



AMHEWAS - The African Multi-Hazard Early Warning and Action System for disaster risk reduction

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in collaboration with:

UNDRR Regional Office for Africa (Kenya), ICPAC (Kenya), ACMAD (Niger), African Union Commission - AUC (Ethiopia)

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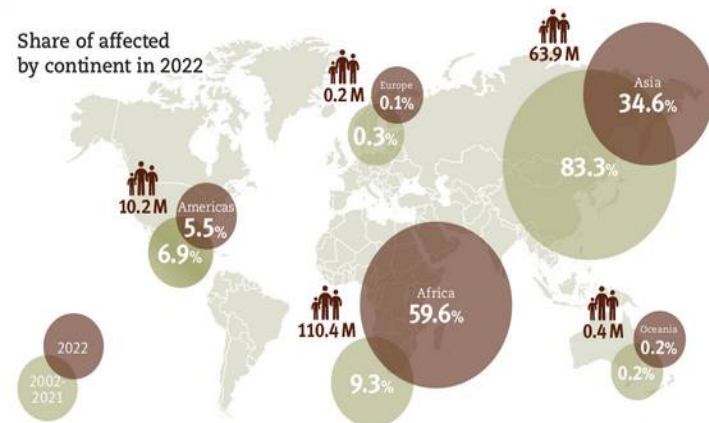
2024 EO for Africa Symposium, ESA-ESRIN Frascati, Italy

Disasters and their impacts

(CRED, 2023)

Globally, between 2000 and 2019, disasters caused ~3 trillion US\$ in economic losses, claimed 1.23 million lives, and affected a total of over 4 billion people. Out of those, floods, drought and storms hold the largest share

Human Impact: Total Affected



Number of affected (million) by disaster type: 2022 compared to the 2002-2021 annual average

198.9 2002 to 2021 > 185 in 2022

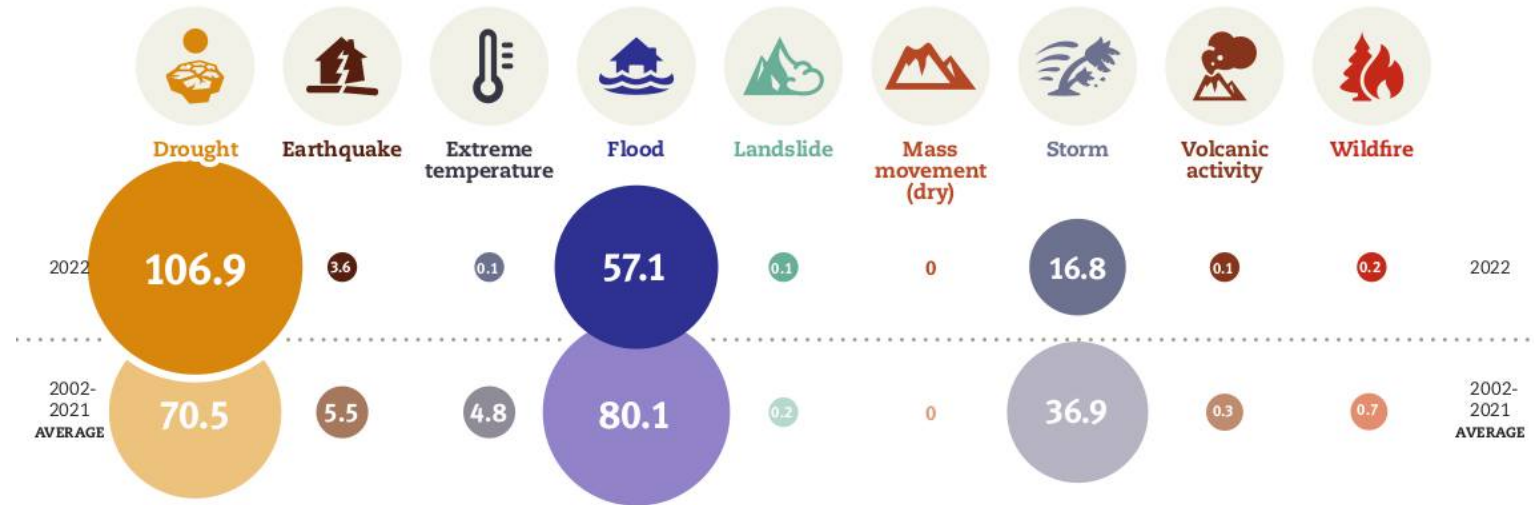


Table 2
Top 10 total affected – 2022

Pakistan	Flood	33.0 million	Bangladesh	Flood	7.2 million
Congo (Democratic Rep.)	Drought	26.0 million	China	Drought	6.1 million
Ethiopia	Drought	24.1 million	Niger	Drought	4.4 million
Nigeria	Drought	19.1 million	Burkina Faso	Drought	3.5 million
Sudan	Drought	11.8 million	Philippines	Storm 'Nalgae'	3.3 million

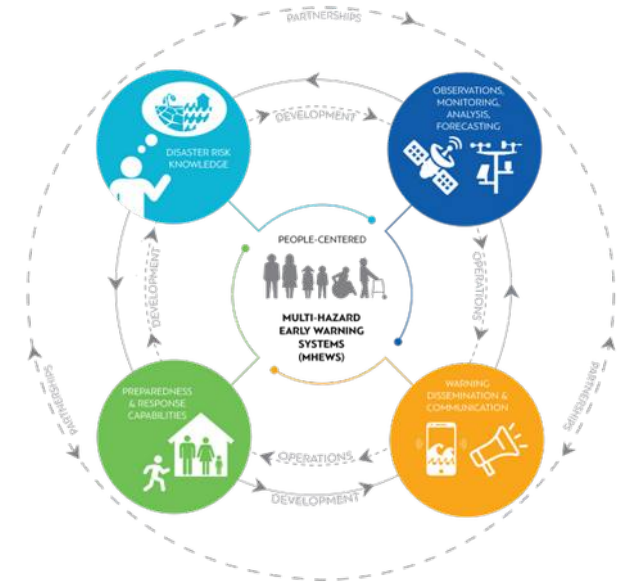
The AMHEWAS vision

2021-present

An African Multi-Hazard Early Warning and Action System (**AMHEWAS**) for Disaster Risk Reduction

