



# AFRICAN CENTRE OF METEOROLOGICAL APPLICATIONS FOR DEVELOPMENT (ACMAD)

<https://acmad.org/>

IMPROVING WARNING SYSTEMS AND ADAPTATION  
MEASURES IN WEST AFRICA

SEPTEMBER 28, 2023

HYBRID EVENT HOSTED BY WASCAL PROGRAMME  
IN THE UNIVERSITY OF LOME TOGO



**IMPLEMENTATION OF THE CONTINENTAL  
MULTIHAZARD ADVISORY CENTRE / AT ACMAD :  
ACHIEVEMENTS, CHALLENGES AND LESSONS  
LEARNT**

Prepared by: ACMAD Team

Presented by : Andre KAMGA FOAMOUHOU /



An initiative of the Organisation of African, Caribbean and Pacific States funded by the European Union



## BRIEF ON ACMAD MISSION AND VISION

- **Created through** resolution 540 of the UNECA Conference of Ministers in April 1985 **following the droughts of the 70s and 80s , ACMAD is established in Niamey-Niger since October 1992 to act as:**

- Continental Weather and Climate Watch Centre for Africa **with Monitoring, forecasting and early warning for droughts, floods, tropical cyclones and other extreme events as functions .**

ACMAD is a WMO designated RCC since Congress in May 2015 and a Continental MultiHazards Advisory Centre since October 2022

- Institution of excellence for the Applications of meteorology for sustainable development **with capacity building, methods, tools and products development, contribution to global weather and climate programs, promotion of database , research and innovation as functions**

**VISION:** an Africa where all people benefit from world class operational continental meteorological Centre to become more resilient to extremes and able to reduced CC impacts

# OUTLINE



**I**

**CONTEXT AND PROGRESS**

**II**

***CHALLENGES AND OPPORTUNITIES***

**III**

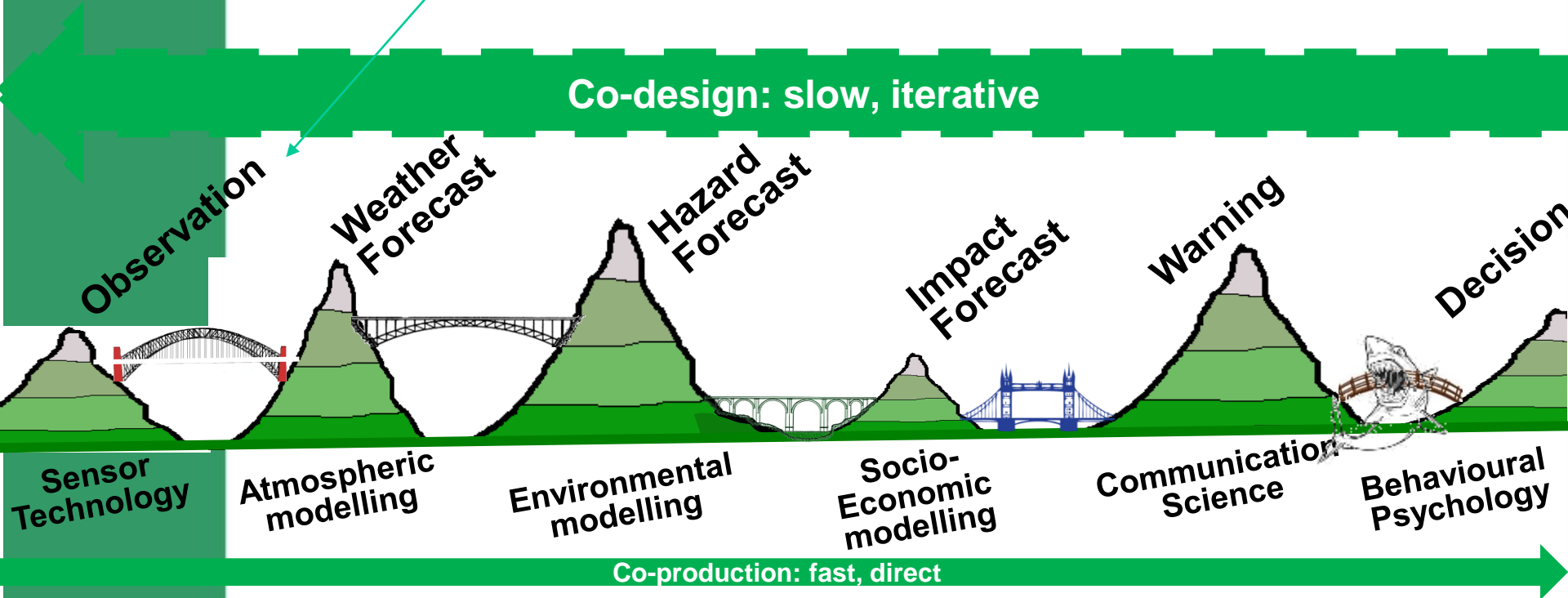
***LESSONS LEARNT and WAY FORWARD***

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# Along the warning value chain

Synoptic Network to rehabilitate- Urgent for local thresholding



**Bridges represent necessary Partnership**  
**Mountains are needed expertise to operate warnings**



# Climate Services: The Value Chain

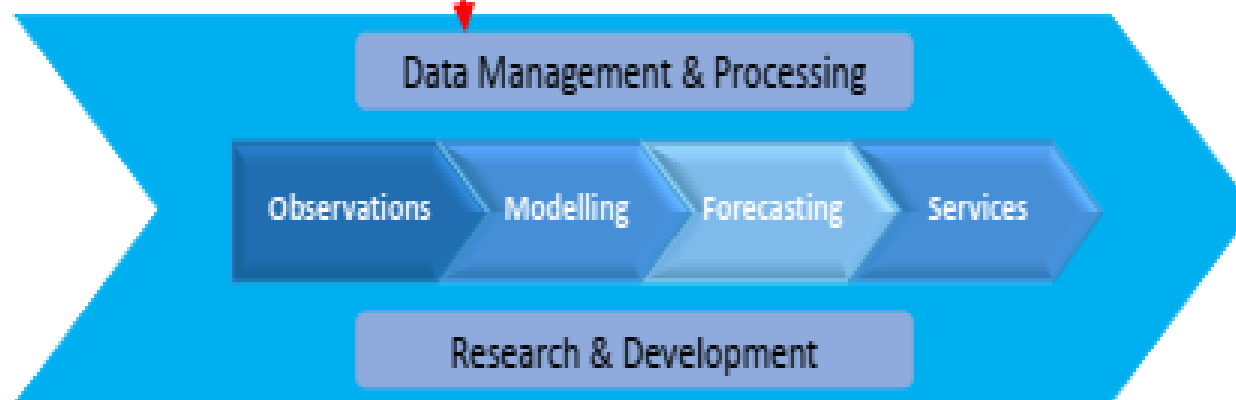
## Value-adding Processes (Tailoring)



