WORLD METEOROLOGICAL ORGANIZATION

Global Water Partnership

IDMP

INTEGRATED DROUGHT MANAGEMENT PROGRAMME

Virtual Exchange On Drought Indicators and Indices

24 October 2023

Agenda

- **Welcome and short update.** Robert Stefanski, IDMP TSU, WMO (10 mins)
- **The East Africa Drought Watch**. Viola Otieno, EO Expert and Lead Regional Drought, ICPAC-IGAD (15 mins)
- **Updating the IDMP Handbook of Drought Indicators and Indices. Drought Resilience +10.** Robert Stefanski, Head Applied Climate Services, WMO (15 mins)
- **Q&A and discussion** (10 mins)
- **Marketplace: Partners' initiatives** (20 mins)
- **Closing Remarks** (05 mins)

The IDMP Annual Meeting - Highlights

Selected Recommendations
Support, organize, manage to HMNDP+10
More research and focus on compound / cascading events
Need to better pool available courses and resources
Promote / increase awareness on climate extremes (floods and drought
Capacity building in project proposal preparation and access to finances
Use new media technologies for talking about drought management.
Guidance / report on Flash Drought
Update guidance documents on Pillar 1 - Monitoring & Early Warning
Guidelines on collection of impacts on global level (pillar 1 and 2)

IDMP online course
Integrated Drought Management: Monitoring and Early Warning

Free, online and self-paced course is **open until 15th November 2023**.

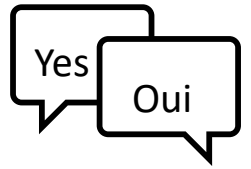
MORE INFO HERE

Time: 8 hours.

Total time dedication: 4 weeks.

Institutions: Cap-Net, UNEP-DHI, World Meteorological Organisation, Global Water Partnership, IDMP. Volta Flood and Drought Management

Certification: Attendance and Completion



ENGLISH & FRENCH COURSE

INTEGRATED DROUGHT MANAGEMENT PROGRAMME

ASSOCIATED PROGRAMME ON FLOOD MANAGEMENT

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Drought Resilience +10

High-level Meeting on National Drought Policy

- International Organizing Committee
-
- 14 Organizations (FAO, GWP, IWMI, IOM, NDMC, NOAA, UNCCD, UNDRR, UNESCO, WMO, World Bank) & Spain and Morocco

- Likely in April 2024 in Spain

- Many side events held

- 9 Workstreams with lead organizations

VISIT HERE

Questions?

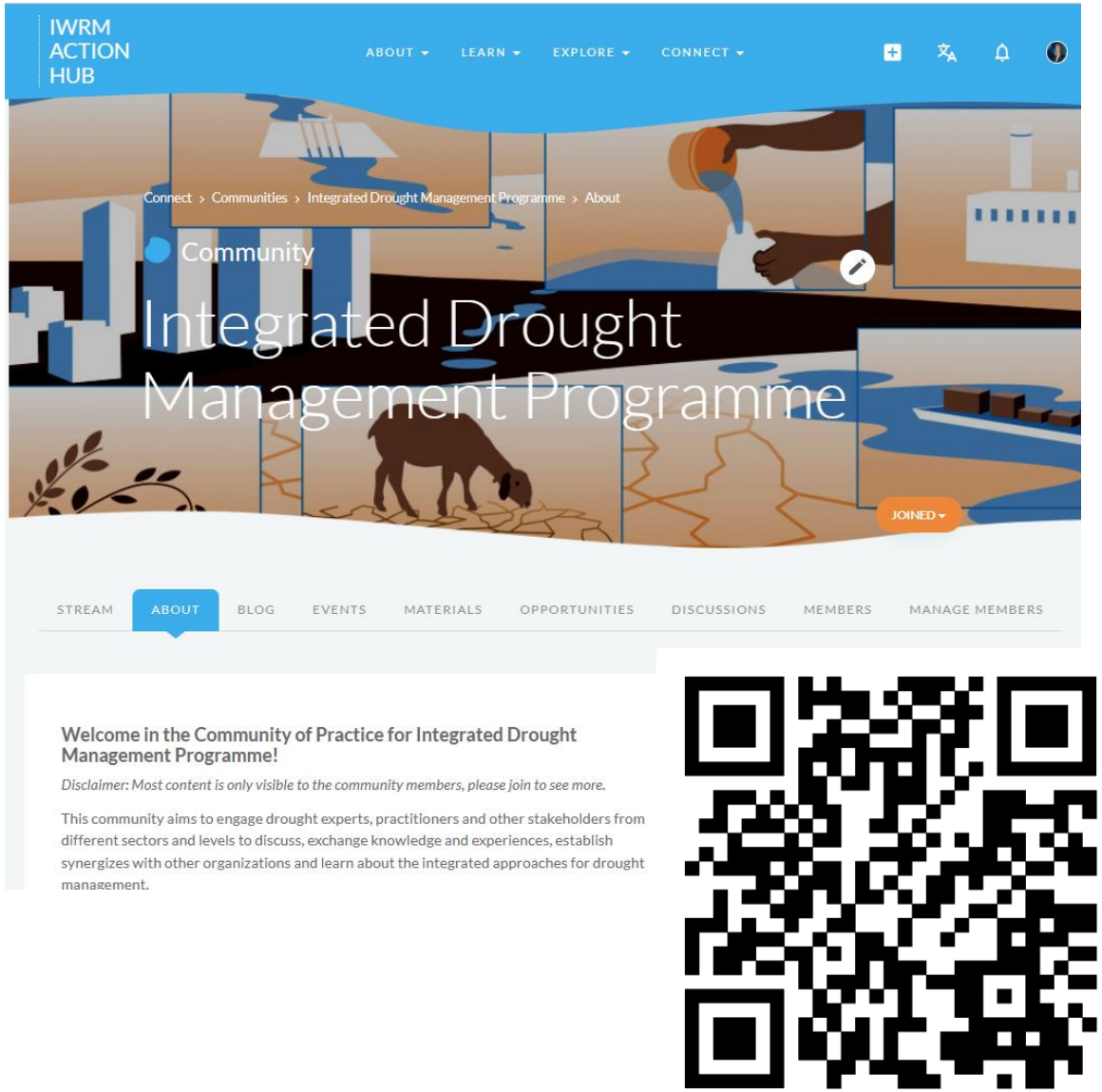
DroughtResilience10@wmo.int

Drought Resilience +10
High-level Meeting on National Drought Policy

N°	Workstream	Leading organizations
1	Drought resilience and global mechanisms	UNDRR/NOAA
2	Drought risk governance: The regional, national, and local challenges	UNCCD/UNESCO
3	Drought Impact monitoring, assessment and forecasting	WMO/NDMC
4	The need to turn drought policies into action	FAO/UNCCD
5	Ecosystems and drought	IWMI/IUCN/TNC
6	Social inclusion, climate justice and drought	GWP/IWMI
7	Drought risk finance	FAO
8	Public-Private-Civil society partnerships for integrated drought risk management	WMO/GWP/World Bank
9	*Health and Drought*	

Join NEW IDMP Community of Practice

1. Register to the IWRM Action Hub
2. Search for the IDM Community of Practice – click JOIN
3. … and you are a member!



Virtual space to discuss, exchange, inform, share, establish synergizes and learn.

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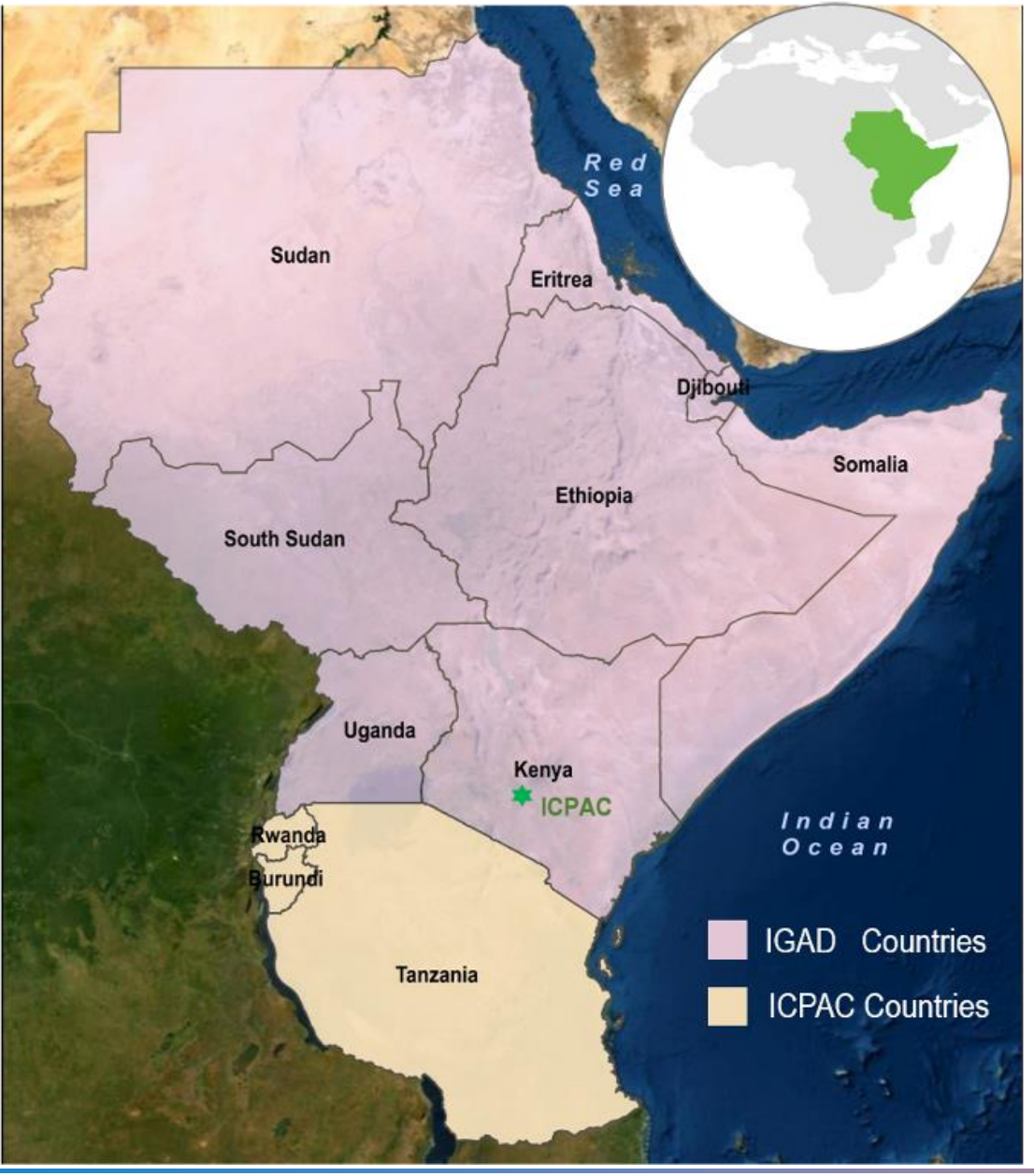
East Africa Drought Watch

Viola Otieno – EO scientist for EWS,
IGAD Climate Prediction and Applications Centre - ICPAC
24 October 2023



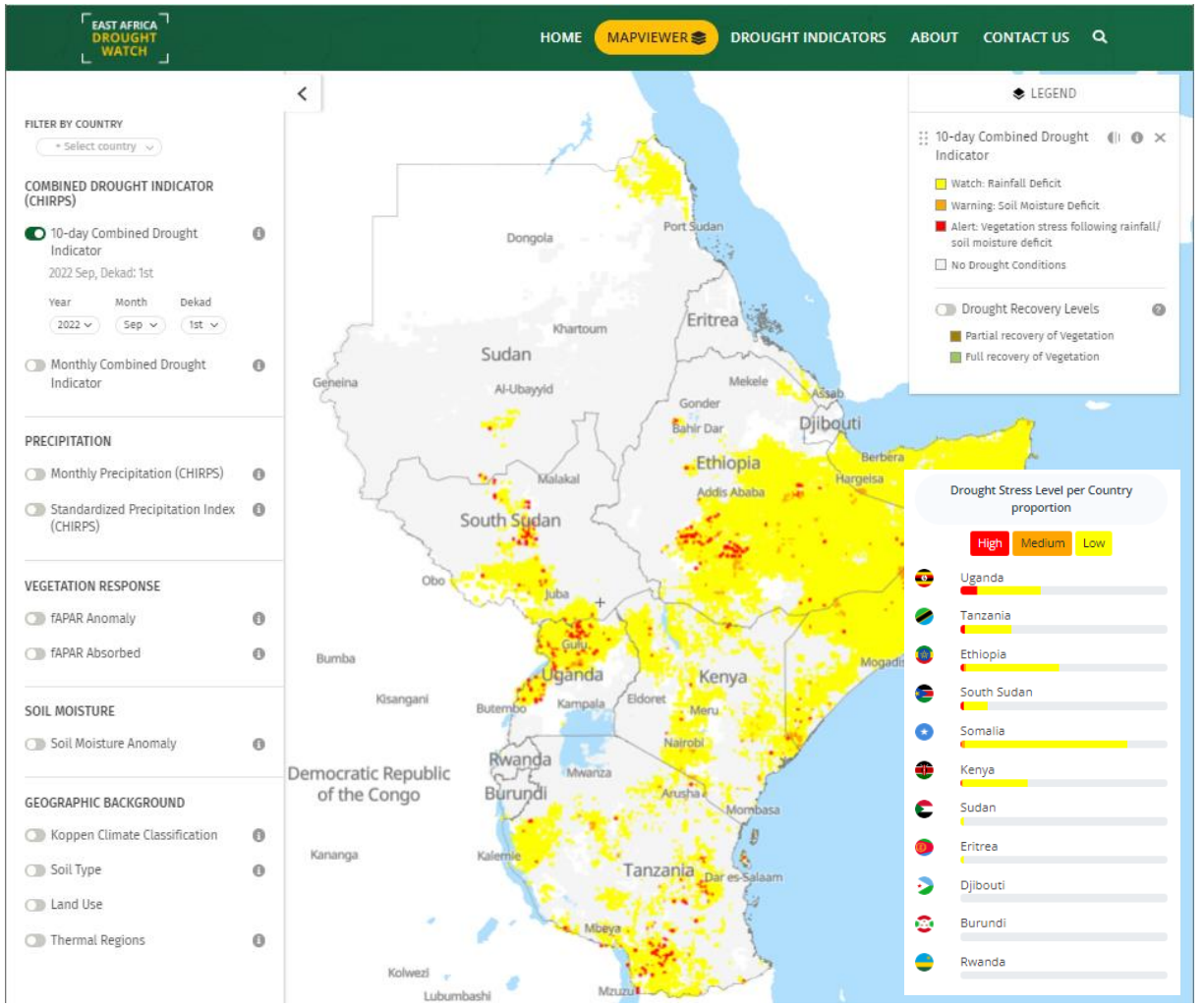
ICPAC

- IGAD Climate Prediction and Applications Centre, Nairobi – Kenya
- Specialized institution of IGAD
- Established in **1989** as the Drought Monitoring Centre (DMCN)- Nairobi
- **2007**, protocol establishing the Centre signed & name changed to IGAD Climate Prediction and Applications Centre
- **2017** – designated Regional Climate Centre(RCC) by WMO
- Member of AUC/NEPAD Network of Water Centers of Excellence
- ICPAC has an Observer Status with UNFCCC
- Provides climate services to 11 member states

