



# CLIMATE INFORMATION AND SERVICES

A fast track course on application of climate information and services in decision making



ECA

**WISER**

Weather and Climate Information Services for Africa



Supported by



UN CC:Learn  
The One UN Climate Change Learning Partnership

CLIMATE  
INFORMATION  
AND SERVICES

This tutorial has been developed under UNECA's African Climate Policy Center (ACPC) and the Pan-Africa Weather and Climate Information Services for Africa (WISER) programme, kindly supported by the UK's Department for International Development (DfID). The WISER programme's mission is to deliver transformational change in the quality, accessibility and use of weather and climate information services at all levels of decision making for sustainable development in Africa.

For further information, please visit  
<http://www.unece.org/acpc>


# Welcome!

This is the offline version of the tutorial **Climate Information and Services: A fast track course on application of climate information and services in decision making**. You can take the tutorial on your computer or paper.

## Good to know about this tutorial...

- ✓ It contains the **same information** provided in the online version
- ✓ It includes slide **visualizations**, detailed notes, write-in activities and reflection points
- ✓ Downloadable **Glossary**, **List of references** and **Feedback form** are available online
- ✓ Feel free to focus on the content that is **most interesting and relevant to you**
- ✓ It is designed to take about **30 minutes of learning time**

# Why learn about climate information and services?

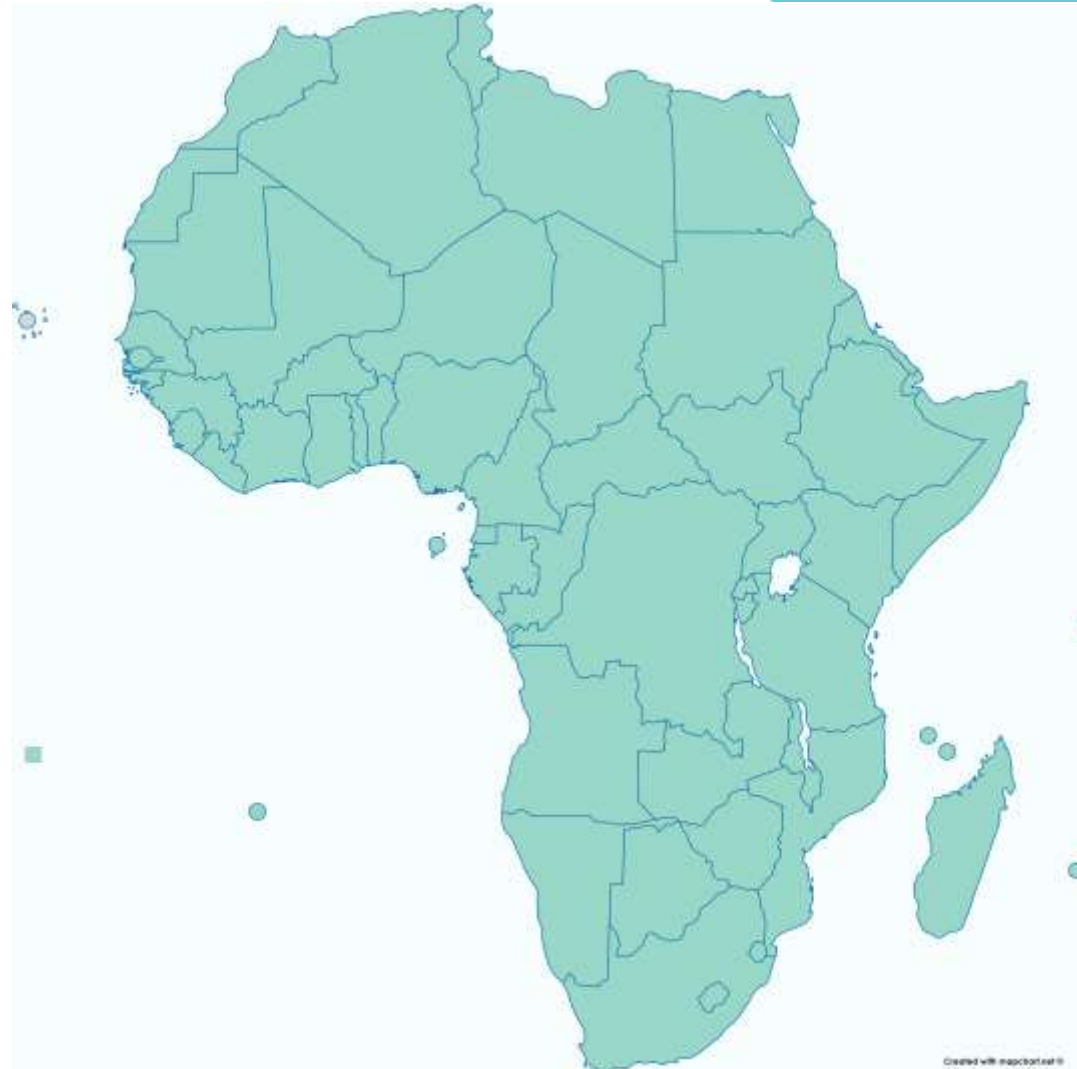


The African continent, especially Sub-Saharan Africa, is exposed to climate variability and extremes at frequencies which exceed normal thresholds. Such climate-related events could significantly erode gains in poverty reduction and set back economic development.

Climate information and services (CI/S) are key resources for governments and communities to prepare for these changes and when well integrated into policy and practice, they can help reverse this trend and enhance cross-sectoral climate resilient development.

This tutorial highlights key concepts and practical examples to increase decision-makers' awareness of climate information and services.

Extreme  
weather events  
pose the most  
significant  
climate risks in  
Africa.



# You can use climate information and services to:

- **Define** the nature and magnitude of climate risks and better evaluate adaptation options and long-term investments.
- **Design** climate-proof sector development plans and maximize opportunities from predicted climate variability for different sectors.
- **Make informed decisions** about ways to reduce vulnerabilities and impacts of climate-related disasters, such as floods or wildfires.
- **Analyze the implications** of climate risks for decisions on long-term projects such as infrastructure investments or insurance schemes.

Climate Information and Services are **crucial resources** for decision-makers at all levels working on **medium and long-term planning**.



**ADAPTATION  
PLANNING**



**SECTORAL  
DEVELOPMENT**



**MANAGE  
DISASTER RISK**



**PLAN FOR  
FUTURE RISK**

# Objectives of this tutorial


This fast-track tutorial will enable you to:

- ✓ Define **climate information and services**;
- ✓ Identify the **uses** of climate information and services in development planning and policy;
- ✓ Discuss the **role of legislation** in strengthening climate information and services;
- ✓ Provide examples of **instruments** available to governments **for mainstreaming** climate information and services.







# Tutorial overview



What are  
climate  
information  
and services  
(CI/S)?



What is the  
role of CI/S in  
development  
planning and  
policy?



How can  
decision-  
makers  
strengthen  
CI/S and their  
use?

# WHAT ARE CLIMATE INFORMATION AND SERVICES?



The tutorial starts by explaining what climate information and services are, who are their main providers and end-users.



# What is what? (1)

Climate

.....

.....

Weather

.....

Weather Data

.....

.....

Climate Information

.....

.....

Climate Services

.....



