Tanzania Meteorological Authority Stakeholders' Training on the Sixth National Climate Outlook Forum (NCOF6) for November 2022 – April 2023 Rainfall Season

John W. Recha

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Accelerating Impacts of CGIAR
Climate Research for Africa

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Workshop Report

Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA)

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About AICCRA reports

Titles in this series aim to disseminate interim climate change, agriculture, and food security research and practices and stimulate feedback from the scientific community.

About AICCRA

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Introduction

In the late 1990s the World Meteorological Organisation, National Meteorological and Hydrological Services (NMHSs), regional institutions and other international organizations initiated an innovative process known as the Regional Climate Outlook Forums, that led to the National Climate Outlook Forums. These Forums bring together climate experts, on an operational basis, to produce geographical climate outlooks based on input - climate predictions - from all participants. By bringing together the different experts, the Forums ensure consistency in the access to, and interpretation of, climate information. Through interaction with users in the key economic sectors, extension agencies and policymakers, the Forums assess the likely implications of the outlooks on the most pertinent socio-economic sectors and explore the ways these outlooks could be used by them.

The Tanzania Climate Outlook Forum focused on the delivery of consensus-based, user-relevant climate outlook product for the November 2022 – April 2023 (Msimu) rainfall season in real time through national cooperation and partnership with AICCRA (https://aiccra.cgiar.org/) and the International Livestock Research Institute (https://www.ilri.org/) . The process included the following components:

- Meetings of the TMA and international climate experts to develop a consensus for the national climate outlook, typically in a probabilistic form.
- The Forum itself, involving both climate scientists and representatives from the user sectors, for the identification of impacts and implications and the formulation of response strategies.
- A training workshop on seasonal climate prediction to strengthen the capacity of the national climate scientists.
- Special outreach sessions involving media experts, to develop effective communications strategies.

The forum also reviewed impediments to the use of climate information as well as experiences and successes in the use of the past climate products issued by TMA in order to enhance sector-specific applications. The national forum developed detailed national-scale climate outlooks and risk information, including warnings for communication to Tanzanian decision-makers and the public. Close interaction between the providers and users of climate information and predictions has enhanced feedback from the users to climate scientists and has catalyzed the development of many user-specific products. The invited users that would benefit from the Forum contributed to its organization and to the breadth of the sessions, thus ensuring the applicability to meeting user needs. It attracted practitioners and decision-makers from different sectors in the United Republic of Tanzania.