Key activities

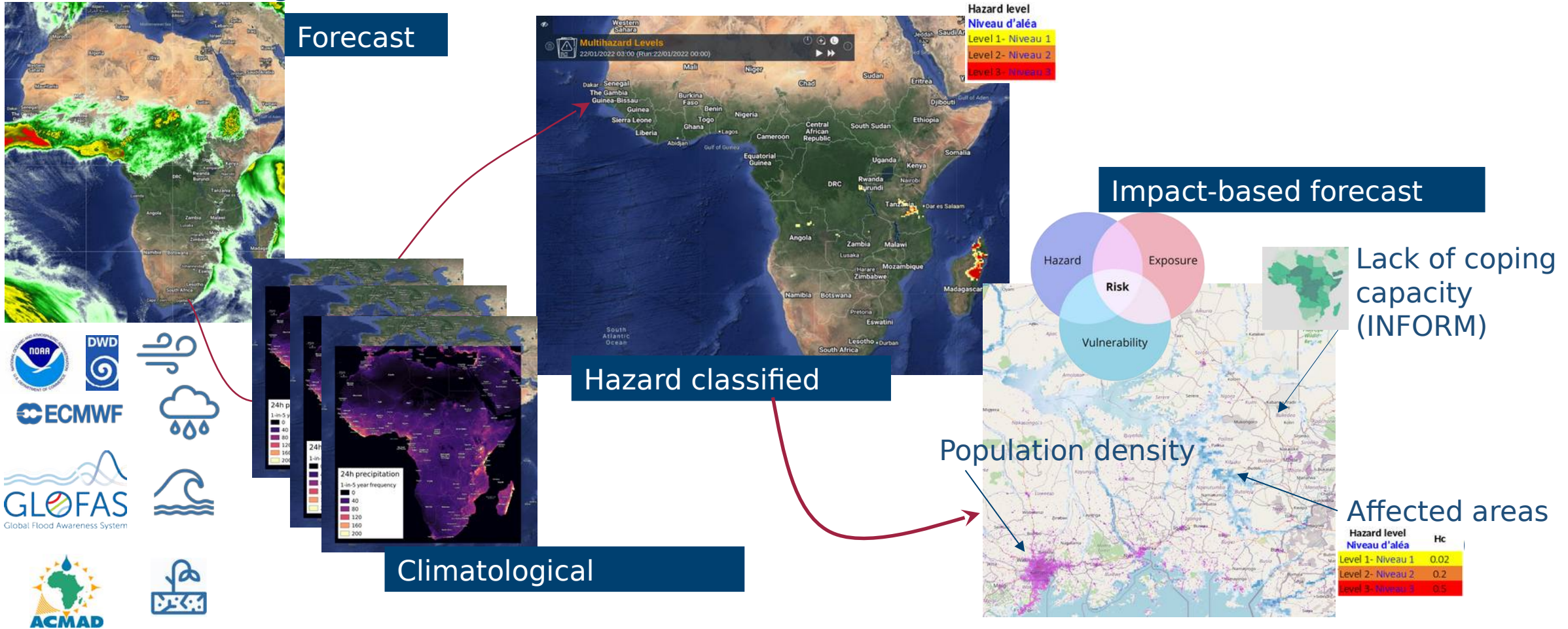
- Design of **legal and institutional framework** consistent across the different levels
- Set up of **Situation Rooms** with 24/7 operation and shared **Standard Operating Procedures**
- Implement **operational tools** for monitoring and **impact-based forecasting** at different scales
- Issue warning **bulletins** for disseminating **advisories for early actions**
- **Capacity building** for staff and experts from Member States and RECs



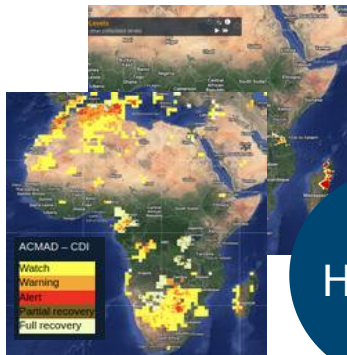
AMHEWAS Conference - Nairobi, October 2021

The continental operational forecast system

An operational automated **impact-based forecasting system** has been implemented at the continental scale, feeding the AMHEWAS products, based on the use of global available meteo-hydro forecasts and drought indices.