# What is what? (2)

*Example: 24 km/h - wind speed in Saint Louis, Senegal at 13h00, Feb.24.2017*

**Climate**

*Example: Weather forecasts fishermen use to decide if it is safe to fish on a given day.*

**Weather**

*..What you expect the weather to be tomorrow, next week, this season, etc...*

**Weather Data**

*..What the weather is at a given time and place...*

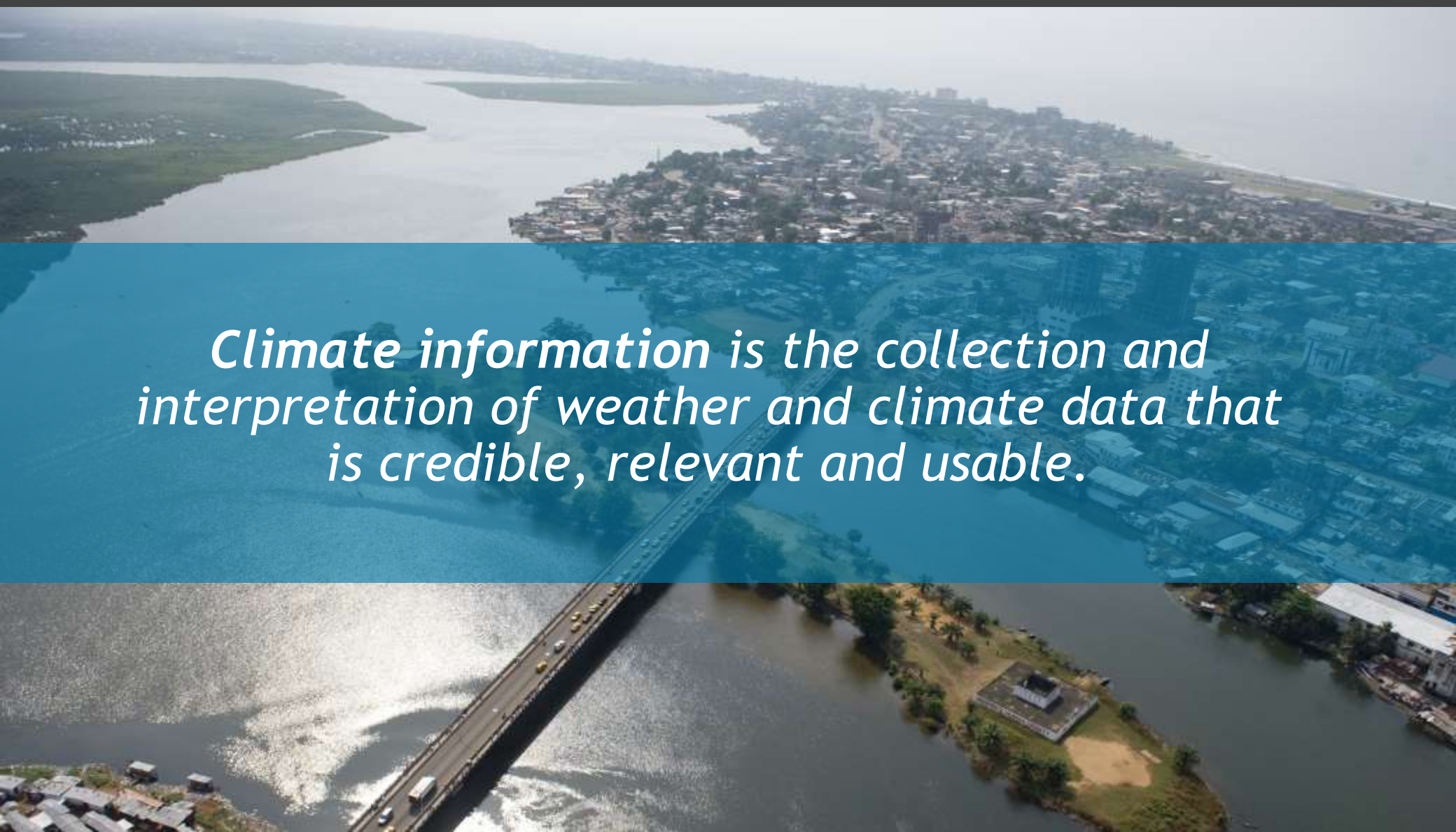
**Climate Information**

*Example: SMS weather alert system to fishermen in Saint Louis, Senegal.*

**Climate Services**

# Climate information

CLIMATE  
INFORMATION  
AND SERVICES

An aerial photograph of a coastal city, likely in the Philippines, showing a large river or bay flowing through the urban area. A prominent bridge spans across the water. The city is densely packed with buildings, and the coastline is visible in the distance. The image is overlaid with a semi-transparent blue band containing text.

*Climate information is the collection and interpretation of weather and climate data that is credible, relevant and usable.*

# Types of climate information

Depending on the level of **complexity**, climate information can be characterized as:

BASIC

INTERMEDIATE

ADVANCED

**NB!** This classification is based on the complexity of the information, *not* the level of complexity of the decision it could inform.

- Basic
- Basic climate information is typically derived from historical observed climate data as well as projected mean future changes derived from climate models over **large spatial and temporal scales** and for **simple climate variables**, such as temperature and precipitation.  
Type (e.g.) Historical trends, future mean changes over large scales  
Purpose (e.g.) Raising awareness and risk scanning
- Intermediate
- Intermediate climate information is also about **projected future climate changes**. In addition to projected mean changes, it includes more complex formats that may require a more **in-depth analysis**.
- Type (e.g.) Future changes or absolute values of more complex climate variables over finer spatial scales
- Purpose (e.g.) Vulnerability assessment, early development of adaptation plan

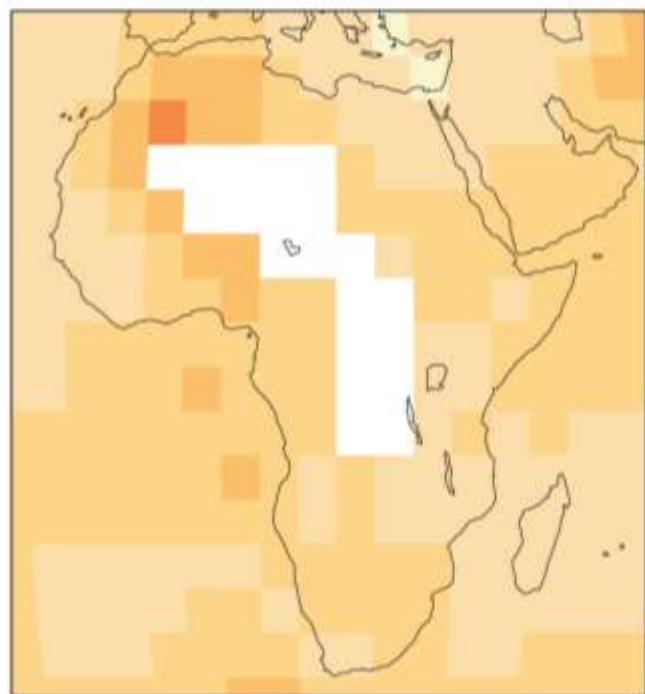
- **Advanced**
- Advanced climate information is also focused on **projected future climate changes**. It also indicates **changes in extreme events** and for **climate indices** for which there is **less confidence in model projections** at this time. Advanced climate information is often tailored to **specific temporal and spatial scales**.
- Type (e.g.) Future changes in means, absolute values and extremes over fine scales
- Purpose (e.g.) Evaluation of adaptation options



## BASIC CLIMATE INFORMATION

Trend over 1901–2012  
(°C over period)

Annual Temperature Change



*Reflection*

Can you identify an  
area at risk?

