GCRF African SWIFT
Science for Weather Information and Forecasting Techniques

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Subseasonal-to-Seasonal S2S Prediction Project

APPLICATION OF REAL TIME S2S FORECASTS OVER EASTERN AFRICA IN THE CO-PRODUCTION OF CLIMATE SERVICES

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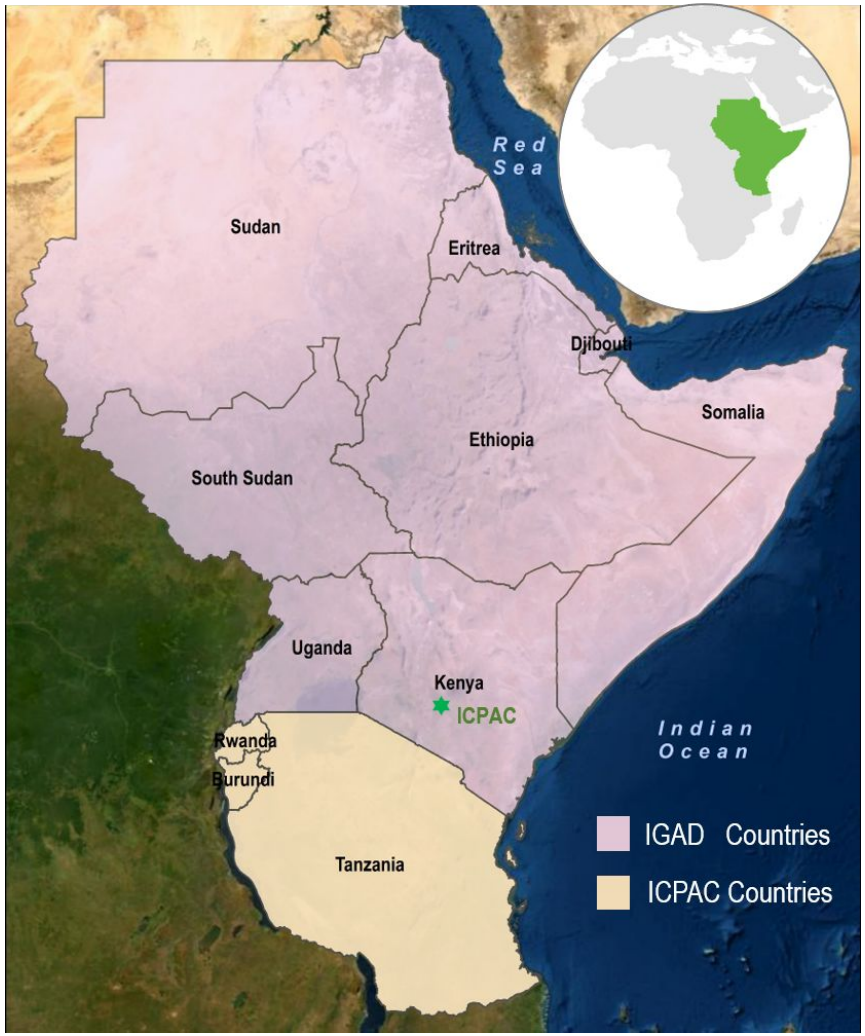
16 November 2022

WCRP World Climate Research Programme

WWRP WORLD WEATHER RESEARCH PROGRAMME

ABOUT ICPAC



- **BACKGROUND**: Established in **1989** as the Drought Monitoring Centre, Nairobi (DMCN);
- 2007, the Protocol establishing the Centre signed & the name changed to: ***IGAD Climate Prediction and Applications Centre (ICPAC)***
- May 2017 ICPAC was designated a **WMO Regional Climate Centre** (WMO-RCC) for Eastern Africa.
- ICPAC is a member of AUC/NEPAD **Network for Water Centers of Excellence**.
- ICPAC has an Observer Status with the **UNFCCC**

MISSION: Foster climate services and knowledge to enhance community resilience for prosperity in the Greater Horn of Africa

WMO- World Meteorological Organization
AUC – Africa Union Commission
NEPAD- New Partnership for Africa's Development
UNFCC- United Nations Framework Convention on Climate Change