East Africa Drought Watch

- Public online system for drought monitoring and early warning
- **Uses Earth Observation and Weather information**
- Provides **automatic 10-day warnings** for:
  - Developing and actual drought events
  - Recovery from drought conditions
- Developed jointly by **ICPAC** and the **Joint Research Centre (JRC)** of the European Commission.
- Hosted at the IGAD Disaster Operations Centre
  - IDOC: A state-of-the-art situation room tasked with providing regional multi-hazard monitoring and early warning to improve response and disaster risk management
  - Covers 11 Eastern Africa countries; Burundi, Djibouti, Ethiopia, Eritrea, Kenya, Somalia, South Sudan, Sudan, Tanzania, Uganda

East Africa Drought Watch



https://droughtwatch.icpac.net/

INTEGRATED DROUGHT MANAGEMENT PROGRAMME

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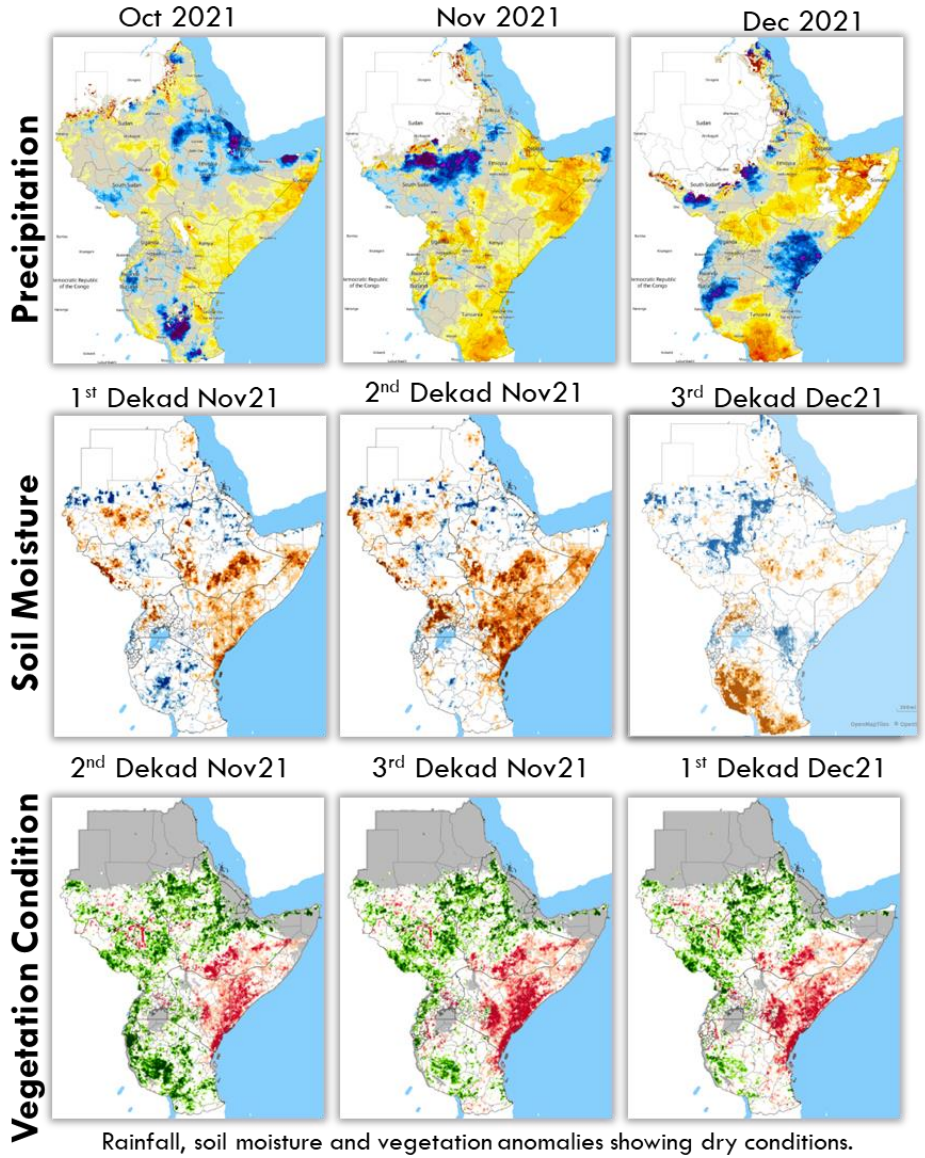
Drought Indicators

- Three indicators:
  - Precipitation anomalies
  - Soil moisture anomalies
  - Vegetation anomalies
- Standardised Precipitation Index (SPI)
  - SPI-1, SPI-3, SPI-9/SPI-12
  - Source: CHIRPS
- Soil moisture anomaly
  - Source: LISFlood model
- Vegetation anomaly
  - Source: MODIS/VIIRs
- **Combined Drought Indicator**

  {SPI, soil moisture, vegetation anomalies}

Convergence of Evidence

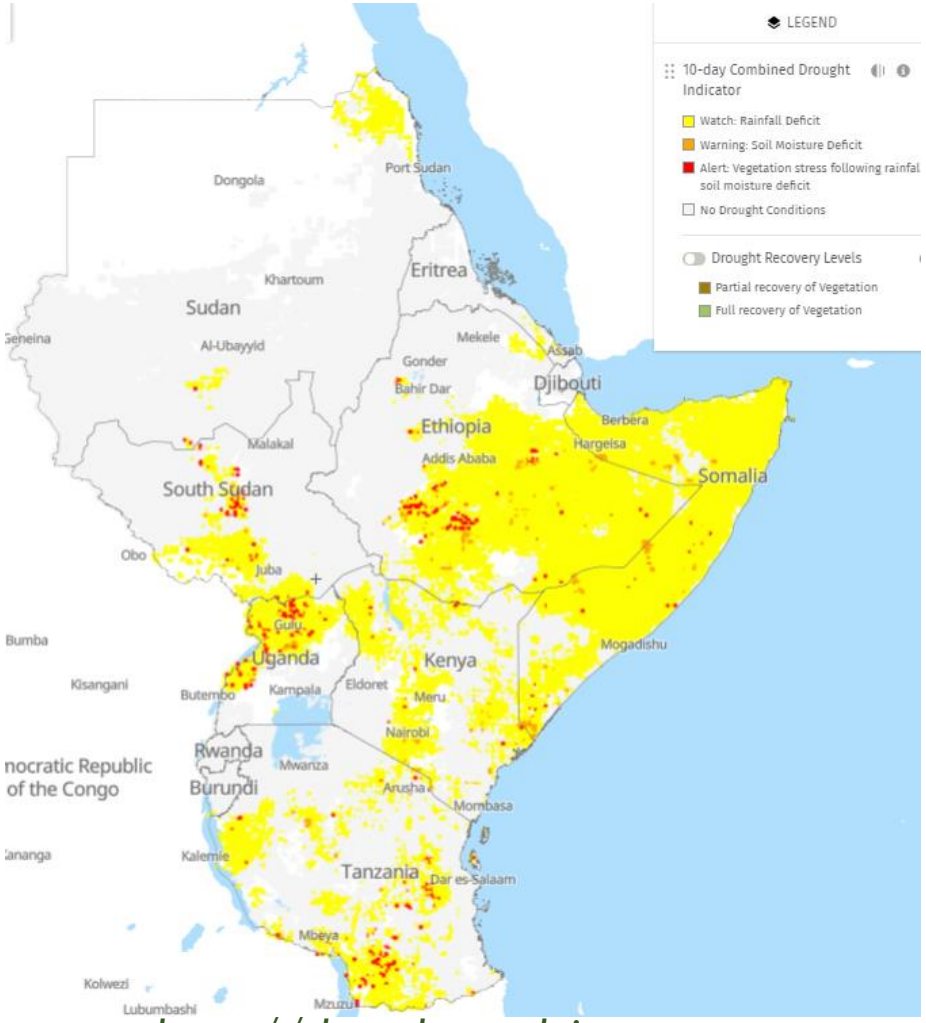


Rainfall, soil moisture and vegetation anomalies showing dry conditions.
Source: EADW

Combined Drought Indicator (CDI)

The Combined Drought Indicator (CDI) identifies areas with the potential to suffer agricultural drought, areas where the vegetation is already affected by drought conditions, and areas in the process of recovery to normal conditions after a drought episode.

Colour	Level	Classification description
	Watch	A relevant precipitation deficit is observed
	Warning	The above precipitation deficit is accompanied by soil moisture deficit
	Alert	The above two conditions are accompanied by a negative anomaly of vegetation growth
	Partial recovery	When after a drought episode, the meteorologivcal conditions are recovered to normal but the vegetation conditions are yet to recover
	Full recovery of vegetation	When after a drought episode both the meteorological and vegetation conditions have recovered to normal
	No drought conditions	



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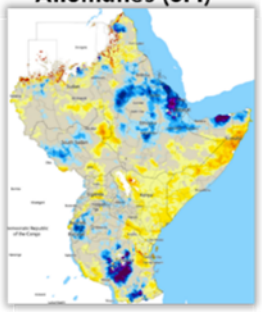
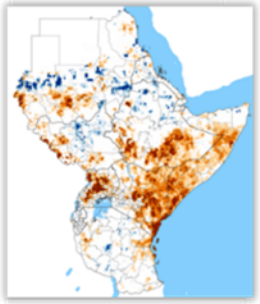
Combined Drought Indicator (CDI)

Combined Drought Indicator (CDI) for Agricultural Drought =

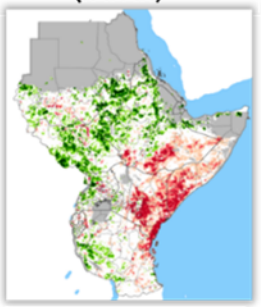
1 **Precipitation Anomalies (SPI)**

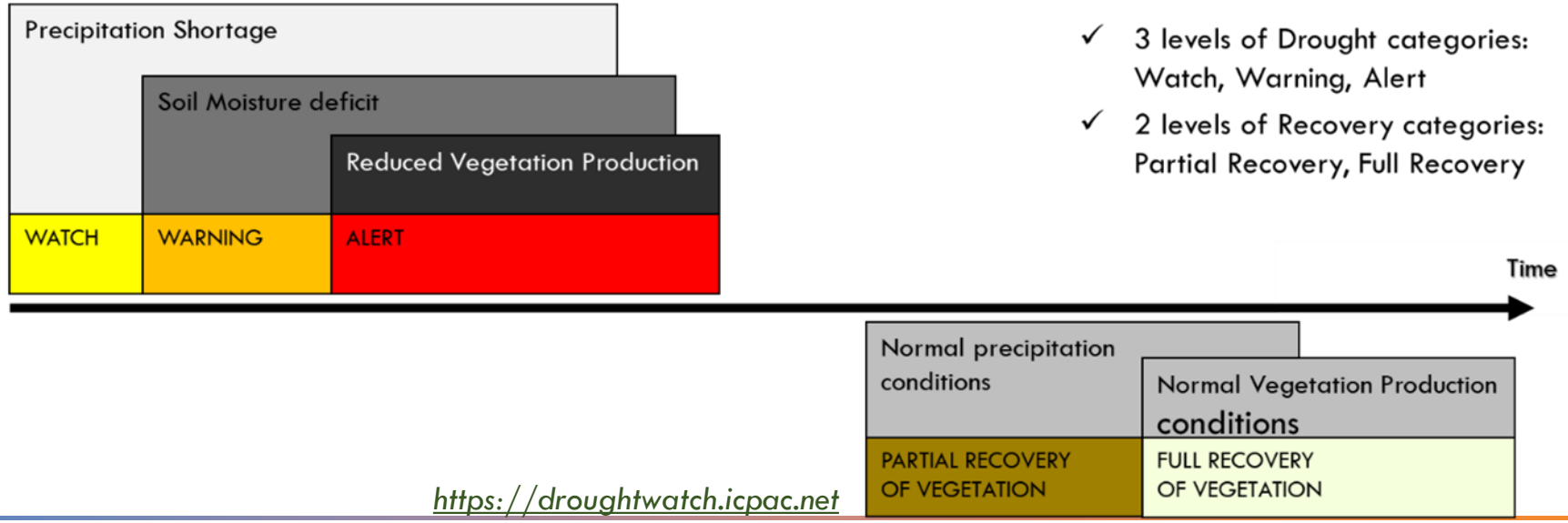


2 **Soil Moisture Anomalies**



3 **Vegetation Anomalies (fAPAR)**





- ✓ 3 levels of Drought categories: Watch, Warning, Alert
- ✓ 2 levels of Recovery categories: Partial Recovery, Full Recovery

https://droughtwatch.icpac.net

Products: Periodic Bulletins & Reports

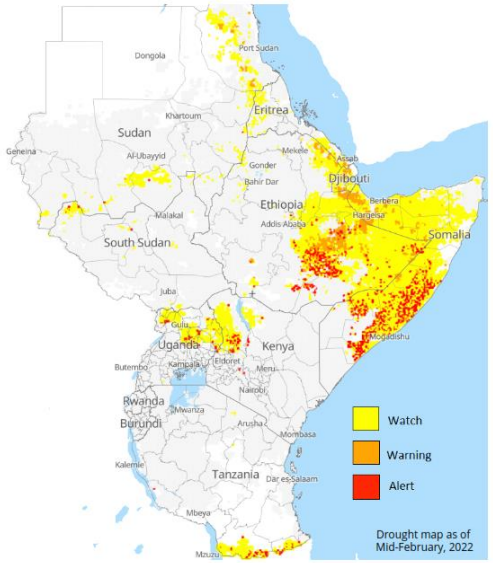
East Africa Drought Watch

IGAD
ICPAC

Disaster Operation Centre - Drought Update

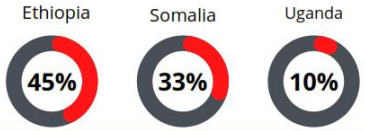
March 29, 2022

- 5,290,883 Estimated population affected
- No Data Deaths
- 6,071,110 Displaced population
- 29,632,601 Food insecure people
- 2,900,000 Estimated number of dead livestock & wildlife
- USD 849M Humanitarian response needed



Most affected countries:

In percentage of the population



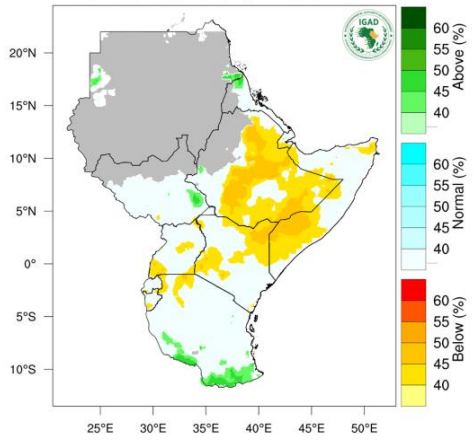
Key messages

- Eastern Africa faces serious food insecurity with over 29M people in need of humanitarian assistance.
- The ongoing drought is particularly acute in Ethiopia, Kenya, and Somalia.
- Sharp increase in the number of drought-induced IDPs in Somalia since November 2021.
- Ethiopia: traceability regulations prevent meat exporters from reaching European and North American markets.

