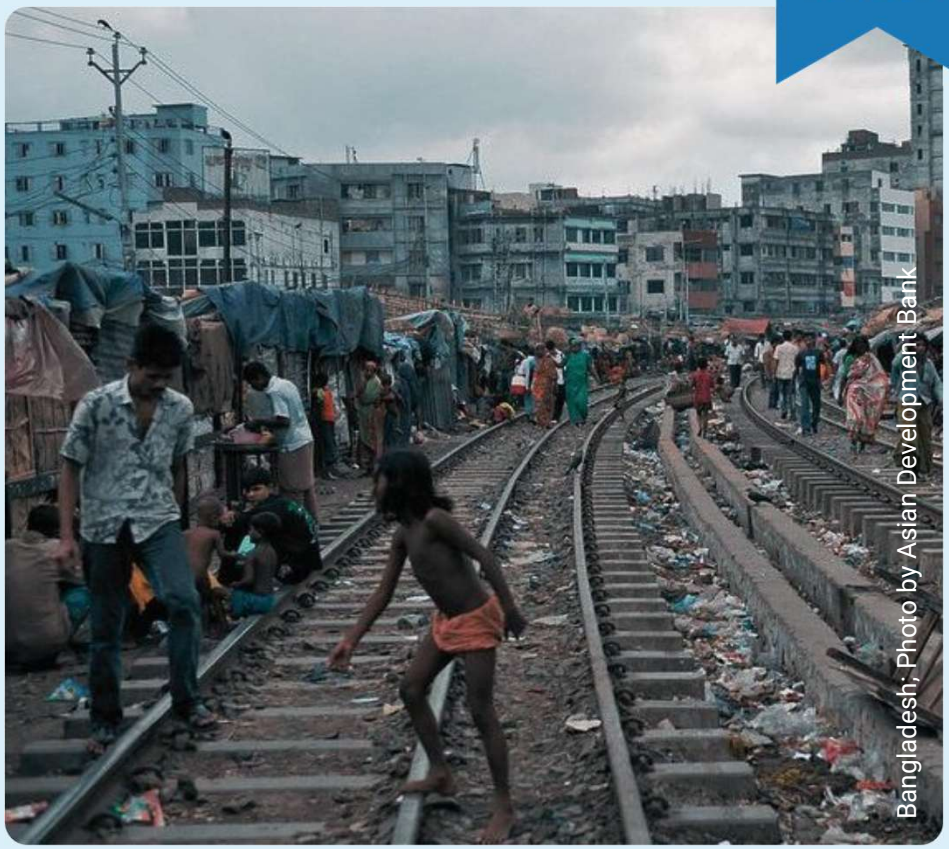
NEW TERM

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

NEW TERM

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

NEW TERM

Inclusion is the practice of including relevant stakeholders and communities, particularly marginalised groups, in policy making and urban governance processes, 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

NEW TERM

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.