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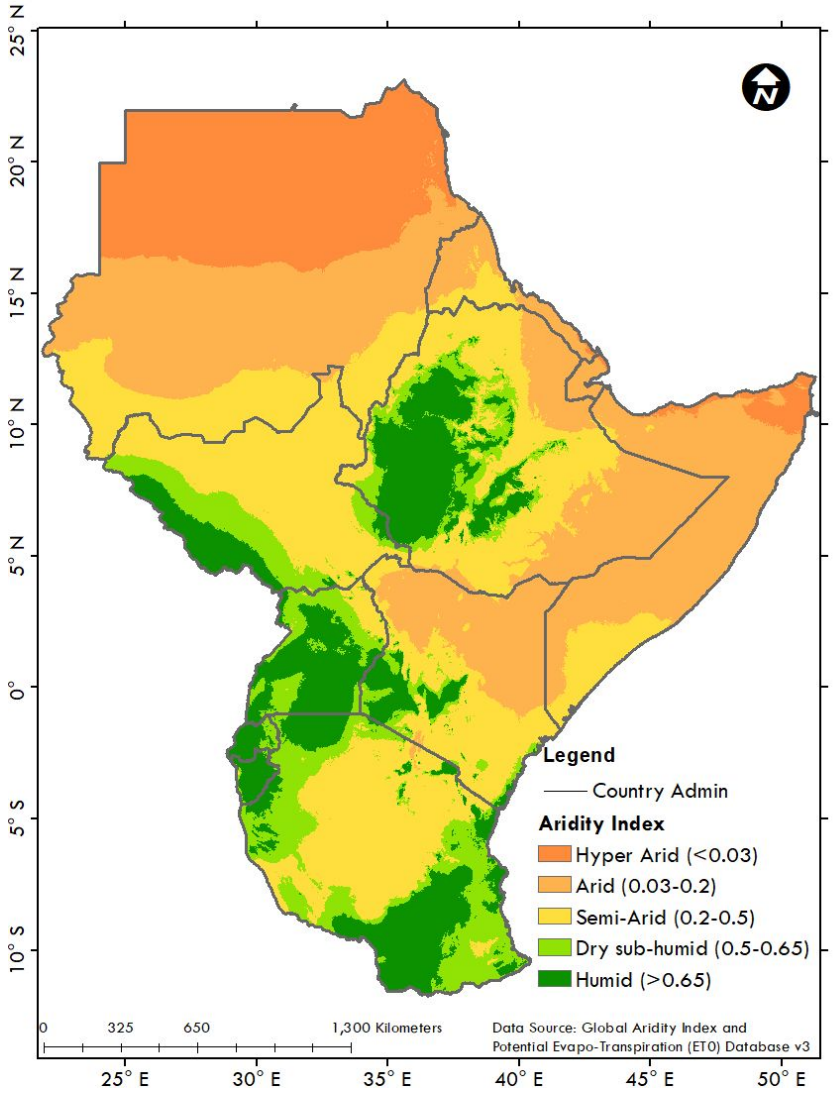
BACKGROUND OF THE REGION



- Approximately 70% of the population depends directly on agricultural productivity for their livelihood.
- Most parts of Eastern Africa are Arid and Semi-arid. The communities are highly vulnerable to climate variability.
- The livelihood in the regions is mostly pastoral, Agro-pastoral and cropping.

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CO-PRODUCTION APPROACH

The building blocks of co-production (building on models developed by AMMA-2050, *Visman et al., 2017b and KCL engagement in two BRACED consortia projects in Visman et al., 2018 and WISER 2017)*

Source: Carter, S., Steynor, A., Waagsaether, K., Vincent, K., and Visman, E. (2019) 'Co-production of African weather and climate services'. Manual, Cape Town: SouthSouthNorth (https://futureclimateafrica.org/coproduction-manual)