## Communication Process (2-way dialog, co-design)



## Climate Services Information System

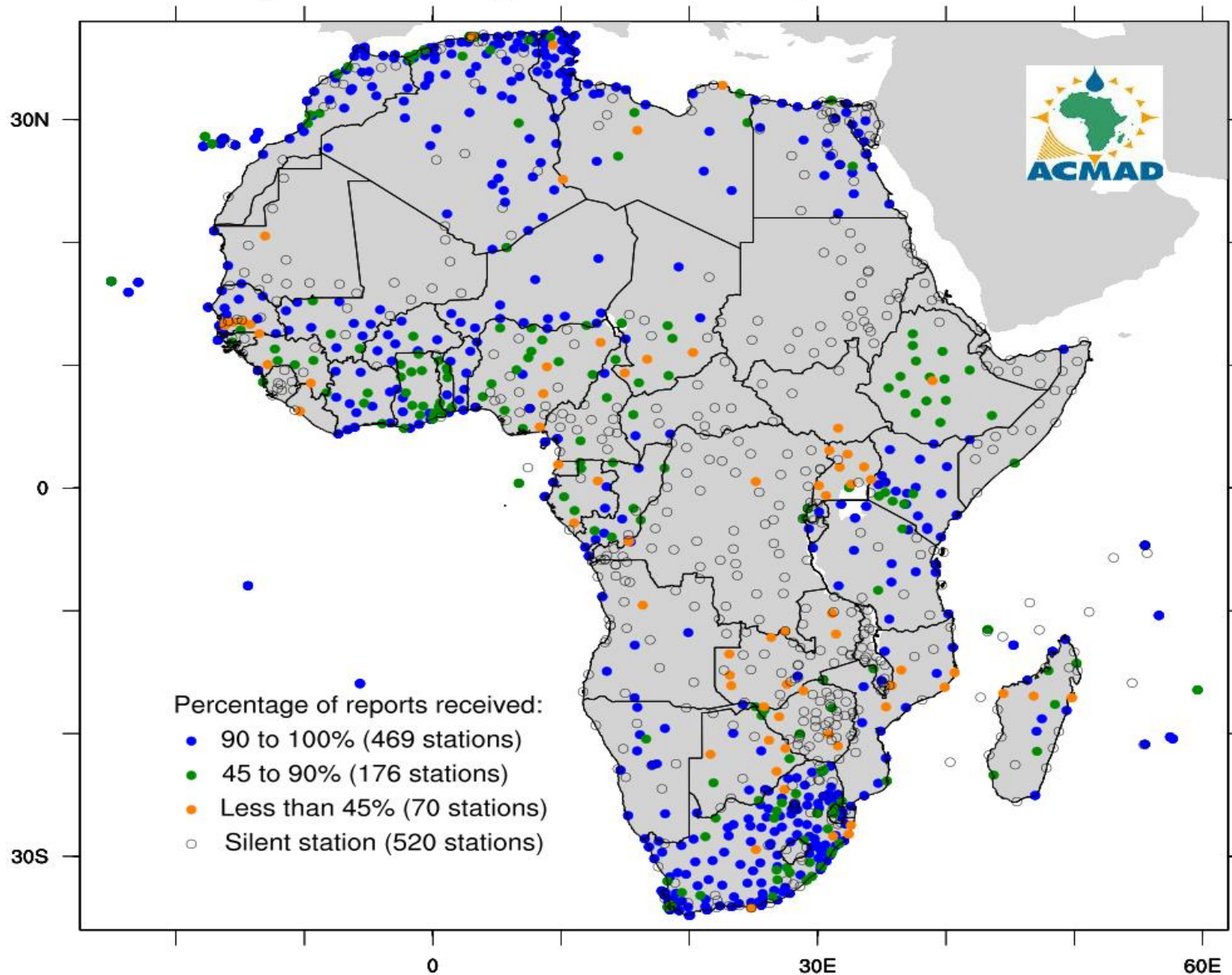


Scale-up,  
replicate

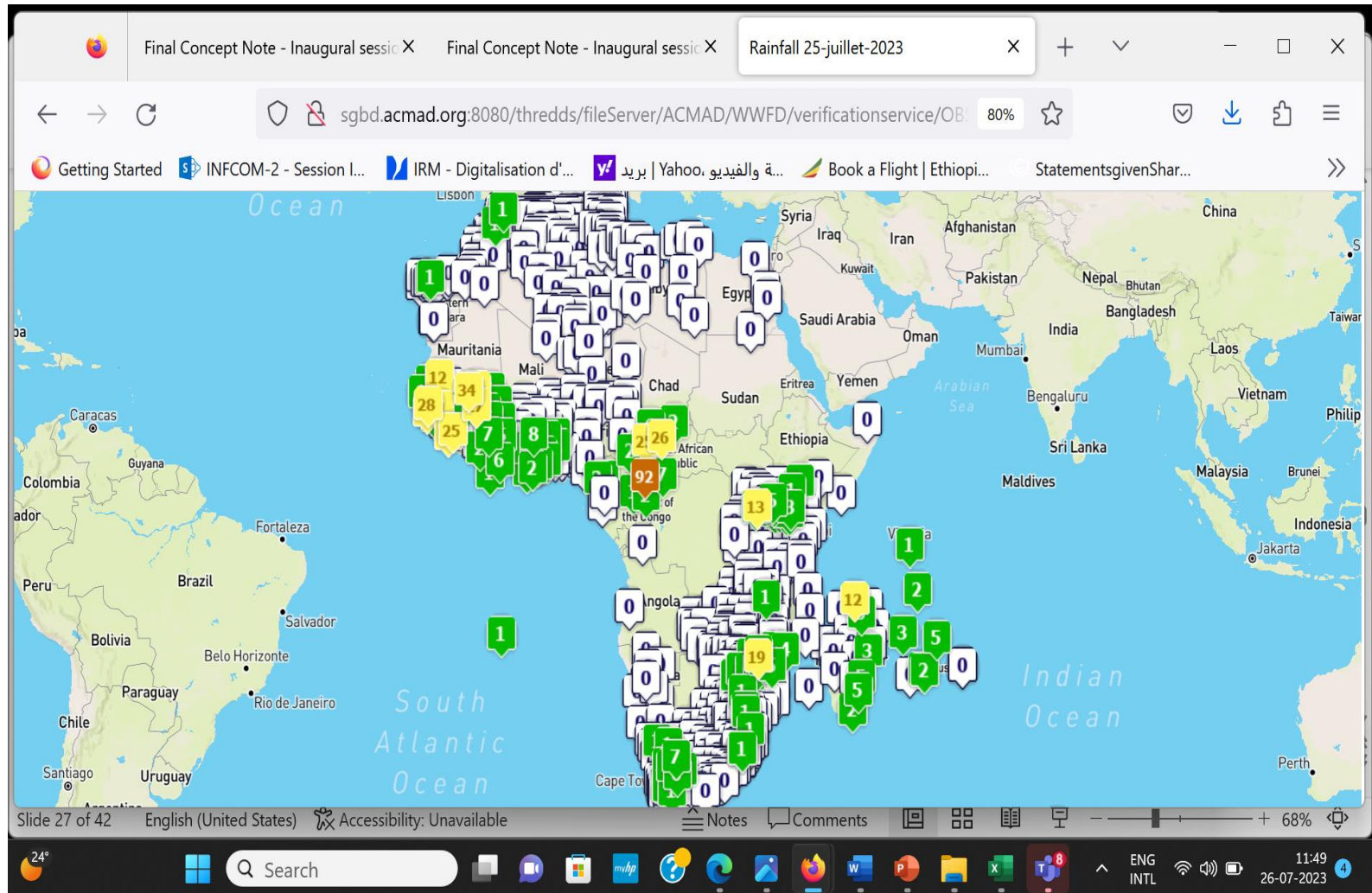




# Monthly monitoring of SYNOP reports for June-2023



Stations used for continental analyses and forecasts, for regional forecasts regional networks are required and even higher number of stations for downscaling at national level to detect local phenomena with impacts limited in communities



# CONTEXT

- ✓ *Provide **hazards , impact ,warning, decision/action, benefits and costs** information;*
- ✓ *facilitate its use to raise awareness of stakeholders on threats and impacts through situation rooms and other platforms ( GCEAO, UIPs,...);*
- ✓ *build capacity to act ;*
- ✓ ***measure benefits of actions Using disaster managers platforms to prepare sustainability***



# *Weather and Climate Services Requirements for early warning*

- Hazards intensity, frequency, location including locations for impacts analyses and assessment, risk profiling, resilience and adaptation planning ( support Risk Knowledge)
- Hazards observations, monitoring, understanding and modeling, prediction, forecasting
- Hazards and impacts outlooks, advisories, vigilance, watches and warnings for communication, emergency preparation, anticipatory action and response
- Risk Communication, Anticipatory Action planning and implementation

# IMPACT BASED INFORMATION ( from Bulletin of the American Meteorological Society ) – **THIS IS WHAT WE WANT IN THE MEDIUM TO LONG TERM** **SUBSTANTIAL INVESTMENT IN RESEARCH IS A PRIORITY**

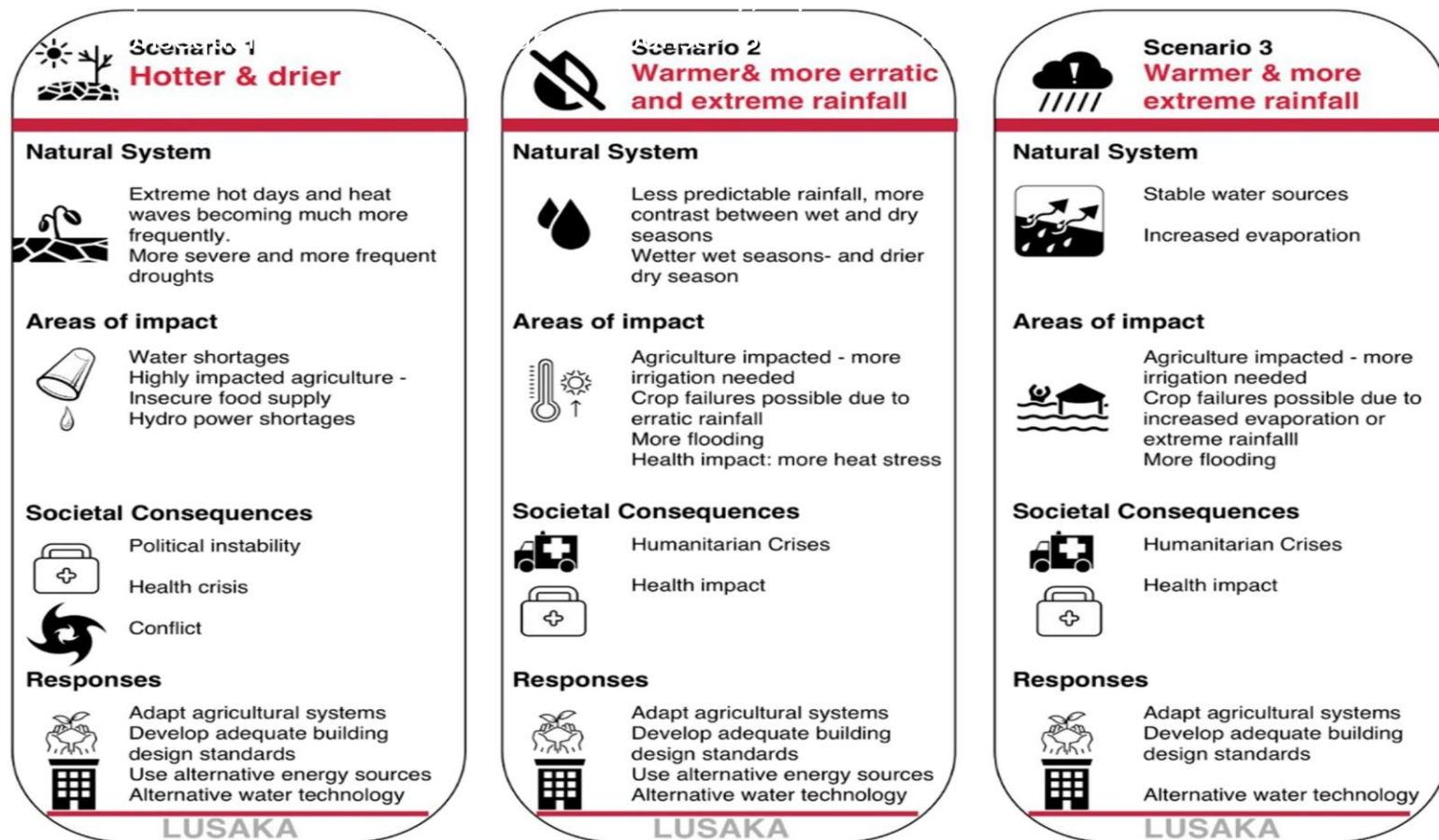


Fig. 5. Infographic summarizing three plausible future climate scenarios for Lusaka along with some key impacts, possible societal consequences, and responses.



***We shall provide weather, climate **data, information, Knowledge, understanding*****  
***Ensure that information is used to make **decisions and act** to reduce negative impacts and exploit opportunities***

## ***Principles and success measures***

**Ensure that all stakeholders are *aware* of threats and mitigation actions**

*Measure of success: evidence that fewer surprises occur, or fewer poor decisions are made due to inadequate information.*

### **Make society *aware* of our science**

*Measure of success: evidence that capacity building and training include various groups in society. Increase the number of public engagement events.*

*Conduct successful citizen science initiatives*

1. *Measure of success: workshops designed with scientists, forecasters and decision makers to raise awareness on new tools and provide training to make their work more effective.*

**Ensure that stakeholders are *aware* of each other's work for coordination:**

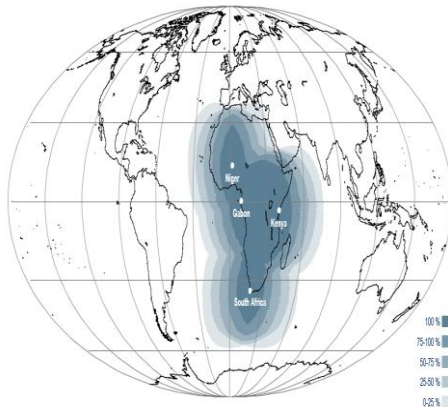
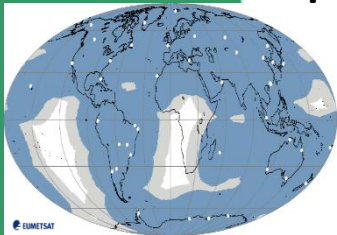
*Measure of success: projects or initiatives started/continued with partners*

# ACMAD SUPPORT PROVISION OF LEO DATA FOR ASSIMILATION IN HIGHJ RESOLUTION REGIONAL AND GLOBAL NWP

4 Regional Advanced Retransmission System for low earth orbiting satellite data contributing to implementation of **WMO and Africa space strategies and programmes**, RARS data may unlock source of predictability in global and limited area models

Contribute to research and development of Satellite Applications products for tracking convection, MCS, strong winds, heavy rain rates, severe lightening and dust storms, very low visibility, air pollution, detecting severe thunderstorms

AMSAT is key for country level and local warnings to trigger evacuation and protection of exposed assets





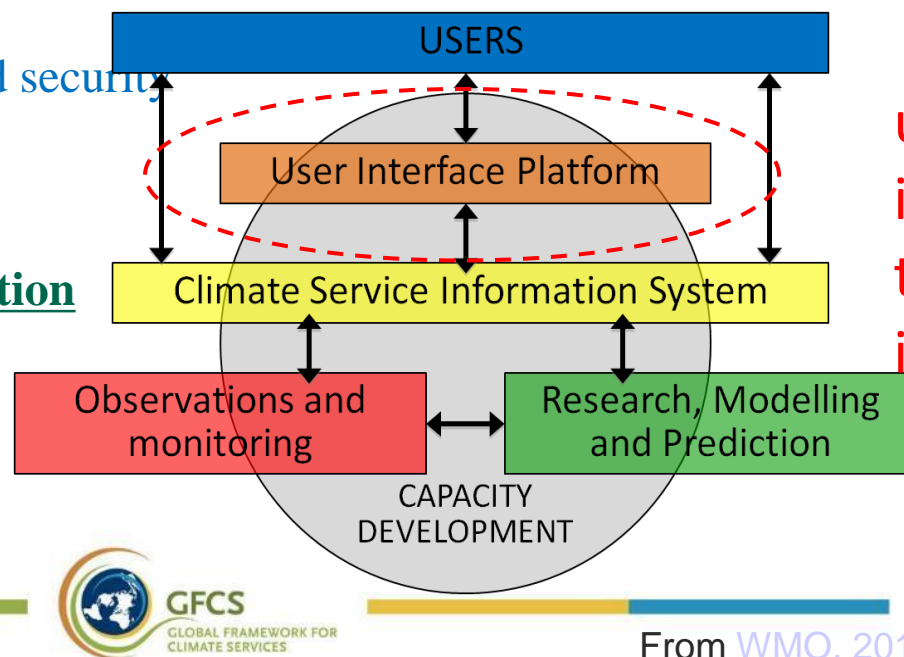


# Global Framework for Climate Services (GFCS)

Vision: enable society to manage better the risks and opportunities arising from climate variability and change, using science-based climate information

Priority areas:

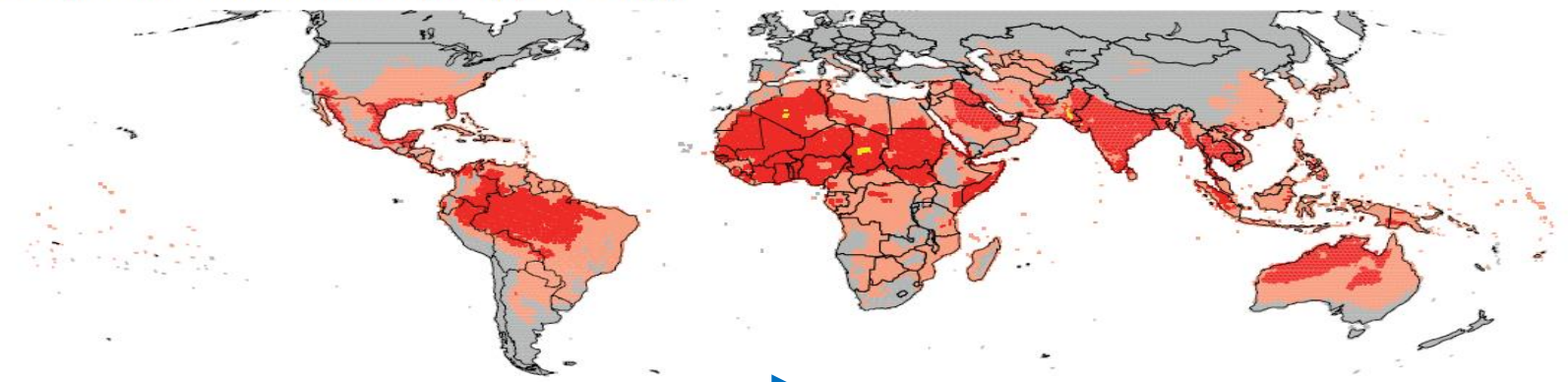
- Agriculture and food security
- Water management
- Health
- **Disaster risk reduction**
- Energy



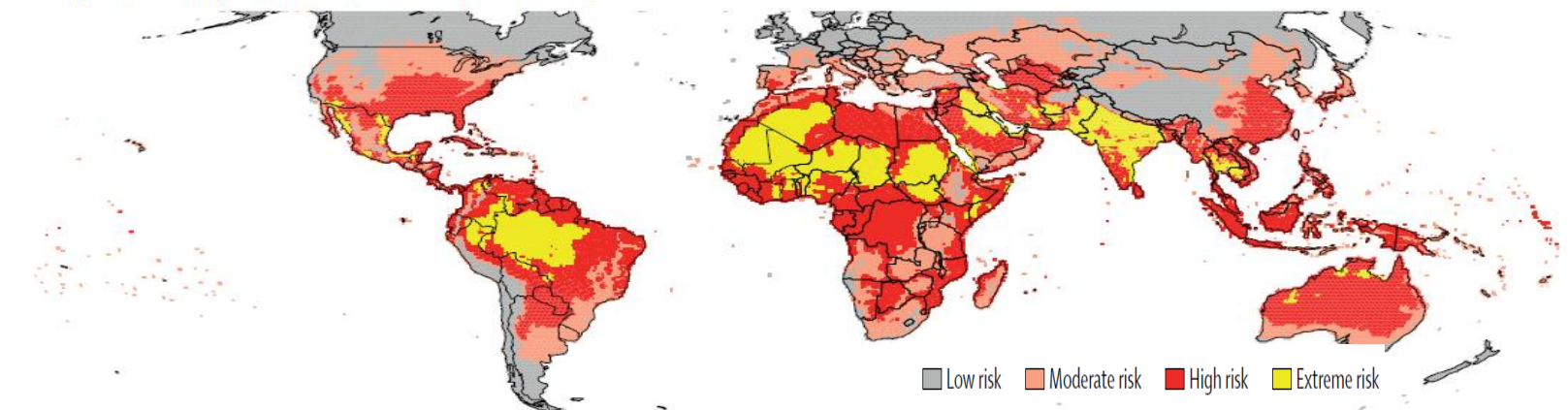
user engagement  
is key and Science  
to accelerate this  
is pivotal

# A MAJOR PROBLEM FOR URBAN AREAS IN THE FUTURE IS RELATED TO INCREASE IN URBAN HEAT STRESS UCLIP IS AN INFORMATION PLATFORM TO SUPPORT PLANNING AND ACTION FOR SUSTAINABLE AND SMART CITIES USING ECOSYSTEM BASED ADAPTATION SOLUTIONS

Temperatures from the recent past (1986–2005)

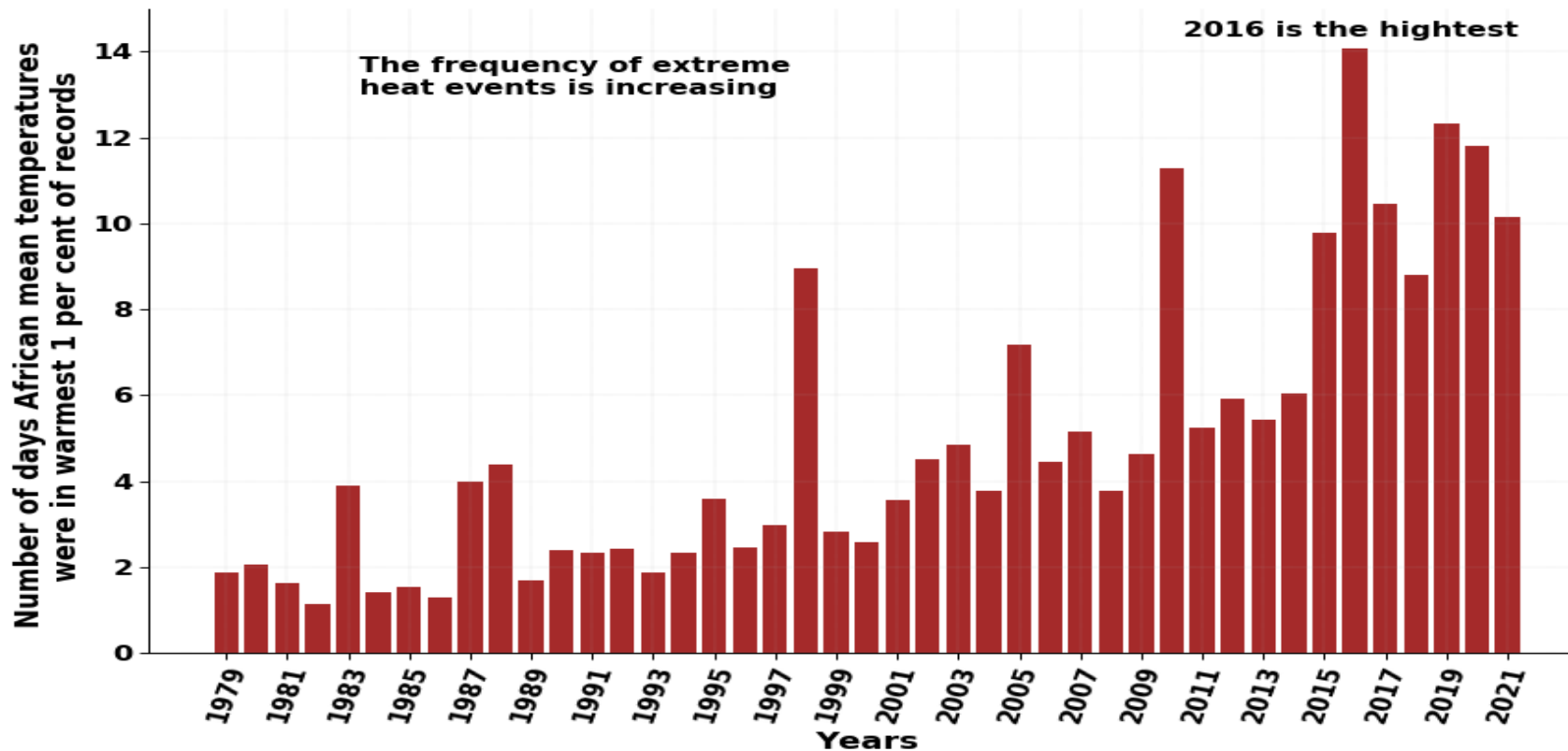


3°C global temperature increase (2090–99)

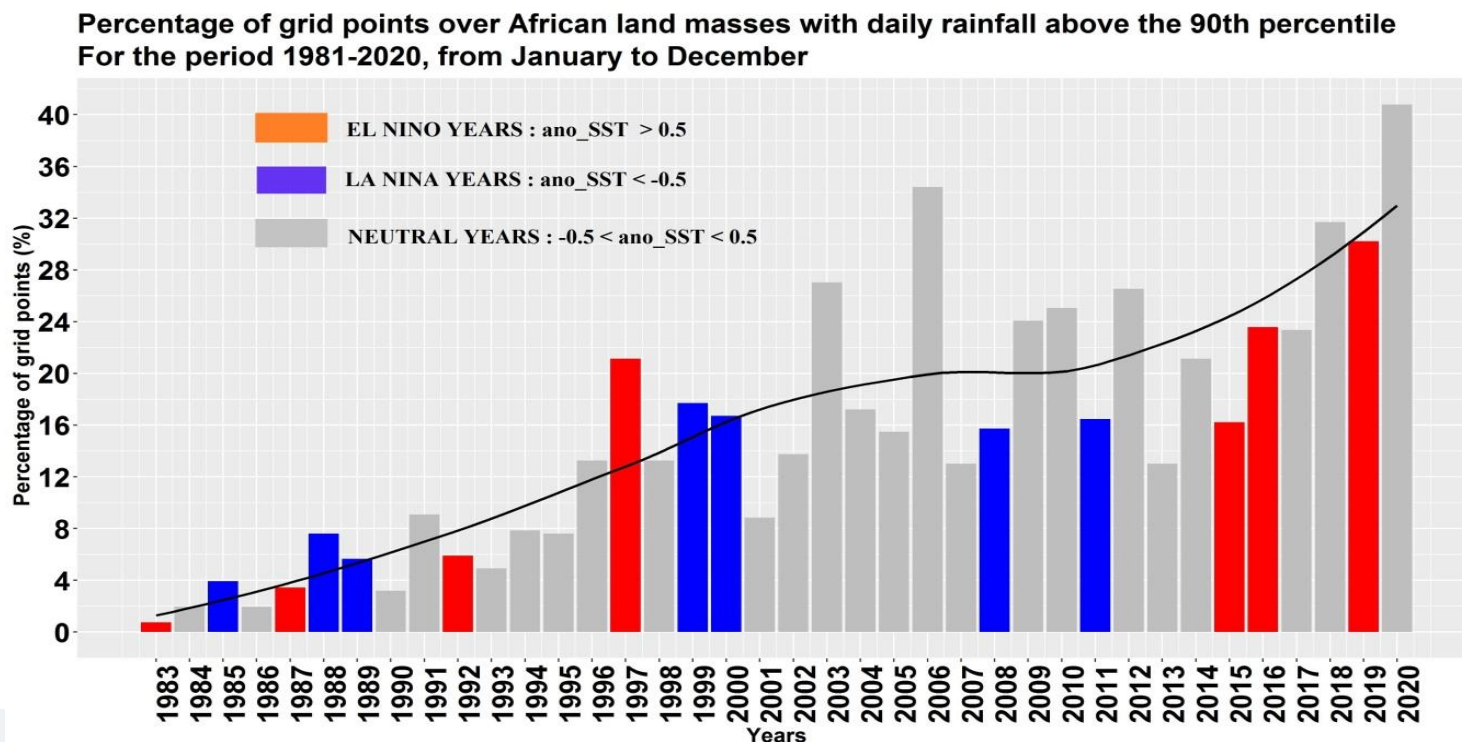


Rohat et al., 2019. Projections of human exposure to dangerous heat in African cities under multiple socio-economic and climate scenarios. *Earth's Future*, 7, 528–546.

