

Exploring the Dynamics of Floods and Droughts in the Horn of Africa

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Outline

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- Causes and mitigation strategies
- Conclusion

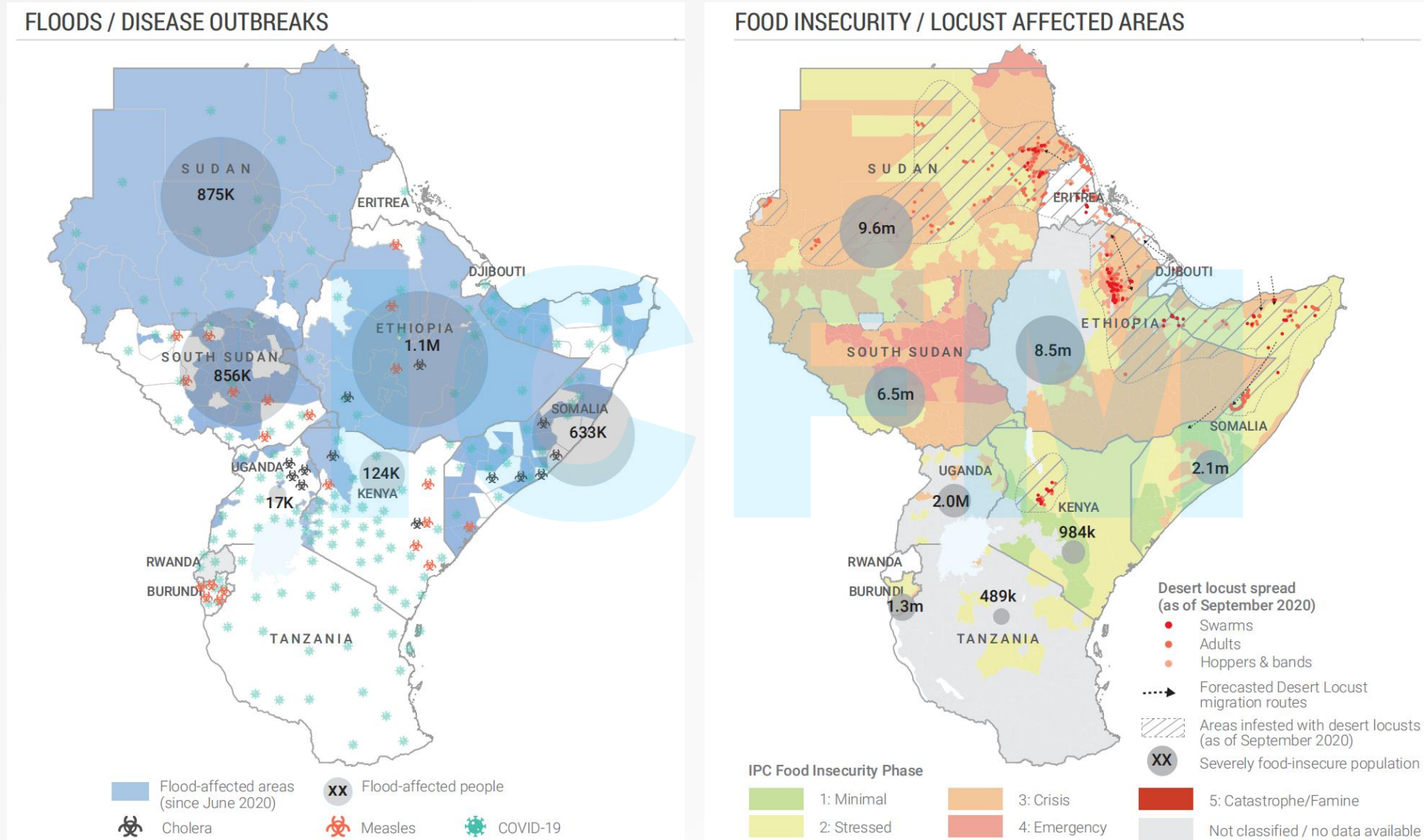
Introduction

- The Horn of Africa experiences cyclical patterns of floods and droughts due to its geographical location and climate variability.
- Many parts of the region is impacted by a dual crisis of acute food insecurity and recurrent flooding.
- Across these regions, more than 1.1 million people were displaced by violence that has tested the resilience of its community (OCHA, 2020)
- Climate change exacerbates the frequency and intensity of floods and droughts in the Horn of Africa.