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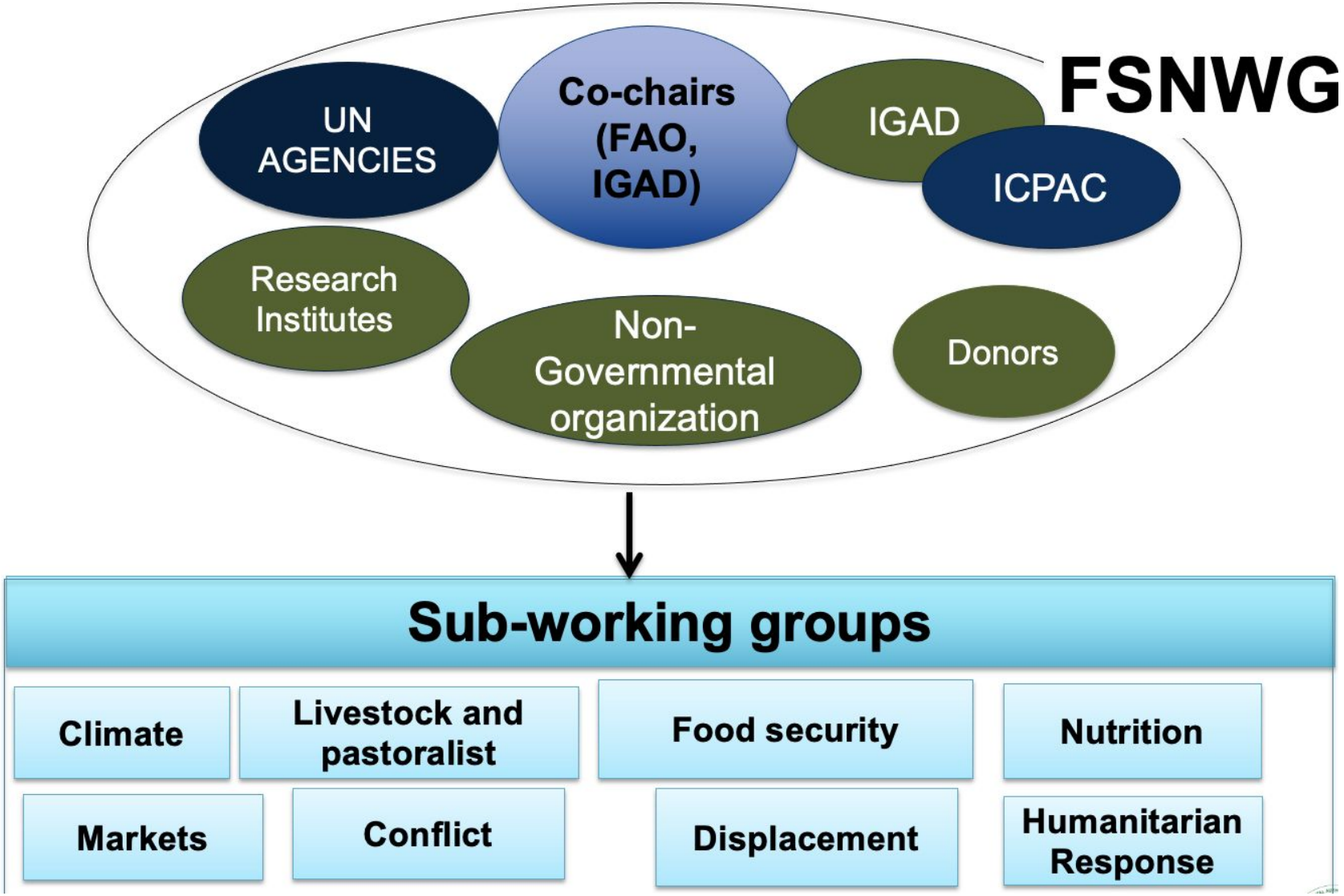
Identify key Partners



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PRE-TESTBED QUESTIONNAIRE KEY MESSAGES

- Climate is the main driver of food insecurity over most countries in Eastern Africa, closely followed by conflict or insecurity, and macro-economic drivers.
- Extreme weather escalates conflict-related food insecurity, for example, conflicts over pasture land and water points.
- Poor rains lead to widespread crop failures, loss of livestock and destabilize other livelihood strategies, all of which impact food availability and access.
- 7-30 day forecasts can help generate and execute tactical or emergency strategies in order to safeguard or reduce impact of extreme events on lives and livelihoods

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THE SWIFT S2S TESTBED KICKOFF WORKSHOP

- The kick-off workshop was held in Ngong Kenya at the ICPAC headquarters in November 2019

- The workshop brought together forecast users, operational forecast producers and researchers from 6 African countries Cameroon, Ghana, Kenya, Nigeria, Niger, and Senegal and also partners from the UK