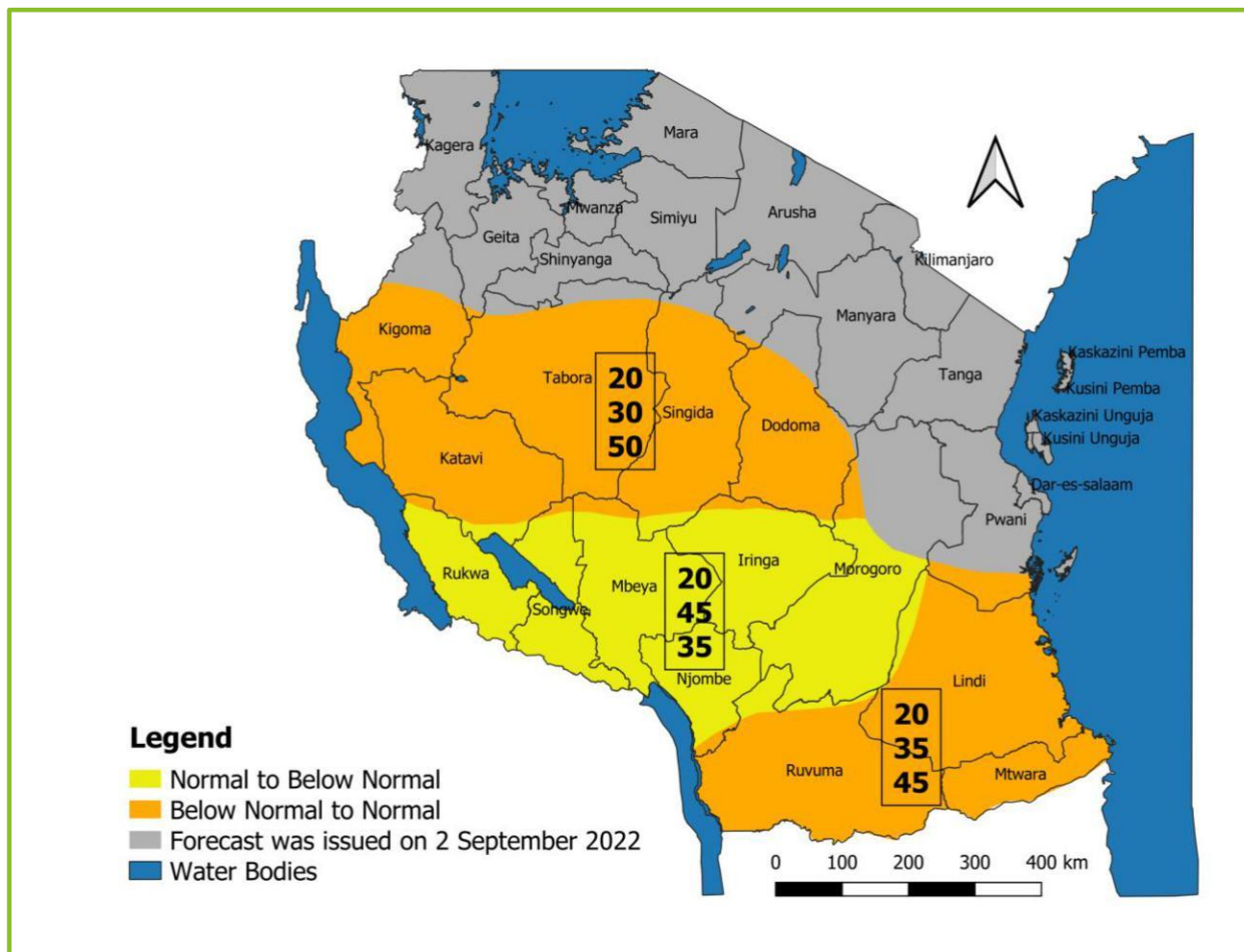# Summary of Climate outlook for November 2022 – April 2023 (Msimu) rainfall season by TMA

Figure 1: Rainfall Outlook for November 2022 to April 2023

Highlights for *Msimu* rainfall season (November, 2022 – April, 2023)

This statement gives evolution of climate systems and outlook for *Msimu* rains, over the unimodal areas (western, central, southwestern highlands, southern, southern coast and southern parts of Morogoro region) for the months of November, 2022 – April, 2023. Advisories and early warnings have been provided to various weather sensitive sectors such as agriculture and food security, livestock and fisheries, natural resources, wildlife and tourism, energy and water, transport (land, marine and aviation), local authorities, health, private and disaster management. The Outlook for *Msimu* rains is as follows:

a) Outlook for *Msimu* rains over Unimodal areas:

    i   Below normal-to-normal rainfall is expected over many areas of Kigoma, Tabora, Katavi, Singida, Dodoma, Ruvuma, Lindi and Mtwara regions. In addition, normal to below normal rains are expected over some areas of Njombe, Rukwa, Songwe, Mbeya, Iringa and southern Morogoro regions.

    ii   In the first half of the season (November, 2022 – January, 2023) long periods of dryness are expected to emerge.

    iii   An increase in rainfall is expected in the second half of the season (February-April, 2023). In addition, off-seasonal rains are expected in May

         2023, in many areas.

    iv   In Singida and Dodoma regions, the seasonal rains are expected to start late in the second week of January 2023.

b) Expected Impacts

    (i) During November and December 2022, a significant deficit in soil moisture is expected to occur in many areas that receive seasonal rains and affect the growth of crops and the availability of pasture for livestock and wildlife.

    (ii) Water Levels in rivers and dams are expected to decrease and affect the availability of water for various uses such as irrigation and energy production.