Forecast and warning

- Ethiopia, Kenya, and Somalia: 12 to 15M people likely to face high levels of food insecurity until May 2022.
- Somalia: 1 to 1.4M people may be displaced in the next 6 months.
- Updated forecast for March to May (MAM) 2022 season: drier than normal conditions in most of the eastern parts of the region, covering Eritrea, most of Ethiopia, western South Sudan, isolated places in Uganda, eastern and north-eastern Kenya, parts of southern Somalia, and north-eastern Tanzania.

Rainfall Forecast for April 2022



Advisory

- Urgent call for immediate and coordinated humanitarian action to save lives, livelihoods, and build resilience.
- Interventions include: food and water supply, cash payouts, and livestock off-setting.
- Humanitarian actors should advocate for no-regret approaches.

Data/Infor Sources: IGAD-Member States/ICPALD/FSNWG/ /UNHCR/OCHA East Africa Drought Watch: https://droughtwatch.icpac.net Contact: disaster-risk-management@igad.int

IGAD
ICPAC

DROUGHT IN SOMALIA 2020/2022 (August Update)

Causes – Trends – Impacts and Current Status

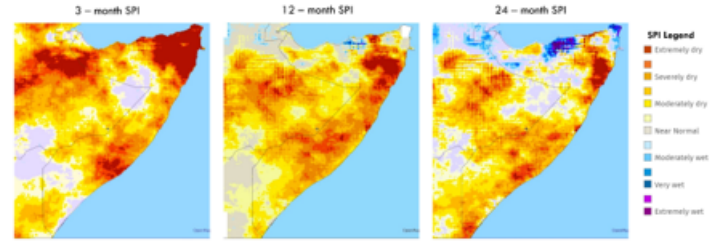
1. Cause

The current drought and subsequent impacts are attributed to complex interplay between biophysical factors such as climate variability and Climate Change impacts to the global pandemic (COVID-19) and ecosystem degradation and disruption of food supply chains and conflicts creating compounding risks and cascading impacts.

There were early indications of below normal rains starting from July 2020 (Figure 3) and early warnings have been issued since then every start of the main season by ICPAC. The main challenge in the ongoing drought is lack of early action, CHC[1] analysis of response to the drought indicate there were two critical points in the timeline when early action would have been triggered in Somalia to avert the devastating impacts of the drought.

Despite isolated rains received in July, the drought conditions continue to persist across most parts of Somalia with the situation expected to worsen considerably over the upcoming October-December rainfall season based on the seasonal forecast issued by ICPAC during the GHACOF 61.

Drought Trends in Somalia



Precipitation anomaly maps over Somalia as of June 2022 showing prolonged drought conditions persisting over 24 months period

Figure 1 SPI maps showing rainfall anomalies over 3, 12 and 24 months. Most parts of Somalia have been severely dry to extremely dry over extended periods of time (Source: FAO/W)

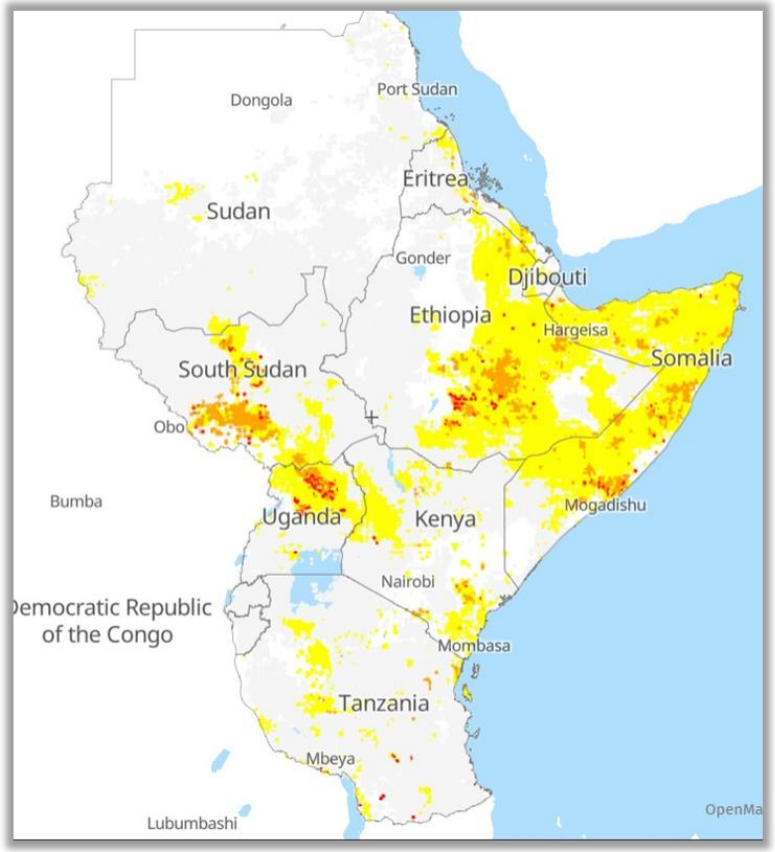
Even in the absence of other factors, a fifth consecutive failed rainfall season would likely be sufficient to induce starvation and in some cases famine for a sizable portion of the population. It is important to keep in mind that in drought of 2010–2011, several livelihood groups were driven into famine by just two significant failed rainfall seasons. The 2022 Gu season failure had the highest deficit I history and it is anticipated that the 2022 Devr season failure will be as terrible or worse Figure 2. If the devr

East Africa Drought Watch

Products: Regional Analysis – Transboundary

Regional Overview of Drought Conditions (3rd Dekad Jun 2022)

Regional Overview of Drought Conditions (3rd Dekad Jun 2022)



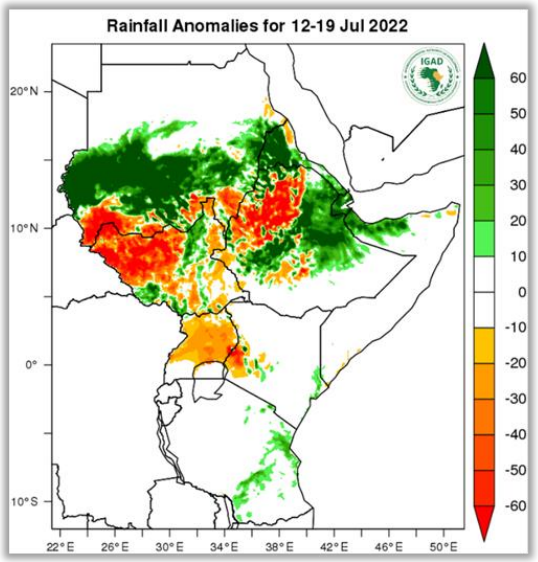
Low: Rainfall deficit

Moderate: Soil moisture deficit

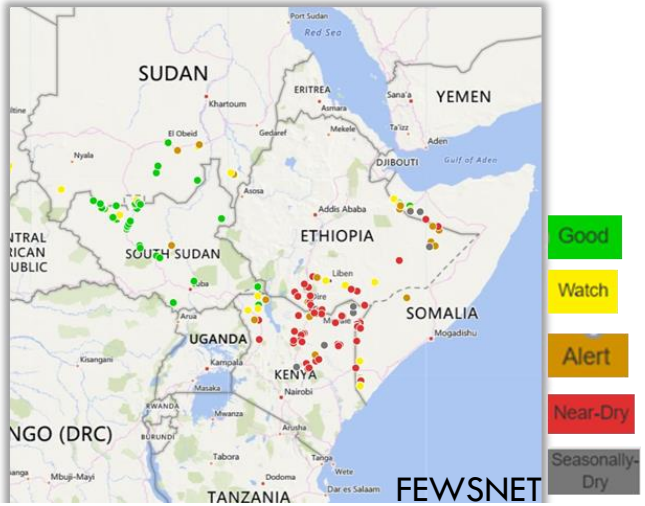
Severe: Vegetation Stress following rainfall/soil moisture deficit

https://droughtwatch.icpac.net/

Rainfall Forecast for 12-19 Jul 2022



Status of Water Points (May 2022)



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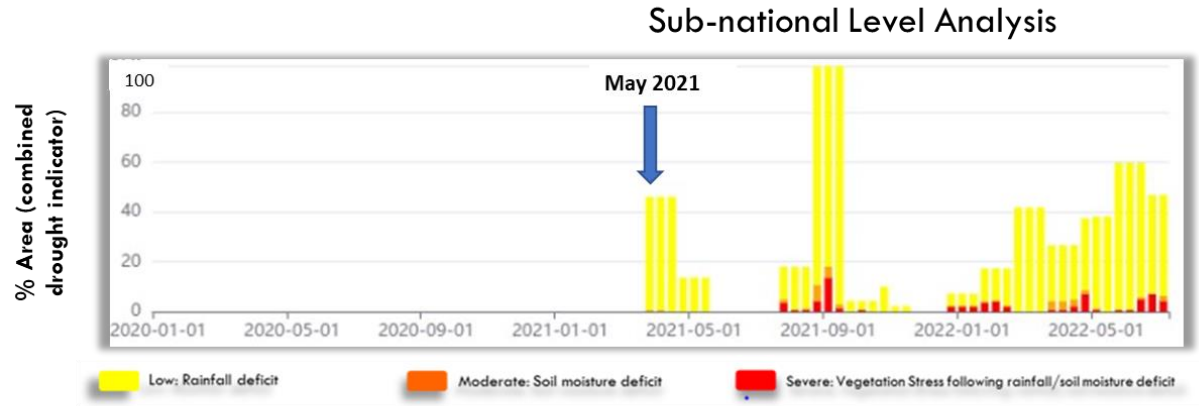
Products: Sub-national Analysis - Kotido, Uganda

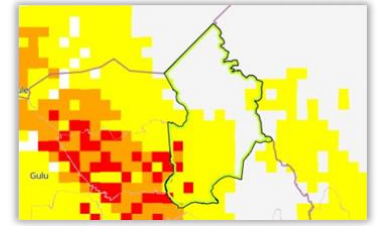


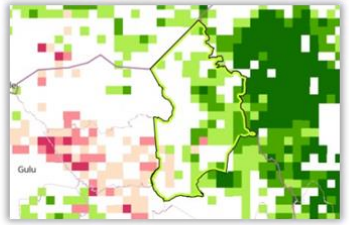
Population exposed (Apr 2022)

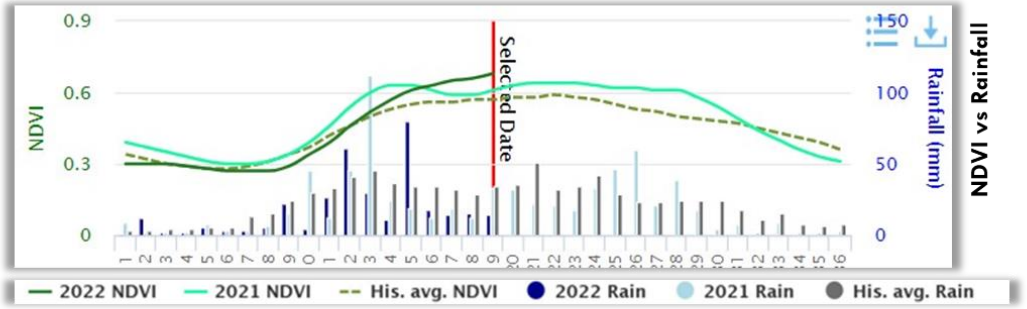
Category	Population	% of whole region
Warning	65,918	9.49 %
Watch	218,327	31.44 %
Alert	21,632	3.12 %

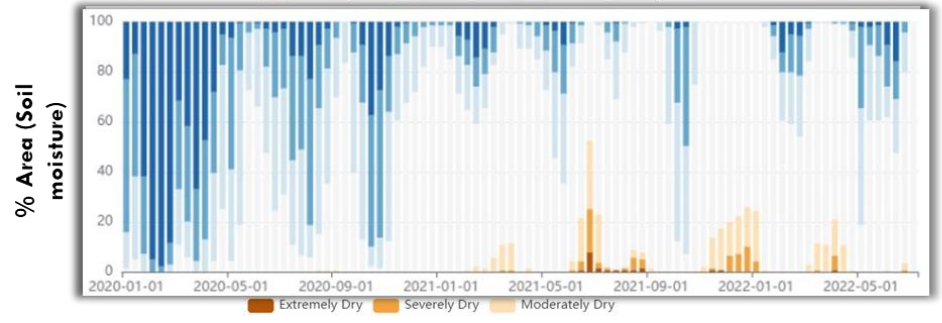
Population exposed (Jun 2022)