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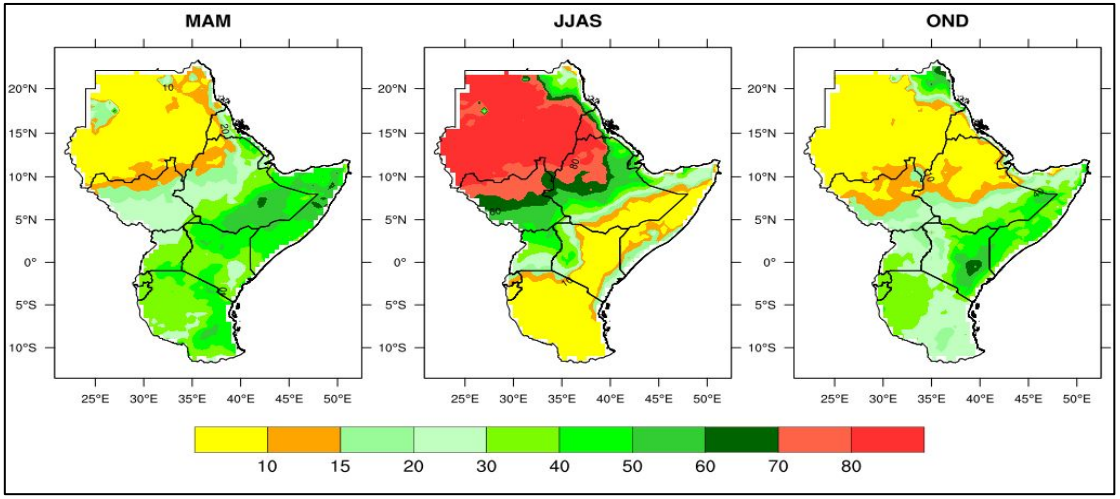
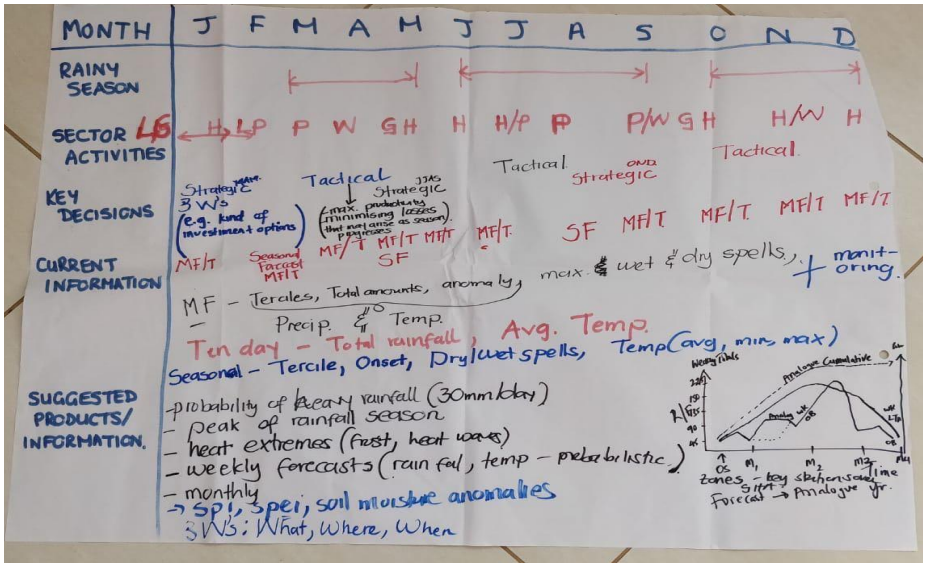
MAPPING OUT KEY AGRICULTURAL ACTIVITIES





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IDENTIFICATION OF FORECAST INFORMATION GAPS

Forecast products produced prior to the testbed	Proposed forecast products
Ten day (dekadal) forecast ● Total rainfall ● Average temperature Monthly forecasts ● Precipitation total ● Rainfall anomalies ● Probabilistic tercile rainfall ● Average temperature ● Probabilistic tercile temperature ● Average temperature anomalies ● maximum wet and dry spells	Weekly forecasts ● Rainfall total ● Rainfall anomalies ● Probability of exceedance for rainfall ● Weekly timeseries rainfall anomalies ● Minimum temperature anomalies ● Maximum temperature anomalies ● Soil moisture anomalies ● Maximum wet and dry spells in the forecast 4 weeks ● Standardized precipitation index ● Standardized precipitation evapotranspiration index