    (iii) Authorities are advised to ensure that water sources are maintained as well as to set up water harvesting infrastructure in parallel with preparing and implementing strategic plans to encourage sustainable agriculture.

Progress for October-December 2022 *Vuli* rains and outlook for *Msimu* Rains (NDJFMA) 2022/2023

1.1 The October to December (*Vuli*) 2022 season progress

The October to December (*Vuli*) 2022 rainy season for bimodal areas (Kagera, Geita, Mwanza, Shinyanga, Simiyu, Mara, Manyara, Arusha, Kilimanjaro, Tanga, Dar es Salaam, northern part of Morogoro and Pwani (including Mafia Island) regions together with Zanzibar (Unguja and Pemba islands)) is expected to continue as issued on 2nd September 2022, whereby most areas are anticipated to feature below normal to normal rains. However, off seasonal rains are expected during the month of January, 2023.

1.2 Outlook for *Msimu* rains (November, 2022- April, 2023)

Msimu rains are specific for the western, central, southwestern highlands, southern region, southern coast and southern parts of Morogoro region. These regions experience unimodal rainfall regime, which starts in November and ends between April and May of the following year.

Based on the current and expected climate systems (as indicated in section 2 of this outlook), there is an elevated chance of below normal to normal rains over Kigoma, Tabora, Katavi, Singida, Dodoma, Ruvuma, Lindi and Mtwara regions. However, normal to below normal rains are expected over regions of Njombe, Rukwa, Songwe, Mbeya, Iringa and southern part of Morogoro region. Furthermore, during this season, most areas are likely to be characterized by late onset and prolonged periods of dry spells especially during November, 2022 to January, 2023. Nevertheless, increase of rainfall activities is expected during the second half of the season (February- April, 2023). However, off seasonal rains are expected during the month of May, 2023 over most areas. Details of the rainfall season are as follows:

i **Western areas: (Tabora, Katavi and Kigoma regions):**
Below normal to normal rains are expected over Kigoma, Tabora and Katavi regions. Rains over most areas are expected to commence during the third and fourth weeks of November, 2022 and cease in the fourth week of April, 2023 with expectation of off-seasonal rains in May, 2023.

ii **Central areas (Singida and Dodoma regions):**
Rains over these regions are expected to be below normal to normal and anticipated to start during the second week of January and cease in the fourth week of April, 2023 with expectation of off-seasonal rains in May, 2023.

iii **Southwestern Highlands: (Rukwa, Songwe, Mbeya, Iringa, Njombe regions and southern part of Morogoro region):**
Normal to below normal rains are expected in these regions. Rains in these areas are likely to commence during the first and second weeks of December, 2022 and cessation is expected in the fourth week of April, 2023 with expectation of off-seasonal rains in May, 2023.