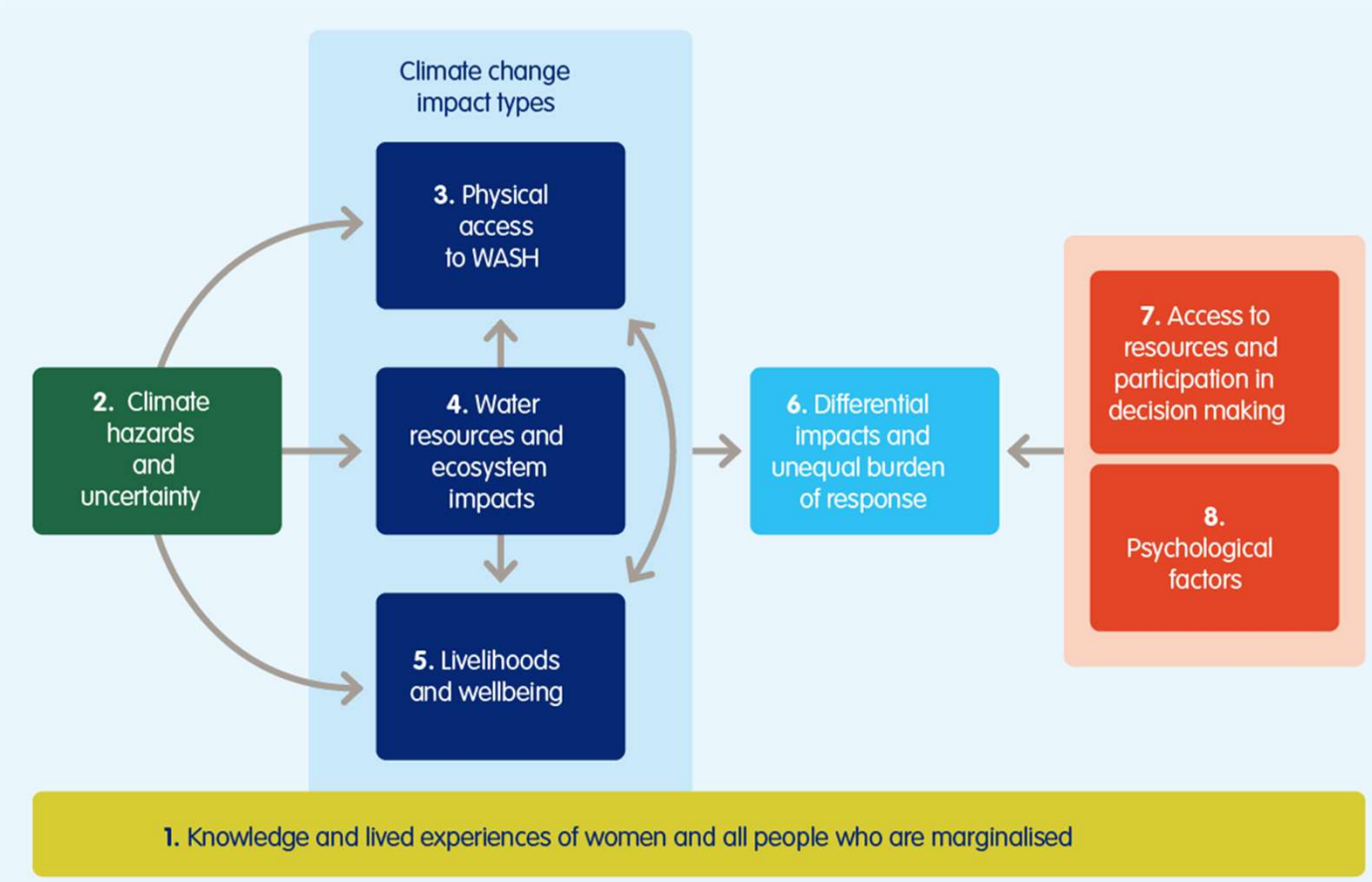


Dhaka; Photo by Dibakar Roy, PeDxels

Putting people at the heart



The relationship between WASH, climate change impact, and gender & social inclusion



Inclusive Water Committees in Kibera, Nairobi (Kenya)

Inclusive Design Features

- Accessible taps with ramps and handrails.
- Flexible payment systems for low-income households.
- Community feedback mechanisms to report issues and suggest improvements.



InforNile photo - Residents tapping water at Gatwekera water ATM dispensing kiosk

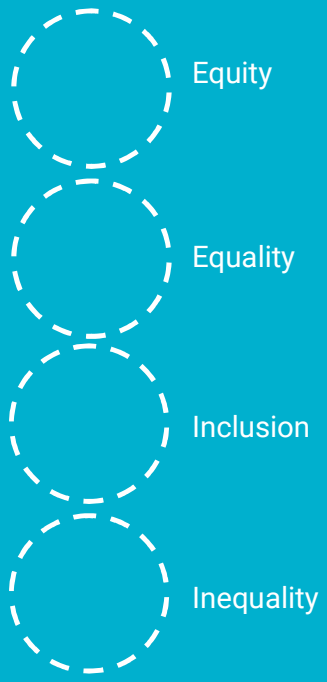
Physical infrastructure vulnerability

- Poor quality material
- Weak, or insufficient dimensions in intake
- Shallow-buried pipes
- Borehole design without proper sealing
- Electrical systems without back-up

Review Exercise: Pictionary

Test your knowledge, and challenge those around you:

- Choose one of the definitions.
- In 2 mins, draw a simple sketch of what you think this concept would look like in real life.
- Challenge someone else on your table to guess which of the definitions you have drawn.