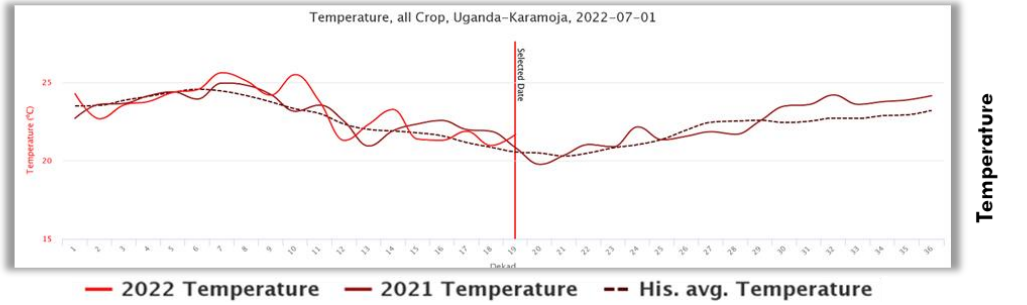
Category	Population	% of whole region
Watch	335,327	48.29 %
Warning	18,225	2.62 %
Alert	31,287	4.51 %





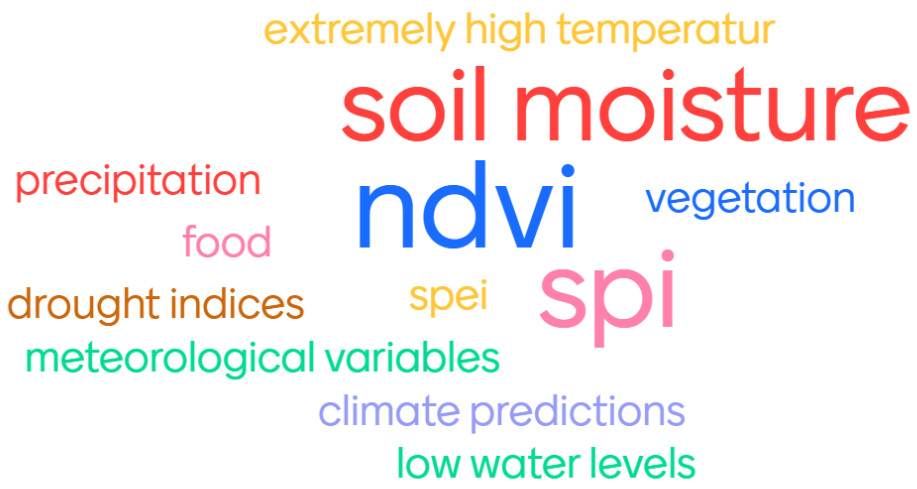




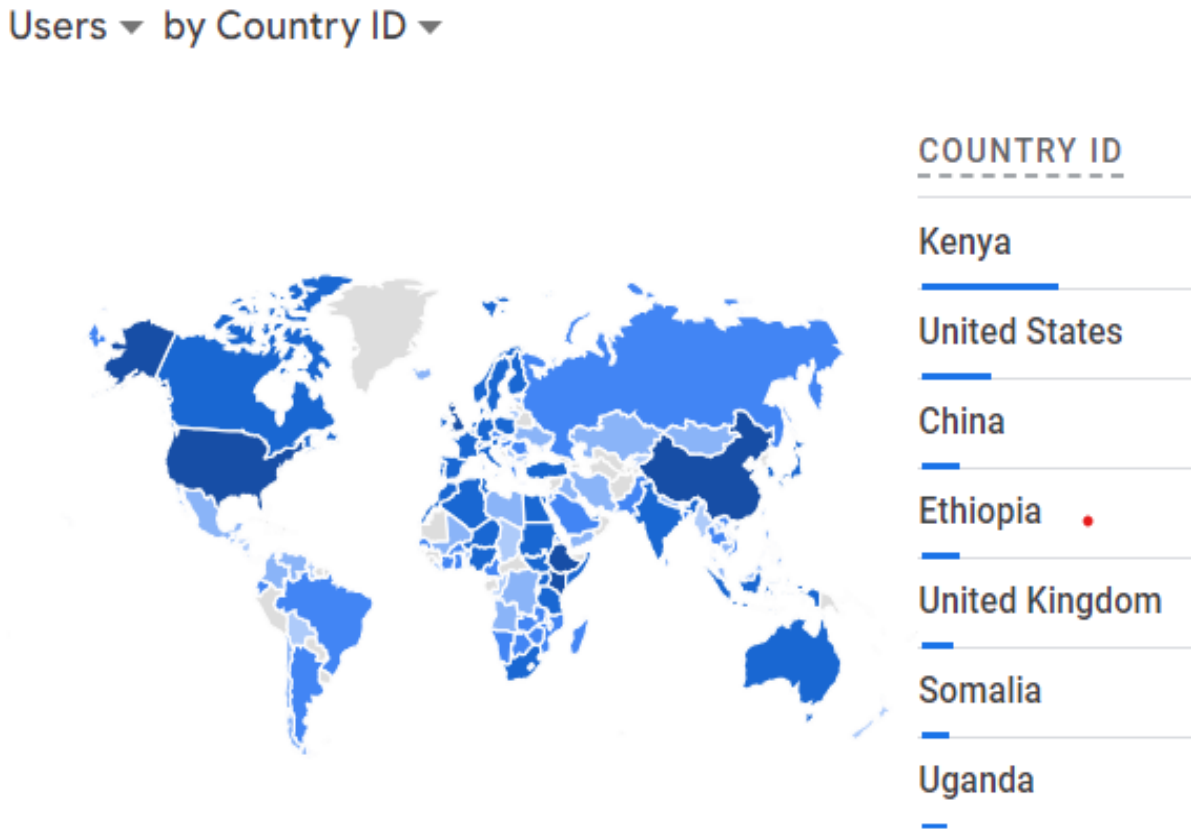


Drought Indicators

workshop results



Users Analytics



Thank You

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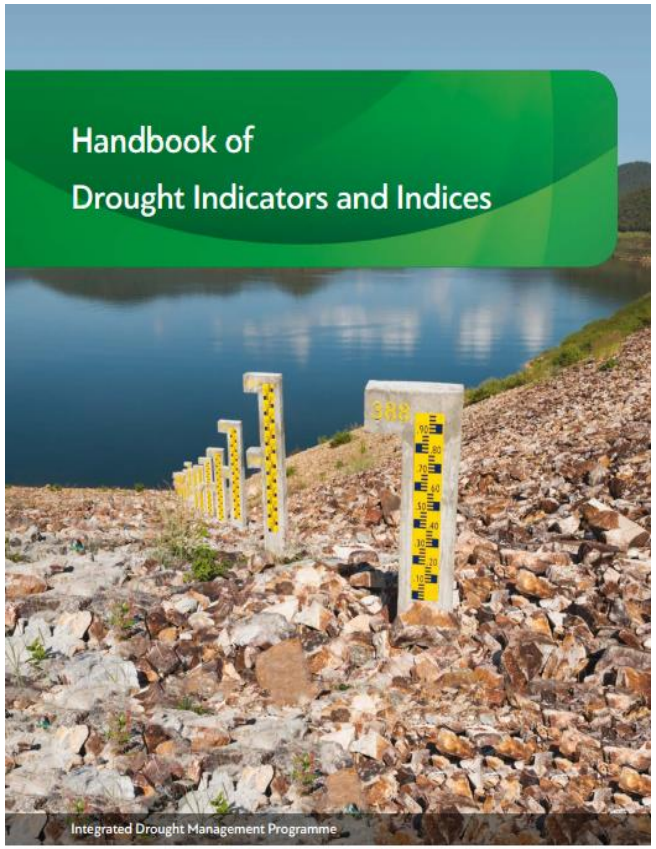
Updating the IDMP Handbook of Drought Indicators and Indices

Robert Stefanski – Head of Applied Climate Services
WMO
24 October 2023

Handbook of Drought Indicators and Indices

- Handbook is a resource to cover most commonly used drought indicators/indices
- A starting point to describe and characterize the most common indicators and indices and their applications
- Does not recommend a ”best” set of indicators and indices, given research requirements for appropriate application in location in question.
- Five themes: Meteorology, Soil Moisture, Hydrology, Remotely Sensed, Combined and Modelled

- **Will be sending request to Partners to update list of indicators and indicies**



Selected Drought Indices

Meteorology	*Page*	*Ease of use*	*Input parameters*	*Additional information*
Aridity Anomaly Index (AAI)	11	Green	P, T, PET, ET	Operationally available for India
Deciles	11	Green	P	Easy to calculate; examples from Australia are useful
Keetch–Byram Drought Index (KBDI)	12	Green	P, T	Calculations are based upon the climate of the area of interest
Percent of Normal Precipitation	12	Green	P	Simple calculations
Standardized Precipitation Index (SPI)	13	Green	P	Highlighted by the World Meteorological Organization as a starting point for meteorological drought monitoring
Weighted Anomaly Standardized Precipitation (WASP)	15	Green	P, T	Uses gridded data for monitoring drought in tropical regions
Aridity Index (AI)	15	Yellow	P, T	Can also be used in climate classifications
China Z Index (CZI)	16	Yellow	P	Intended to improve upon SPI data
Crop Moisture Index (CMI)	16	Yellow	P, T	Weekly values are required
Drought Area Index (DAI)	17	Yellow	P	Gives an indication of monsoon season performance
Drought Reconnaissance Index (DRI)	18	Yellow	P, T	Monthly temperature and precipitation are required
Effective Drought Index (EDI)	18	Yellow	P	Program available through direct contact with originator

Selected Drought Indices

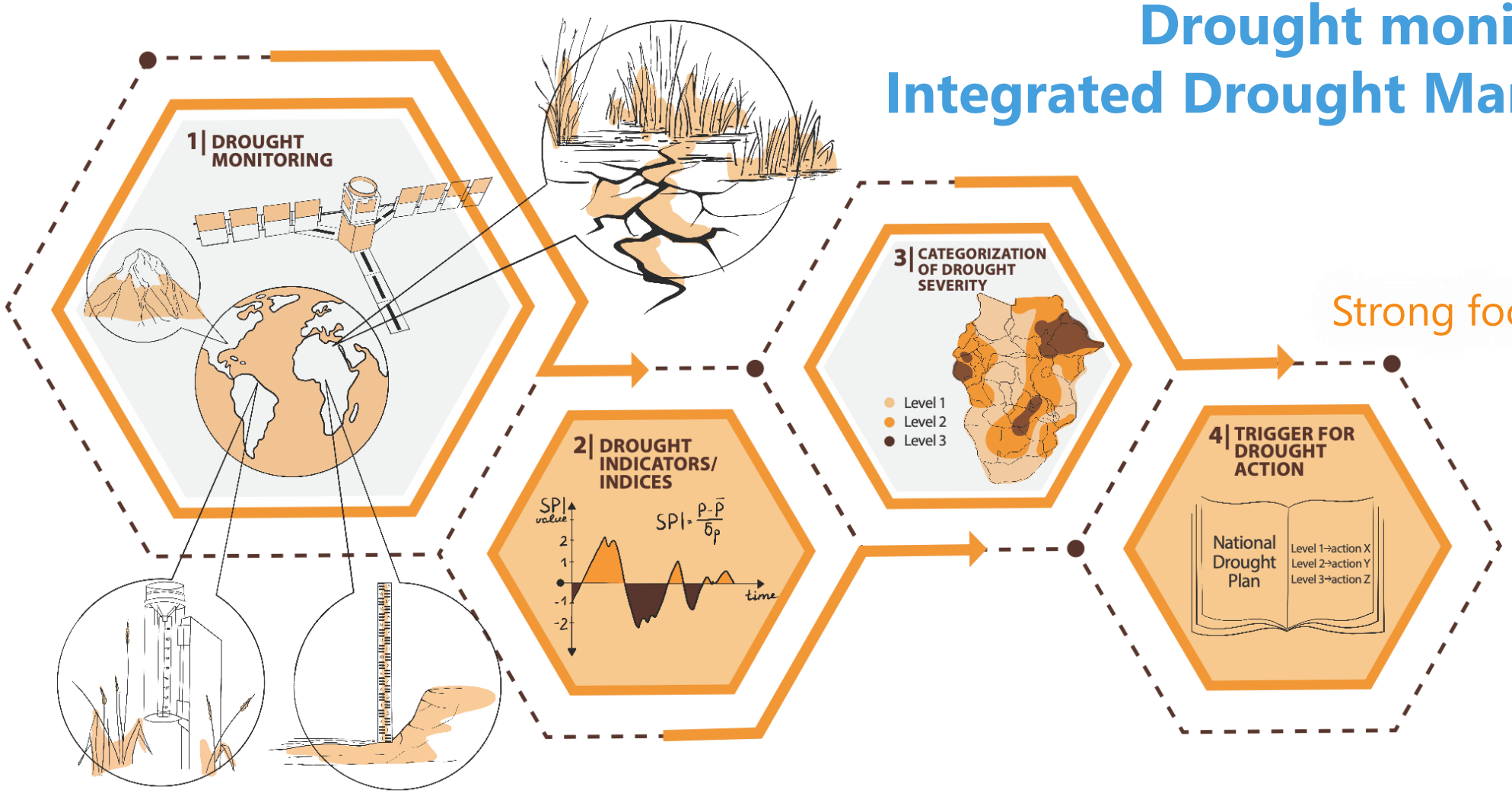
Standardized Anomaly Index (SAI)	22	Yellow	P	Point data used to describe regional conditions
Standardized Precipitation Evapotranspiration Index (SPEI)	23	Yellow	P, T	Serially complete data required; output similar to SPI but with a temperature component
Agricultural Reference Index for Drought (ARID)	24	Red	P, T, Mod	Produced in south-eastern United States of America and not tested widely outside the region
Crop-specific Drought Index (CSDI)	24	Red	P, T, Td, W, Rad, AWC, Mod, crop data	Quality data of many variables needed, making it challenging to use
Reclamation Drought Index (RDI)	25	Red	P, T, S, RD, SF	Similar to the Surface Water Supply Index, but contains a temperature component