iv *Southern Coast and Southern Region: (Mtwara, Lindi and Ruvuma regions):*
Below normal to normal rains are expected in these regions. The rains are likely to commence during the first and second weeks of December, 2022 in Mtwara, Lindi and Ruvuma regions accompanied by prolonged dry spells during December, 2022 and January, 2023 over Ruvuma region. Rains are expected to cease in the fourth week of April, 2023 with expectation of off-seasonal rains in May, 2023.
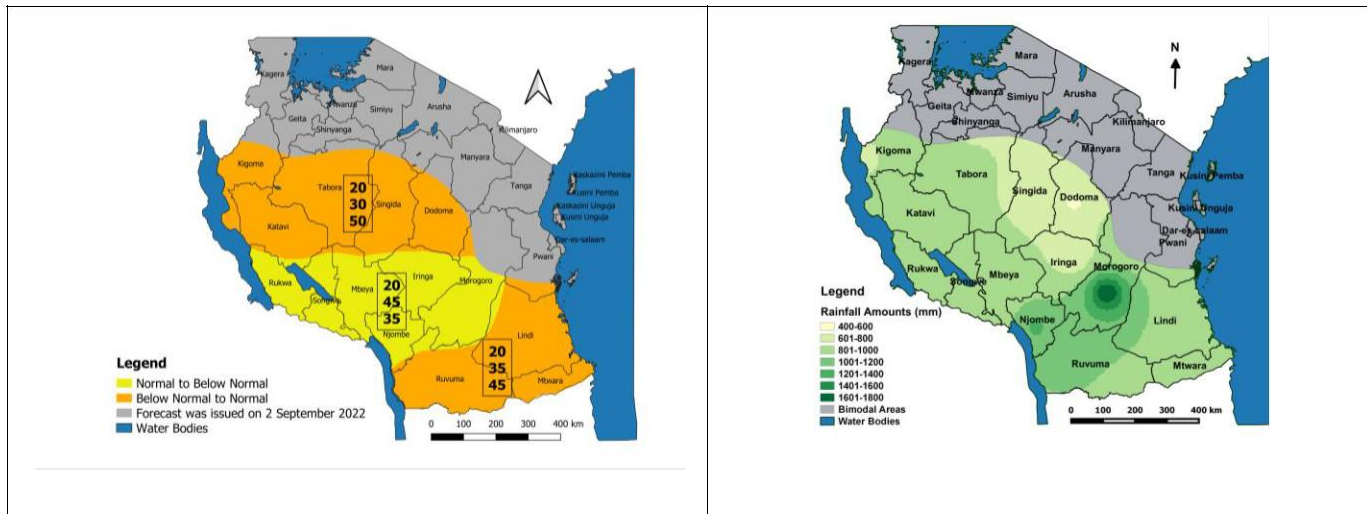

Figure 2: Left: Rainfall Outlook for Msimu rains (November, 2022-April, 2023) and Right: 30-year from November to April climatological rainfall averages (1991-2020).

Note 1: It should be noted that events of heavy and short duration rainfall might occur even over areas with below normal rainfall conditions.

Note 2: Tropical depression are likely to occur over the southwestern Indian Ocean which include the Mozambique channel and this may trigger rainfall activities during the second half of the season.

Note 3: The current status of seasonal forecasting allows for prediction of spatial and temporal averages over larger areas and may not fully account for all physical and dynamical factors that influence short-term climate variability. Users of this outlook are, therefore urged to make good use of daily, ten-day and monthly updates issued by the Tanzania Meteorological Authority (TMA).

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Climate Systems Outlook

The observed cooler than average Sea Surface Temperatures (SSTs) over the Central Equatorial Pacific Ocean (La Niña condition) is expected to persist during the first half of the season (November, 2022 to January, 2023). This condition is likely to lessen towards neutral SSTs during the second half of the season (February to April 2023).

On the other hand, SSTs over the western (East African Coast) and the eastern (Indonesia) parts of the Indian Ocean are expected to be cooler and warmer than average respectively during the first half of the season. However, near average SSTs are expected over both domains during the second half of the season. This condition is expected to generally reduce flow of moist air from the Indian Ocean towards the country and suppress rainfall making mechanisms over some areas of the country especially southern coast, southern and central regions.

Meanwhile, slight cooler than normal SSTs are expected along the eastern Atlantic Ocean (off-Angola coast) coupled with cooler than average SSTs over the West Indian Ocean (east African Coast), this condition is likely to lessen the flow of moist westerly winds from the Congo Basin towards the western areas including the south-western highlands.

Likely Impacts and Advisory

The section of impacts and advisories of the outlook were jointly developed with experts from respective sectors during the stakeholders meeting held on 24th October, 2022.

39) **Agriculture and food security**
Severe soil moisture deficit is likely to prevail due to below normal to normal over most of the Unimodal areas. This condition may affect crop growth and development mainly during November and December, 2022. In addition, an increase in crop pests such as ants, fall armyworms, rodents and diseases are expected to occur in the season thus affecting crops and production in general. Fire outbreaks are also expected due to prolonged dryness.

Farmers are advised to plant early maturity crops and drought tolerant such as root and tuber, legumes and horticultural crops. The use of sustainable farming techniques and technologies for water and soil moisture conservation including rainy water harvesting and mulching are highly advisable. Farmers and agriculture extension officers are advised to seek information on weather updates from TMA for agricultural and cropping activities.