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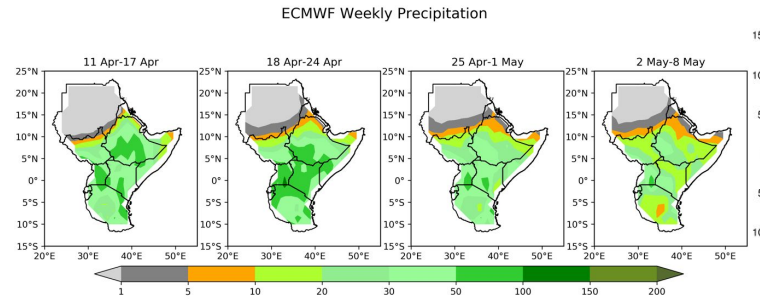
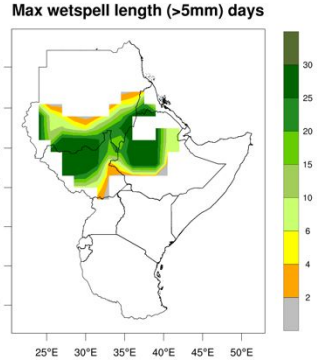
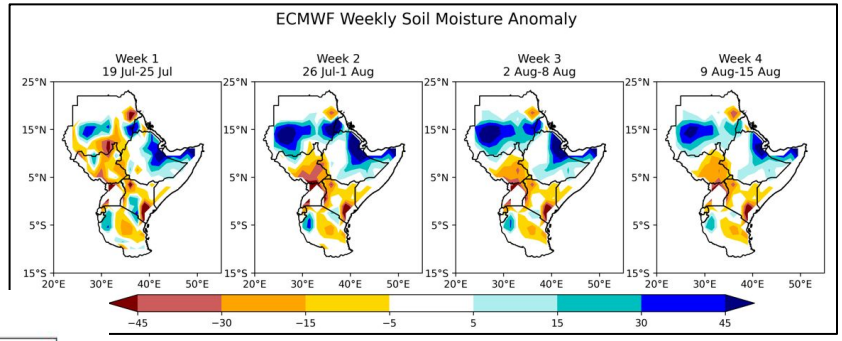
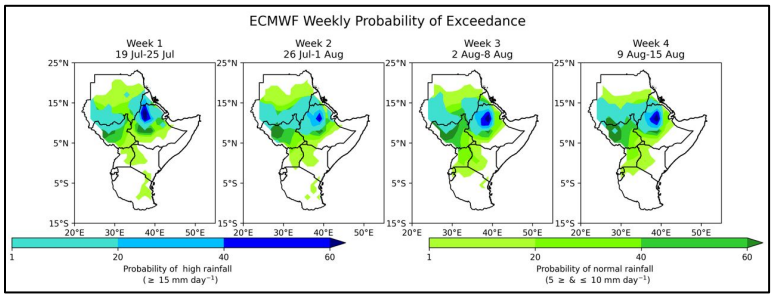
CAPACITY BUILDING WORKSHOP OF FORECASTERS

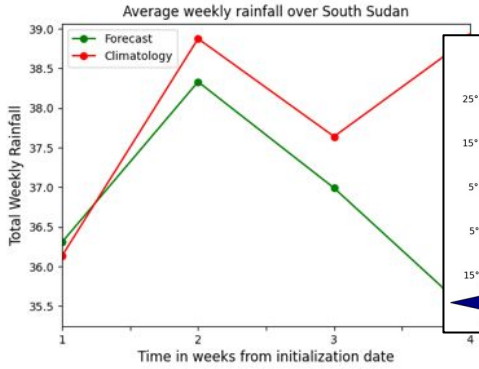
- A one week long workshop was held at University of Reading to train forecasters on the production of the tailored products that were requested by the users, utilising python
- ECMWF forecast outputs initialised on Mondays were utilised