Soil moisture	*Page*	*Ease of use*	*Input parameters*	*Additional information*
Soil Moisture Anomaly (SMA)	25	Yellow	P, T, AWC	Intended to improve upon the water balance of PDSI
Evapotranspiration Deficit Index (ETDI)	26	Red	Mod	Complex calculations with multiple inputs required
Soil Moisture Deficit Index (SMDI)	27	Red	Mod	Weekly calculations at different soil depths; complicated to calculate
Soil Water Storage (SWS)	27	Red	AWC, RD, ST, SWD	Owing to variations in both soil and crop types, interpolation over large areas is challenging

Remote sensing	*Page*	*Ease of use*	*Input parameters*	*Additional information*
Enhanced Vegetation Index (EVI)	32	Green	Sat	Does not separate drought stress from other stress
Evaporative Stress Index (ESI)	33	Green	Sat, PET	Does not have a long history as an operational product
Normalized Difference Vegetation Index (NDVI)	34	Green	Sat	Calculated for most locations
Temperature Condition Index (TCI)	34	Green	Sat	Usually found along with NDVI calculations
Vegetation Condition Index (VCI)	35	Green	Sat	Usually found along with NDVI calculations
Vegetation Drought Response Index (VegDRI)	35	Green	Sat, P, T, AWC, LC, ER	Takes into account many variables to separate drought stress from other vegetation stress
Vegetation Health Index (VHI)	36	Green	Sat	One of the first attempts to monitor drought using remotely sensed data
Water Requirement Satisfaction Index (WRSI and Geo-spatial WRSI)	36	Green	Sat, Mod, CC	Operational for many locations
Normalized Difference Water Index (NDWI) and Land Surface Water Index (LSWI)	37	Green	Sat	Produced operationally using Moderate Resolution Imaging Spectroradiometer data
Soil Adjusted Vegetation Index (SAVI)	38	Red	Sat	Not produced operationally

Composite or modelled	*Page*	*Ease of use*	*Input parameters*	*Additional information*
Combined Drought Indicator (CDI)	38	Green	Mod, P, Sat	Uses both surface and remotely sensed data

Drought monitoring for Integrated Drought Management



Strong focus on the "**Last Mile**"

The design and implementation of technical solutions is based on **stakeholder engagement** at all steps and using an inclusive **whole-of-society approach**

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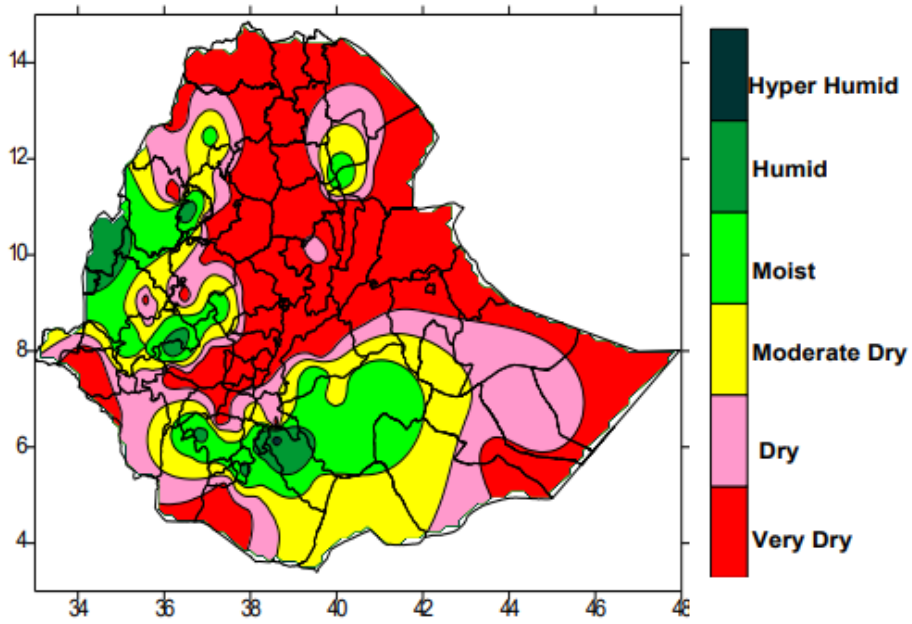
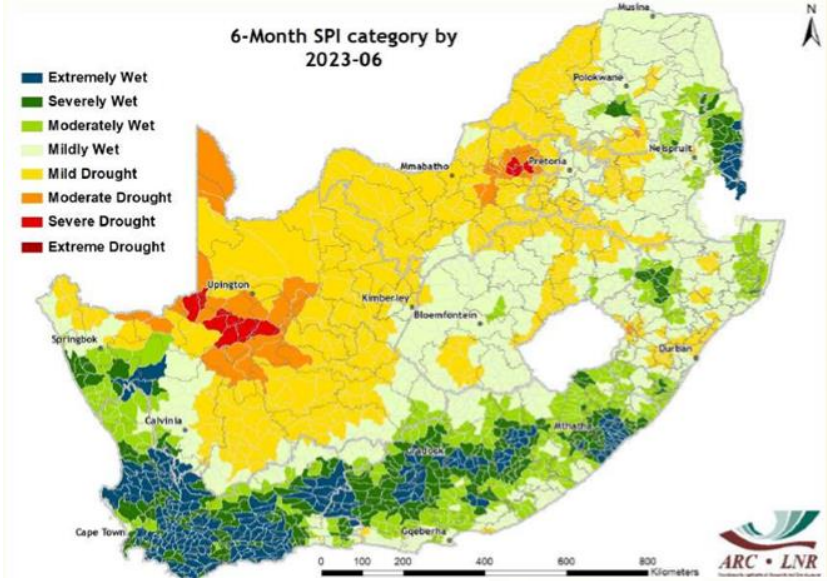
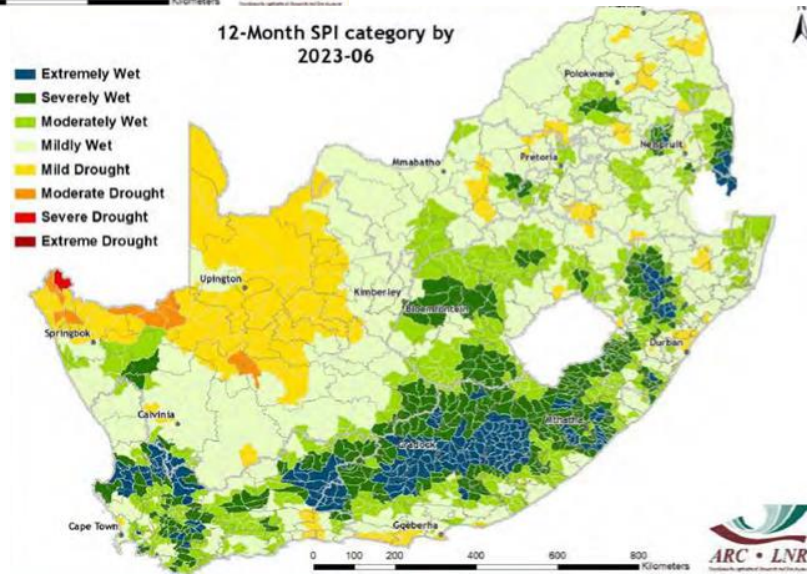
Ethiopia Moisture status (01-11 October 2023)



Source:National Meteorology Agency: Bulletins (ethiomet.gov.et)