The relevant authorities are advised to strengthen awareness and advice to farmers on the best way to use the expected prevail rains due to below normal to normal over most of the unimodal areas optimize the use of available food reserves.

39) **Livestock and Fisheries**
Deficit of rainfall particularly during the first half of the season (November, 2022 to January, 2023) is expected to affect availability of water and pasture for livestock leading to possible conflicts between pastoralists and other land users. Furthermore, in some areas, livestock diseases (transmitted by ticks as well as flying insects) and livestock production are expected to decrease. The supply of nutrients and food for fish is expected to decrease and affect fish yields. On the other hand, the cultivation of algae in shallow water is expected to be affected due to prolonged dry spells.

Livestock keepers and fishing community are advised to prepare proper plans for the use of scarcely available water and pasture resources, practicing commercial farming and livestock harvesting. In addition, livestock keepers and fishers are advised to use weather forecast information and follow extension officer's advisories.

39) **Tourism, Natural resources and wildlife**
Below normal rainfall over most unimodal areas may lead to water scarcity, as a result there shall be insufficient pasture for wildlife. Moreover, this will cause wildlife animals to migrate in searching for water and pasture. This situation may lead to human-wildlife conflict and spread of diseases. Furthermore, honey production is also expected to be affected due to water scarcity.

The relevant authorities are advised to improve infrastructure in wildlife reserves and provide awareness to the community regarding the expected seasonal rainfall condition. In addition, the community is advised to report to the relevant authorities in case of any wildlife invasion.

d) Transport and Transportation
Transportation sector, including Land transport, Maritime and Aviation are expected to benefit from the expected weather condition. In addition, constructions and rehabilitation of infrastructure are also expected to benefit from prolonged dry spells that are anticipated. Operating cost and safety of transportations are expected to be satisfactory, however, it is advised that, planning for operations and rehabilitation of infrastructures should be implemented taking into account the daily weather forecast to specific sector and areas to reduce the possible impacts.

e) Energy, Water and Minerals
Decrease in water levels in rivers, reservoirs and the aquifer recharge is most likely to continue in most of the areas forecasted to experience high chances of below normal rainfall. Water levels are expected to decrease and impair water availability for various uses. The production of minerals (especially for small scale miners) and hydropower are expected to be affected.

Water users may be affected and lead into conflicts between large- and small-scale water users. However, the implementation of hydropower projects including construction, exploration and extraction of oil and gas is expected to be favoured. Moreover, stakeholders are urged to consider the sustainable use and conservation of water resources in mineral processing activities, electricity production, industrial and domestic use. Likewise, the relevant authorities are advised to have effective plans for the production of electricity from other sources other than water such as solar, wind and gas.

Similarly, the availability of water in rivers and dams is expected to be satisfactory in some areas where normal rains are likely.

However, water users are advised to consider application of sustainable methods of water harvesting, storage and use since the rainfall distribution is likely to be poor.

f) Local Authorities
Due to the expected rainfall deficit, the local authorities are advised to use this opportunity to continue with maintenance of various infrastructures such as roads, bridges, buildings, waste storage areas, warehouses and electricity lines as well as to ensure that the clean water and

sewage systems are working at the appropriate level. Local authorities are advised to ensure that water sources are maintained as well as to set up water harvesting infrastructure in order to control water loss for future sustainable use. Likewise, local authorities are advised to continue with mobilization and finalization of various public infrastructure development projects planned in this period such road, schools, hospitals.

g) Health Sector

For areas that expected to receive below normal rains, shortage of clean and safe water may occur and result into an outbreak of water related diseases as impact of poor hygiene e.g cholera, typhoid, trachoma. The health authorities are advised to encourage communities to harvest and treat water before using it, improve sanitation (e.g frequent hand washing) and carefully use of water. For areas expected to receive normal rains, in addition to the measures mentioned above, the communities are advised to destroy breeding grounds for vectors such as mosquitoes. Furthermore, emphasis is given to health authorities to provide health education to the public and take appropriate action to reduce the likely negative impacts, which may be associated with the anticipated below normal rains.

h) Private Sector

The private sector that relies on natural resources for self-sufficiency including industries that process agricultural products, livestock, livestock products and large farm is expected to be affected. This situation may lead to high costs for the acquisition of raw materials and operations. In addition, the quality of products such as pole trees, wood, meat and honey may be affected.