Do you have any questions on the definitions or concepts?

Summing up



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

Illustration by Maisha Rahman, Original concept by Craig Froehle

06| Adaptive approaches



Drone support via Flickr

How to create resilient water services?

Adaptive approaches:

- **Structural Approaches (Infrastructure-Based Solutions)** such as Nature Based Solutions (NBS)
- **Non-Structural Approaches (Policy and Community-Based Solutions)** such as Early Warning Systems



Marie-Christine Cormier Salem/IRDMangroves of Senegal

Structural (Infrastructural approaches)

Category	Approach	Description / Examples
Structural (Infrastructure-Based Solutions)	**Nature-Based Solutions (NbS)**	• Wetlands act as natural buffers, mitigating flooding and filtering pollutants. • Green Infrastructure (urban parks, green roofs, permeable surfaces) manages stormwater and reduces heat island effects. • Watershed Protection safeguards water quality and availability through sustainable management.
	Grey Infrastructure	• Traditional engineered “hard” systems that secure water supply, sanitation, and flood protection. • Examples: reservoirs, weirs, irrigation networks, wastewater treatment facilities, pumping stations, and managed aquifer recharge systems.
	Hybrid Infrastructure	• Combined use of grey and nature-based solutions to maximize resilience and efficiency. • Examples: seawalls reinforced by mangrove forests; urban stormwater drainage linked to green roofs and wetlands; managed aquifer recharge supported by watershed protection.
	Decentralized Systems	• Small-scale, modular systems that are flexible and adaptable to local conditions. • Particularly valuable where infrastructure is limited or environmental conditions are changing.

Non- Structural (Policy and community-based)

Category	Approach	Description / Examples
Non-Structural (Policy and Community-Based Solutions)	Early Warning Systems & Monitoring	• Real-time data enables anticipation and rapid response to climate-related threats such as floods and droughts.
	Community Engagement & Capacity Building	• Local involvement ensures solutions are context-specific and sustainable. • Training and awareness empower communities to adapt and manage water resources effectively.
	Policy & Financing Innovations	• Climate-resilient budgeting, insurance mechanisms, and public–private partnerships secure long-term financial support for both structural and non-structural measures. • Water demand-oriented measures such as providing incentives to reduce water demand (subsidies, pricing), and technological options to reduce demand (such as recycling, drip irrigation, etc.).



Nature-based solutions

- Work with nature, not against it
- Dual benefits
  Adaptation & Mitigation
- Cost-effective and long-lasting
- Boost biodiversity and livelihoods
- Enhance urban and rural resilience