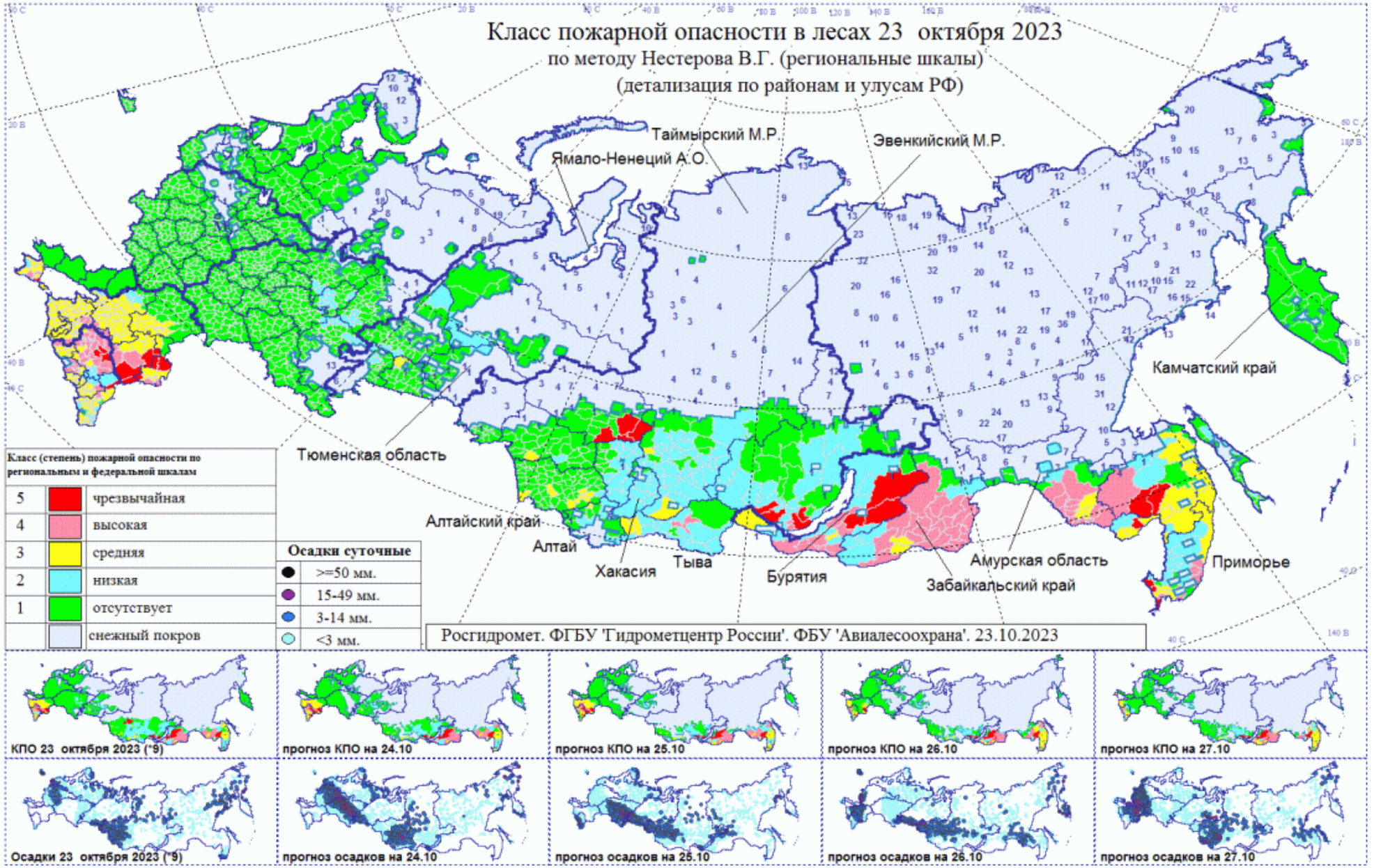
South Africa SPI on August 2023





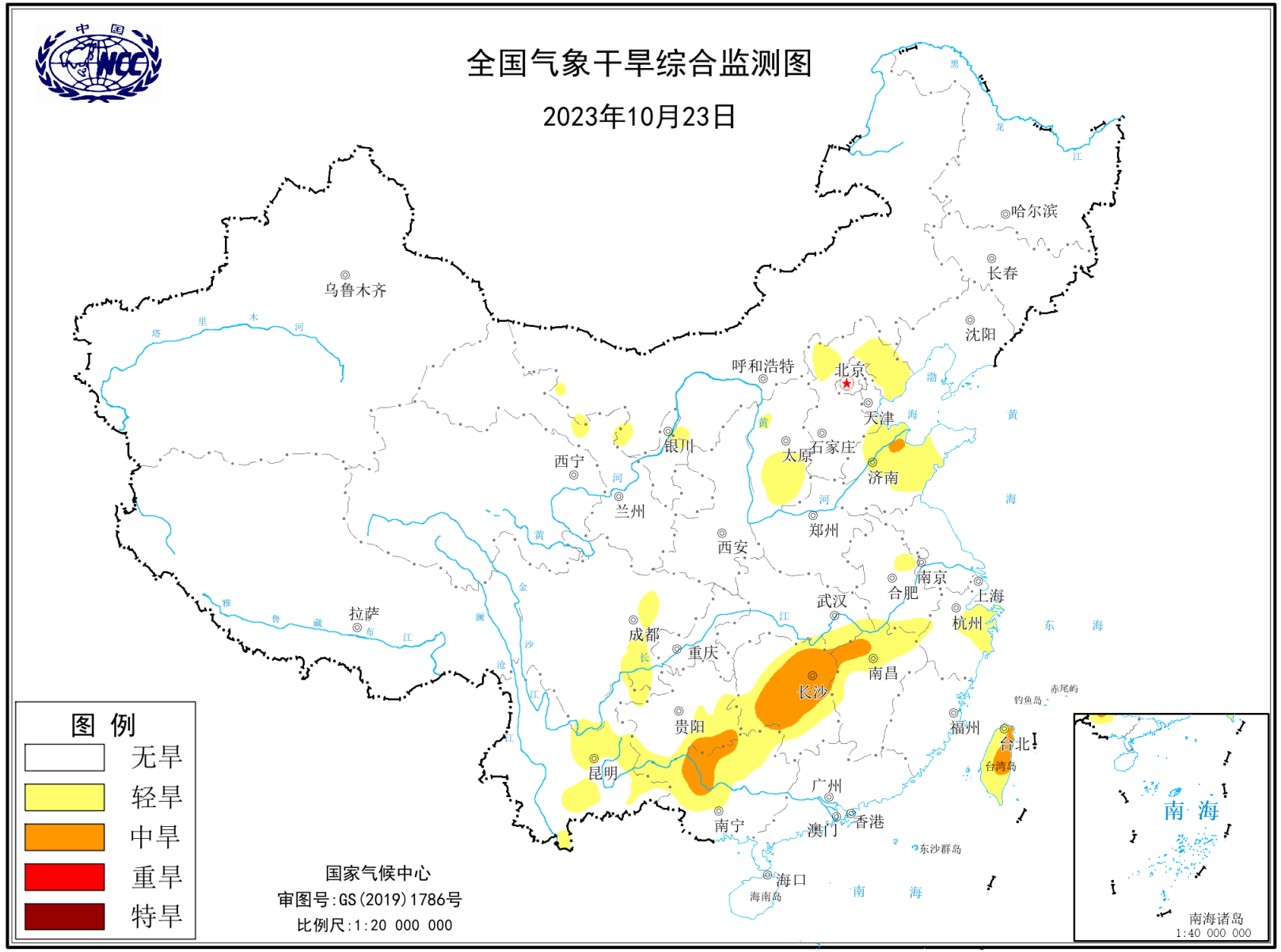
Source:Agricultural Research Council

Fire hazard in woodlands across the territory of Russia – 23 October 2023



Source: Hydromet Center of Rusia

China - October 2023



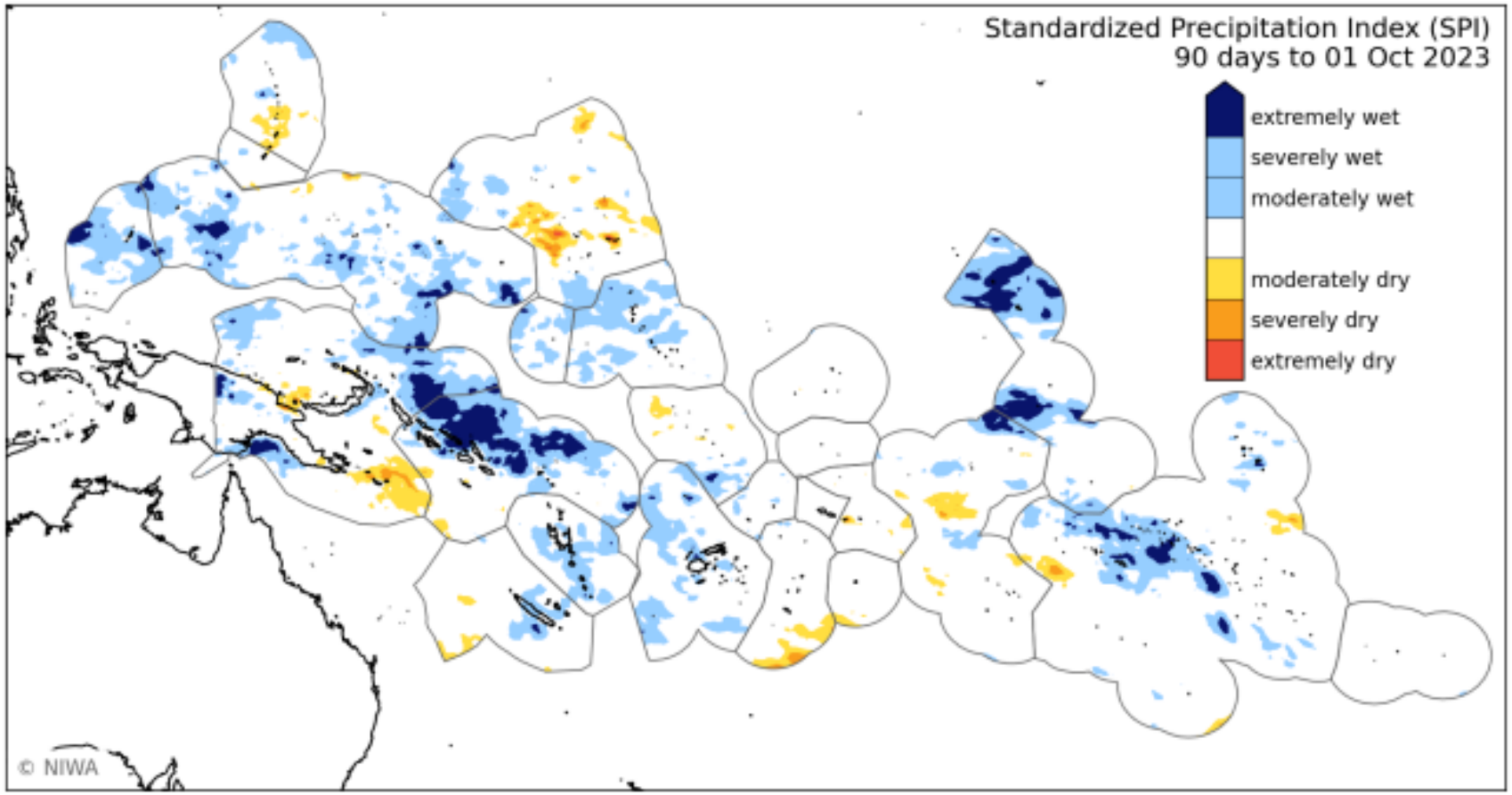
Source: National Climate Center of China

SPI Regional situation summary (1 October 2023)

The Standardized Precipitation Index (SPI) thresholds for cumulative rainfall over the last 90 and 30 days are shown in the plots below.

During July-September (top plot), extremely or severely dry conditions occurred in parts of Northern Marianas, the Marshall Islands, PNG, and American Samoa.

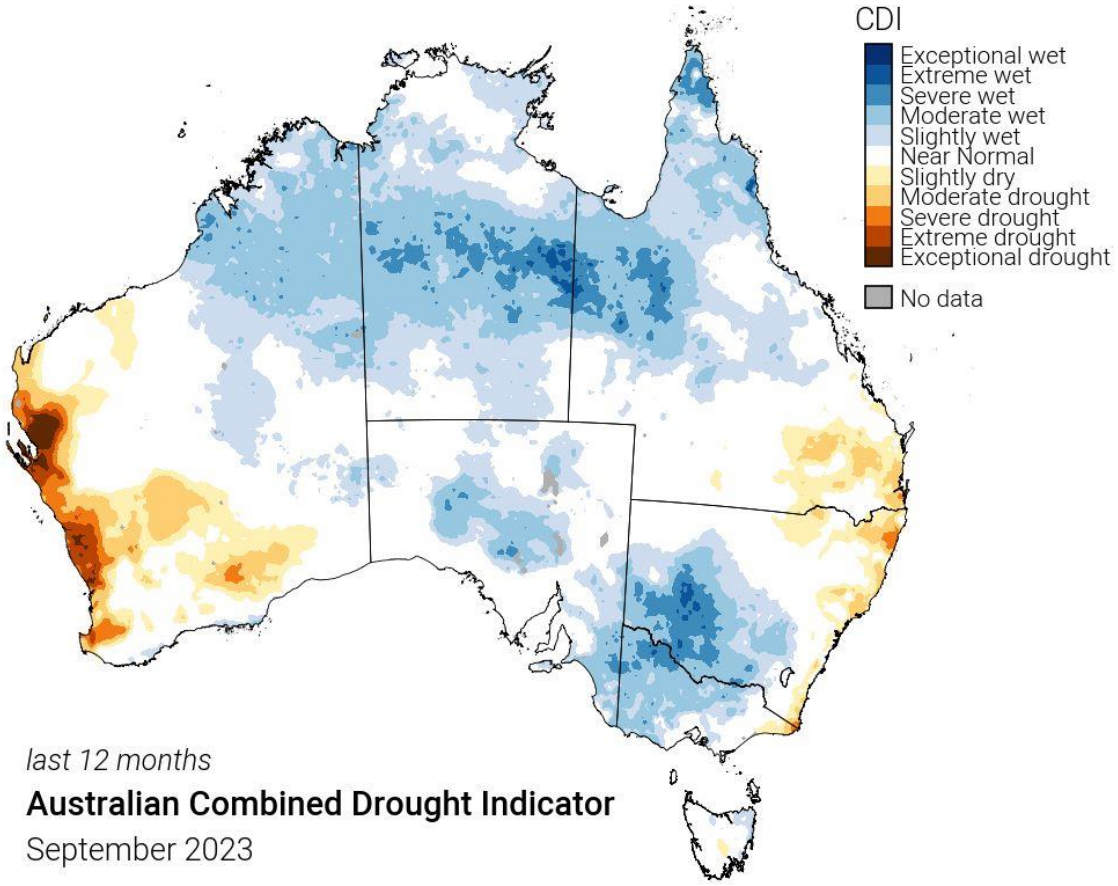
During September (bottom plot), extremely or severely dry conditions occurred in western FSM, parts of the Marshall Islands, the Solomon Islands, Wallis & Futuna, eastern Fiji, Tonga, and Niue.