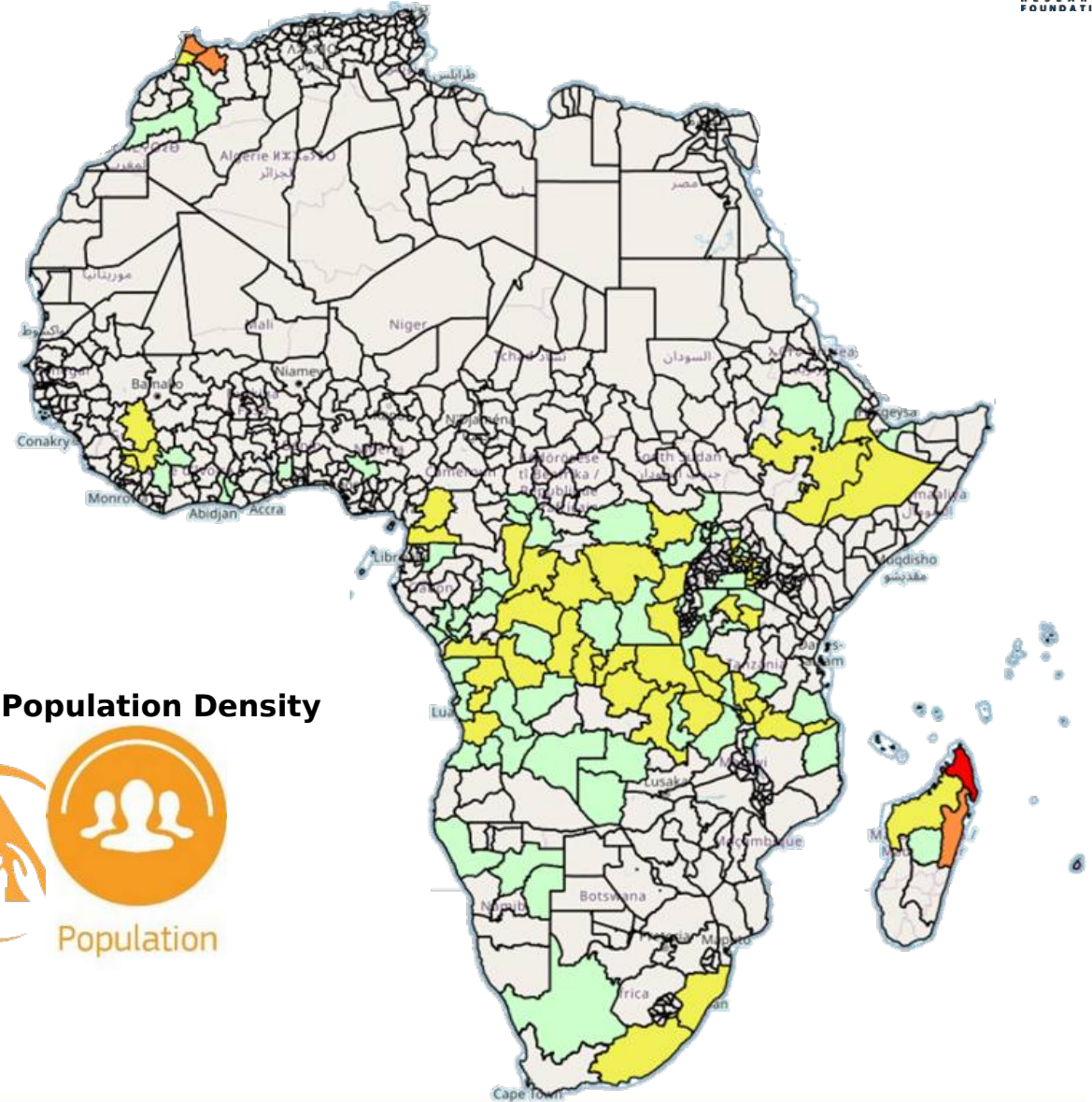
The impact-based classification



Hazard

INFORM Risk Index

Coping
Capacity



Exposure

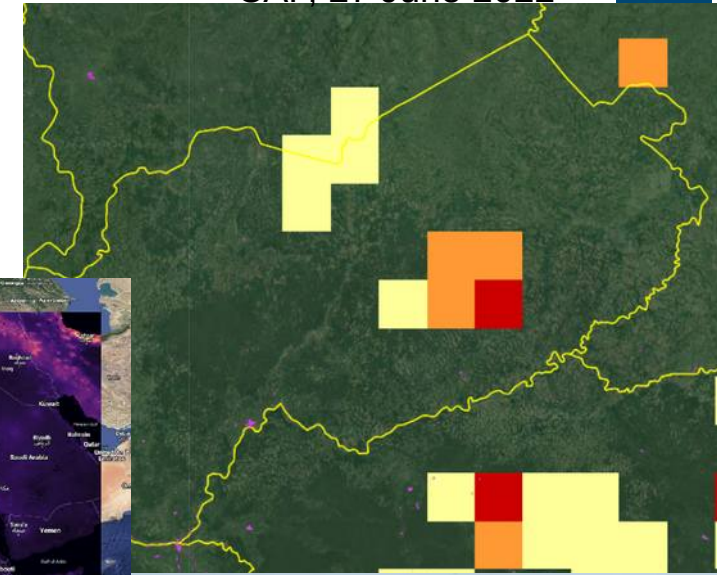
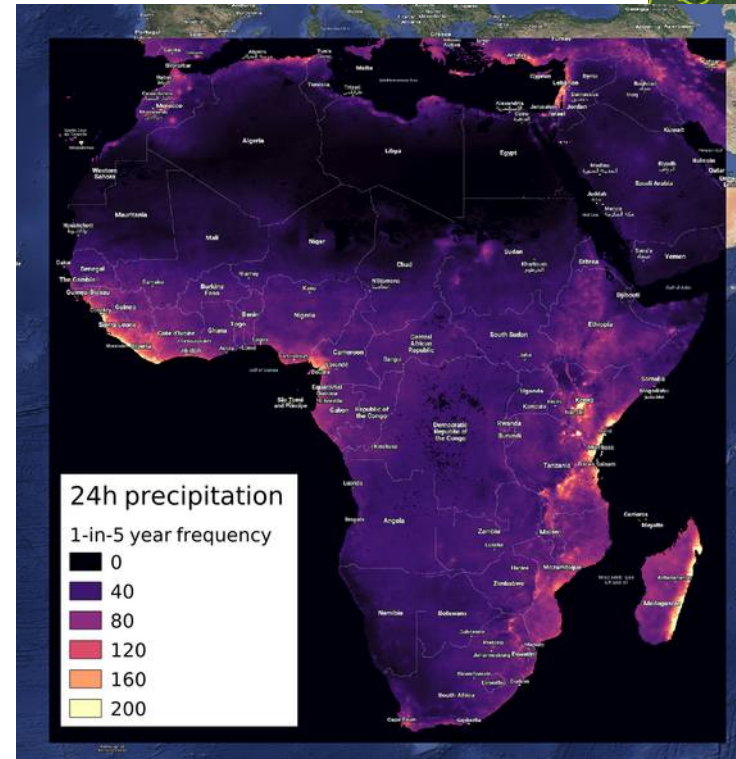