Review exercise: Nature-based solutions

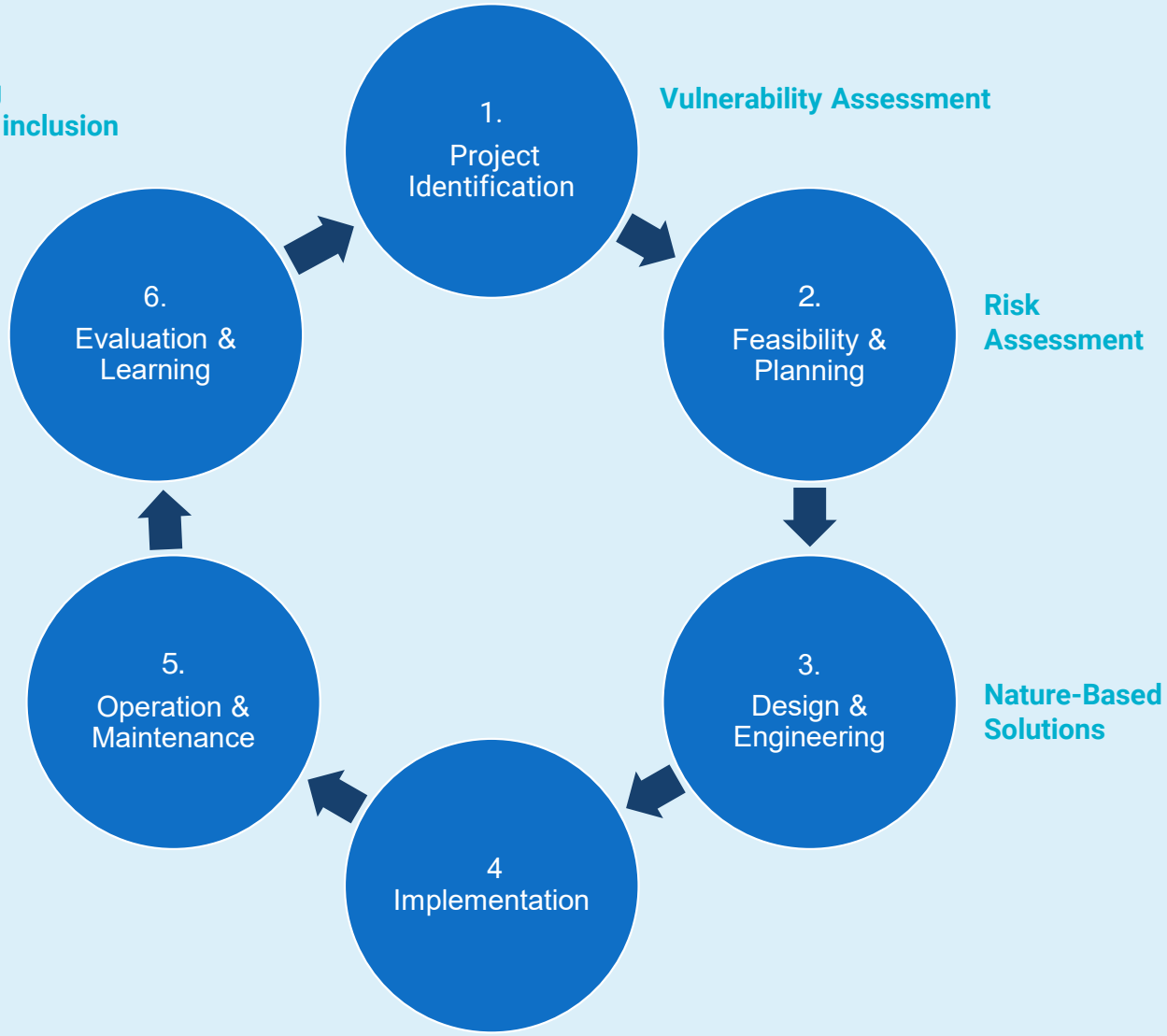
Can you think of examples of nature-based solutions in your context?

Discuss with your neighbor

Integrating climate risk, vulnerability, and resilience into the project cycle of water services

Cross cutting themes:

- **Data driven planning**
- **Gender equality and inclusion**
- **Youth engagement**