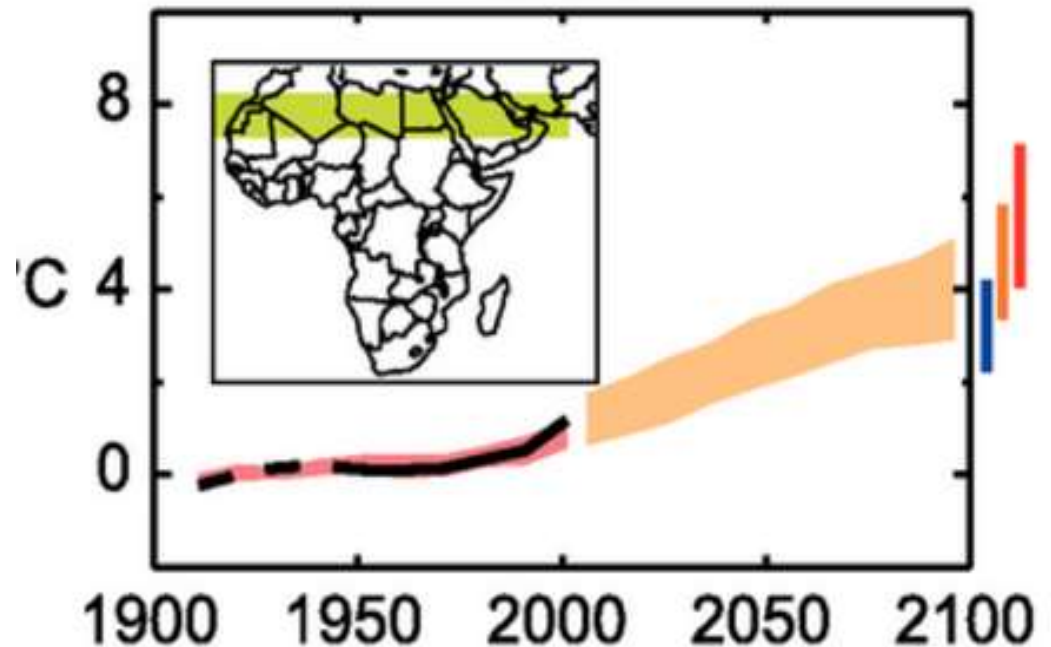
## INTERMEDIATE CLIMATE INFORMATION

Differences in near-surface temperature averaged over the Saharan sub-region



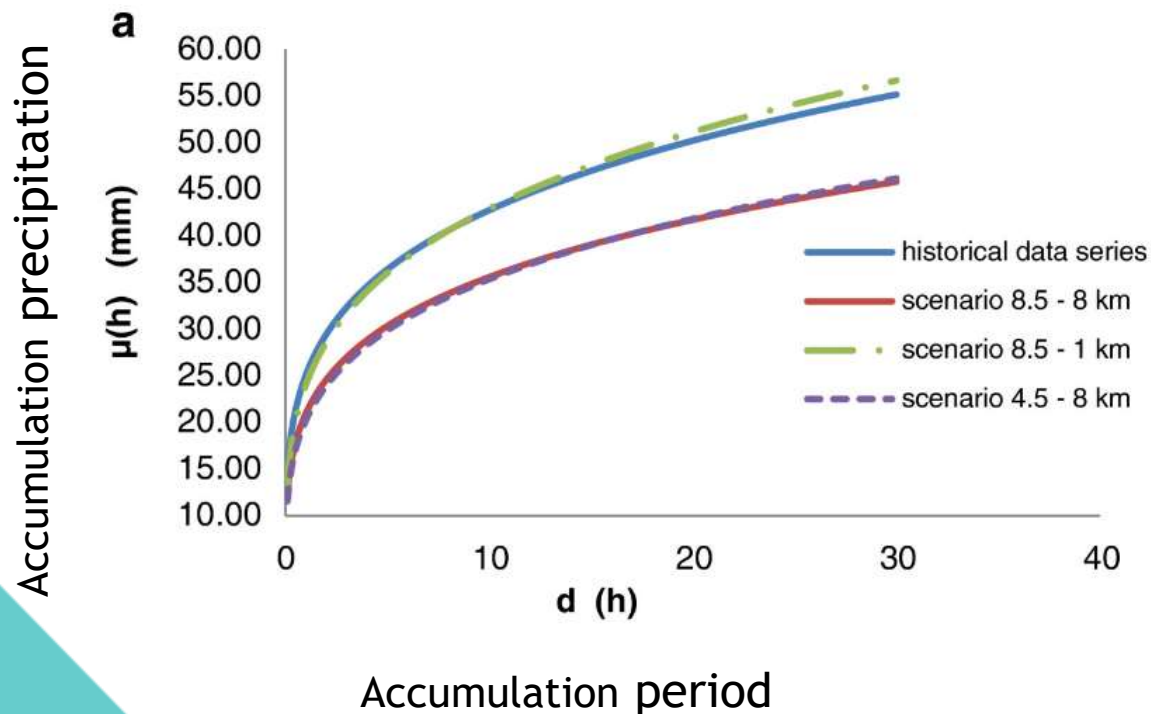
*Reflection*

What is the likely impact for the region in the future?



## ADVANCED CLIMATE INFORMATION

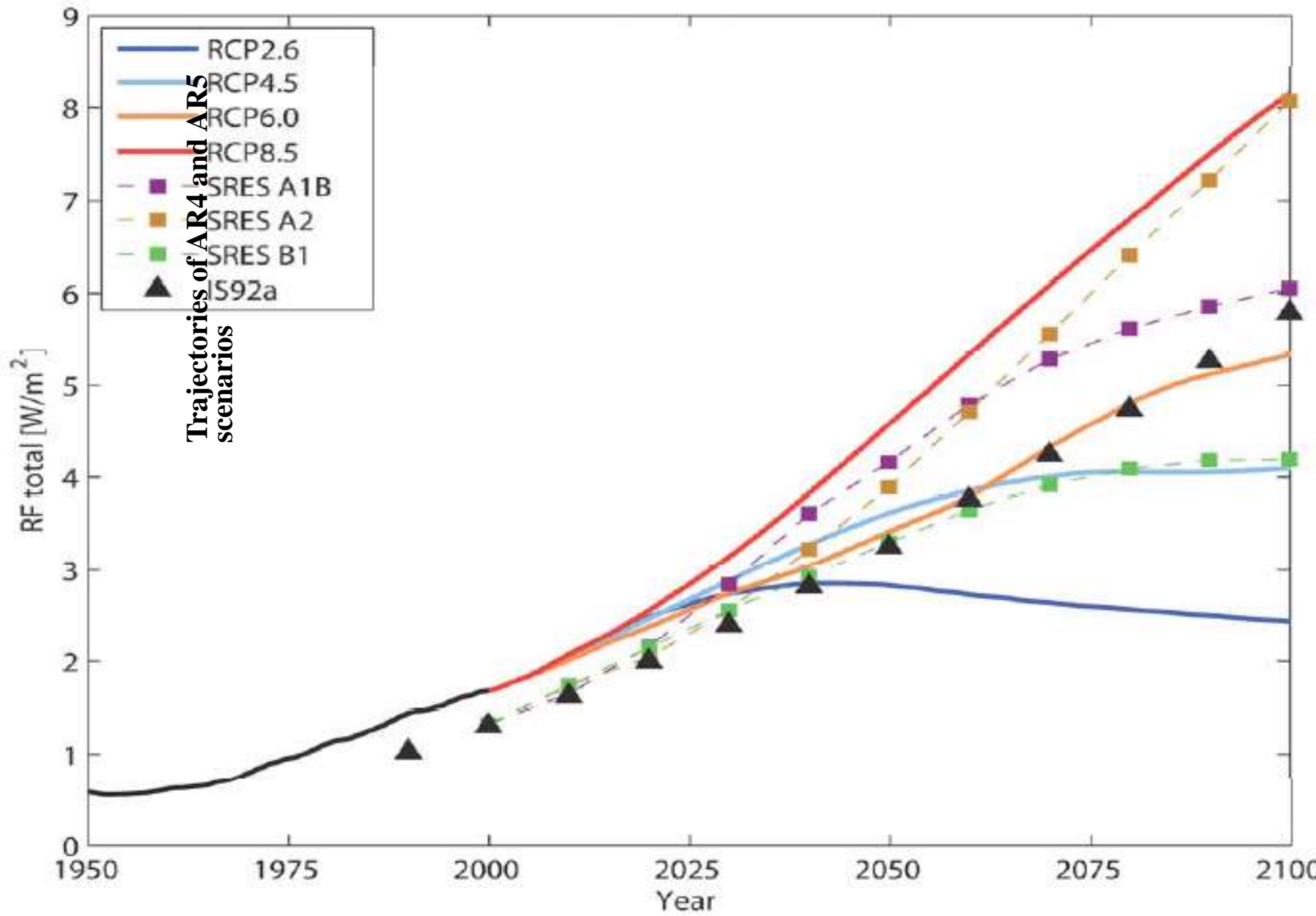
Intensity-Duration-Frequency **rainfall** curves for the city of Addis Ababa