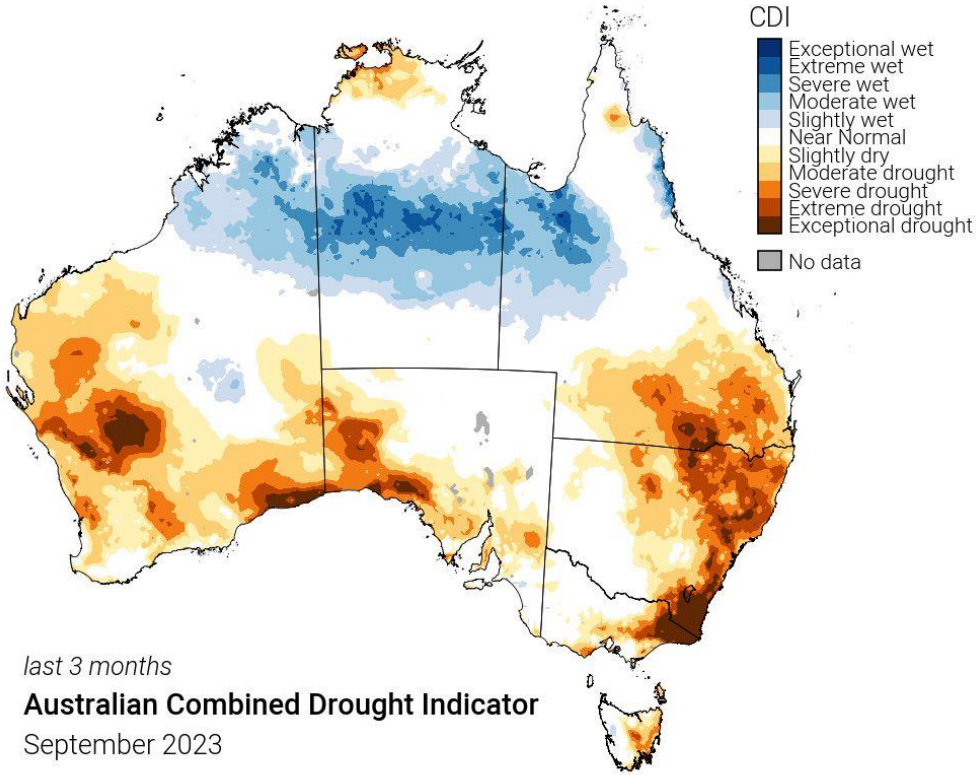
Source: NIWA Island Climate Update

Australia - Monitor

Last 12 Months

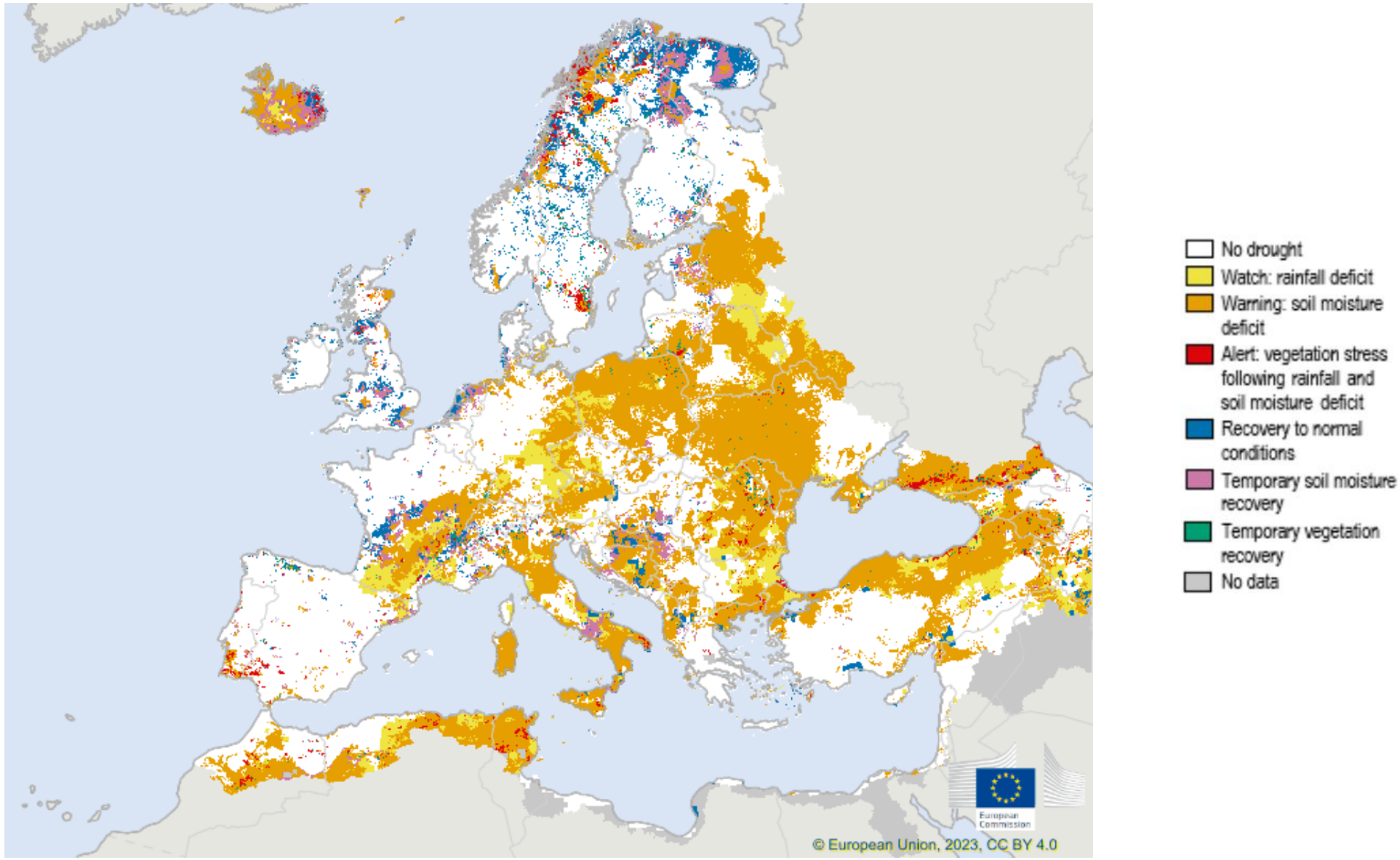


Last 3 Months



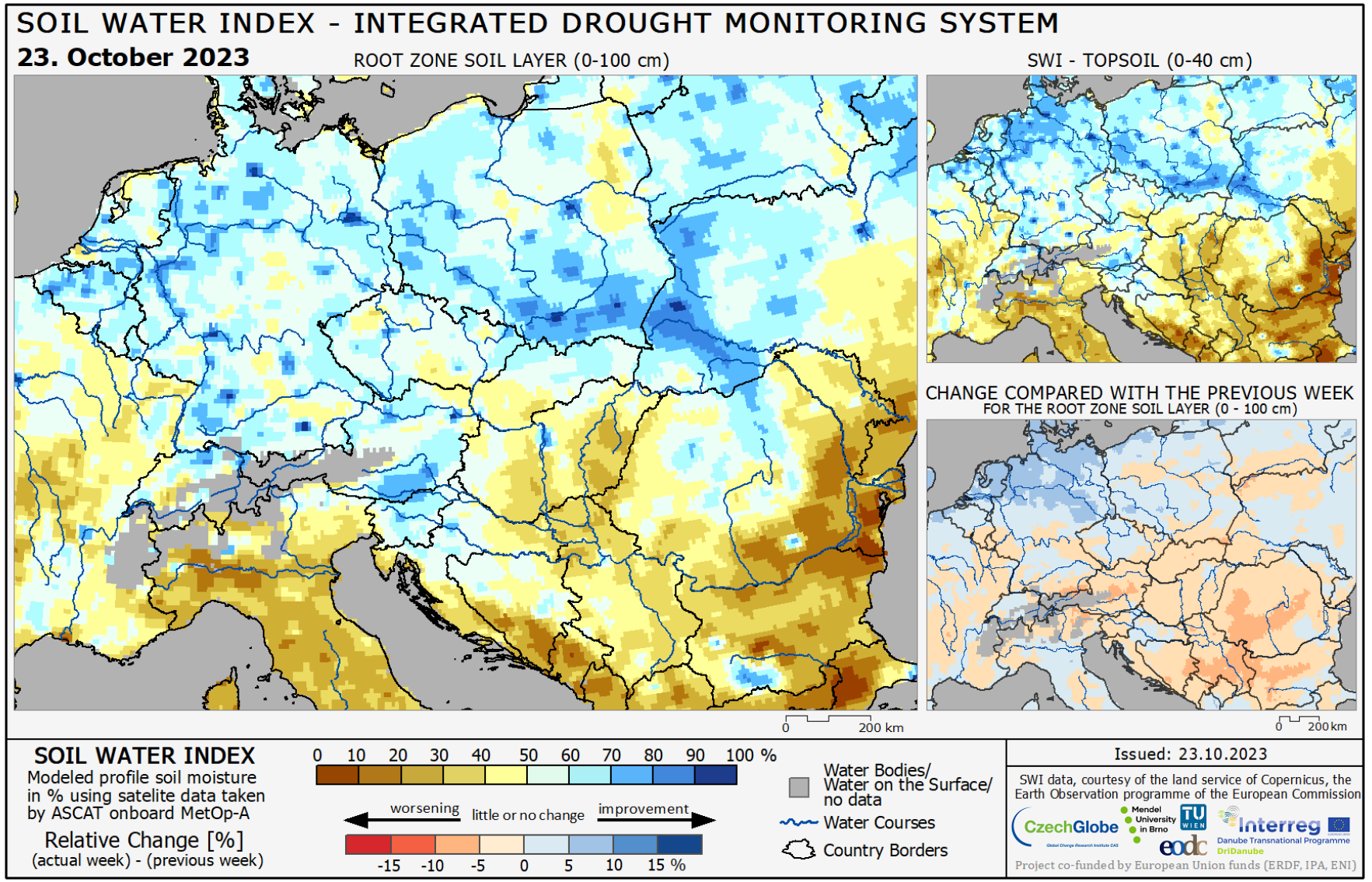
[Source: Northern Australia Climate Program]

Combined Drought Indicator in Europe – 3rd ten-day period of September 2023



Source: European Drought Observatory

Central Europe



Source: Integrated Drought Monitoring System – Central Europe

What indicators and indices would you like to add in the Handbook ?

Please scan the QR-code or go to www.menti.com and use this code:

XXXX

https://www.menti.com/xxxxx

Partners' Marketplace

- Updates from CIIFEN- Mario Lopez
- COPE Disaster Series– Lina Suarez
- Project "Water From a Rock Initiative" - Martha Djan
- Project "Appropriation Of the Territory and Contribution to Flood Resilience with Student Collectives" -Yéssica De Los Ríos Olarte

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COPE Disaster Series

Lina Suarez
Marketing and Public Relations

24 October 2023

The COPE Series

COPE is a free series of story books, aimed to increase the **disaster resilience** of children. The books cover **hazards** ranging from **floods** to **earthquakes and** provide coping tools and **preparedness.**

COPE was created in 2018 by author **Martha Keswick**, illustrator **Mariko Jesse** and global disaster risk reduction expert, **Dr Timothy Sim.**

And with expert advise from academics in the field of **Disaster Risk Reduction (DRR)** from **Yunnan, Stirling, and Oxford University.**

The World Meteorological Organization and **the Hong Kong Observatory** are our scientific advisors**,** while COPE collaborates with leading DRR organizations such as **UNDRR**, **World Vision** and **UNICEF.**

COPE Creators

Martha Keswick

Mariko Jesse

Timothy Sim

Hong Kong Jockey Club Disaster Preparedness Response Institute

Primary schools

World Vision in Nepal

42.000 books printed.

Teachers and volunteers.

University of Malaysia

Floods book

Evacuation Centers – DRR materials (puppets, games)

Colombia

Hurricanes book - Evacuation Center

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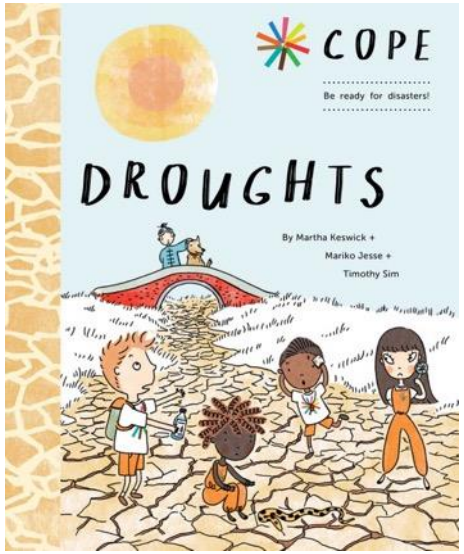

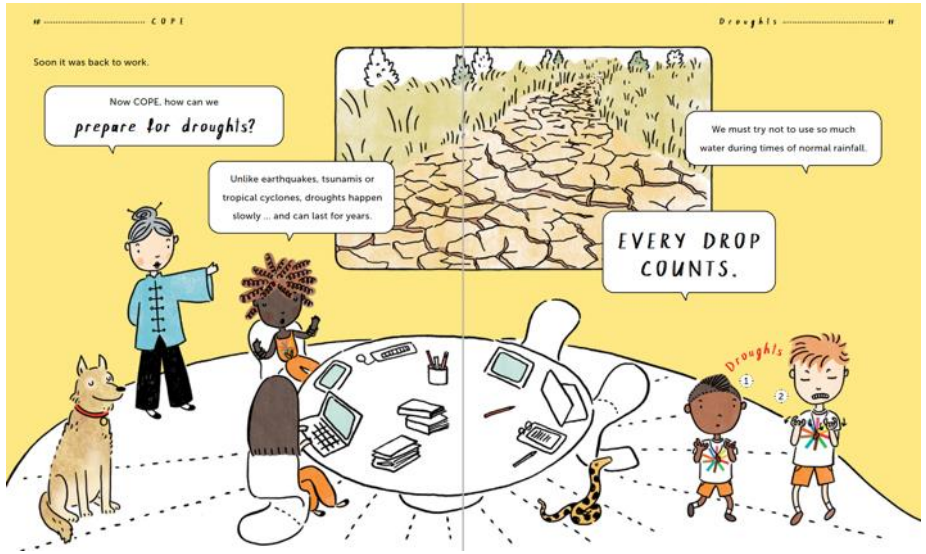

Droughts –2022
EVERY DROP COUNTS

Collaborators: Yunnan University, Shandong University and UNICEF East Asia and Pacific.
DRR Advisor: Prof Ziqiang Han.
Scientific Advisors: World Meteorological Organization, China Meteorological Administration and Hong Kong Observatory.

Droughts book is available in English, Spanish, and Arabic.
Coming soon in Russian, Chinese and French.

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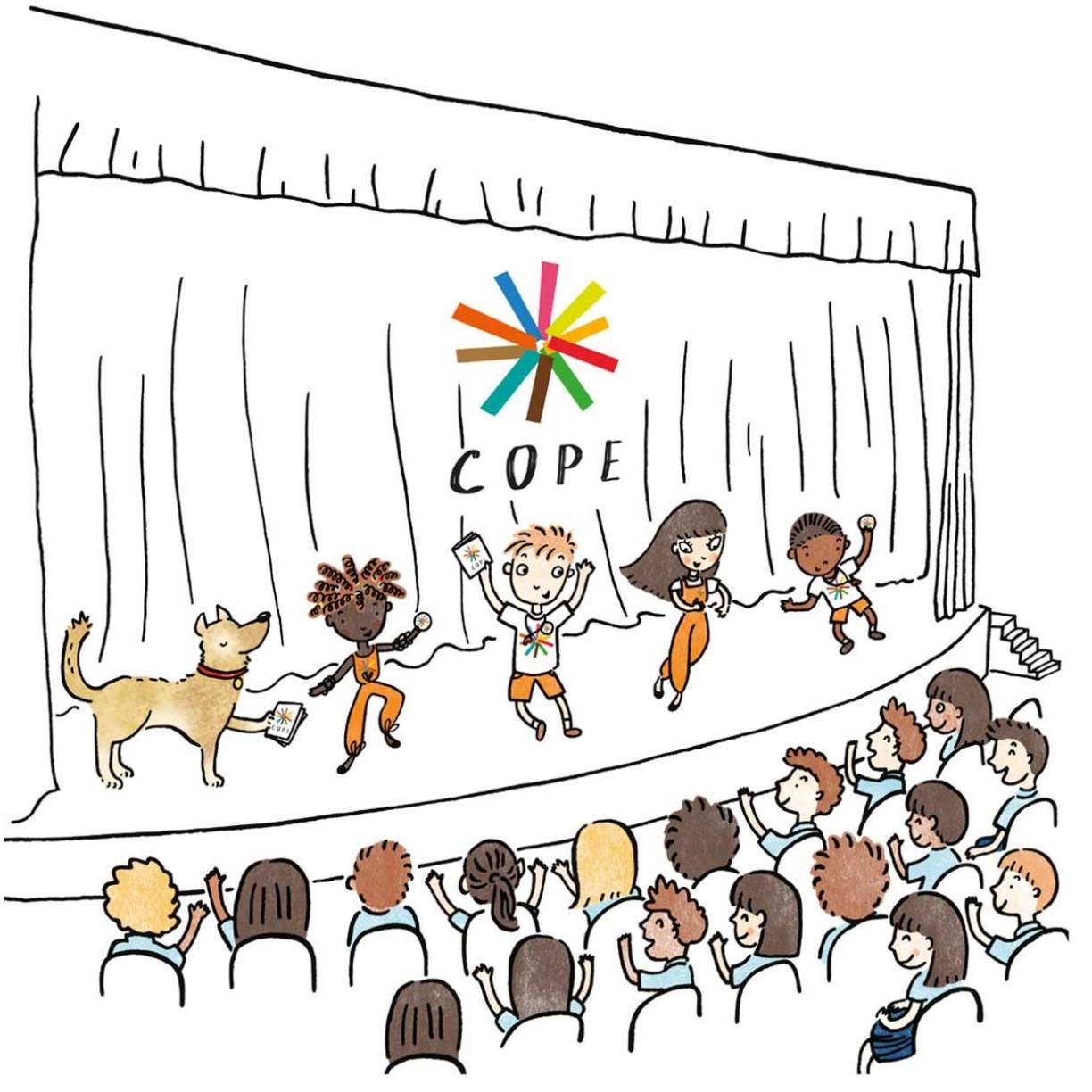

Please contact us if you would like to collaborate with COPE. Let's join forces and work together to spread key DRR messages to children all over the world!

Email us
hello@cope-disaster-champions.com

All the books here:

Thank you!