Thresholds Population Affected (PA)	Warning level	Severity
PA < 10 people	0	No event
10 < PA < 500	1	Low
500 < PA < 10,000 and PA < 0.5%	2	Medium
10,000 < PA < 50,000 and 0.5% < PA < 5%	3	High
PA > 50,000 and PA > 5%	4	Extreme

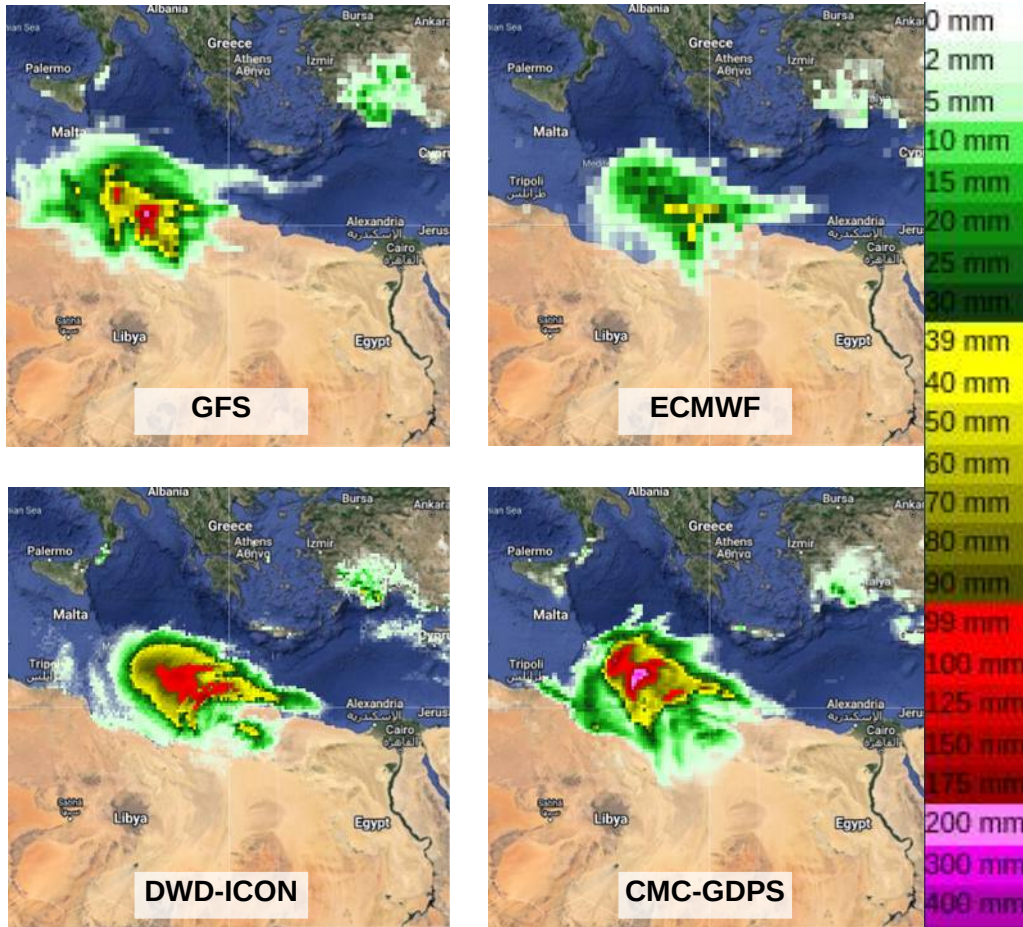
Extreme precipitation and wind speed

Precipitation: Maximum 24h cumulations in a sliding window over the subsequent 5 days. Thresholds derived from a long term satellite dataset (CHIRPS). Linked to annual probability of exceedance (2, 5, 20 years)

Wind: Maximum speed. Thresholds are taken from published research and operational centers. Linked to impact-related features (e.g., breaking or uprooting of trees, peak of the distribution of fatal and injury-causing accidents)