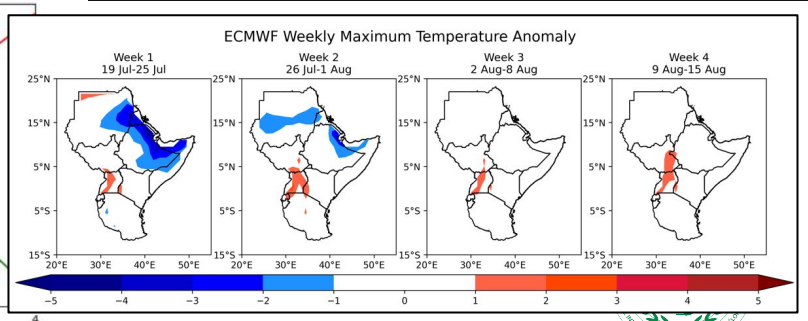












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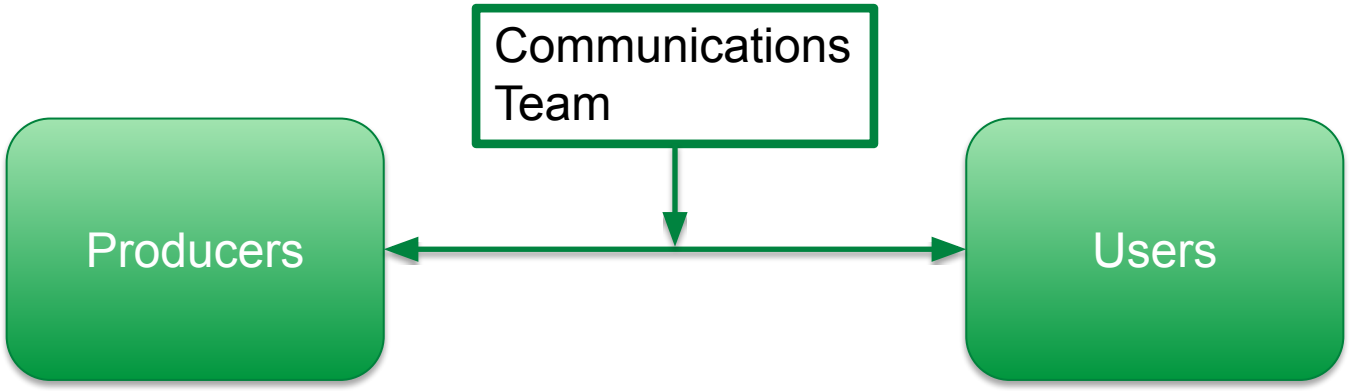
ICPAC COMMUNICATION AND USER SERVICE TEAM

- Act as an intermediary between the climate information producers and the climate information users
- The team is made up of journalists, social scientists,digital content creators, and user engagement experts
- Train journalists on use and communication of the climate information (Mooc availabe)



KEY OUTCOMES OF THE COPRODUCTION PROCESSES

- Biweekly forecast bulletins produced for the FSNWG
- Communication team within ICPAC provided feedback on the layout and language to improve the bulletins
- The sub-seasonal forecast information was incorporated in the climate presentations during the monthly meetings
- Standard operating procedures developed

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Sub-seasonal Weekly Forecasts over Eastern Africa for the Food Security and Nutrition Working Group

Forecast Summary

- This bulletin provides the forecast for the next four weeks (19 July 2021-15 August 2021) utilizing the ECMWF model initialized on the 12th of July 2021.
- During the forecast period, parts of Ethiopia, Eritrea and South Sudan, are expected to be wetter than the usual.
- Parts of Ethiopia, Eritrea and Sudan expected to receive rainfall greater than 15 mm per day, with higher probabilities over Ethiopia.
- Cooler than the usual maximum temperatures are forecast over Ethiopia, Eritrea, Sudan from week one to two.
- Wetter than the usual soil moisture conditions are forecast over most parts of Ethiopia and Sudan, while drier than the usual soil moisture conditions are forecast over parts of South Sudan.

Likely Impacts

- Drier than usual conditions expected in week one and two over Uganda are likely to affect the growing season. Farmers in the affected areas are advised to put in place mitigative measures in anticipation of the above.

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CHALLENGES FACED AND LESSONS LEARNT

- **User Feedback:** The feedback provided were generally not specific enough to attach the forecast to the decision that was made.

- **Scale - downscaling of products:** Climate information users highlighted that the spatial extent of averaging was too big for the forecast to be useful for decision-making, so it was request that the timeseries be broken down for each climatological region in the country. ---East Africa Hazards Watch

- **Inconsistent storylines in the forecasts:** in some forecast weeks there were significant changes from one week to the next.

- **Coarse Data:** The S2S reforecasts and forecasts were archived and shared on relatively coarser horizontal resolution (1.5-degree), which makes difficult to produce detail S2S information at local levels.

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CHALLENGES AND OPPORUNITIES MOVING FORWARD

Challenges

- Access to real-time S2S data was only through projects, where most of the projects that had access to the real-time S2S data are already ended.

Opportunities

- Co-produce with other sectors over the Region such as disaster risk reduction, health, water and energy.
- Downscale the data to local level utilizing statistical and machine learning techniques.

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THANK YOU

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