The private sector is advised to collaborate with climate experts and experts from various sectors in making productive decisions on their businesses, including access to financial resources to strengthen investment and protect commercial capital.

i) Disaster Management

The expected rainfall shortage is likely to lead to potential effects includes shortage of pasture, accessibility of water, soil moisture and food security. In addition, damage to infrastructure, loss of property and harm to humans may occur due to short periods of heavy rain that may occur. The relevant authorities and the Disaster Management Committees at the Regional, District, Ward and Village levels are advised to co-operate and take appropriate action dealing with disasters to prevent and reduce the impacts that may arise including creating awareness on measures regarding disaster preparedness that will emphasize cultivating drought tolerant crops, food, water and pasture storage.

In addition, during short periods of heavy rains, various sectors including City authorities, transport (land, air and water), energy, health and private sector are advised to take precautions in avoiding and preventing possible effects that may occur.

j) Media

The media is advised to make regular follow up, obtain and disseminate seasonal weather outlooks and updates from Tanzania Meteorological Authority (TMA).

Journalists are advised to seek advice from sectoral experts; prepare and disseminate sector-wide articles and reports in simple language with the aim of informing and educating the public.

TMA advises all users of this climate outlook including farmers, livestock keepers, wildlife conservation authorities, hydrological and health sectors to continue seeking and utilizing experts' advice on their respective sectors.

TMA will continue to monitor developments of the weather systems and issue updates whenever appropriate. Users are encouraged to consult TMA for specialized outlooks and forecast on relevant sectors so as to suit their specific needs.

Annex 1: Training workshop programme

TANZANIA METEOROLOGICAL AUTHORITY
The 6th National Climate Outlook Forum (NCOF 6) for the *Msimu* rains (November, 2022–April, 2023) Stakeholders' Training
Venue: Tiffany Diamond Hotel, Dar es Salaam. 24th-25th October, 2022

TIME	ACTIVITY	RESPONSIBLE PERSON
08:30-09:00	**Arrival and Registration**	All
	SESSION I: STAGE SETTING AND OFFICIAL OPENING CEREMONY	
09:00-09:45	**Introduction and Opening remarks** *(Separate program)*	*All*
09:45-10:00	*Group Photo*	*All*
10:00-10:30	*Health Break*	
	SESSION II: PERFORMANCE OF NDJFMA, 2021/22 & USERS FEEDBACK	
10:30-10:40	Performance of NDJFMA, 2021/22 seasonal rains	J. Makwata
10:40-10:50	*Feedback from Ministry of Agriculture; Contribution of November, 2021- April, 2022 cropping season*	Representative – Ministry of Agriculture
10:50 -11:30	*Feedback from other sectors*	Representatives
	SESSION III: OND 2022 PROGRESS, NDJFMA 2022/23 SEASONAL OUTLOOK	

11:30-11:40	❖ *OND, 2022 progress*
	 ❖ *NDJFMA 2022/23 climate outlook*
	    o Climate systems review
	    o NDJFMA 2022/23 rainfall forecast
		R. Omary

	SESSION IV: PANNEL DISCUSSION AND PRESENTATION ON IMPACT ASSESSMENT	
11:40-12:25	*Sectors group discussion*	Sectors
12:25-13:10	*Sectors presentations on impacts and advisories*	Sector's representatives
13:10-13:30	*Closing remarks*	
13:30-14:30	*Lunch hour*	
	SESSION V: COMPILATION OF SECTOR INPUTS	
14:30-16:30	o Gathering impacts from various sectors o Report writing	TMA experts

Annex 2: List of Participants

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About AICCRA

Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) is a project that helps deliver a climate-smart African future driven by science and innovation in agriculture.

It is led by the Alliance of Bioversity International and CIAT and supported by a grant from the International Development Association (IDA) of the World Bank.

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