Trends on number of extreme hot days across Africa. 2016 was the warmest year on record globally. *Research on high frequency of very warm days impacts on agriculture, energy, infrastructure, health, water scarcity, disasters is a priority for sustainable development planning*

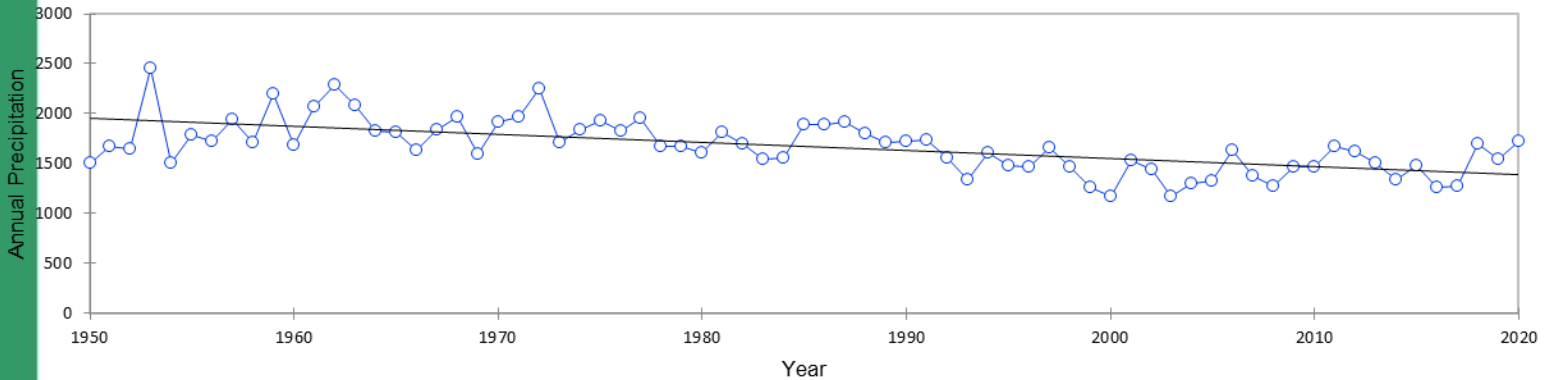


Trends on the surface hit by heavy rainfall. A research on impacts of heavy rains at regional/local levels with emphasis on losses and damages to infrastructure, crops, major assets particularly in cities is essential for resilient development planning

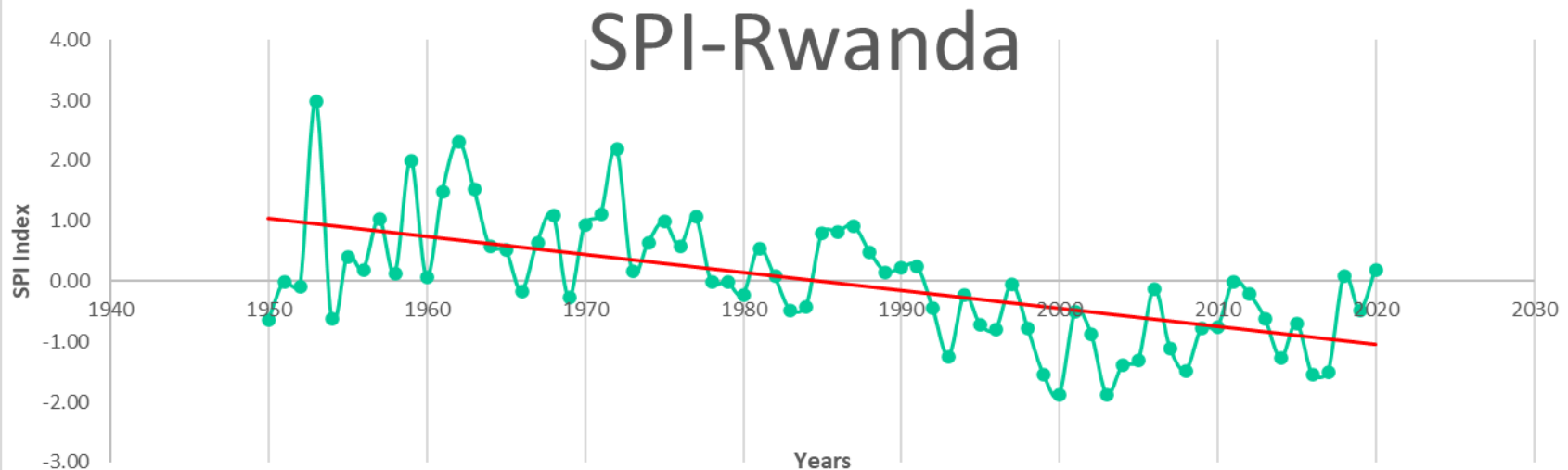




# Annual Precipitation-Rwanda

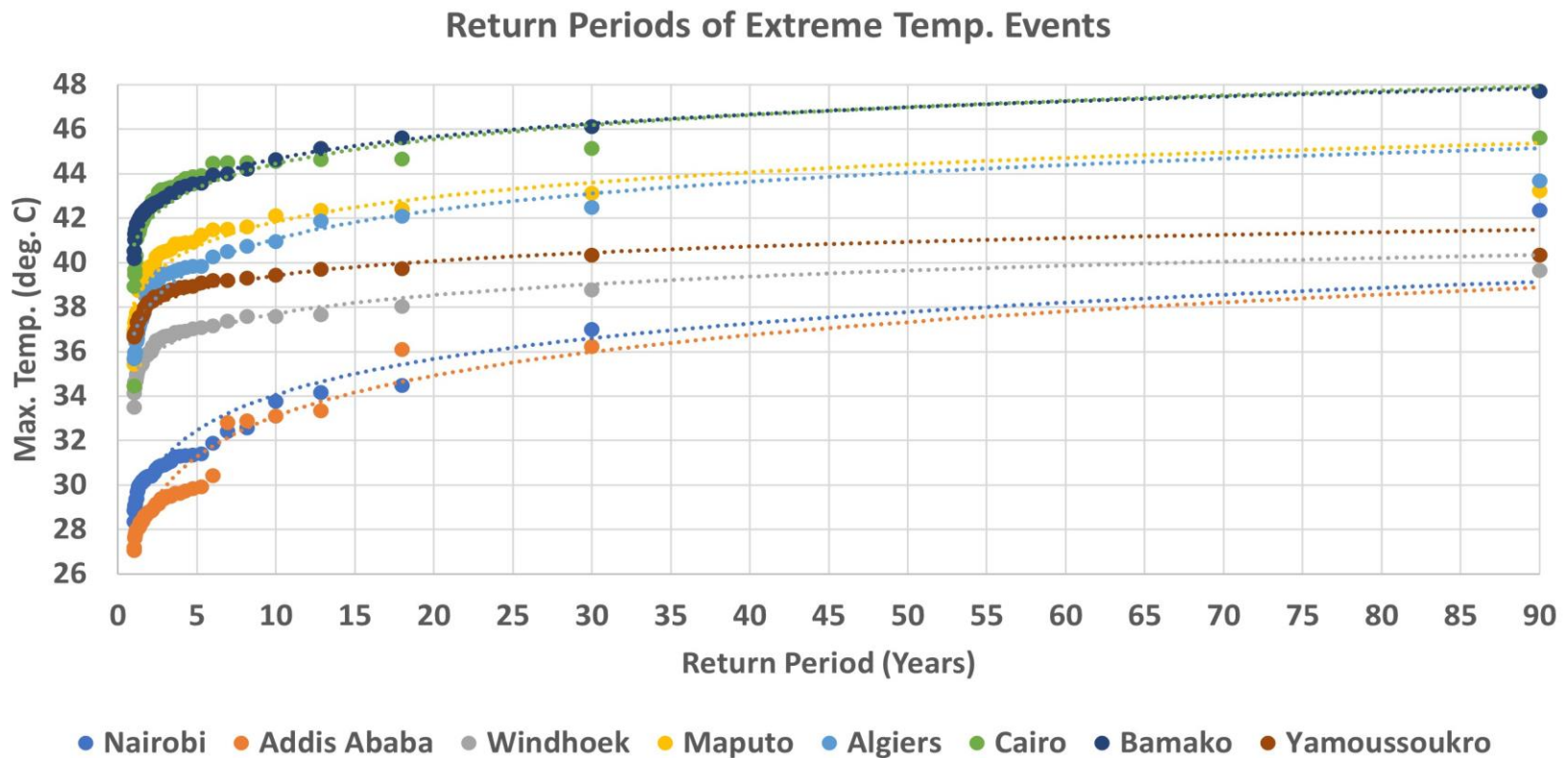


**Drought monitoring Service with more actionable indicator**



## – Actionable Climate indicators for resilient infrastructure design

Early warning for high temperatures, and wildfires urgent in North Africa (Cairo) and Sahel ( Bamako)

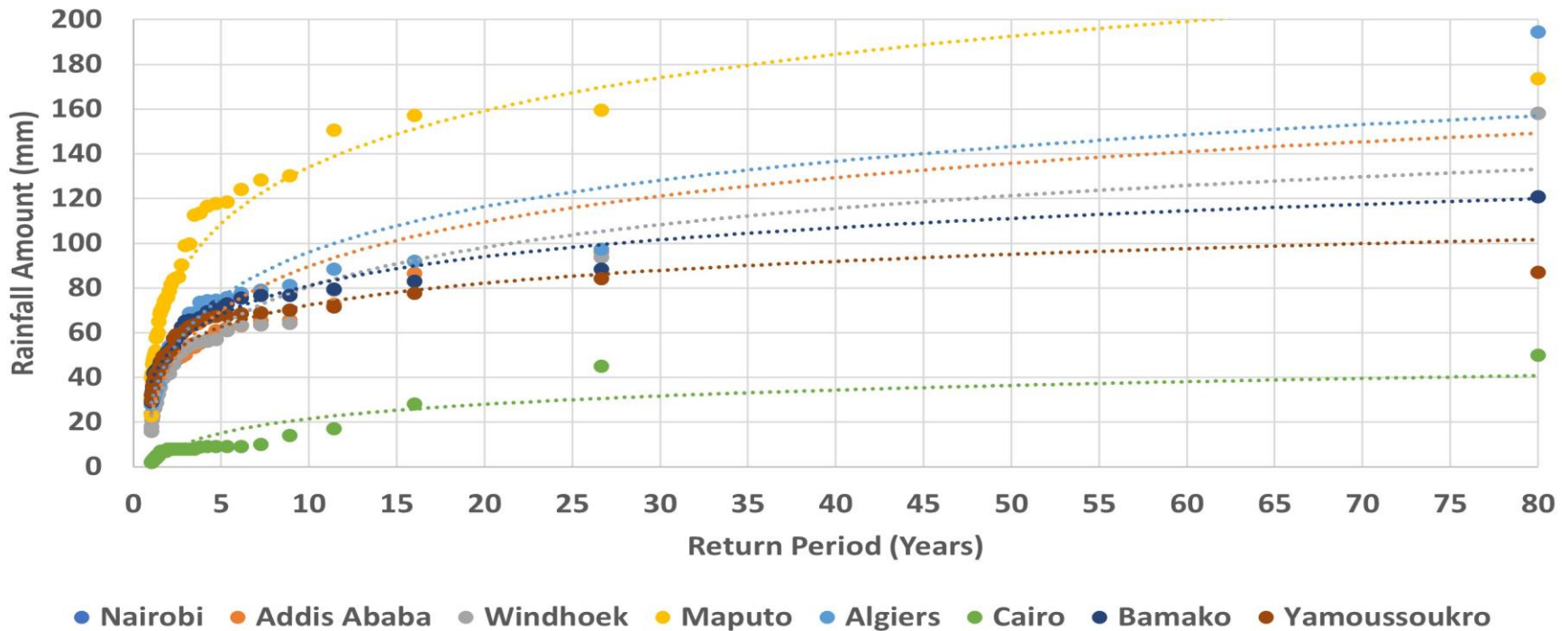


## 2.2 Output 2: Continental and Regional support Services at ACMAD



Only Cairo is not highly vulnerable to heavy rains and floods

Return Periods of Extreme Rainfall Events



# ***PROGRESS***

1. *Continental watches and disaster situation report*
1. *Coordinated ad hoc briefings with NMHSs, Regional Severe Weather and Climate Centres for impact forecasting and harmonization of hazards and impact information*
3. *Trained forecasters and disaster experts on operation of risk knowledge, outlook, advisory, watch, warning and disaster management centers and situation rooms*
4. *Special briefings and statements for AWGDRR, GECEAO, UNOCHA, WMO with UNHCR*
4. *Better Access to data , Research and innovation*