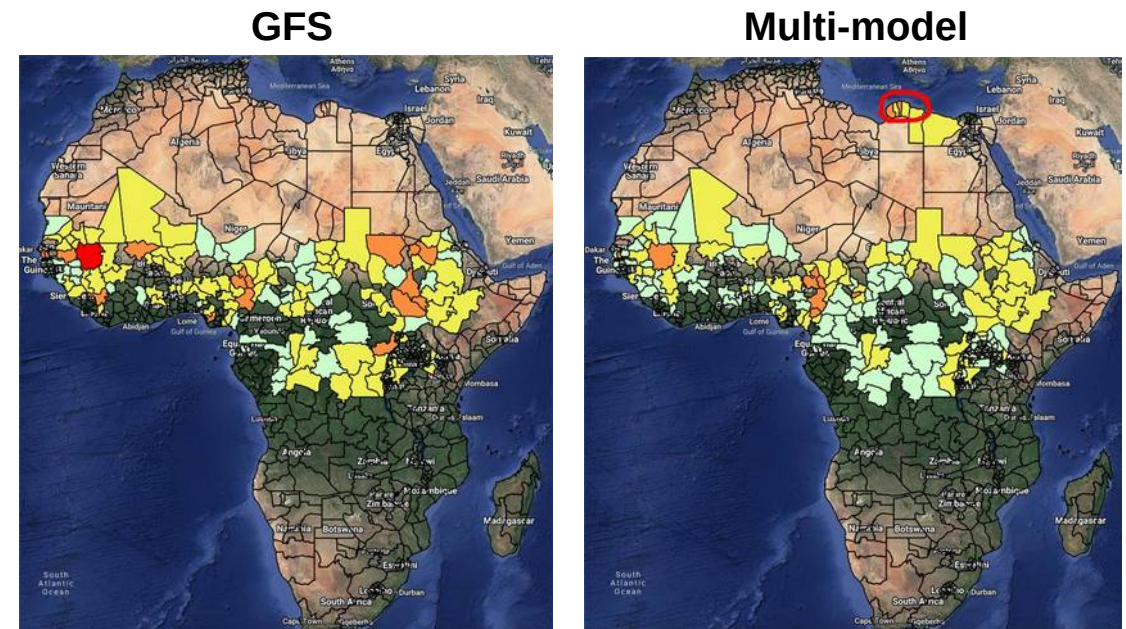


Multi-model forecasts



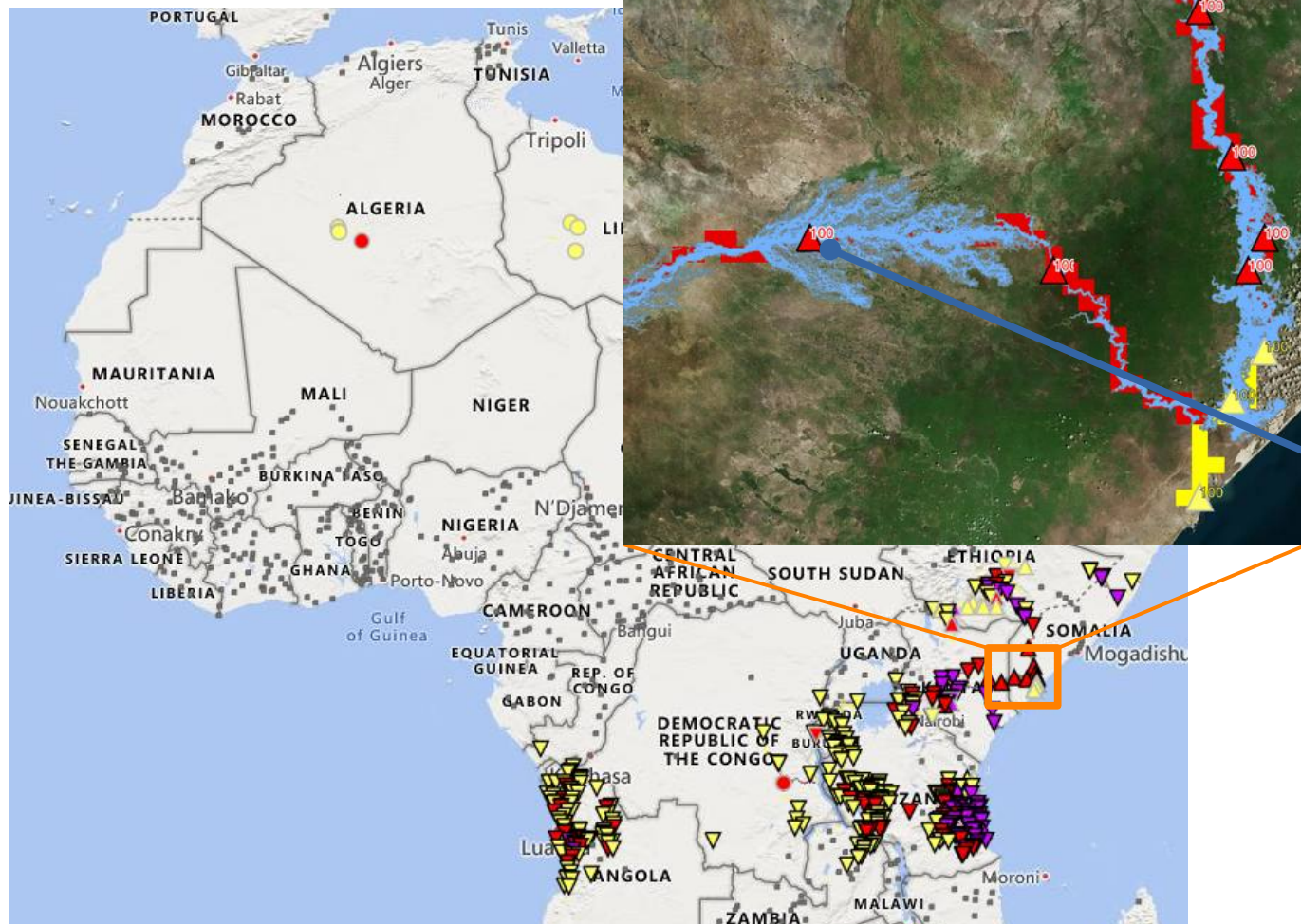
NWP Forecast 8 September 2023 over NE Libya
48h precipitation ending on 11 Sep 2023 12 UTC

Multi-model impact based classification of warning levels
Model weights assigned based on expert evaluation at ACMAD
More robust evaluation of affected areas and reduction of single-model outliers