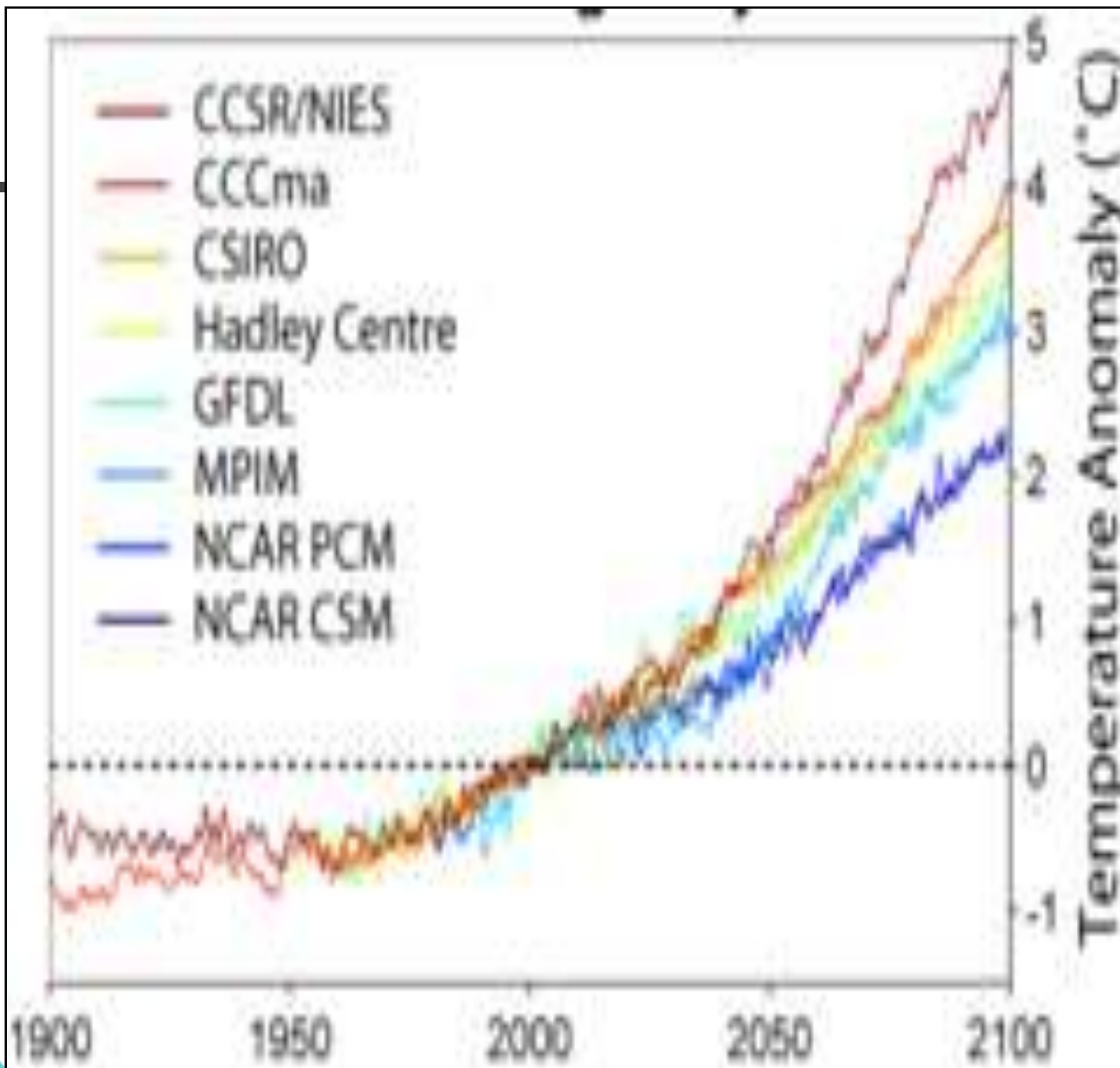


*Reflection*

How could municipal infrastructure adapt to changing rainfall intensity under RCP 8.5?

- RCPs are 4 GHG concentration trajectories adopted by the IPCC for its fifth Assessment Report (AR5) in 2014. It supersedes Special Report on Emission Scenarios (SRES) projections published in 2000.
- The pathways are used for climate modeling and research. They describe four possible climate futures, all of which are considered possible depending on how much greenhouse gases are emitted in the years to come.
- The 4 -- RCP2.6, RCP4.5, RCP6, and RCP8.5, are named after a possible range of radiative forcing values in the year 2100 relative to pre-industrial values





5)

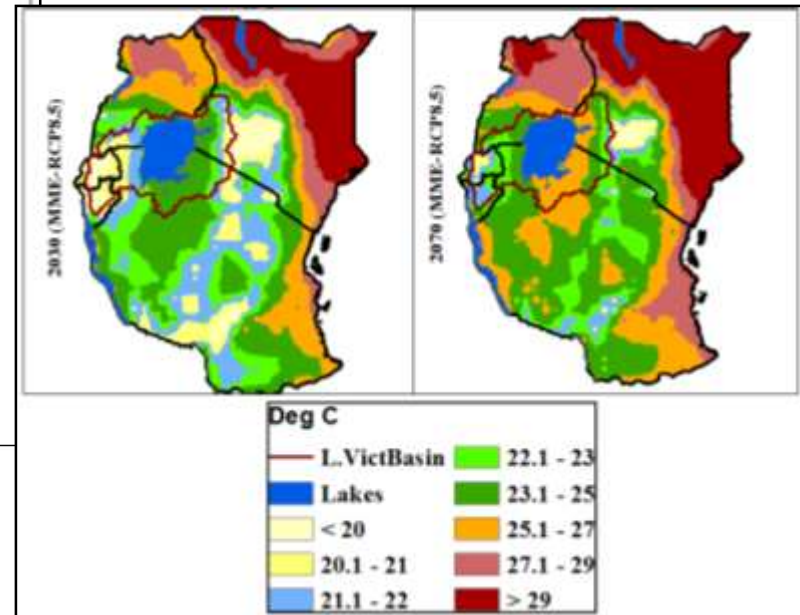
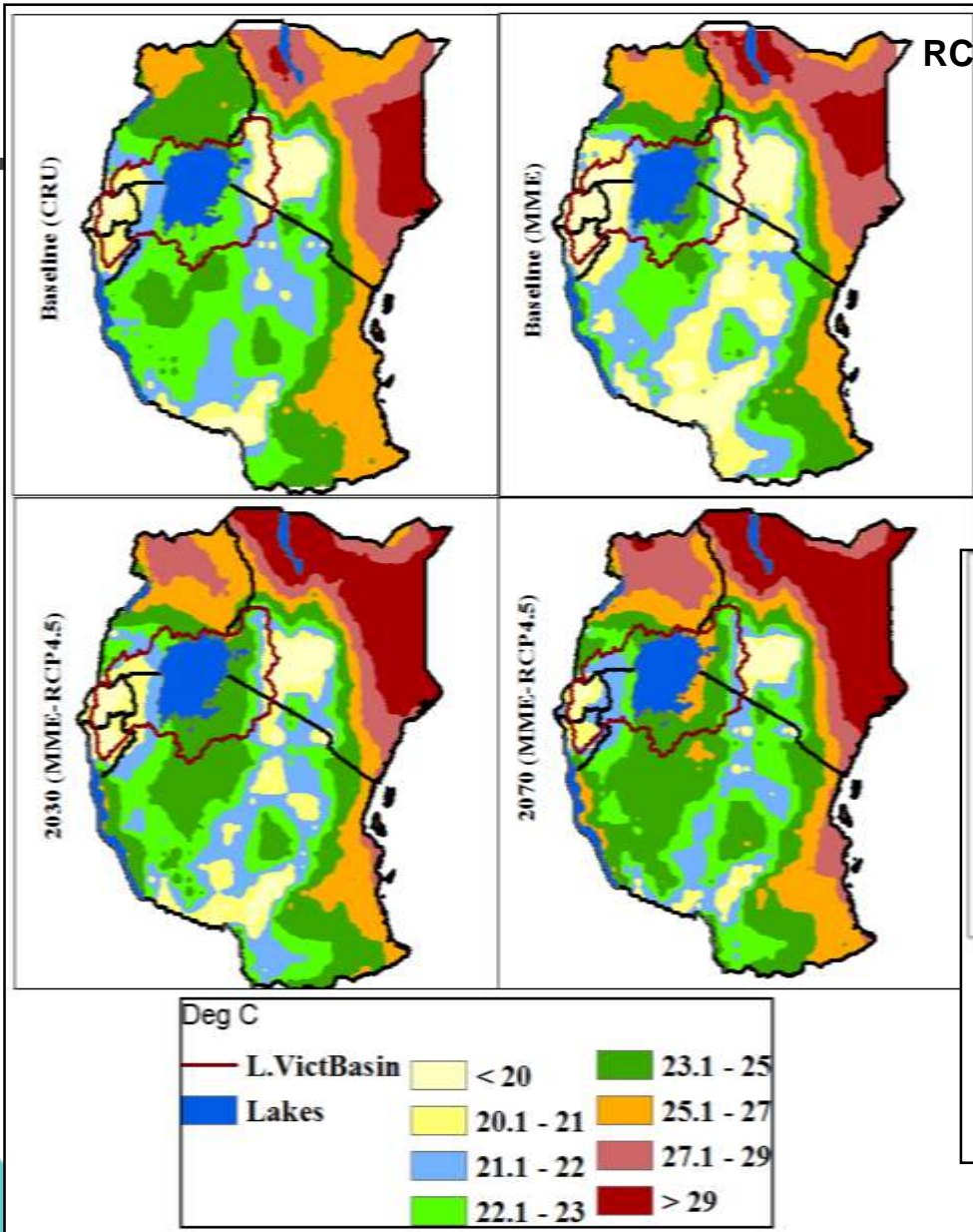
for the "best estimate" value of climate sensitivity and including the effects of future increases in aerosol, models project an increase in global mean surface air temperature relative to 1990 of about  $2.8^{\circ}\text{C}$  by 2100, with a likely range of  $1.7 - 4.4^{\circ}\text{C}$ .