07| A quiz & end of the day reflection

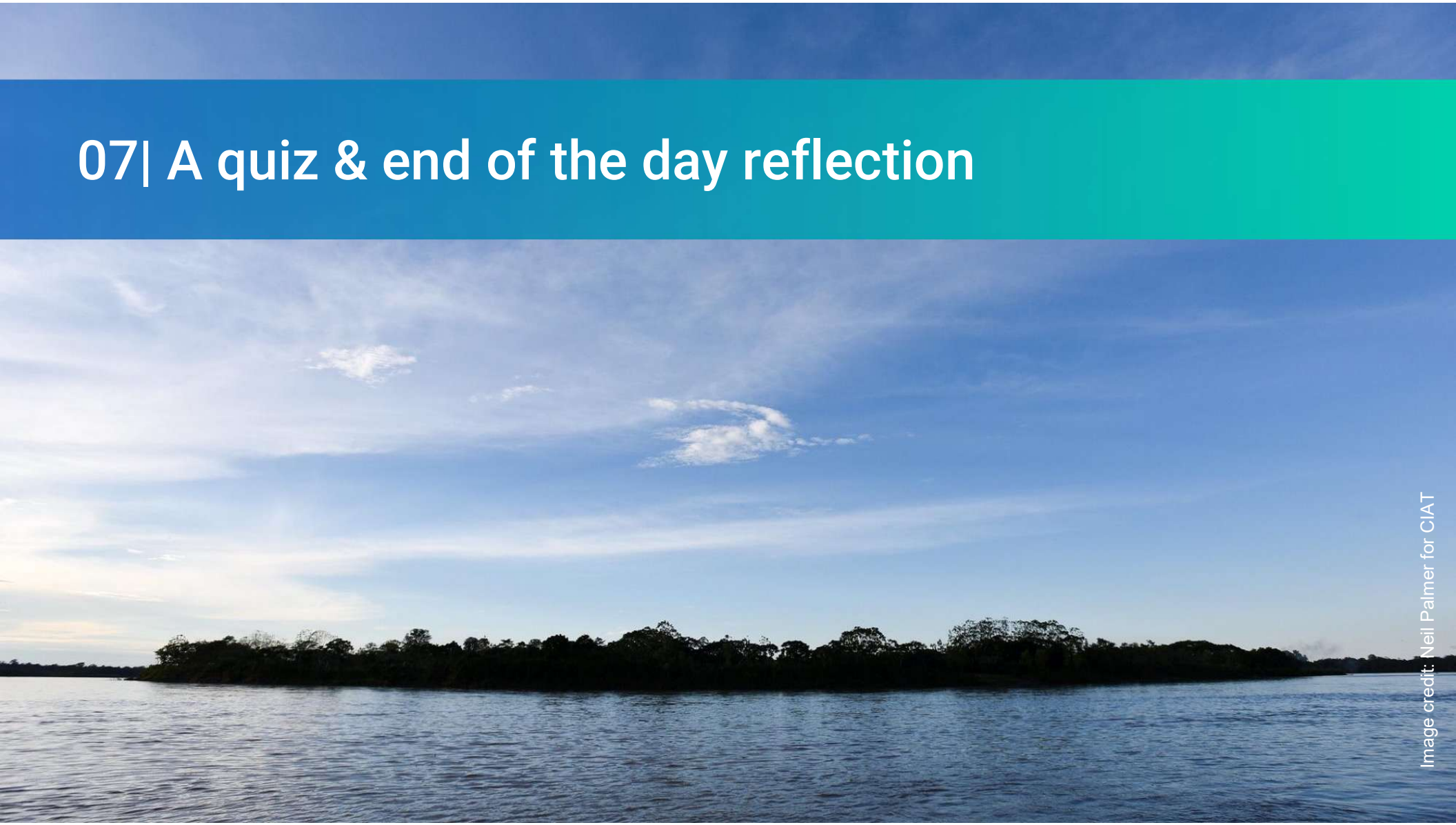


Image credit: Neil Palmer for CIAT

1. True or false?

Nature-Based Solutions (NbS) are an example of a structural approach to enhancing water system resilience.

Answer: It is true.

Structural Approaches (Infrastructure-Based Solutions) focus on physical interventions and infrastructure development to enhance the resilience of water services. Nature-Based Solutions (NbS) are a good example.

2. Is this formula to assess climate risks, correct?

Risk = Hazard + Exposure

A. Yes
B. No

2. Is this formula to assess climate risks, correct?

Risk = Hazard + Exposure

A. Yes
B. No

Answer: B – No the correct formula is:

Risk = Hazard x Exposure x Vulnerability

3. Which statement(s) is not correct?

A. **Climate change** amplifies existing inequalities.

B. **Equality** is about giving everyone what they need to have an equal chance of success.

C. **Climate mitigation** means reducing emissions of greenhouse gases that cause climate change.

D. **A resilient water system** is one that can withstand, adapt to, and recover from climate-related shocks and stresses

3. Which statement(s) is not correct?

A. Climate change amplifies existing inequalities.

B. Equality is about giving everyone what they need to have an equal chance of success.

C. Climate mitigation means reducing emissions of greenhouse gases that cause climate change.

D. A resilient water system is one that can with stand, adapt to, and recover from climate-related shocks and stresses.

Answer: B

Equity is about giving everyone what they need to have an equal chance of success. **Equality** is about giving everyone the same.

4. True or false?

Water services include stormwater and flood management.

Answer: It is true.

Water services refer to the systems needed to supply, treat, distribute, and manage water for various uses, including:

- Irrigation: Supplying water for agricultural purposes.
- Industrial use: Delivering water for manufacturing, cooling, and other industrial processes.
- Stormwater and flood management: Handling excess water from rainfall to prevent flooding and protect ecosystems.
- Drinking water: Ensuring safe and clean water for human consumption.
- Sanitation: Providing water for hygiene, sewage treatment, and waste disposal.