Types of Natural Disasters



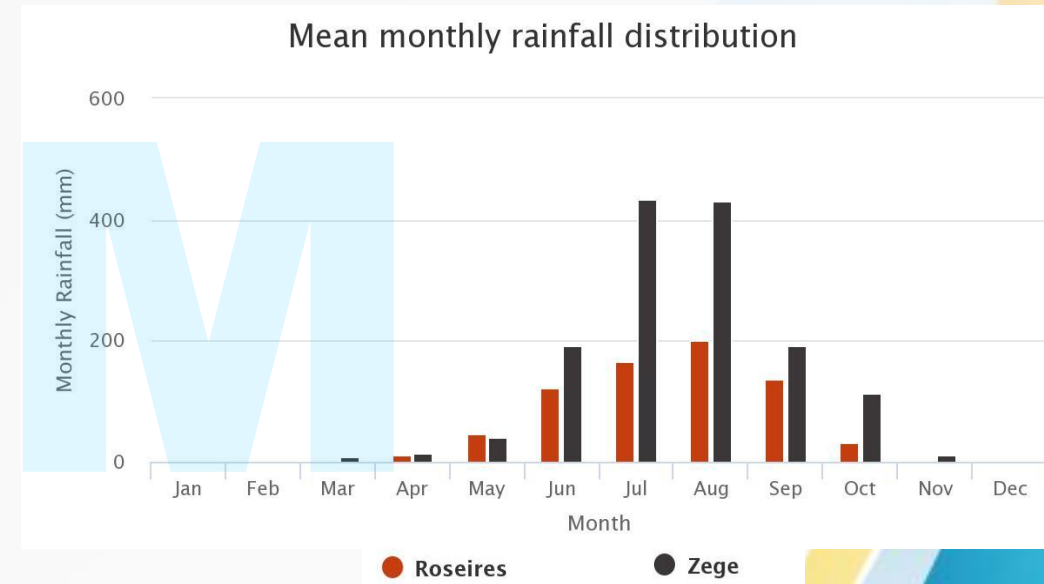
Disaster spots in the horn of Africa



Source: UN-OCHA 2020

Flood and drought trends in the region

- Predominantly seasonal precipitation with inter annual variability pattern.
- The absence of expected seasonal rains propels millions into severe food scarcity.
- Concurrent floods and droughts result in significant shocks in the communities.
- Several countries have faced catastrophic events throughout the past decade.



Monthly rainfall in Blue Nile

Flood and drought in Ethiopia



- Heavy summer season rains cause flooding in Awash, Wabi Shebelle and Baro-Akobo basin, and South Sudan
- Nearly 1.1 million people have been affected, including some 370,000 displaced (UN-OCHA, 2023).
- Since 2015, severe drought caused successive harvest failures in Ethiopia (WFP, 2020)
- Recently, starvation killed 210 people in Tigray.



Flash floods in Diredawa 2006



Abergele starvation, Tigray (2023)

Flood and drought in Kenya

- Heavy rains in Kenya affected 233,000 people, including over 116,000 displaced (KRC, May 2020)
- Flood causes landslides in the Rift Valley and the central and coastal regions (NDOC, 2020).
- Drought in Kenya caused an estimated 4.4 million people face high levels of food insecurity (OCHA, 2023).
- In response to escalating crisis, President William Ruto has called for an upscaling of interventions to prevent “widespread distress and suffering” (2023).



Flood and drought in Somalia

- Climate extremes have triggered shocks in Somalia.
- Over two years of drought pushed the country to the brink of famine. (OCHA, Jul 2020).
- Recently, deadly floods have swept Somalia, devastating deeply food-insecure communities (WFP, 2023).
- Flash and riverine floods affected an estimated 191,800 people, about 124,200 people displaced Shabelle valley and Banadir region. (UNHCR, 2020)