# Projected Temperature Patterns over the EAC

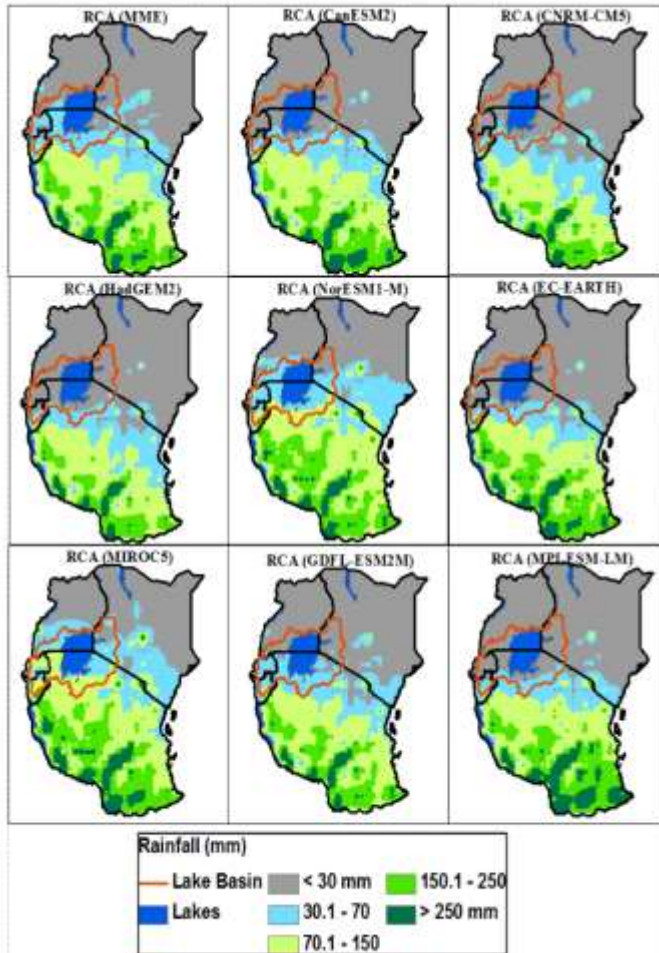
## RCP4.5 April Temperature Patterns

- Increasing air temperature are projected under both climate change scenarios. RCP8.5 is slightly warmer than RCP4.5.
- The northern and Eastern parts of the region experience warmer temperatures than central, western and southern parts

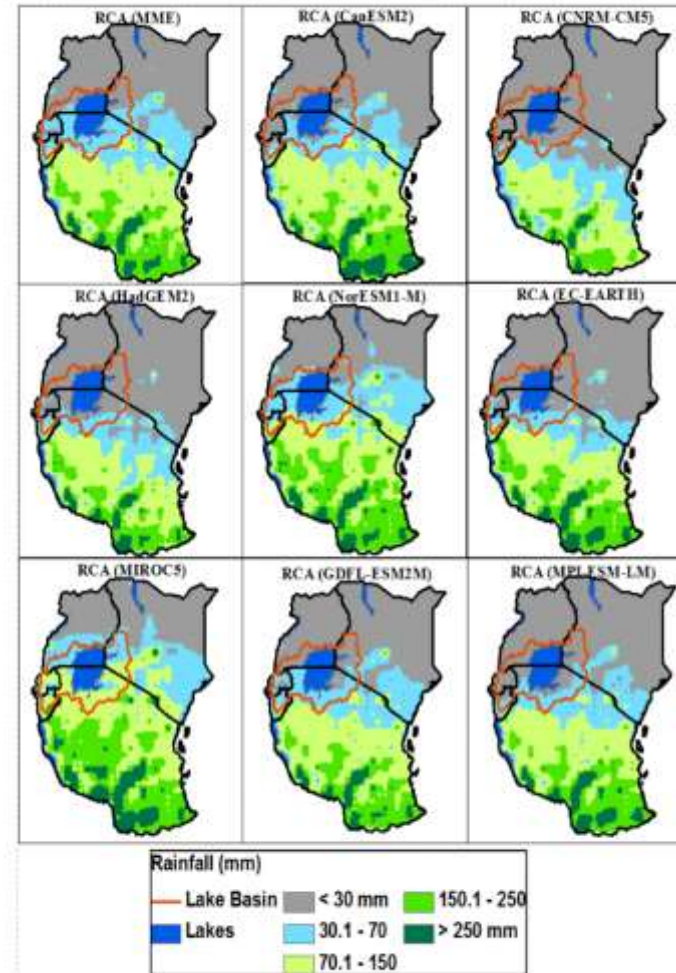
## RCP8.5 April Temperature Patterns



RCP8.5 (2030) Monthly Rainfall Variations



RCP8.5 (2070) Monthly Rainfall Variations





# Climate information products

CLIMATE  
INFORMATION  
AND SERVICES

Climate information is collected, assessed and assembled into products that are disseminated to users and services. Some of the more common representations of climate information are forecasts, climate models and climate scenarios.



Forecasts

Climate Models

Climate Scenarios

# Important characteristics (1)

In this tutorial, we will explore 5 characteristics of climate information to consider when making decisions. We start by focusing on:

1. Resolution
2. Accuracy





# Provision

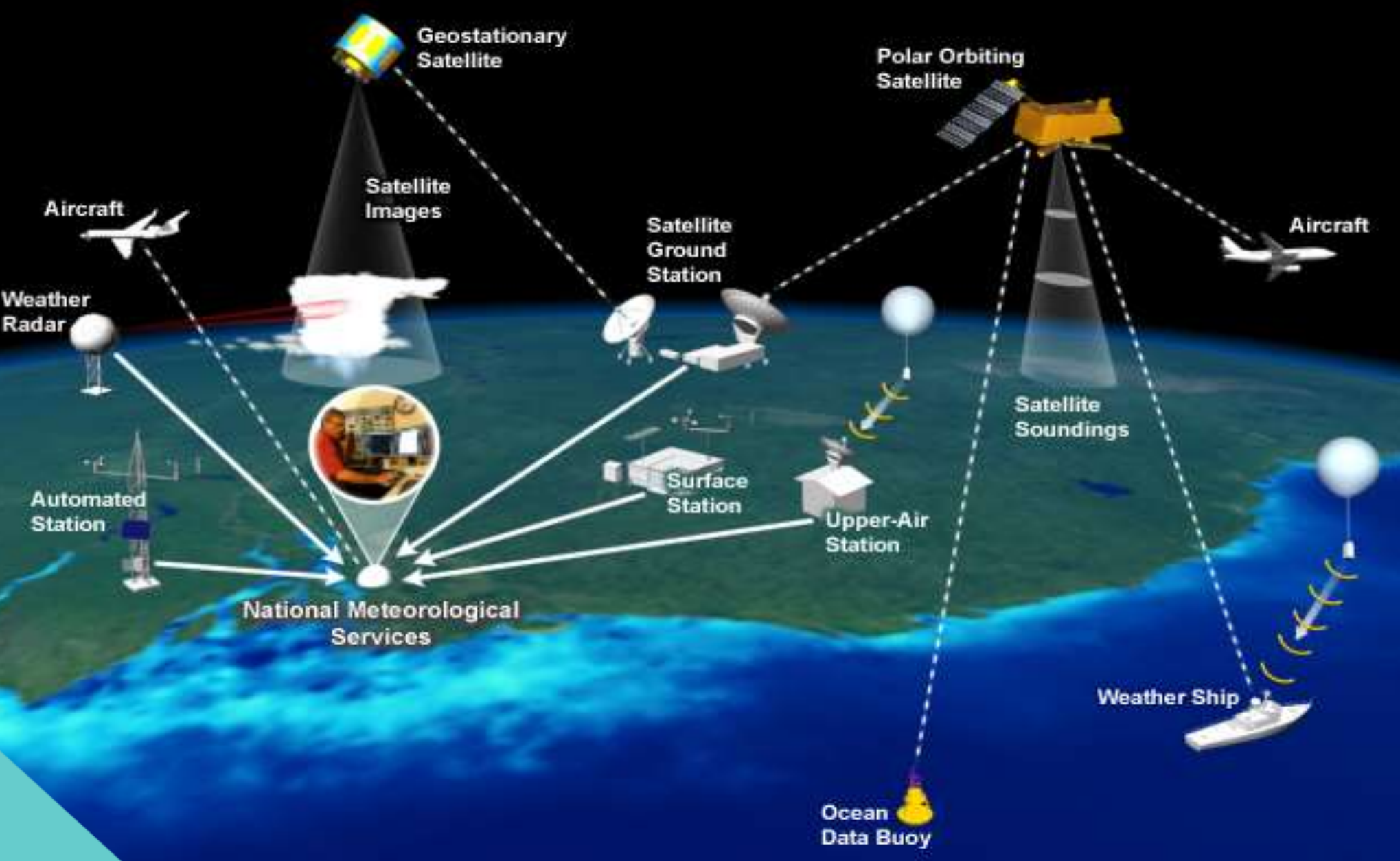
CLIMATE  
INFORMATION  
AND SERVICES

The production and distribution of climate information is complex. They require **physical infrastructure, technical, analytical and communication skills and capacities**, well-integrated public communication systems to effectively **1) Collect 2) Analyze 3) Package and 4) Disseminate** weather data and climate information.

# Collecting data

Collecting weather and climate data requires a functioning network of international, national and local weather information infrastructure.

# WMO Global Observing System



# Climate services

*Climate information services are tools and processes that enable decision-makers and user communities to assess, and prevent or prepare for, potential impactful weather or climate events.*

Providers of climate information and services collect, analyze and package climate and weather data.

*Climate information is produced at national, regional and international levels.*

# Key providers

## *International*



## *Regional*



## *National*

National Hydro-Meteorological Services (NHMS)

## *Global and Regional Support*

**AMCOMET**

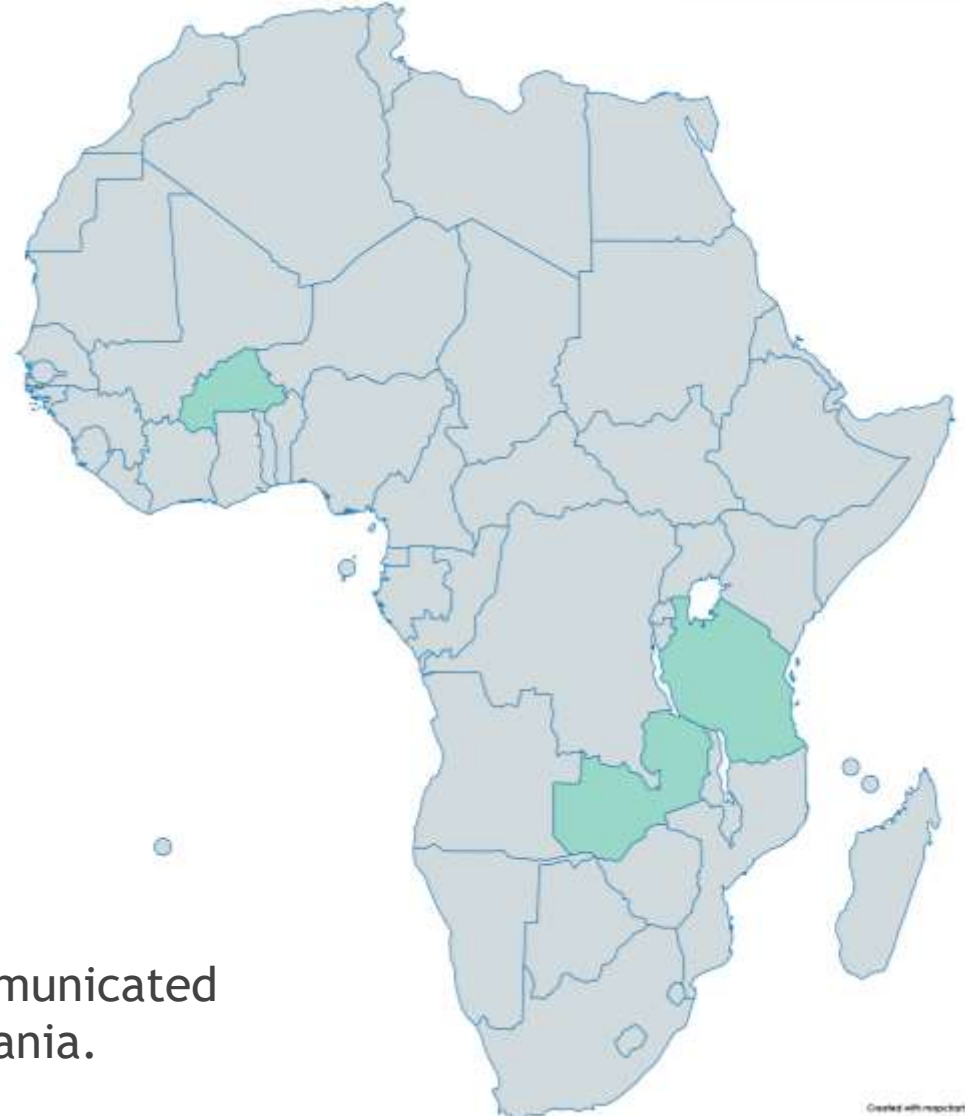
African Ministerial Conference on Meteorology





# Communication of climate information

The climate service is a “process of two-way communication” and “involves providing context that turns data into information”.  
(Shafer, 2004)



Find out how climate data is communicated in Zambia, Burkina Faso and Tanzania.



# Where do you access climate information?

- ✓ What's the weather tomorrow?
- ✓ Temperature trends
- ✓ Seasonal precipitation forecasts
- ✓ Future climate projections for African countries



# Communicating Climate Information

- Common methods of communication include:
  - **Traditional media channels:** television, radio and newspaper broadcasts
  - **Information bulletins:** Contain more detailed information and analysis of weather forecasts
  - **Internet:** emails, National Meteorological Service website, social media
  - **Public displays and social forums:** billboards, community organizations and barazas
  - **Text Message services:** paid services such as SMSs, free messaging services such as WhatsApp e.tc.
  - **On demand:** Provision of information upon request