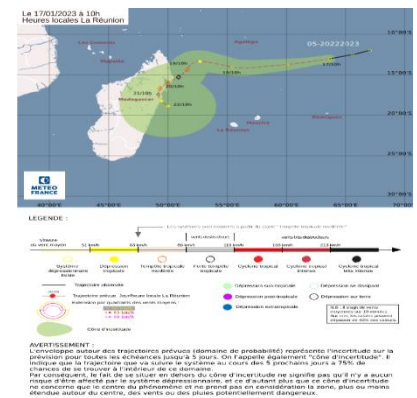
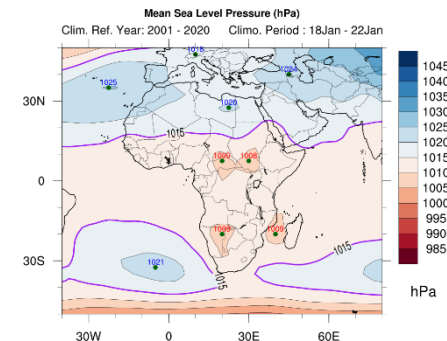
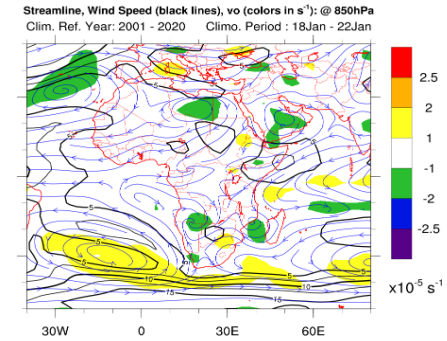
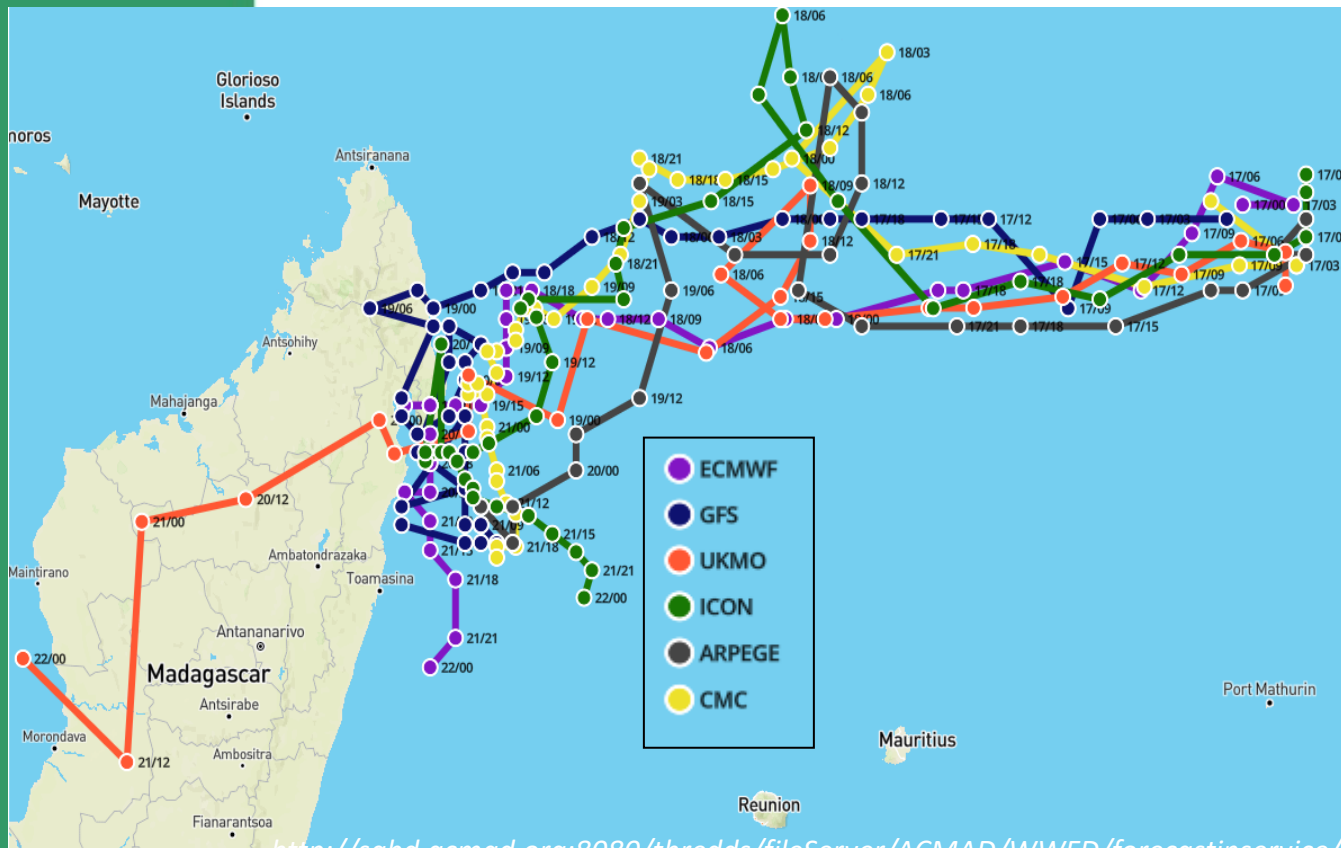


# Tracks from: 17-01-2023, 00UTC to 22-01-2023, 00UTC

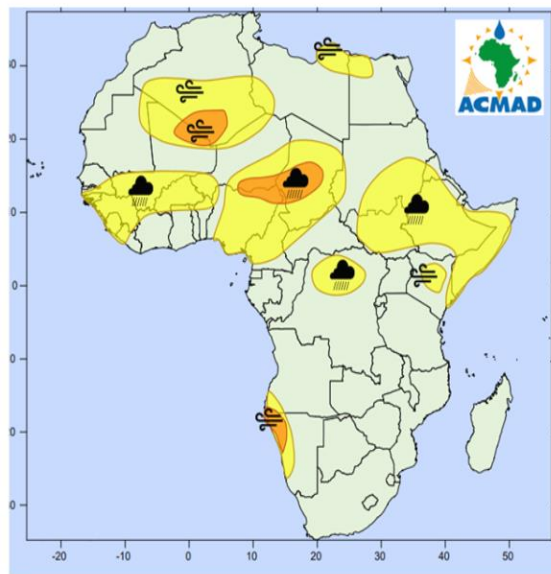
(Global deterministic models : ARPEGE, CMC, ECMWF, ICON, GFS and UKMO)

– **Climatology of the forecast period** favors evolution towards the Mozambican channel

Need training on interpretation

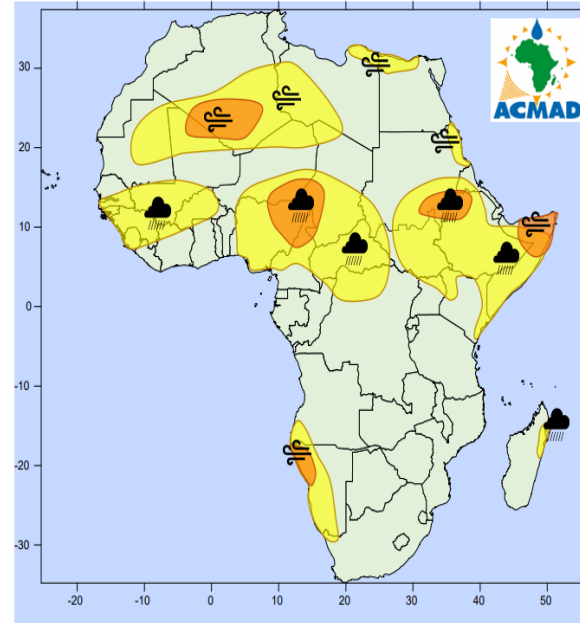


# Heavy rain forecast 3 days and 1 day ahead



**MULTI-HAZARD OUTLOOK**  
**Validity: 2022-07-15**  
 issued on 2022-07-11

| Rain                  | Wind                                | Dust                                  | Meningitis  |
|-----------------------|-------------------------------------|---------------------------------------|-------------|
| Very heavy<br>>100mm  | Very strong<br>>80kmh <sup>-1</sup> | Very heavy<br>>1000µg m <sup>-3</sup> | Very likely |
| Heavy<br>50-100mm     | Strong<br>>65kmh <sup>-1</sup>      | Heavy<br>>600µg m <sup>-3</sup>       | Likely      |
| Moderate<br>10 - 49mm | Moderate<br>>50kmh <sup>-1</sup>    | Moderate<br>>400µg m <sup>-3</sup>    | Less likely |
| Light<br>1 - 10mm     | Light<br><50kmh <sup>-1</sup>       | Light<br><200µg m <sup>-3</sup>       |             |

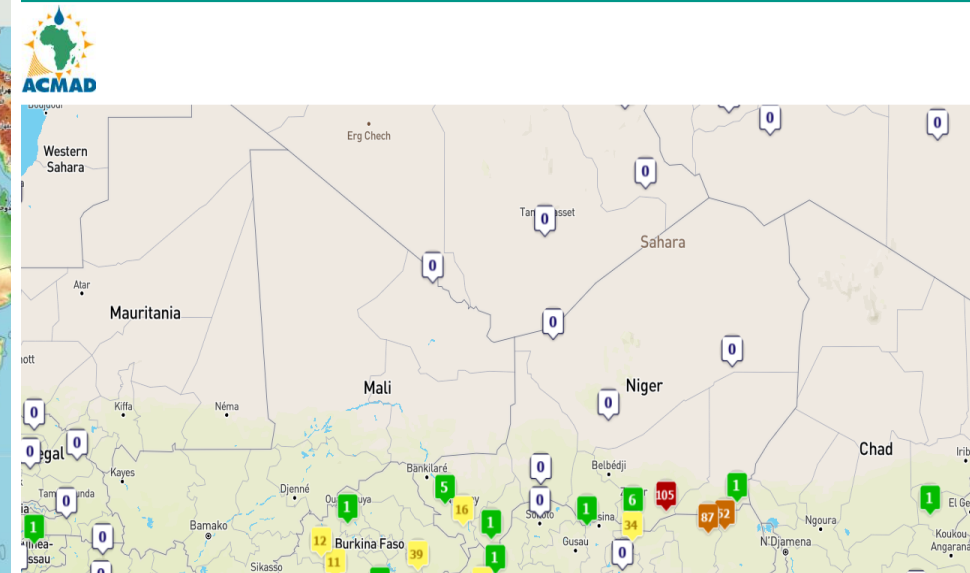
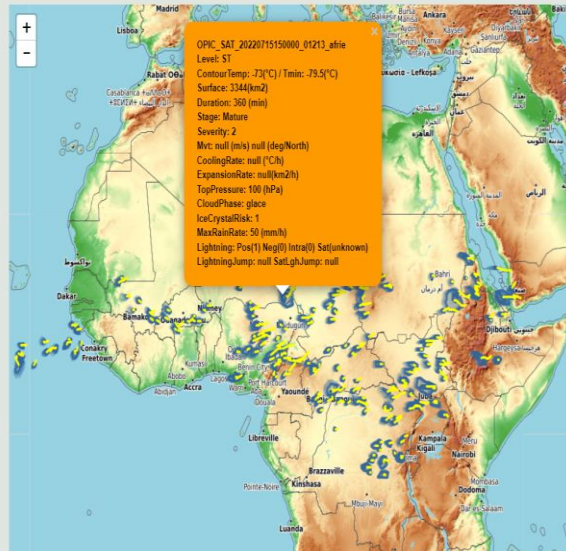
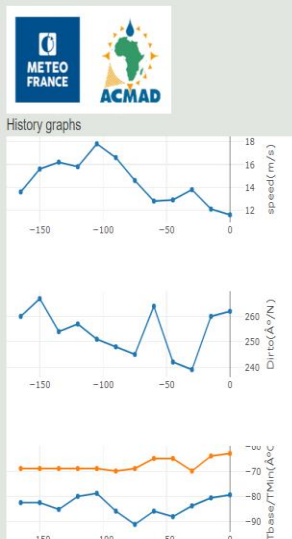


**MULTI-HAZARD OUTLOOK**  
**Validity: 2022-07-15**  
 issued on 2022-07-14

| Rain                  | Wind                                | Dust                                  | Meningitis  |
|-----------------------|-------------------------------------|---------------------------------------|-------------|
| Very heavy<br>>100mm  | Very strong<br>>80kmh <sup>-1</sup> | Very heavy<br>>1000µg m <sup>-3</sup> | Very likely |
| Heavy<br>50-100mm     | Strong<br>>65kmh <sup>-1</sup>      | Heavy<br>>600µg m <sup>-3</sup>       | Likely      |
| Moderate<br>10 - 49mm | Moderate<br>>50kmh <sup>-1</sup>    | Moderate<br>>400µg m <sup>-3</sup>    | Less likely |
| Light<br>1 - 10mm     | Light<br><50kmh <sup>-1</sup>       | Light<br><200µg m <sup>-3</sup>       |             |

## Observed daily rainfall (mm) on: 16-juillet-2022

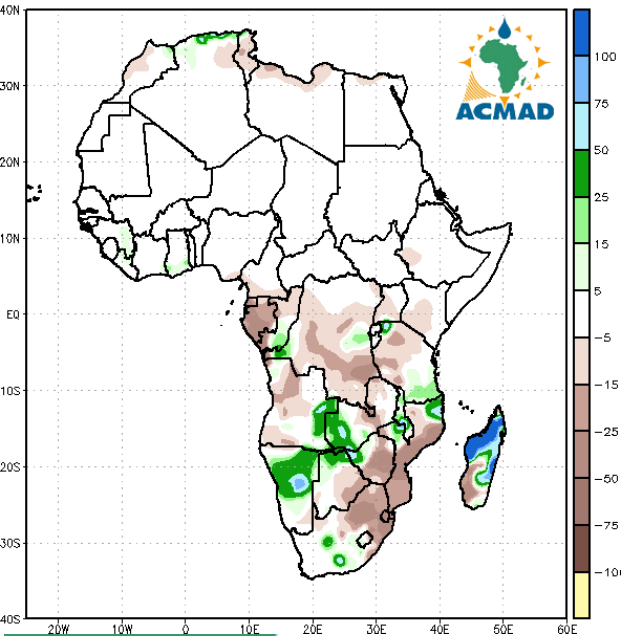
MSG 2022-07-15T15:00:00Z : RDT-CW\_v515\_