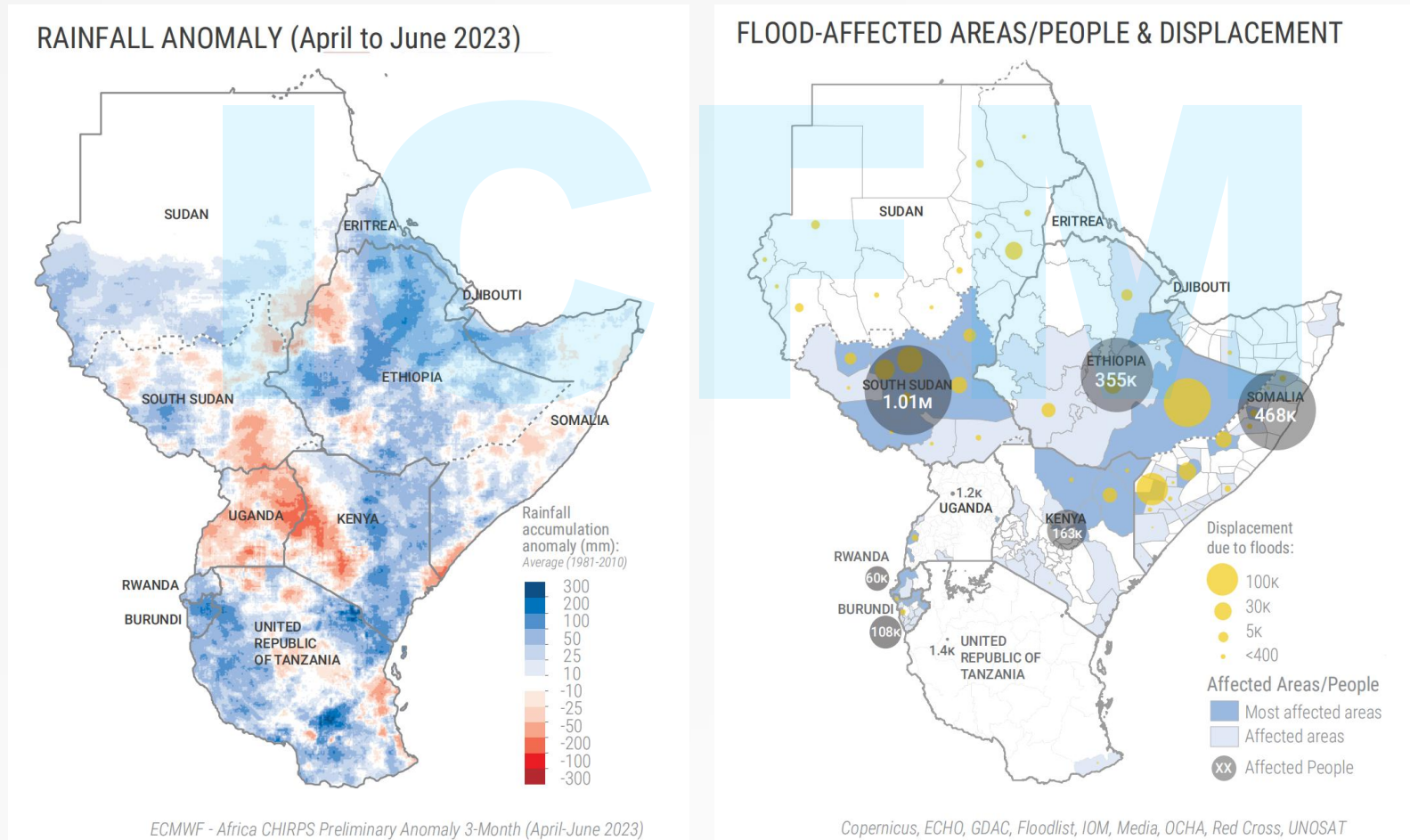


Factors contributing to floods and droughts

- Rainfall anomaly
- Frequency of El-nino and La-nina seasons cause catastrophic disasters in the region.
- Factors such as the Indian Ocean Dipole, and the Intertropical Convergence Zone influence the occurrence of extreme weather events.
- Climate model projections indicate short rains will deliver more rainfall than the long rains causing extreme disasters (Palmer et al., 2023).
- Deforestation and ecosystem degradation
- Poor urban planning and river channel modifications.

Rainfall anomaly

- Variable of seasonal rainfall patterns and topographical conditions influences rainfall distribution.