# End-users

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AND SERVICES

Communities

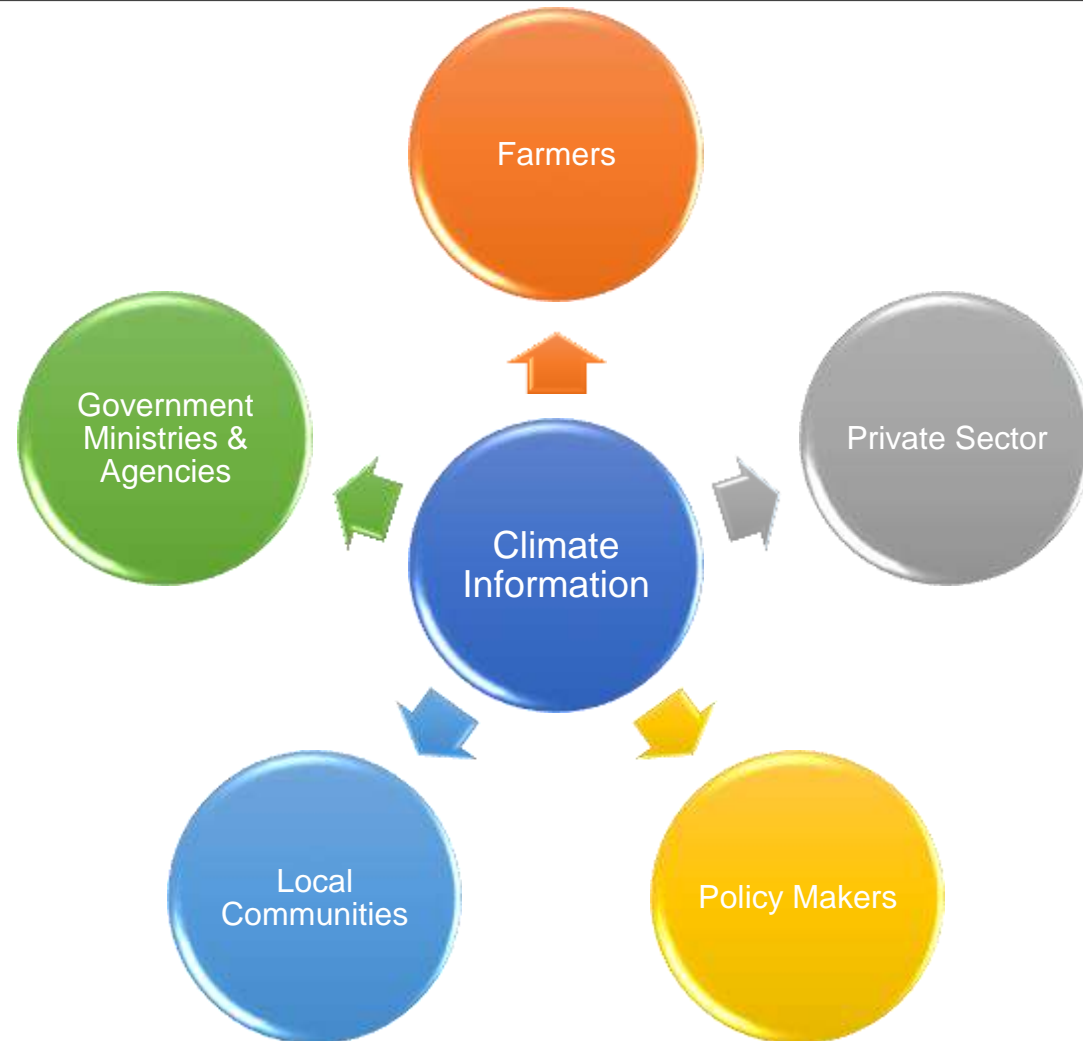
Private sector

Policy-makers



Anybody who needs to make a decision on a matter that is affected by the weather and climate can benefit from climate information and services

# End -Users of Climate Information





# WHAT IS THE ROLE OF CI/S FOR EFFECTIVE DEVELOPMENT PLANNING AND POLICY?

This section focuses on practical application of climate information and services in development planning and policy including sectoral policy and domestication of international agreements.

Climate is typically one of many factors one must consider in development planning. Climate information and services can provide valuable insight along the decision-making process.

Climate variation and climate impacts vary from country to country and sector to sector.



**DEVELOPMENT  
PLANNING**



**AGRICULTURE  
DEVELOPMENT**



**DISASTER RISK  
REDUCTION**



**INFRASTRUCTURE  
AND CONSTRUCTION**



## Development Planning

In the face of **increasingly uncertain climate**, achieving medium and long-term development objectives will increasingly depend on climate predictions and the use of climate information.

### *Role for Climate Information and Services*

Climate information can build resilience through informed decision-making across social, economic, political and ecological dimensions. It can guide adaptation planning and investments at various levels, and sectoral planning for key climate-sensitive sectors. Climate-smart development planning can **reduce the impacts of climate-related disasters, improve food security, enhance water resource management and build resilience.**



**DEVELOPMENT  
PLANNING**

Agriculture is one of the most climate-sensitive sectors in economies around the world. As a rain-fed sector, the quantity of precipitation and climate extremes, such as droughts and floods, affect **sector productivity, food security and economic development**.

### *Role for Climate Information and Services*

Predicting seasonal climate behavior can help stakeholders to **minimize impacts of hazards** through planning how to avoid the risk or taking precautionary measures as well as to **maximize on the predicted variability** such as building water storage tanks to store water for irrigation.



**AGRICULTURE  
DEVELOPMENT**

Majority of **disasters experienced in Africa are weather or climate driven**. For instance, weather parameters such as rainfall and temperature directly correlate with natural disasters such as floods, storms, heat waves leading to vector and waterborne diseases, pest outbreaks, famine, wild fires and land-slides.

### *Role for Climate Information and Services*

Short-term weather forecasts, seasonal forecasts, early warning systems can be used to build reliable risk scenarios and, in turn, to **strengthen disaster preparedness**.



**DISASTER RISK  
REDUCTION**

Infrastructure and construction are also vulnerable to weather and climate variability. Strong precipitation, wind and temperature extremes can physically damage buildings, bridges, railways and other forms of infrastructure.

### *Role for Climate Information and Services*

Since infrastructure facilities typically have long lifetimes, scenario building is a key way of using climate information to climate-proof infrastructure. For instance, combining a range of scenarios and historic trend analyses can inform long-term infrastructure planning and many policy and investment choices.



**INFRASTRUCTURE  
AND CONSTRUCTION**



# Match the climate information product with a corresponding sector

Extreme weather  
events analysis

Early warning  
system

Seasonal climate  
projections

Disaster Risk  
Reduction

Agriculture

Infrastructure and  
construction

# Domesticating international climate agreements

Designing national contributions to international agreements, as well as their implementation, also requires the application of climate information. Climate services will have to **monitor the efficacy and relevance** of these contributions.

Climate information provides **a scientific basis** for international climate agreements and **determining global goals** for climate change mitigation and adaptation, as well as support for countries.

# NDCs and climate information

## BURKINA FASO 1<sup>st</sup> NDC

### Mitigation Contribution

- Construction of GHG **emission scenarios** by key sectors
- Identification of **mitigation actions**



## UGANDA 1<sup>st</sup> NDC

### Priority Adaptation Action

- Expand **climate information** and early warning systems

## ZAMBIA 1<sup>st</sup> NDC

### National Circumstances

- 1.3 C **mean annual temperature** increase
- Decrease of average rainfall by a 1.9 mm/month/decade



# HOW CAN DECISION- MAKERS STRENGTHEN CI/S AND THEIR USE?

This section introduces how climate information and services can fulfil their potential toward the achievement of development objectives. What can policy-makers do?





# What are the important features of climate information?

Can you recall the first two climate information characteristics:

1. R.....
2. A.....
3. Relevance
4. Accessibility
5. Cost-effectiveness



## GROUP/INDIVIDUAL ASSIGNMENT

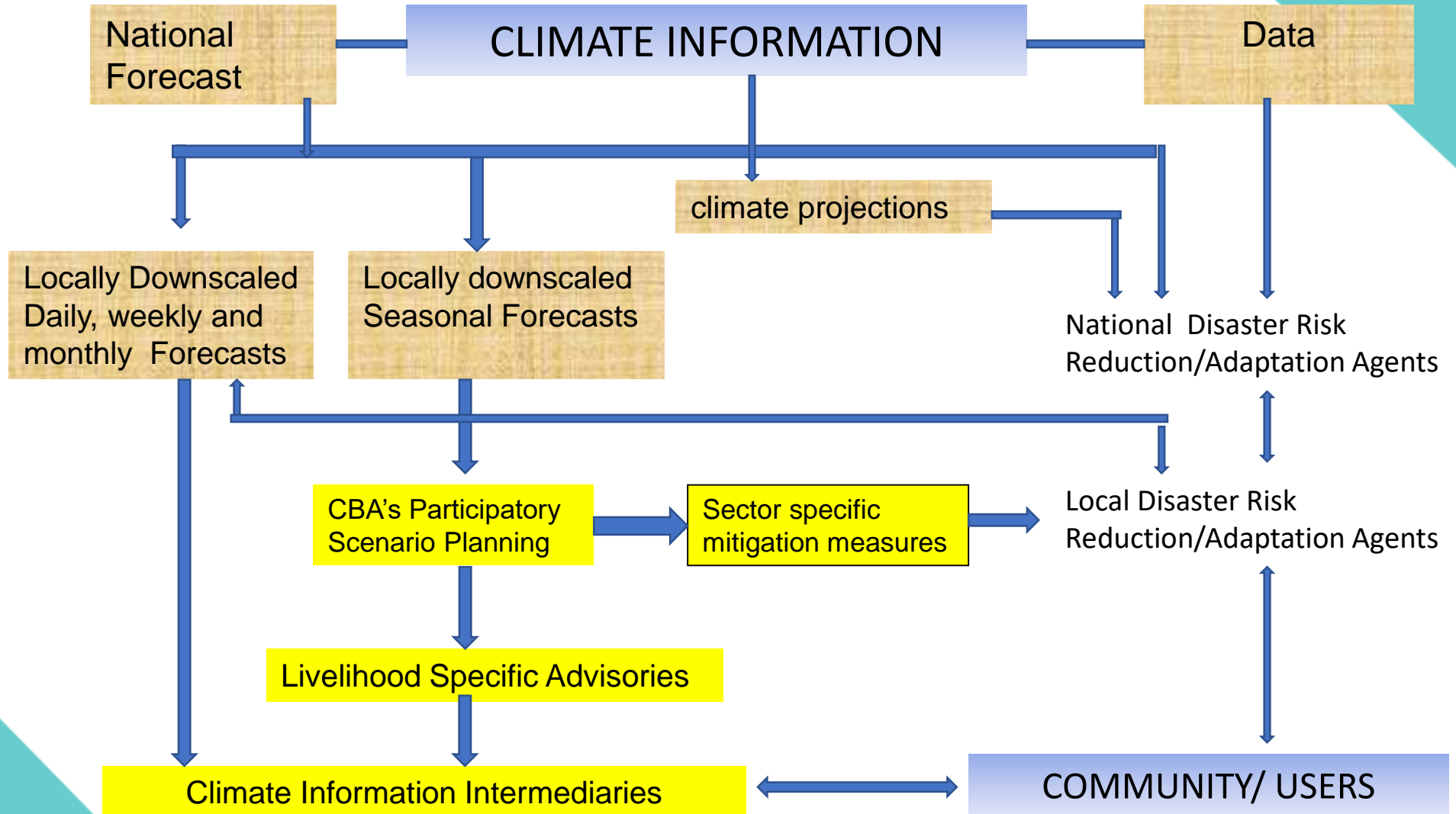
- Your National Meteorology and Hydrological Station (NMHS) is not performing very well in disseminating and communicating CI/S
- As CI/S trainer, how can you assist the NMHS to ensure that it is working effectively with other CI providers to disseminate CI/S to communities and other end-users
  - a) Name the agency
  - b) state how the agency is performing?
  - C) what are some of the challenges it is facing
  - d) how can you assist the agency to be effective in working with other providers to disseminate CI/S
  - e) How will you recommend it communicate CI/S to end-users/i