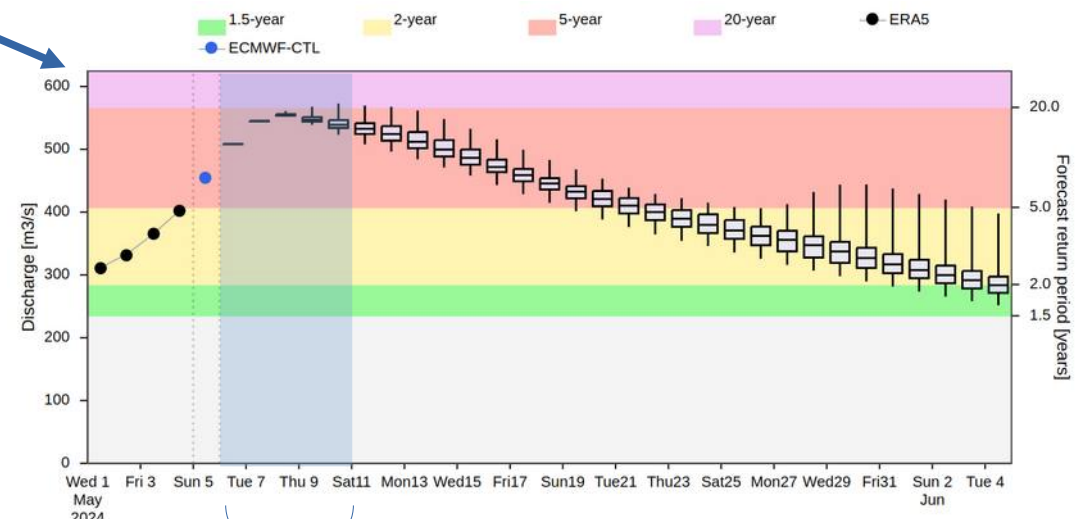
IBF Forecast 8 September 2023

River floods



GloFAS forecasts 2024-05-06

- Forced by **ECMWF weather forecasts**
- **5-day discharge forecasts**, mean of 51 ensemble members
- Discharge threshold exceedance for return periods **between 2 and 500 years** (0.05° ~5.5 km grid), linked to scenarios of inundation at 90m resolution



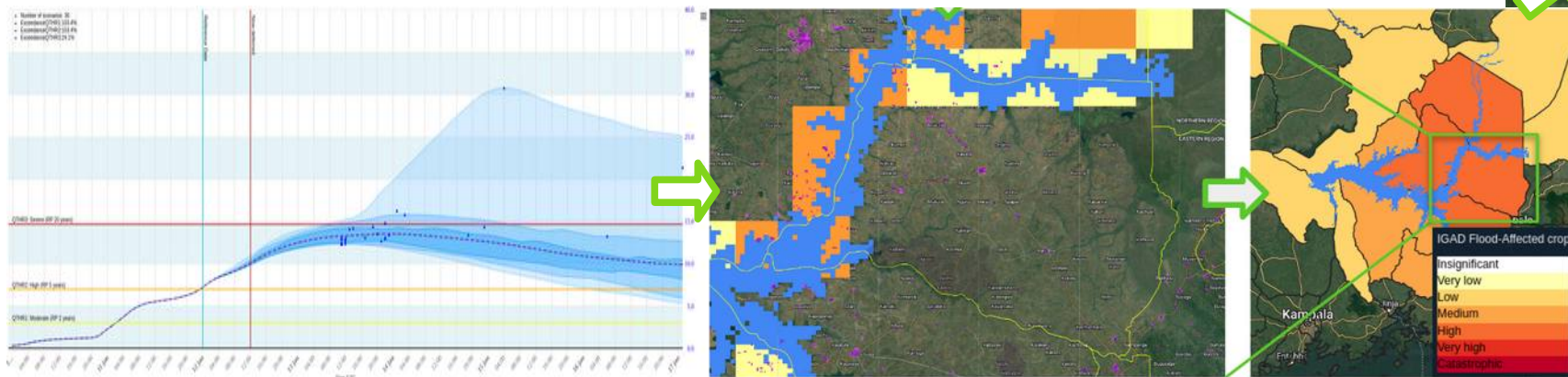
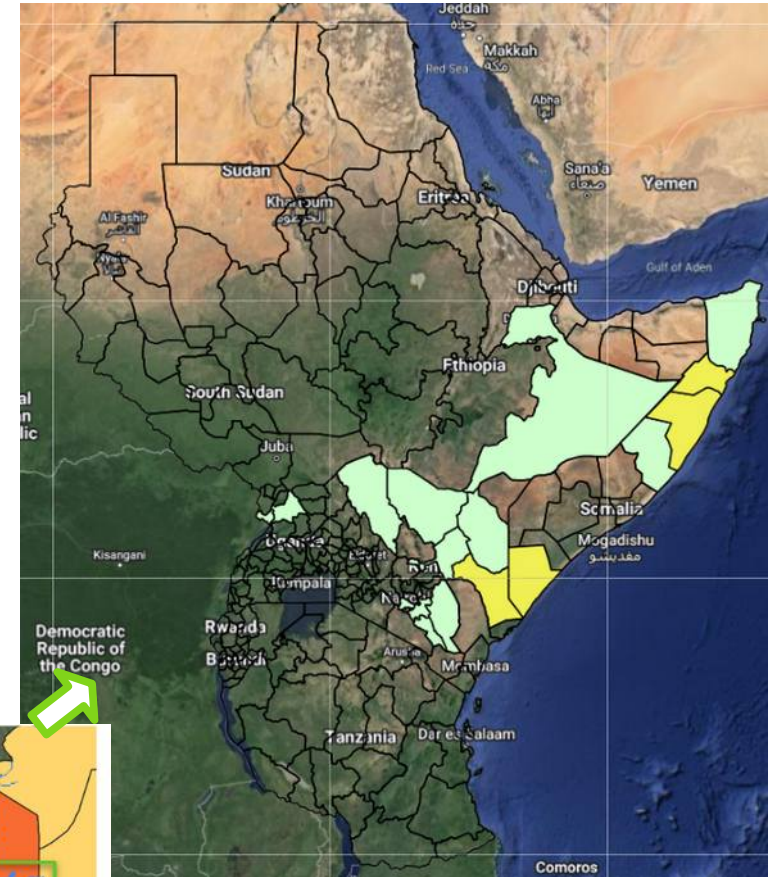
5-day forecast

Flood-PROOFS East Africa

Flood-PROOFS East Africa is an impact-based riverine flood forecasting system for the Greater Horn of Africa (GHA)

Modeling steps:

1. Distributed hydrological modeling with the **Continuum** model
2. Threshold exceedance analysis based on a coherent long term hydrological reanalysis
3. Link to inundation mapping
4. Risk assessment framework applied to 5-day hydrological forecasts and 6 exposure layers