5. Complete the sentence

_____ creates new challenges, known as _____, like scorching heat, floods, and droughts which pose _____ ; chances of negative consequences for people and nature.

A. Climate risk
B. Climate hazard
C. Climate change

5. Complete the sentence

Climate change creates new challenges, known as **climate hazards**, like scorching heat, floods, and droughts which pose **climate risks**; chances of negative consequences for people and nature.

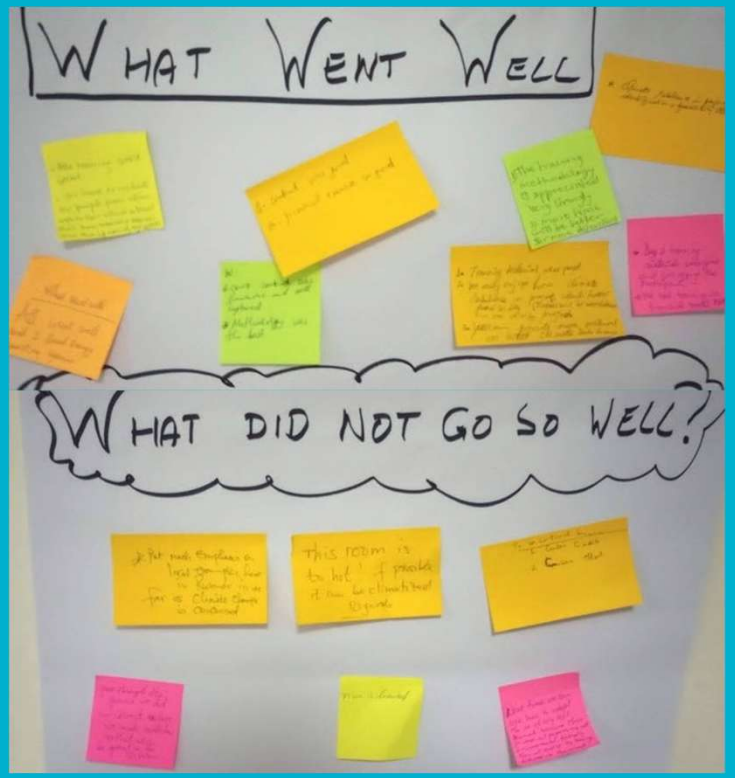
Answers:
C. Climate change
B. Climate hazard
A. Climate risk

For tomorrow

- We requested you to bring examples of Case studies / experiences of climate change and water and sanitation
- We have slots tomorrow to share – who would like to do so?

End of day reflection

- **Yellow post-it**
  what went well today
- **Pink post-it**
  what could be improved of today
- Post them on the evaluation sheet when leaving the room
- Also add in your learning logs – both in participants manual and facilitators handbook



Key points Module 2

- **Climate risk** is influenced by a combination of the probability of an event and its negative consequences and results from the interaction of hazard, vulnerability and exposure.
- **Climate change** exacerbates existing inequalities, intensifying challenges for girls, women, and marginalized groups such as persons with disabilities and older adults.
- **Adaptation** techniques for resilient water services can be broadly classified into structural and non-structural approaches, each offering distinct advantages for enhancing water system resilience.
- **Both structural and non-structural approaches** are essential for building long-term resilience in water services, ensuring they can withstand and adapt to the challenges posed by climate change.

Extra resources Module 2

- This report by the Global Commission on the Economics of Water (GCEW) sets out the shifts required to drive radical changes in how water is valued, managed, and used The Economics of Water: Valuing the Hydrological Cycle as a Global Common Good.
- IPCC Sixth Assessment Report
  https://www.ipcc.ch/report/ar6/syr
- Guide to Climate-Smart Cities
  https://siwi.org/publications/guide-to-climate-smart-and-water-wise-cities
- Gender and WASH
  https://gca.org/wp-content/uploads/2022/07/02_WTW_14855_GCA_2021_Sect3_GENDER_v4.pdf
- Nature-Based Solutions
  https://www.c40knowledgehub.org/s/article/Urban-water-management-Creating-climate-resilient-cities?language=en_US
- Urban Water Resilience
  https://resilientcitiesnetwork.org/downloadable_resources/UR/Resilience-Point-of-View-Water.pdf