Source: UN-OCHA 2023

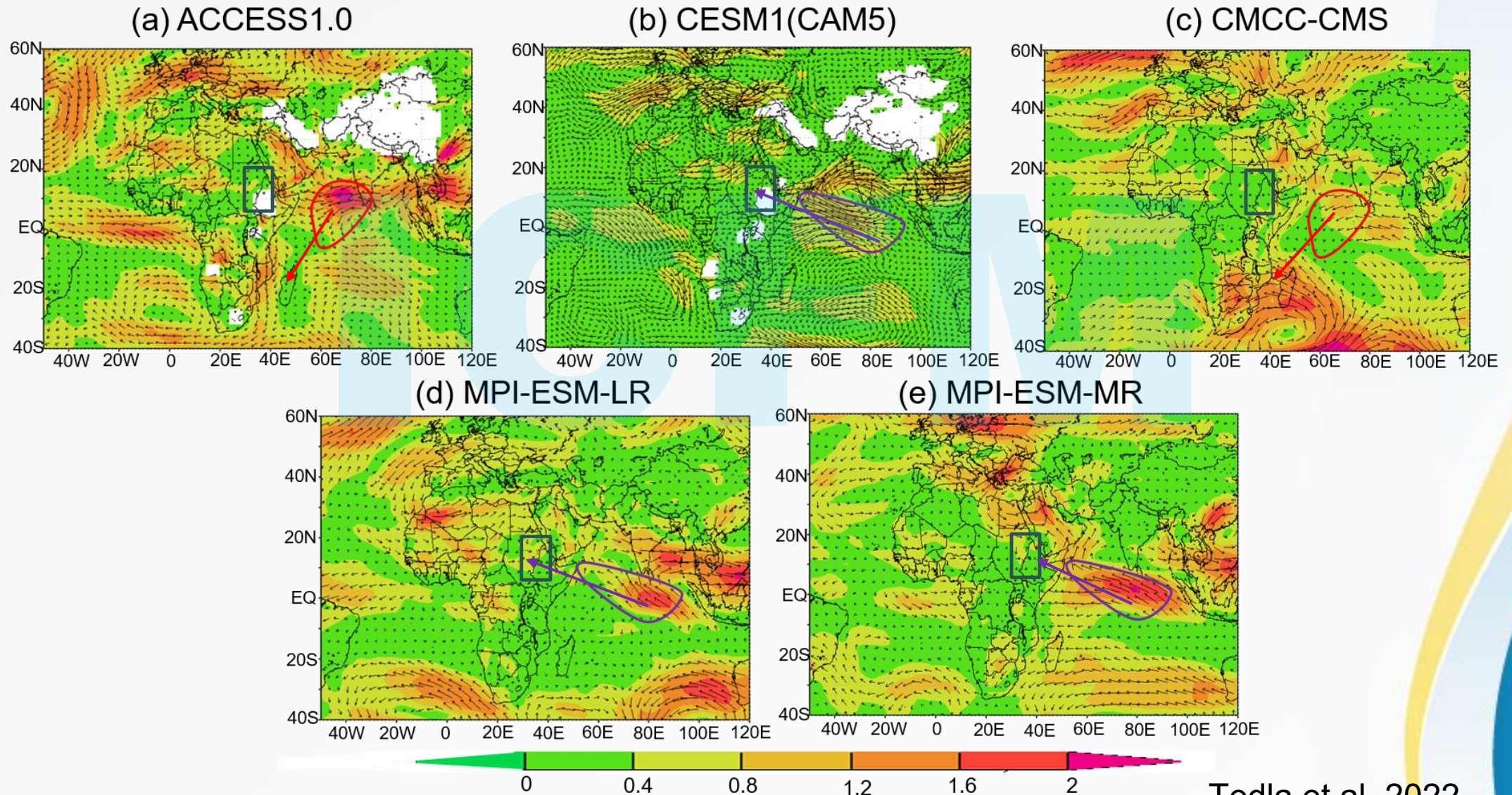
Regional climatic influence

- El Niño can have significant impact on weather patterns in the Horn of Africa, leading to increased rainfall and flooding in some areas, while causing drought conditions in others.
- The frequency of El-nino and La-nina seasons can lead to catastrophic extreme events.
- The occurrence of a positive Indian Ocean Dipole (IOD) in Eastern Africa, in 2019, caused widespread flooding (UN-OCHA, 2023).
- A likely combination of El Niño and a positive IOD potentially resulting in wetter conditions in parts of the region.
- Understanding the teleconnections of regional climate variables play a crucial role in understanding and predicting weather patterns in the Horn of Africa

Regional climatic influence

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Wind speed and vector:- JJAS @850hPa