**Check Poster ID 281
Impact-based flood
forecasting in Africa**

Drought

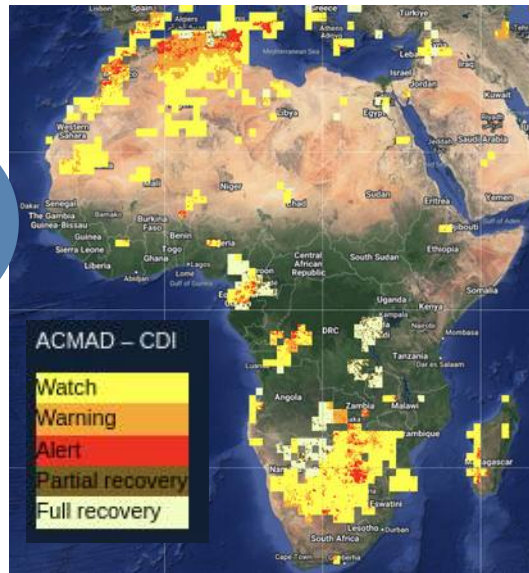
Drought-affected population is estimated on the basis of the CDI computed by ACMAD every 10 days



Africa Multi-Hazard Early Warning and Action System for DRR
Continental Situation Room

Issue no. 2024-010

Combined Drought Indicator (CDI)

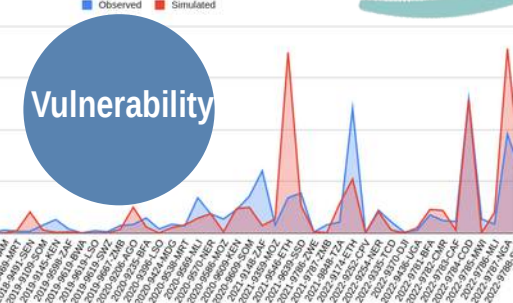


Hazard

INFORM Risk Index



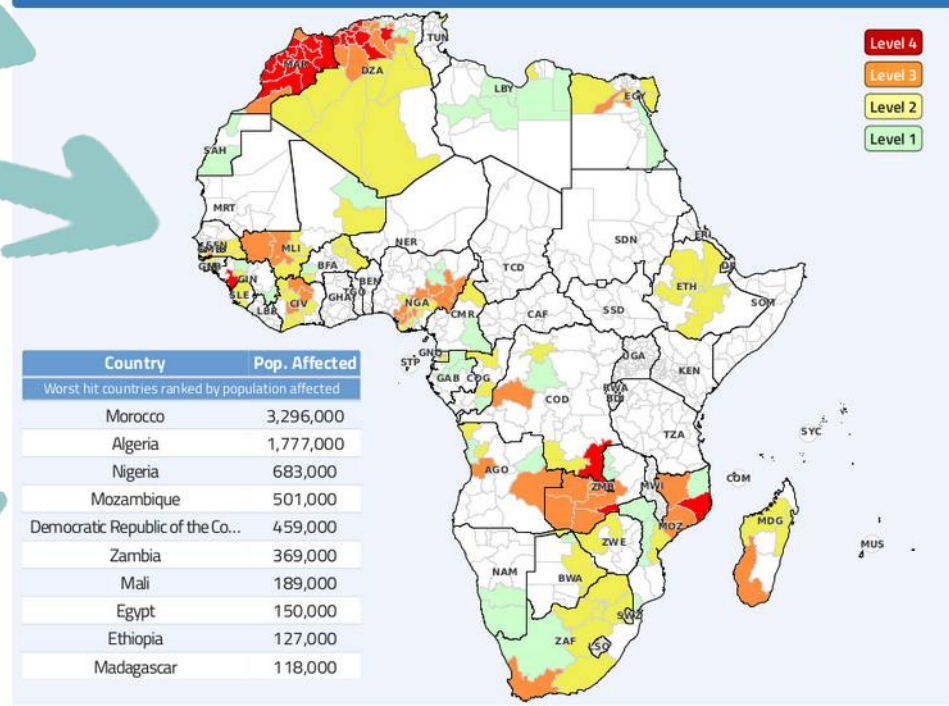
GHS Population density



Vulnerability

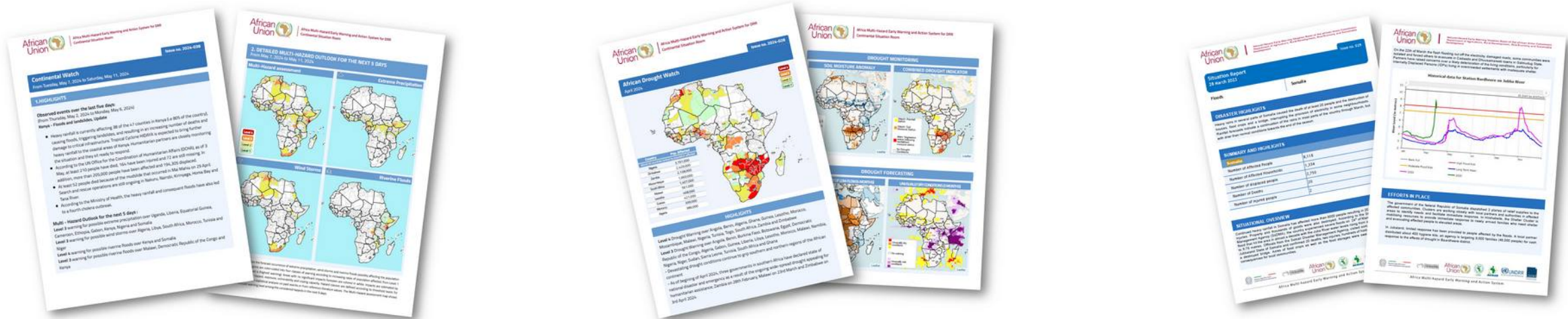
African Drought Watch

February 2024



Calibration of vulnerability functions through optimization of simulated impacts (People affected) versus recorded data from 55 droughts in Africa in 2016-2022 available in EM DAT

The AMHEWAS products



Continental Watch

Issued **twice per week** (Tue and Fri)
 Impact-based **forecast up to 5 days**
 Hazards covered: **Wind, extreme precipitation, river flooding**
 Multi-language
 Includes a summary of recent disasters