# VIGILANCE FOR HEAVY RAINFALL FOR THE NEXT 5 DAYS. POTENTIAL IMPACTS AND PREPARATION/RESPONSE MEASURES VERIFICATION WITH RAINFALL DATA ON THE LEFT

CPC-Uni 7day Precip Anomaly (mm)  
Period: 18Jan2023 to 24Jan2023



## VIGILANCE MAP AND POLICY BRIEF FOR HEAVY RAINFALL AND STRONG WINDS

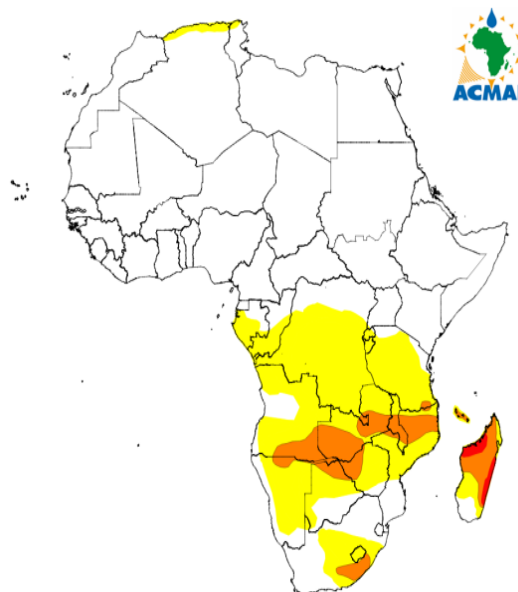
Valid From January 20 to 24, 2023

Issued on January 19, 2023



**HIGHLIGHT:** Extreme Heavy rainfall associated with the Tropical Storm CHENESO is expected over North-western and eastern Madagascar

Heavy rainfall is expected over Tanzania, Mozambique, Malawi, Zambia, Angola, Namibia, Botswana, Zimbabwe, Comoros and Madagascar

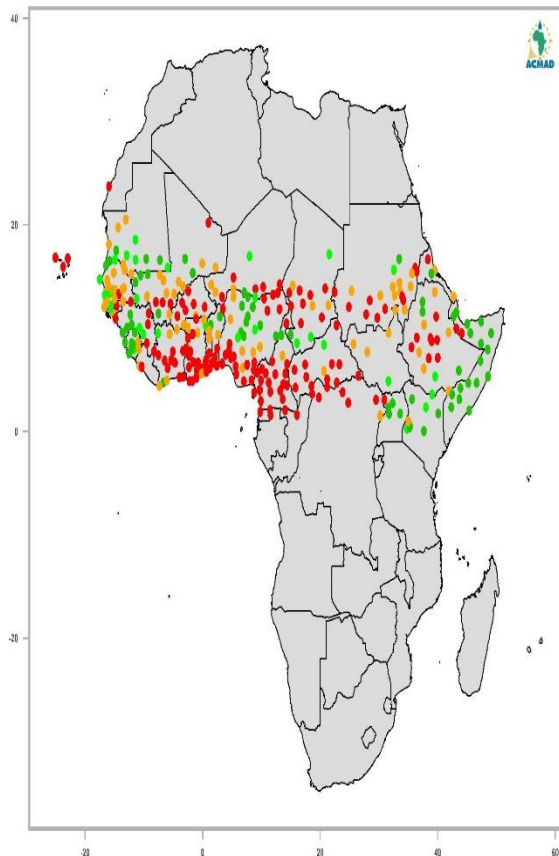


| Phenomenon   | Hazard  | Potentials Impacts  | DRM Measures / Advices  |
|--|---|---|---|
| In next 5 days accumulate d rainfall (50-100mm) is likely,         | Moderate rainfall, flash flood, riverine flooding, landslides, soil erosion and lightning likely  | Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...)                          | DRM authorities to keep informed about the development of the meteorological situation and raise awareness, taking action is more likely, the situation needs to be monitored closely with NHMSs  |
| In next 5 days accumulate d rainfall (100 – 150mm) is very likely, | Heavy rainfall, flash flood, riverine flooding, landslides, soil erosion and lightning, strong winds,                                   | Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...)                          | Update Flood contingency plans, Improve water management in reservoirs and dams, DRM authorities be ready to take adequate actions, DRM to be continuously in touch with NHMSs to be informed of the detailed expected meteorological conditions. |
| In next 5 days accumulate d rainfall (>150mm) is very likely,      | Extreme heavy precipitation, flash flood, riverine flooding, landslides, soil erosion and lightning, strong winds, severe thunderstorms | Loss of lives, Injuries, Displacements of people due to floods, outbreak of water borne diseases, damage of infrastructures (roads, bridges, ...) | Civil Protection services and DRM authorities to activate flood contingency plans for emergency response (assistance to victims, search & rescue operations ), and be in close touch with NHMS in case the situation becomes worst.               |

*Disclaimer:* The presentation of country boundaries on the map does not imply any opinion whatsoever on the part of ACMAD concerning the legal status of any country, territory or area, or concerning the delimitation of frontiers or boundaries.

Research and innovation is promoted to intercompare Start of season definitions, products and compare with perceptions and findings of extension workers and subsistence farmers. Observations of disruptions on the start of season, processes and phenomena driving this event. Its predictability are essential research priorities for the African agriculture sector

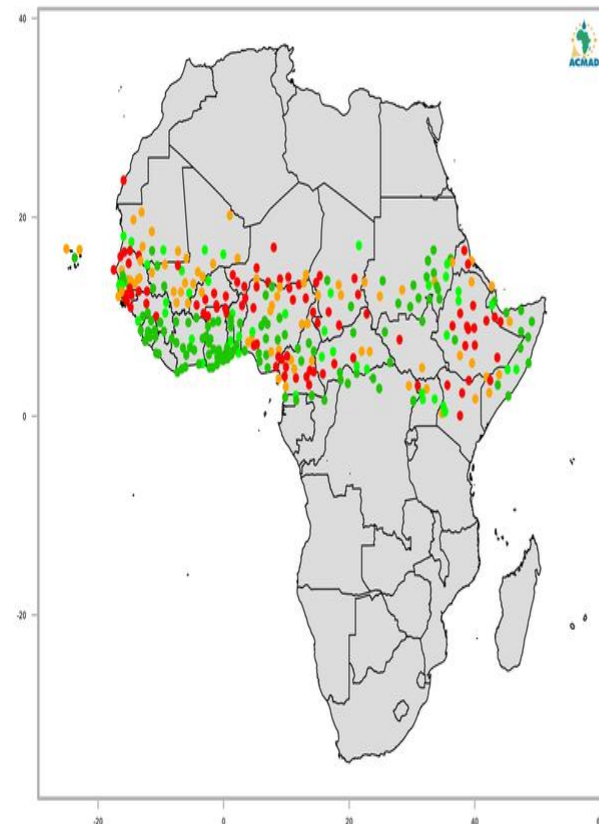
START OF THE AGRICULTURE SEASON FROM JANUARY TO JULY IN 2020  
OVER SUB-SAHARAN AFRICA.



Observed start of the Agriculture  
Season departure from Average.

- LATE
- NEAR AVERAGE TO LATE
- NEAR AVERAGE TO EARLY
- EARLY

START OF THE AGRICULTURE SEASON FROM JANUARY TO JULY IN 2021  
OVER SUB-SAHARAN AFRICA.



Observed start of the Agriculture  
Season departure from Average.

- LATE
- NEAR AVERAGE TO LATE
- NEAR AVERAGE TO EARLY
- EARLY



# IMPACT BASED FORECAST-ACTIONABLE INDICATORS

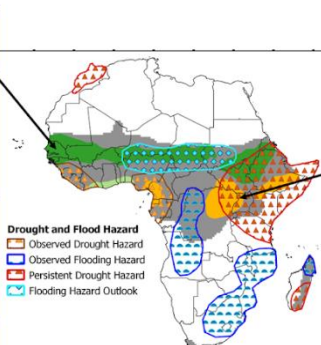
## ACMAD-UNOCHA West and Central Africa office



**CONTINENTAL**  
BRIEF FOR POLICY AND DECISION MAKERS BASED ON  
SIGNIFICANT WEATHER AND CLIMATE EVENTS UPDATE.  
VALID FOR: JULY TO OCTOBER 2022



| CLIMATE ANOMALIES  |
|--|
| Wetter than average season very likely<br>Heavy rainfall with reported flooding events   |
| HAZARDS  |
| Heavy rainfall events may lead to flash flood, riverine flooding, landslides and soil erosion. High chance of lightning, hail formation and stormy weather are expected  |
| POTENTIAL IMPACTS  |
| Waterlogging, pest and diseases infestation, Outbreak of water borne diseases damage to infrastructures (dams, reservoirs, bridges, roads...) Displacement of people due to floods.  |
| MEASURES   |
| Select excess moisture tolerant crops, wide tree planting campaigns Develop new and rehabilitate the existing drainage structure, Update and implement flood contingency plans improve water management in reservoirs and dams |



| CLIMATE ANOMALIES   |
|---|
| Drier than average season very likely<br>Prolonged drought with reported persistent impacts   |
| HAZARDS   |
| Weak to Moderate drought, dry spells, near average to late onset very likely.   |
| POTENTIAL IMPACTS   |
| Moisture stress, decreased river discharge, reduced rain-fed crop yield prospect, degradation of pastures and high food prices.   |
| MEASURES  |
| Develop and implement policy to support drought tolerant and short cycle crops, soil and water conservation practice, maximize full irrigation farming. Use watershed based in-situ water harvesting structures Develop and implement policy in support of weather based insurance and dam management |



### WEST AND CENTRAL AFRICA Flooding Situation: Hotspot Countries

As of 9 September 2022

#### OUTLOOK

Countries with the highest risks of floodings based on the rainfall forecast for July to October 2022 include Chad, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Mali, Niger, Nigeria, Senegal, and Sierra Leone. Hotspot countries have a significant number of people residing in areas with high flood exposure and are thus expected to receive "normal to above average rainfall" or "above average rainfall" during the 2022 rainy season<sup>1,2</sup>.

In 2021, hotspot countries included Chad, Niger, Nigeria, The Gambia, and Guinea, with floods killing 172 persons, affecting 820,000, and displacing 311,000.

<sup>1</sup> Analysis was carried out by OCHA

<sup>2</sup> Flood risk exposure map was created by World Bank (<https://www.researchgate.net/publication/347407222>)

<sup>3</sup> Forecast was done by according to African Centre of Meteorological Application for Development (ACMAD)

Percentage of populations exposed to high flood risks overlaid with regions forecasted to have normal or above average rainfall between July and October 2022.

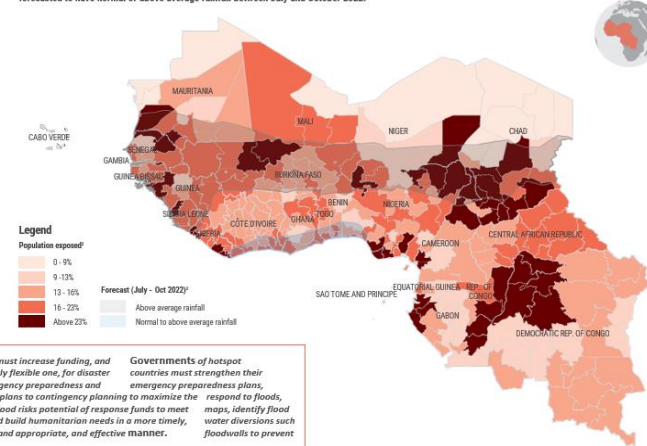
#### Countries most affected by floods between July and October 2021



#### Legend



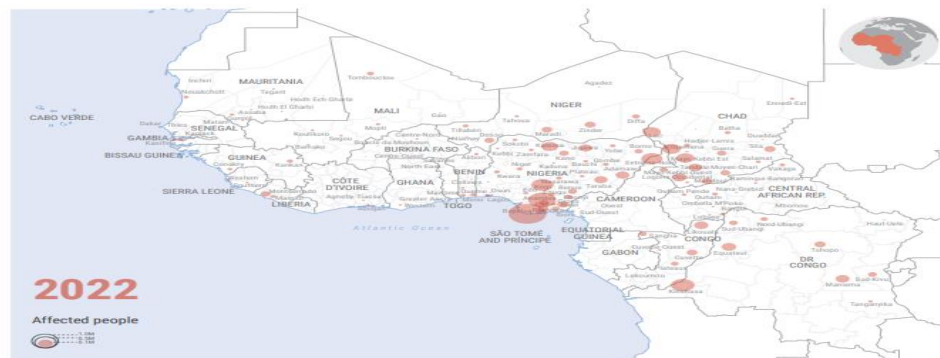
Forecast (July - Oct 2022)<sup>3</sup>  
Above average rainfall  
Normal to above average rainfall



Humanitarian and development organizations must develop and implement emergency preparedness plans to respond to floods, critical to mitigate the risk of humanitarian impact of floods in "at-risk" countries.

