Monthly Hydro Meteorology Bulletin

Forward

This Monthly Hydro Meteorological Bulletin is prepared and disseminated by the Ethiopia Meteorological institute (EMI). The ultimate objective of producing and disseminating this bulletin is to inform all level decision makers with the updated and relevant hydro meteorological information. This monthly Bulletin reviews the April 2025-month climate condition and its impacts over the river catchment across the country and highlights the May, 2026climate outlook along with the likely impact over the water dams and the rivers basins.

The information contained in this bulletin is believed to assist the water professionals for planning the capacity expansion of reservoirs, water supply, ecosystem restoration as well as rehabilitation of existing systems including dams, irrigation, canals, pumps, wetlands and the likes. In addition to the aforementioned benefit the bulletin also reveals the aridity levels of each basin, extremes heavy rainfall events and areas where significant amount of moistures loss through evapotranspiration. In the impact outlook section of the bulletin it provides the likelihood of the climate in the coming month and its potential impact over various aspect of the river basins including the hydraulic structures such as culverts, bridges, reservoir spillways, road embankments and dikes. It also indicates the measures need to be taken as the early actions so as to reduce the possible negative impact of the upcoming month climate condition. Meanwhile, your comments and constructive suggestions are highly appreciated to make the objectives of this bulletin a success.

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1. Introduction

The provision of hydro meteorological services can contribute a significant role toward water resource management and socio-economic development. both surface water and groundwater management are essentially linked to climate variability. Therefore, the provided climate information and knowledge in this monthly hydro meteorological bulletin have a critical importance for efficient, equitable and sustainable development and management of the national water resources and for coping with any climate related risks. The information illustrates the impact of previous month climate on each and every water basins and the associated climate risks observed during the month under review. In addition to the previous month impact assessment, the bulletin also provided the expected climate condition for the coming months and its impact on the water resource. The design of water-use and flood-control facilities, mainly dams and reservoirs, is frequently based on these analyses. Estimating the likelihood of precipitation, the distribution of precipitation and the rate of evaporation in location and time, the heavy rainfall and the subsequent Runoff, extreme temperature and wind are among issues that hydro meteorologists are concerned with.

1.1 Monthly Hydro Meteorological Assessments

1.1.1 Monthly aridity Climatology over the Ethiopian River Basin

In the normal climate moisture condition of April in the south, west, south west, central, and south Eastern river basin will gets sub humid to very wet moisture condition. In line with this, most parts of, Omo gibe, Baro Akobo, Rift Valley, Genale Dawa, Awash, Wabisheble, and Abay, Ogaden, upper Tekeze, Afar Danakil receive significant amount of moisture. The rest Lower Tekeze, and western middle Abay basins will be Arid conditions.

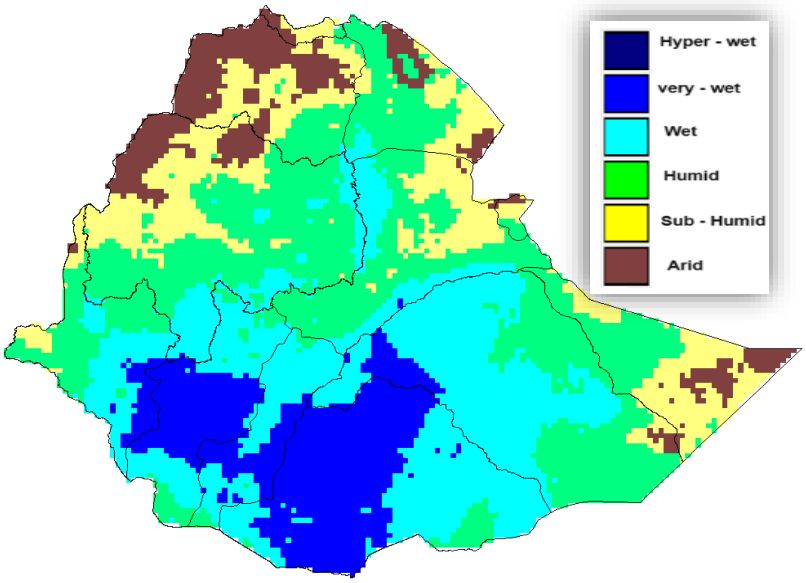


Figure 1. Monthly Moisture Climatology over the river basin during April

1.1.2 April 2026 Rainfall Assessment over the River Basins

April monthly rainfall distribution is observed across the south, south western, south Eastern and central half basins of the country. According to this, the Baro-Akobo Basin receives the highest monthly rainfall in Ethiopia, with extensive areas falling within the 311-450 mm class and localized regions exceeding 450 mm, making it the wettest basin during the period. The Omo-Gibe follows, characterized by predominantly 211–310 mm and 311-450 mm rainfall classes, particularly in its western and south western portions. The Abay ranks next, receiving mostly 121-310 mm of rainfall, with some western sections reaching the 311-450 mm category. The Rift Valley and Awash experience moderate rainfall, generally ranging from 68-210 mm, although the upper Awash and parts of the central Rift Valley receive somewhat higher amounts. The Tekeze receives mainly 68-210 mm of rainfall, with rainfall decreasing toward its northern and north-western areas. The Mereb exhibits similar conditions, dominated by low to moderate rainfall classes between 33 mm and 210 mm. The Genale–Dawa receives relatively low rainfall, largely within the 33-120 mm range, with slightly wetter conditions occurring over elevated terrain. The Wabi Shebelle records the lowest rainfall totals among the major