## Effective Climate information for decision making must

1. **Responsive to user needs and priorities: practical application to decision makers, communities and other stakeholders.**
2. **Downscaled:** to draw effective localised conclusions for plans and policies and to identify uncertainties, opportunities and barriers.
3. **Accurate:** so as to clearly define risks to be accommodated
4. **Accessible:** easy to find and interpret by users
5. Have been collected over a long period of time (historic trends) and frequently updated
6. **Cost effective:** since there are limited resources to manage information systems
7. **Tailored:** to respond to specific needs of users, risks, vulnerable populations and ecosystems, in order to avoid information overload.

# CLIMATE INFORMATION SERVICE MODEL

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AND SERVICES



# Challenges

Currently, climate information and services are not utilized to their full potential in decision-making in Africa.

Various factors affect this outcome:

1. Lack of climate information infrastructure
2. Limited technical capacity to manage weather information systems
3. Lack of capacity to disseminate climate information systematically
4. Lack of enabling policies and practices for climate services



1. Underinvestment in national and local weather stations results in poor and often obsolete physical infrastructure.
2. Climate data and models require highly skilled technical personnel. Many countries find it difficult to attract and retain such human resource due to limited resources.
3. Many countries lack capacity to follow systematic processes for climate information packaging, translating and disseminating. For this reason, users of the information don't receive it in time to utilize it effectively for early warning or proactive planning.
4. Climate data and information can have positive impacts on the ground only when integrated with policy and practice.

## Other Challenges include:

- **Pressing short-term development challenges:** ‘forces’ decision makers to focus on shorter time scales
- **Lack of clear communication between producers and users of Climate Information:** Climate Information shared with decision makers is highly technical and could easily lead to misunderstanding of the uncertainties.
- **Needs of decision makers are rarely communicated to climate scientists** – information should be aligned with needs of decision makers

Addressing these challenges requires the design of a framework for climate services at national level that would lay the foundation for effective climate information and services.





- Assist decision-makers to make informed decisions despite uncertainty about the future climate: Can be done by
- creating awareness about CI,
- consulting decision makers to determine their needs and priorities hence align CI in their context,
- simplify CI so that it is easy to interpret etc

# Opportunities for decision-makers

CLIMATE  
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AND SERVICES

Investment  
&  
Budgeting

Private sector  
Incentives

Capacity  
Development

Standards  
&  
Regulations

Mainstreaming

# Investment and Budgeting

There is very serious need to invest in Climate Information in Africa:

- Africa covers a fifth of the world's total land area, but has the least developed land-based observation network of all continents, and one that is in a deteriorating state,
- This amounts to only 1/8 of the minimum density required by the World Meteorological Organization.
- Exacerbated by a stagnant pool of human and financial resources and obsolete technologies that limit capacity to produce the best services needed by decision-makers

- Underinvestment in Climate Infrastructure:
  - Results in low quality and unreliable data for making management decisions related to climate change induced disaster risks
  - Limits a country's ability to plan for slow-onset climate hazards that will require a transformational shift in economic development and risk reduction efforts.
  - A Climate Information and Early Warning Systems is an important part of adapting to Climate Change related impacts, as it increases resilience to future changes in climate/weather-related hazards.

- CI/S are considered a public good as they are expensive to produce but relatively cheap to reproduce
- Increasing budget for Climate Information can be justified by linking Climate Information/Climate Information Services directly to national development goals, such as:
  - the linkage between Climate Information/Climate Information Service & Early Warning Systems
  - food security
  - water resources management
  - health risk management
  - terrestrial and coastal ecosystem resilience

- It is vital for Africa's governments and policy makers to:
  - Increase budgetary allocation to National Meteorological & Hydrological Services to socio-economic planning and development,
  - integrate CI in national development programmes
  - Public Private Partnerships can be used to boost investments and increase funding for National Meteorological & Hydrological services.



# Approaches to Mainstreaming

The following general approaches can be adopted when mainstreaming climate change into developmental policies



Climate Proofing  
Approach

Climate First  
Approach

Development  
First Approach

# The Climate Proofing Approach

- Targets climate-proofing development initiatives that have been planned without considering Climate Change and variability.
  - Done by increasing capacity to cope and recover from effects of climate change and variability.
  - Suitable for nations that use project-based approaches to development planning: entry point is project based intervention
  - An example is the USAID which aims to integrate climate resilience into the design of its country assistance development portfolio.



# The Climate First Approach

Seeks to increase a society's ability to cope with effects of Climate Change and variability.

Entry point is stand-alone Climate Change policies/strategies.

- Examples are provided in:
  - Initial National Adaptation Programmes of Action (NAPA)
  - Pilot Program for Climate Resilience (PPCR) guidance documents, which allow Least Developed Countries (LDCs) to identify priority activities and projects that responded to their urgent and immediate climate adaptation needs.

# Development First Approach

- Ensures climate resilience is incorporated in all development initiatives – from decision making to implementation to the outcome of the development initiative.
- Entry point for integration is often a national, local or sectoral development planning framework.

# Mainstreaming Guidelines

1. Advocacy and awareness raising
2. Enabling policy environment
3. Development of tools
4. Training and technical support
5. Change in operational practice
6. Learning, experience sharing and networking





# Scoping for climate information needs

**Step 1 - Pick a decision from below**

- ✓ Build a dam
- ✓ Draft a national development plan
- ✓ Design a social protection scheme

**Step 2 - Answer the questions below**

What is the objective of the decision?

What is the role of CI/I in the decision-making process?

Are CI/S mainstreamed in this decision-making process?

How much CI/S is needed? What type?

Are relevant CI/S available? If so, where can one access them?



Climate information and services have the potential to build Africa's resilience to climate change impacts. The quality, accessibility and scale of climate information has significantly improved over the years. Yet, gaps in terms of quality, coordination and analysis of the information and in its dissemination and communication still exist.

The climate mainstreaming efforts by governments across Africa have also increased. However, decision-makers and political leaders have not yet utilized them to their full potential in development planning. Concrete actions to addressing challenges are available for decision-makers and can boost the reliability and usability of climate information and services and ultimately lead to climate-smart decisions among all user groups.

# Main References

- ✓ [IPCC Website](#)
- ✓ [WMO Website](#)
- ✓ [Global Framework for Climate Services](#)
- ✓ [AMCOMET](#)
- ✓ [UNECA Website](#)
- ✓ [UNFCCC Website](#)
- ✓ [UN CC:Learn Website](#)
- ✓ [UN CC:E-LEARN Platform](#)



**Mainstreaming/Integrating Climate Information and Services into Legislation, Development Policies, Plans and Practices:**

**Training Resources for Capacity Building for Legislators, Policy Makers and Civil society**



climate**changesolutions**

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**THANK YOU**