Donors must increase funding, and particularly flexible one, for disaster and emergency preparedness and contingency planning to maximize the response to floods, develop flood risks potential of response funds to meet needs, and build humanitarian needs in a more timely, and appropriate, and effective manner.

Governments of hotspot countries must strengthen their emergency preparedness plans, maps, identify flood water diversions such floodwalls to prevent floods.



**1,567**  
People killed

**4,401**  
People injured

**517k**  
Houses destroyed

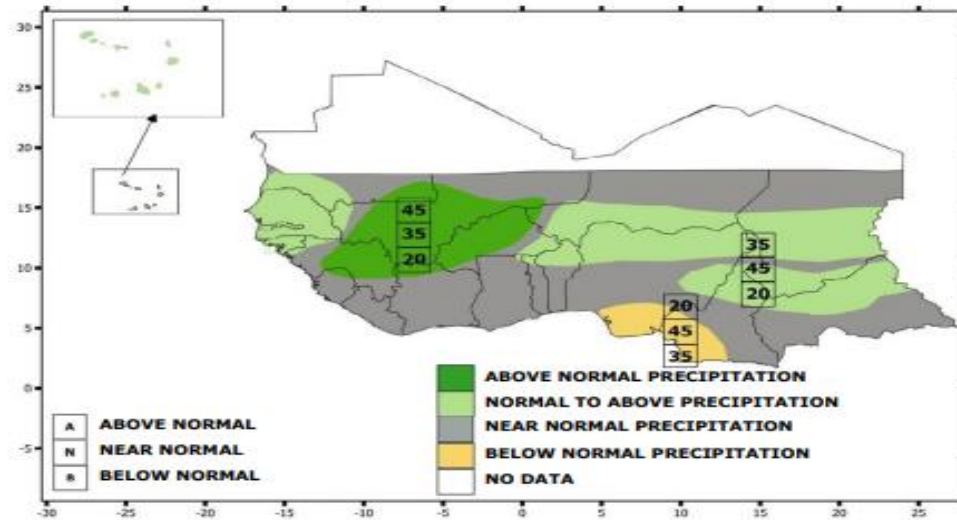
**1.6M**  
Affected fields

**8.5M**  
People affected

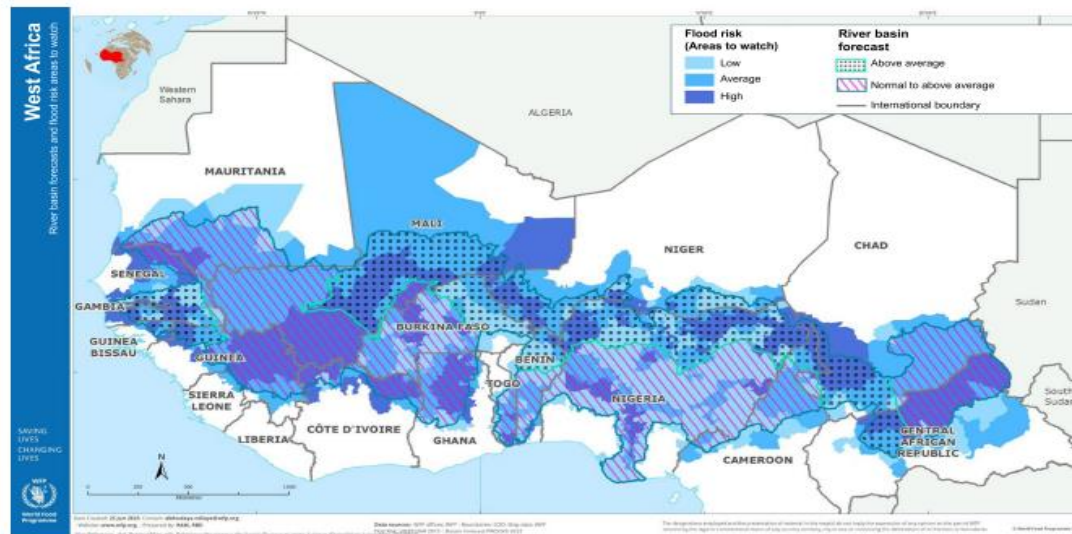
**3.2M**  
People displaced

#### GLOBAL FIGURES IN 2022

|                          | People affected | People killed | People injured | Houses destroyed | Affected fields |
|--------------------------|-----------------|---------------|----------------|------------------|-----------------|
| Nigeria                  | 4.5M            | 2.4M          | 300k           | 36k              | 13k             |
| Chad                     | 1.5M            | 28k           | 300k           | 7k               | 3k              |
| Cote d'Ivoire            | 946k            | 2.3k          | 65k            | 8k               | 96              |
| Guinea                   | 327k            | 2.3k          | 65k            | 8k               | 96              |
| Cameroon                 | 317k            | 2.3k          | 65k            | 8k               | 96              |
| Central African Republic | 120k            | 2.3k          | 65k            | 8k               | 96              |
| Sierra Leone             | 85k             | 2.3k          | 65k            | 8k               | 96              |
| Mali                     | 79k             | 2.3k          | 65k            | 8k               | 96              |
| Benin                    | 75k             | 2.3k          | 65k            | 8k               | 96              |
| Mauritania               | 54k             | 2.3k          | 65k            | 8k               | 96              |
| Gambia                   | 53k             | 2.3k          | 65k            | 8k               | 96              |
| Guinea Bissau            | 48k             | 2.3k          | 65k            | 8k               | 96              |
| Senegal                  | 25k             | 2.3k          | 65k            | 8k               | 96              |
| Togo                     | 19k             | 2.3k          | 65k            | 8k               | 96              |
| Cote d'Ivoire            | 17k             | 2.3k          | 65k            | 8k               | 96              |
| Sierra Leone             | 16k             | 2.3k          | 65k            | 8k               | 96              |
| Burkina Faso             | 13k             | 2.3k          | 65k            | 8k               | 96              |
| Sao Tome-and-Principe    | 350             | 2.3k          | 65k            | 8k               | 96              |



## Humanitarian impact analysis



## RECOMMENDATIONS FOR 2023 SUMMER FLOODS PREPAREDNESS. IFRC, OCHA Governments and NGOs to develop proposal for FbF.

### Recommendations for flood risk preparedness and response

- **Identify existing warning mechanisms and how they work:** be aware of alert levels and establish dissemination procedures to ensure that alerts reach people at risk.
- **Update risk analysis and strengthen monitoring mechanisms** in areas exposed to between "normal" and "above normal" levels of rainfall and flood risk, involving all key players (local authorities, humanitarian and development players, national hydrological and meteorological services, research institutes, etc.). These are as follows:
  - Administrative areas with "medium" or "high" flood risk, located in river basins with expected levels above average;
  - Administrative areas at "high" risk of flooding, located in river basins with average or above-average expected levels;
  - All other areas identified as being at "high" risk of flooding.
- **Launch of anticipatory actions to mitigate and prevent the impact of flooding** on households, property, livelihoods, and health, by triggering pre-positioned funds.
- **Identification of priority multi-sectoral preparedness and response actions** to be implemented both immediately and in the event of an emergency, including aspects relating to coordination, needs analysis and information management, anticipation of access-related risks, communication, etc.
- **Activation of preparedness mechanisms within the various intervention sectors** (health, food security, protection, education, etc.) and reinforcement of contingency stocks available at country level, in high-risk areas with a high risk of experiencing restricted access in the event of an emergency response.
- **Capacity building for all players**, to ensure effective assistance.
- **Strengthen communication and awareness-raising activities** with local communities in at-risk areas, in collaboration with local media and existing community-based early warning systems.
- **Pre-identify funding opportunities** available at country and regional level for emergency preparedness and response activities.



# CO-DEVELOPMENT OF BESPOKE CONTINENTAL HAZARDS OUTLOOK SERVICES FOR UNHCR

WMO Coordination Mechanism (WCM)

## WCM Regional HydroMet Weekly Scan | Sudan

Issued on: < example > , Validity: < example >



Hydromet events considered



Icons Description  
OCHA Icons

Past Forecast

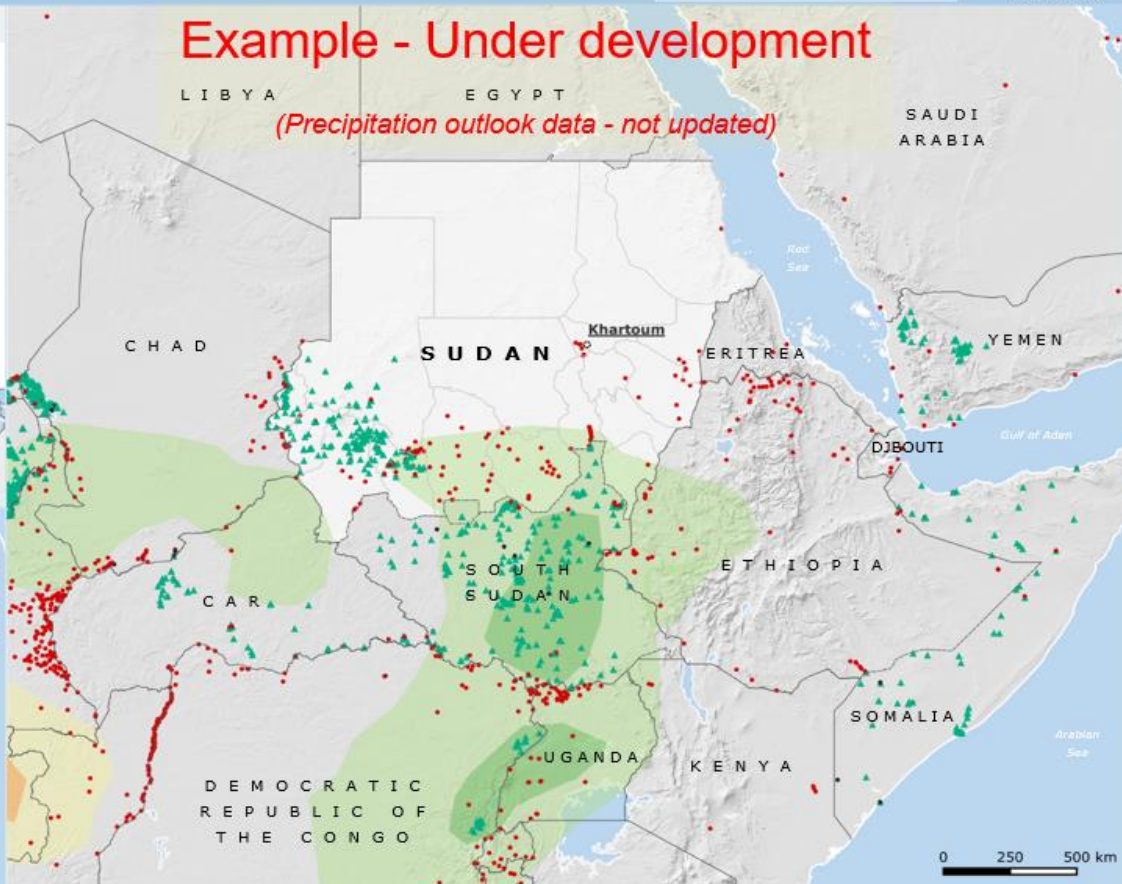
### Current situation and possible evolution

- Possibility of accumulated heavy rainfall of more than 100mm is very likely during the next week (5-11 May). Flash floods, riverine floods, landslides and strong wind gusts may occur.
- Moderate heat wave conditions are likely to persist for 3 days or more with varied severity. Increased likelihood of heat related illness symptoms in people who are either exposed to high temperatures for a prolonged period or doing heavy work at peak sun hours.