Africa Drought Watch

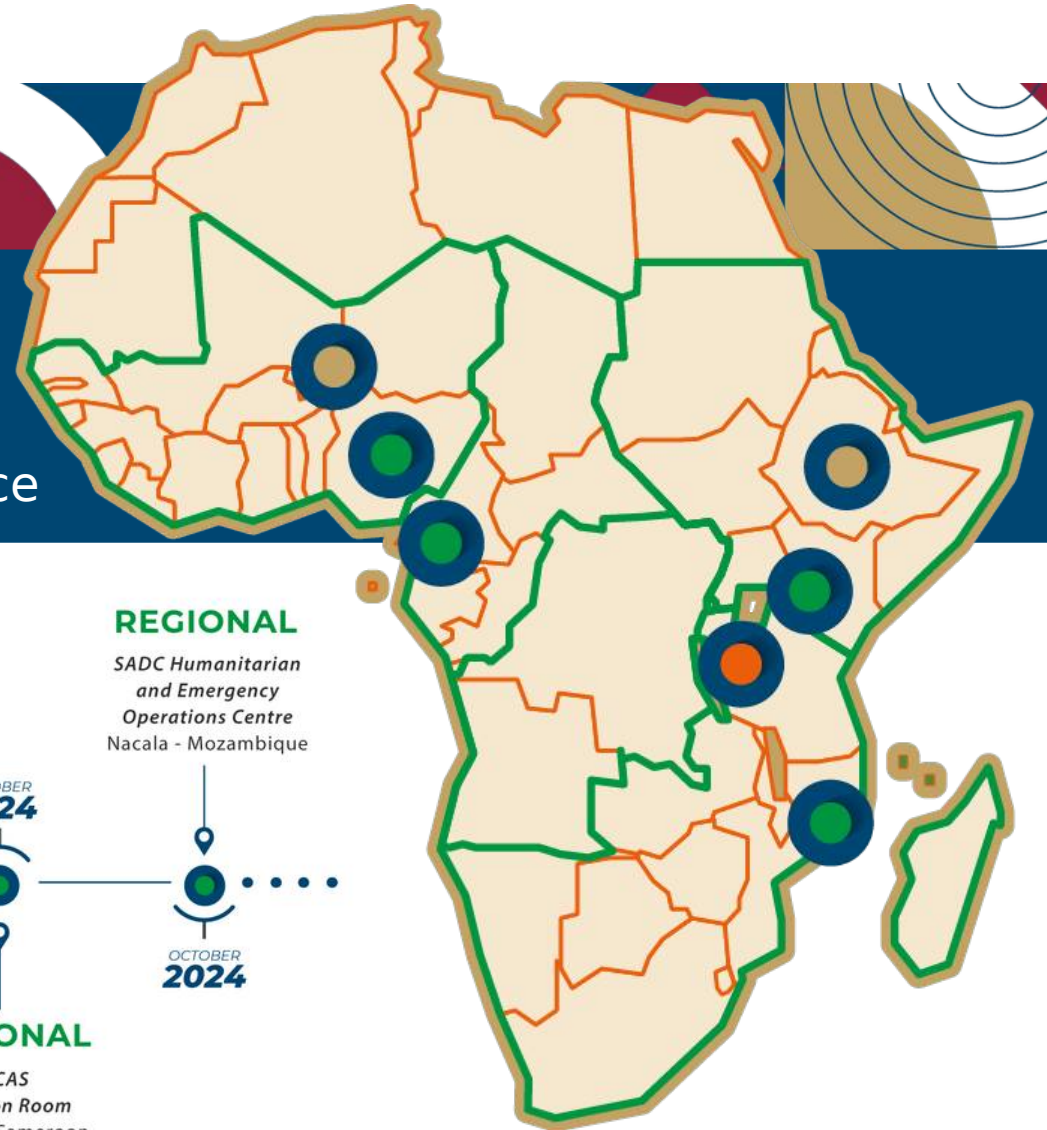
Issued **once per month**
 Impact-based **current drought condition**
 Hazards covered: **drought**
 Multi-language
 Test phase ongoing before operationalization

Emergency Situation Report

Variable frequency (event based)
 Reporting on ongoing / recent events and impacts
 Includes an outlook for the next days

The network of situation rooms

- ✓ Operational core of AMHEWAS and its products
- ✓ Multi-hazard monitoring at various levels
- ✓ MyDewetra platform as common visualization interface



Capacity building

TRAINING FOR REC MEMBER STATES



IGAD x 2

ICPAC



ECOWAS x 2



SADC x 2



ECCAS

TRAIN THE TRAINERS



ICPAC



NATIONAL TRAINING

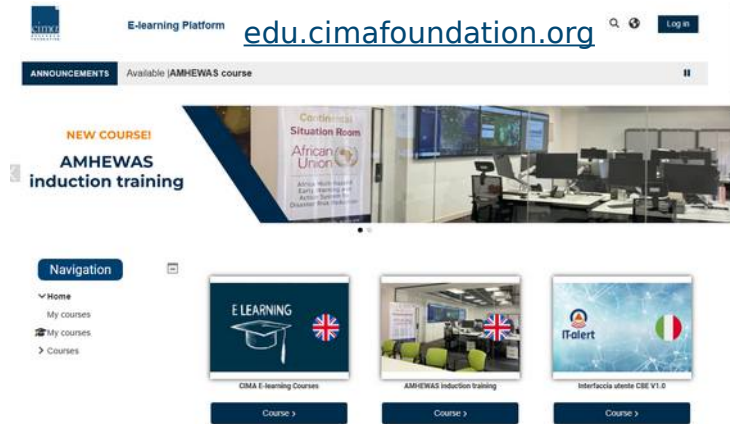


12 agencies
in **Namibia**



3 institutions
in **Tanzania**

ONLINE TRAINING





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