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Global Integrated Flood and Drought Management Competition for #YouthLead Projects

Competition Winners

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Project " Water From a Rock Initiative"

Marta Djan
YouthMappers
24 October 2023

Presentation 2023

WATER FROM A ROCK INITIATIVE

Global Integrated Flood and Drought Management Competition for #YouthLead Projects

People walking through river floodwaters after heavy rainfall in Hadeja, Nigeria. © Africanews

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Our Team

YouthMappers Chapter:
Department of Geography, Geoinformatics & Meteorology

Martha Djan

BSc Environemntal Science (3rd year)

Jack Kgwale

BSc Meteorology (3rd year)

Mulisa Mudau

BSc Meteorology (3rd year)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

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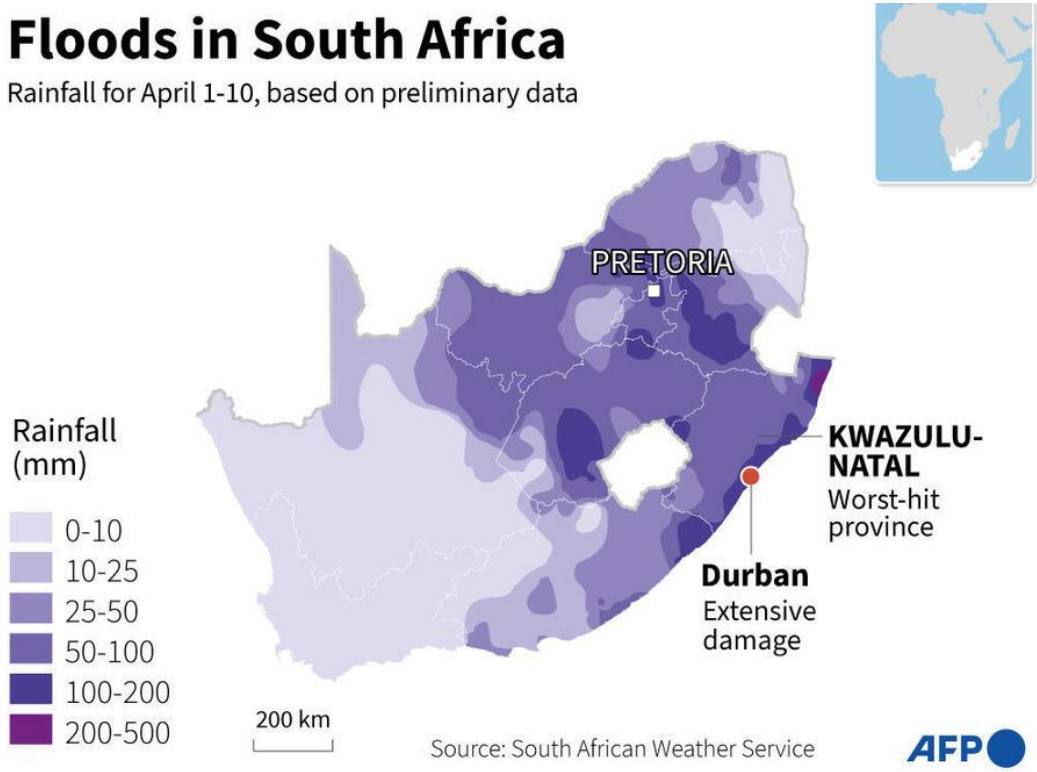
Overview

Through the use of geofencing techniques on university campuses and in vulnerable regions, early warning information can be shared in a timely fashion before extreme weather events.

Most people lose their lives during disasters due to limited information about potential disasters.

Over 440 people were killed and 40 000 were displaced. More than 600 schools were destroyed

Informed communities respond better to natural disasters.

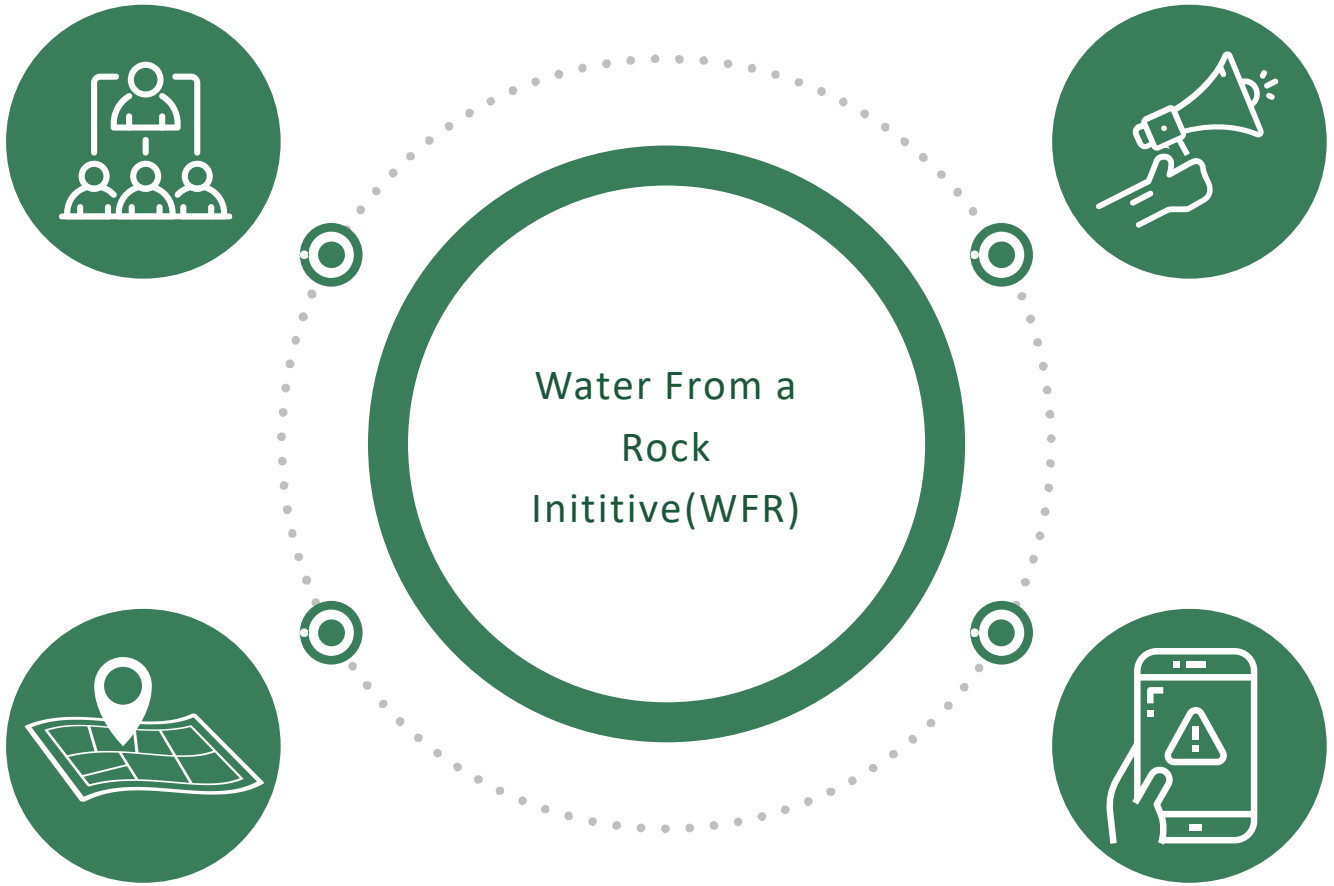


Objectives

01 Raising awareness through digital & hard copy Response and Disaster Packages:
Easily distributable between highschool learners and varsity students.

02 Map Vulnerable Communities based on criteria: Umdloti KZN infrastructure (informal settlements, urban areas), frequency of floods - low, moderate high-risk areas, proximity to the water source(floodline)

03 Creating an application that implements Geofence in local regions vulnerable to disasters.



Target Audience

Highschool Learners

"630 School in KZN affected by floods"

University Students

"Building resilience amoung the youth"

Vulnerable Communities

"Increasing awareness & Education in Vulnerable communities"

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Timeline

Key dates for project.

1st Phase
Digital/Hardcopy Response & Preparedness Information
Oct 2023 - Jan 2024

2nd Phase
Mapping Vulnerable Areas
Nov 2023 - Feb 2024

3rd Phase
Implement Geofences
Dec 2023 - Jan 2024

4th Phase
Campus Awareness
Feb 2024 - April 2024

5th Phase
Field assessment
Jan 2024 - Feb 2024

6th Phase
Application Creation
Dec 2023 - April 2024

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Water From a
Rock
Inititive(WFR)

THANK YOU!

Contact no. 0842325359
Email address: u19186119@tuks.co.za

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Project "Appropriation Of the Territory and Contribution to Flood Resilience with Student Collectives"

Yéssica De Los Ríos Olarte
Universidad de Antioquia
24 October 2023

Collaborative mapping to Flood Resilience

Nueva Villa La Iguaná

Yéssica De los ríos Olarte
Universidad de Antioquia

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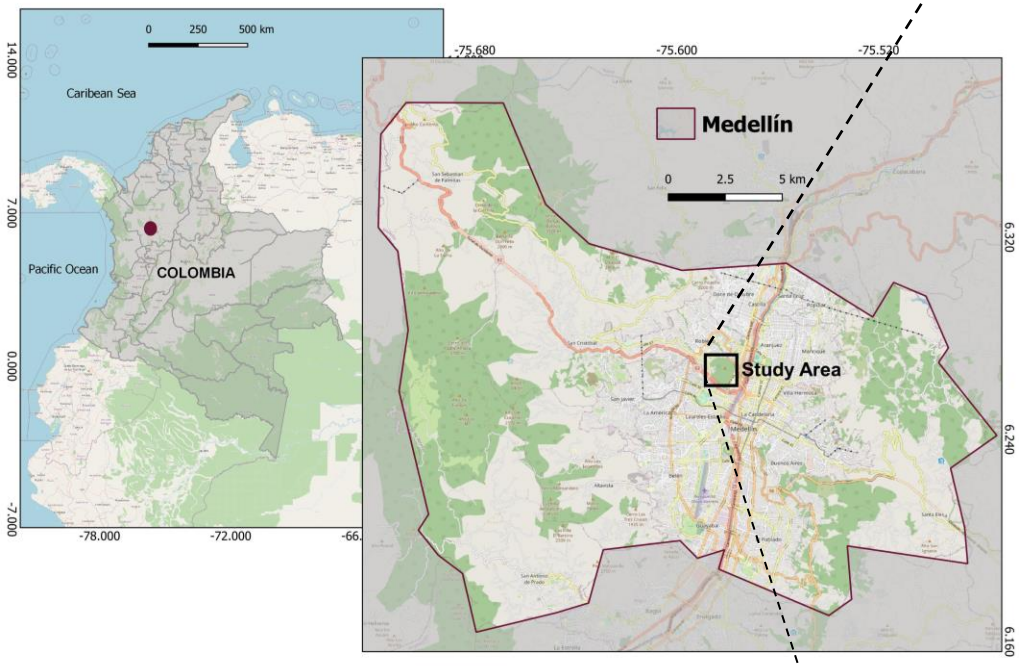

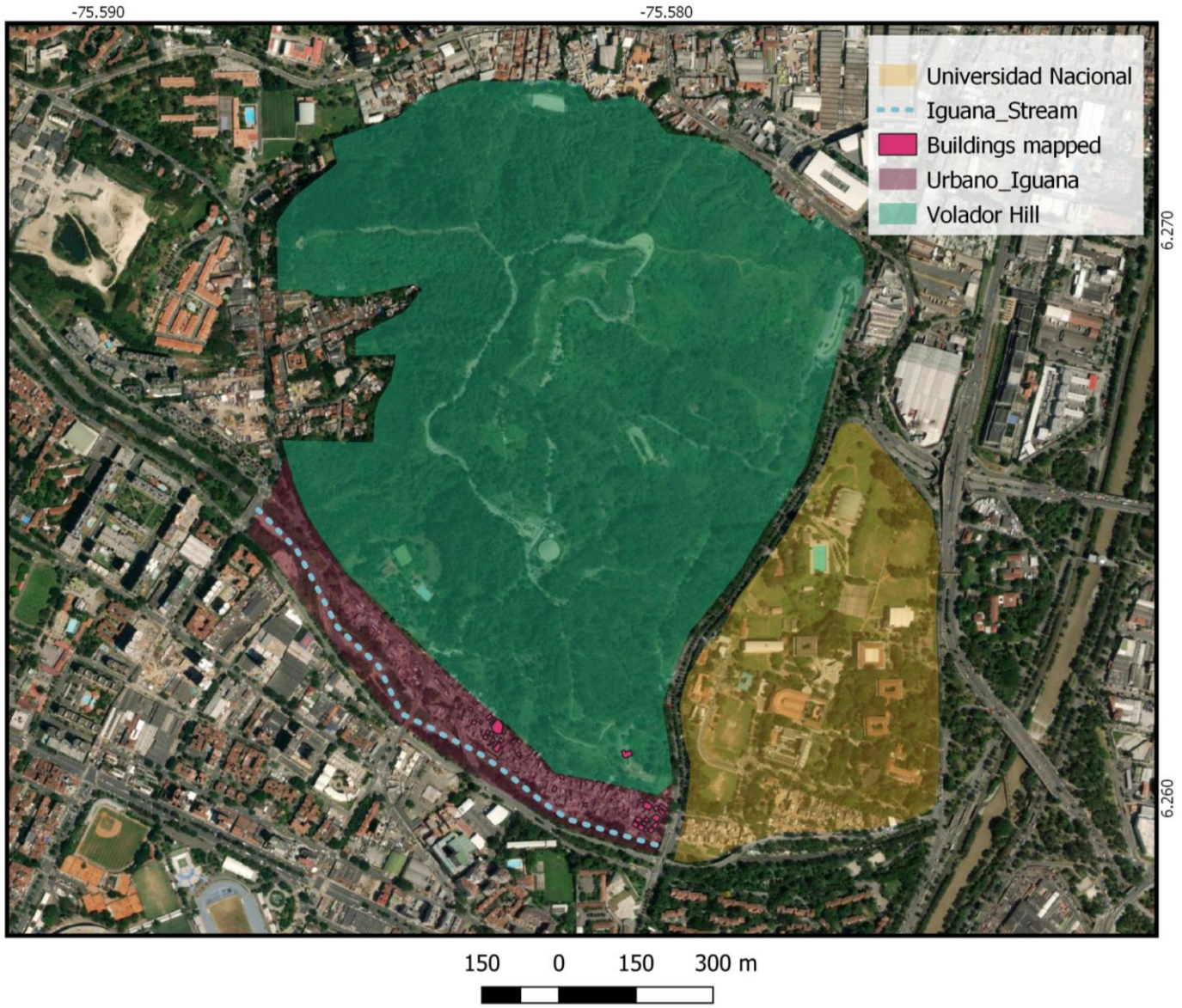

High level of poverty

Overcrowding

General Goal: Contribute to flood resilience through young people and community empowerment using participatory mapping tools.

WORKSHOPS

Nov- Dec	Jan-Feb	March-April	April
Aproaching	**Mapping**	**Mapping Risk**	**Socialization**

TOOLS

KoBoToolbox

uMap

ALLIES

Marco Fidel Suarez School

Cruz Roja Colombiana

youthmappers

HOT

Humanitarian OpenStreetMap Team

What is your biggest challenge in selecting drought indicators / indices ?

Please scan the QR-code or go to www.menti.com and use this code:

XXXX

https://www.menti.com/xxxxx

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Closing Remarks

Robert Stefanski – Head of Applied Climate Services
WMO
24 October 2023

Thank you!

ASK

Ask for assistance on integrated drought management

FIND

Find knowledge resources on integrated drought management

CONNECT

Join our Community of Practice to CONNECT with our partners and other drought experts, practitioners and stakeholders.

www.DroughtManagement.info

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