Sources: African Centre of Meteorological Applications for Development (ACMAD)

### Example - Under development

(Precipitation outlook data - not updated)



Precipitation  
Next 7 days accumulation  
ECMWF-HRES (04 May 2023 00 UTC)



On-going or Potential impacted areas  
over the next 7 days  
Only the zones inside the black polygons could be impacted.  
No guarantee is provided about these areas (completeness,  
geographical extent, etc.). Source: Human expertise.

UNHCR  
Locations of forcibly  
displaced persons  
IDPs  
Refugees  
Asylum-seeker, Returnee

ACMAD  
Precipitation Outlook for  
the upcoming week  
Well Above Normal  
Above Normal  
Below Normal  
Well Below Normal  
No Signal

Sources: <sup>(a)</sup>NMHSs, <sup>(b)</sup>WMO, <sup>(c)</sup>ECMWF, <sup>(d)</sup>ACMAD, <sup>(e)</sup>UNHCR, <sup>(f)</sup>HDX, <sup>(g)</sup>NaturalEarth

**Disclaimer:** This product highlights hydrometeorological events which may be of interest to UNHCR. WMO makes no warranty in respect of the correctness or completeness of this information, nor does this information represent the official view of WMO. This information does not replace the advice and guidance provided by the official meteorological services for these regions. For official national guidance please refer to the national hydromet and disaster management agencies. The designations employed in this map are in conformity with United Nations practice. The presentation of material therein does not imply the expression of any opinion whatsoever on the part of WMO concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its borders. The depiction and use of boundaries, geographic names and related data are not warranted to be error free nor do they necessarily imply official endorsement or acceptance by WMO.

Map Disclaimer



# IMPACT FORECASTING AND MEASURES FOR MENINGITIS DISEASE CONTROL BY WHO IN AFRICA WITH WMO GLOBAL MEDIUM RANGE DETERMINISTIC AND S2S PRODUCTS CENTRES

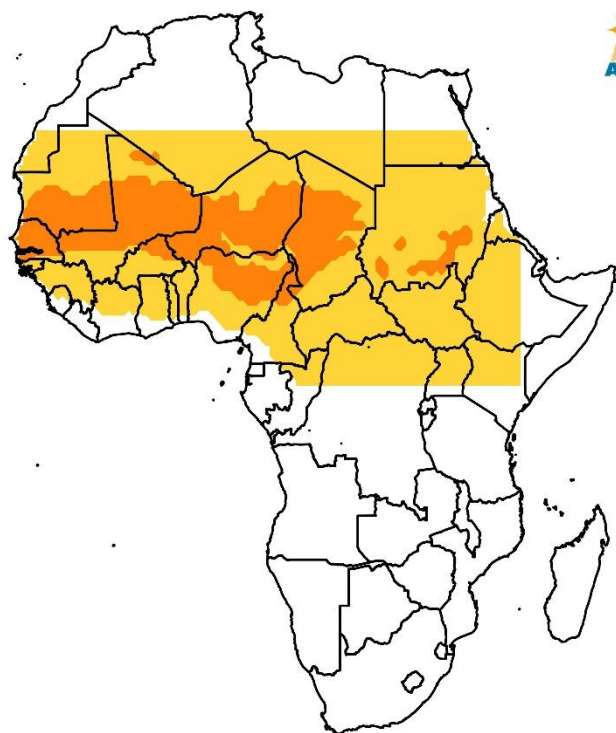


Valid From 10 to 16 February 2023



**HIGHLIGHT:** Meningitis cases likely in Mauritania, Senegal, Mali, Algeria, Niger, Burkina Faso, Nigeria, Cameroon and Sudan.

VULNERANCE MAP FOR MENINGITIS OUTBREAKS IN AFRICA  
issued on 20230209 for week: 20230210-20230216

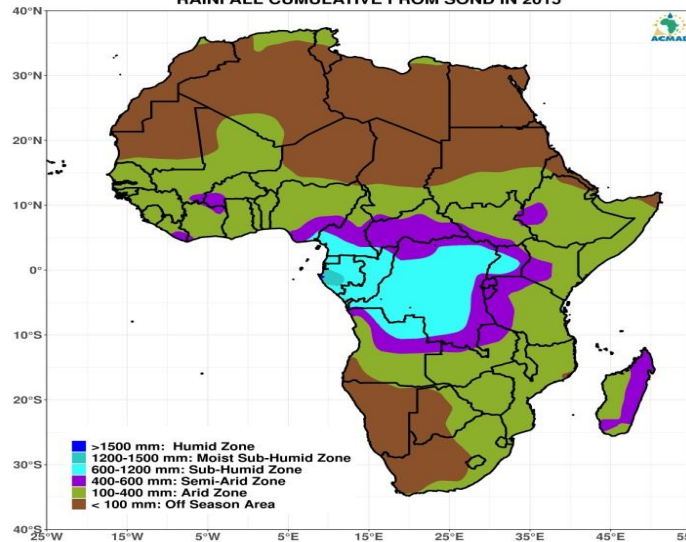


|  | Phenomenon  | Hazard   | Potentials Impacts                                    | Advisory / Measures  |
|--|---|--|---|--|
|  | <ul style="list-style-type: none"> <li>- Dust concentration below <math>150\mu\text{g}/\text{m}^3</math></li> <li>- Relative humidity above 40%</li> <li>- Temperature below <math>27^\circ\text{C}</math></li> </ul>                     | Emergence of Meningitis cases not likely                               | Potential pressure on the health system               | Routine surveillance systems at regional and national levels                                 |
|  | <ul style="list-style-type: none"> <li>- Dust concentration between 150 to <math>400\mu\text{g}/\text{m}^3</math></li> <li>- Relative humidity between 20 &amp; 40%</li> <li>- Temperature above <math>27^\circ\text{C}</math></li> </ul> | Emergence of Meningitis cases very likely                              | Loss of life, pressure on the health system           | Activation of surveillance systems at regional and national levels                           |
|  | <ul style="list-style-type: none"> <li>- Dust Concentration at least <math>400\mu\text{g}/\text{m}^3</math> and above</li> <li>- Relative humidity less than 20%</li> <li>- Temperature above <math>30^\circ\text{C}</math></li> </ul>    | Emergence of Meningitis cases very likely and epidemic status possible | Loss of life, increased pressure on the health system | Strengthen and increase meningitis surveillance systems at both regional and national levels |

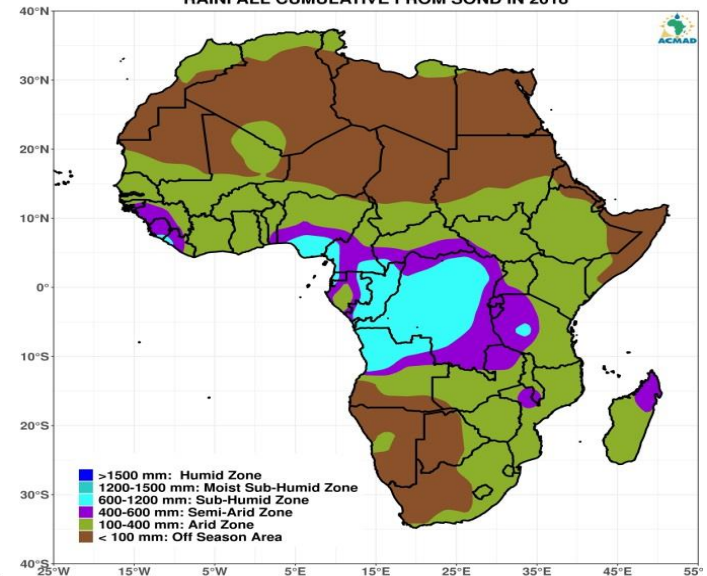


# INCREASE ON EXTEND OF OFF SEASON LAND AREAS IN SOUTHERN AFRICA DURING RECENT EL NINO YEARS

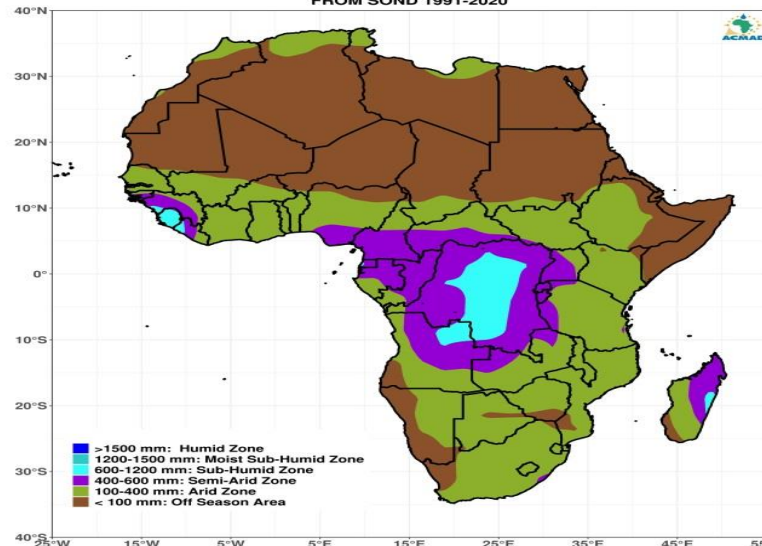
MAJOR CLIMATIC ZONES DETERMINED ON THE BASIS OF RAINFALL CUMULATIVE FROM SOND IN 2015



MAJOR CLIMATIC ZONES DETERMINED ON THE BASIS OF RAINFALL CUMULATIVE FROM SOND IN 2018



MAJOR CLIMATIC ZONES DETERMINED ON THE BASIS OF THE FROM SOND 1991-2020





# CHALLENGES AND OPPORTUNITIES

1. *Limited expertise to cover all types of Hazards ( e.g land and mud slides) in different sectors (e.g Health, agriculture, infrastructure)*
2. *Address the huge capacity and capability gaps ( e.g establishing and operating situation rooms to generate and share information on hazards, impacts, preparation, anticipatory actions and response)*
3. *EW4ALL*
4. *Assessment and management of compounding and cascading disasters*
5. *Routine exchange of local impact data between communities, national, regional and continental stakeholders to accelerate impact forecasting and improve the production of the State of Climate for Africa supporting African Climate Negotiators on Loss and damage*
6. *System change to update crop yields forecasts as soon as the disruptions on the start of the agriculture season is observed ( e. g Burkina Faso)*
7. *Raising Awareness for policy makers to invest more and better in hazards and impact forecasts modernization, budgeting and financing Anticipatory action*
8. *Building capacity of DMAs to mainstream preparation and Anticipatory action in National budget*

# ***LESSONS LEARNT AND WAY FORWARD***

1. *Useful Predictability up to five days ahead for heavy rain events , tropical cyclones and storm tracks, disruptions on the start of season and spells*
2. *Assessment and management of **Compounding and cascading disasters***
3. *Routine exchange of local impact data between communities, national, regional and continental stakeholders to accelerate impact forecasting and improve the production of the State of Climate for Africa supporting African Climate Negotiators on Loss and damage*
4. ***Operate the MultiHazards Advisory Centre** ( staff including research and studies, internet, indirect costs \$200 to 300 thousands) considering that Observation, data management , research, modelling and prediction/forecasting are funded components*
5. ***Capacity development with testbed and forecast demonstrations**, ad hoc and regular briefings and debriefings at the situation room including with humanitarian and DRR communities*
6. *Partner with ClimSA, AMSAF, HYDROMET .... For coordination*
7. ***Prioritize training and operation of impact forecasting, warning, decision making and action as well as benefits assessments***
8. ***Build on achievements of past projects including SAWIDRA for modernizing national warnings***

# ***LESSONS LEARNT AND WAY FORWARD***

- Provide ***multimodel ensemble and deterministic high resolution*** Analysis and forecasts supporting briefings preparation by countries

- ***Nowcasting and synoptic technical notes*** supporting operational forecaster's briefings at National level to facilitate anticipation and response to national emergencies

- ***Train forecasters and DRR experts on tools and products***

- Support countries ***establish and operate national early warning Information system/centres*** and DRR or humanitarian platform for emergency planning and implementation

- ***Support disaster managers*** from continental to local levels to receive and give feedbacks on ***impact information*** for strong winds, heavy rains, dust storm, high temperatures outlooks, drought ...

- Support measures to ***reduce risks or exploit opportunity*** through forecast based ***integrated emergency planning , budgeting, financing and implementation***



**THANK YOU**