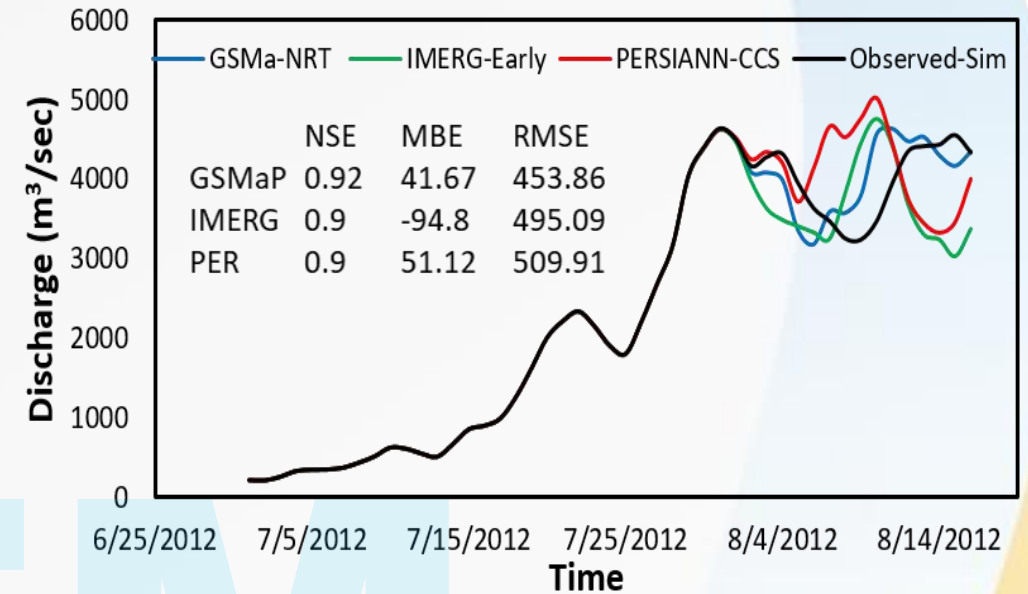
Tedla et al. 2022

Challenges

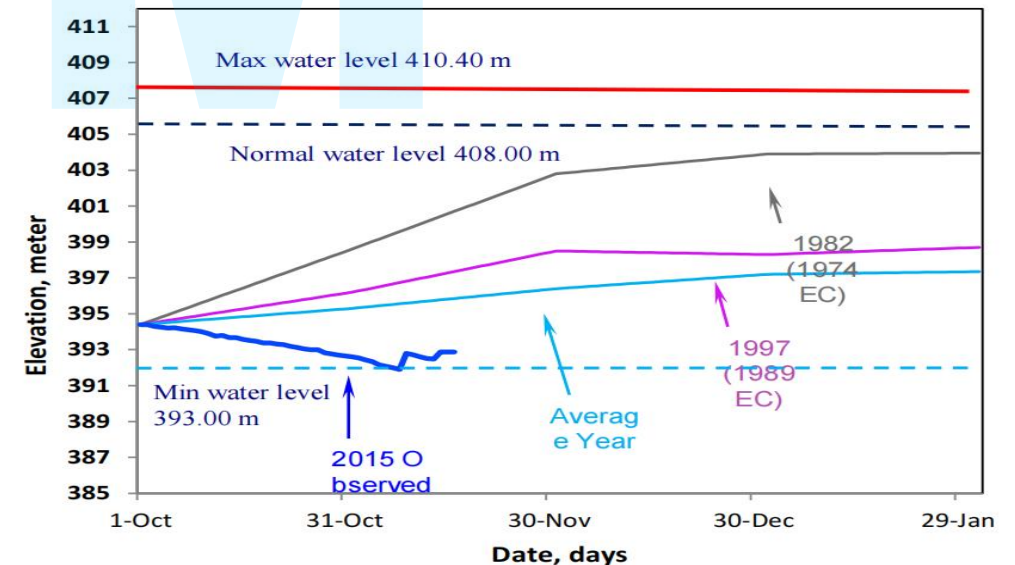
- Water towers are being depleted due to deforestation and natural disasters.
- Forecasts in Eastern Africa, remain uncertain.
- Limited infrastructure and inadequate early warning system
- Poor coordination among stakeholders
- Most basins are transboundary, yet there are no existing policies and institutions for managing resources and minimizing damages.
- Lack of collaboration among governments, NGOs, and international agencies for addressing the complex challenges posed

Mitigation strategies

- Implimentation of sustainable water management practices.
- Hydrologic models for integrating real-time satellite precipitation products into early warning systems.
- Dam operations can help mitigate climate variability and minimize extreme events.
- Afforestation and natural resources conservation.
- Building community resilience for mitigating the impacts of floods and droughts in the region.



SPPs application (Tedla et al., 2024)



Tendaho dam operation plan (2015)

Conclusion

- Recent floods and droughts underscore a troubling trend of rising frequency and intensity of extreme weather conditions.
- Research for understanding meteorological variables teleconnection is crucial for predicting and managing climate variability and extreme weather events in the Horn of Africa.
- There is a need to improve the utilization of space-based precipitation datasets and water storage structure for early warning and disaster risk reduction.
- Scaling up the action for addressing the challenges of floods and droughts and to minimize the exposure such as reforestation and coordination of stakeholders.

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Thank you!!