basins, with much of the basin falling within the 0-32 mm and 33-67 mm classes and only limited areas reaching 68-120 mm**.** Overall, the rainfall distribution reveals a clear gradient from the very wet western and south-western basins particularly Baro Akobo, Omo Gibe, and Abay to the much drier eastern and south-eastern basins of Wabi Shebelle and Genale-Dawa, reflecting the strong influence of Ethiopia's topography and seasonal moisture transport on rainfall patterns

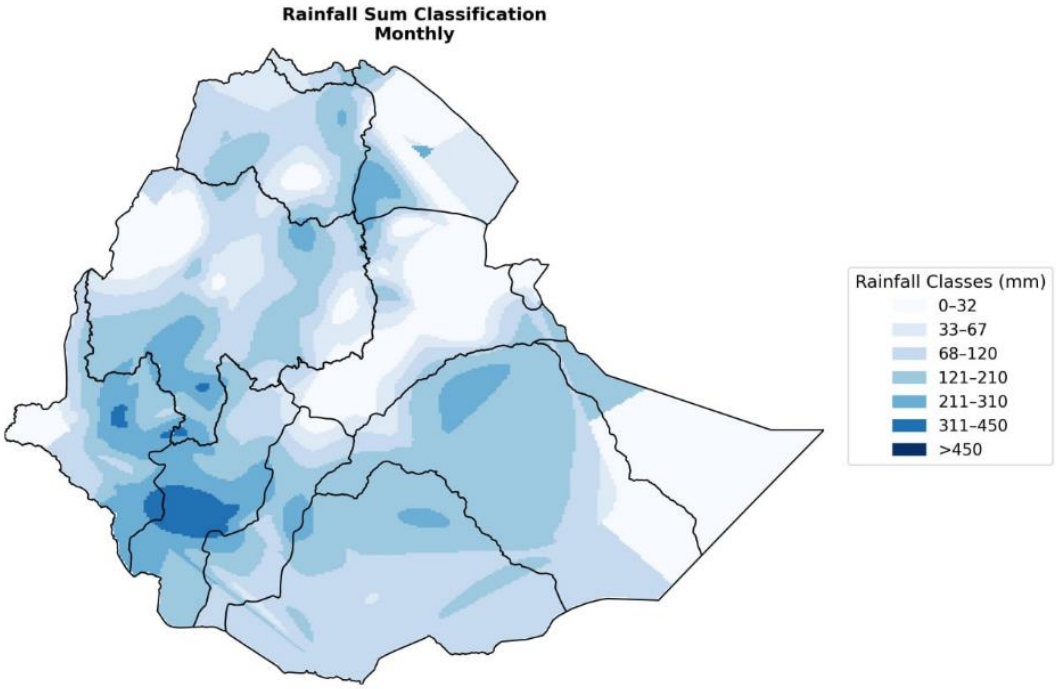


Figure 2 April monthly Total rainfall over Ethiopian River Basin.

1.1.3 Monthly Mean Temperature over the River Basin

In April month mean temperature map indicates considerable spatial variation in temperature across Ethiopia, with values ranging from approximately 12.7°C to 31.7°C. The highest mean temperatures, exceeding 27.9°C, are represented by the dark red shades and are mainly concentrated in the eastern, southeastern, northeastern, and western lowland regions of the country. These areas include much of the Wabi Shebelle**,** Genale-Dawa**,** lower Awash, and parts of the western lowlands, reflecting the influence of lower elevations and arid climatic conditions. Temperatures between 24.1°C and 27.9°C are widespread across large portions of the country and form the dominant temperature class in many low- to mid-elevation areas.

Moderate mean temperatures ranging from 20.3°C to 24.1°C occur over extensive parts of central, western, and southern Ethiopia, representing transitional zones between the hot lowlands and cooler highlands. Cooler conditions, with temperatures between 16.5°C and 20.3°C**,** are mainly associated with the Ethiopian Highlands, including portions of the Abay Tekeze**,** Awash, and Omo-Gibe basins. The lowest mean temperatures, ranging from 12.7°C to 16.5°C, are shown by the blue shades and are concentrated in the elevated highland regions of central, northern, and southwestern Ethiopia, where altitude strongly moderates temperature. When considered by basin, the Wabi Shebelle and Genale-Dawa Basins exhibit the highest mean temperatures, followed by the lower parts of the Awash. The Baro-Akob**o** and Omo-Gibe Basins generally experience moderate to warm temperatures, while the Abay**,** Tekeze**,** and Mereb contain extensive cooler highland areas. The hottest conditions occurring in the lowland regions and the coolest conditions occurring across the Ethiopian Highlands.

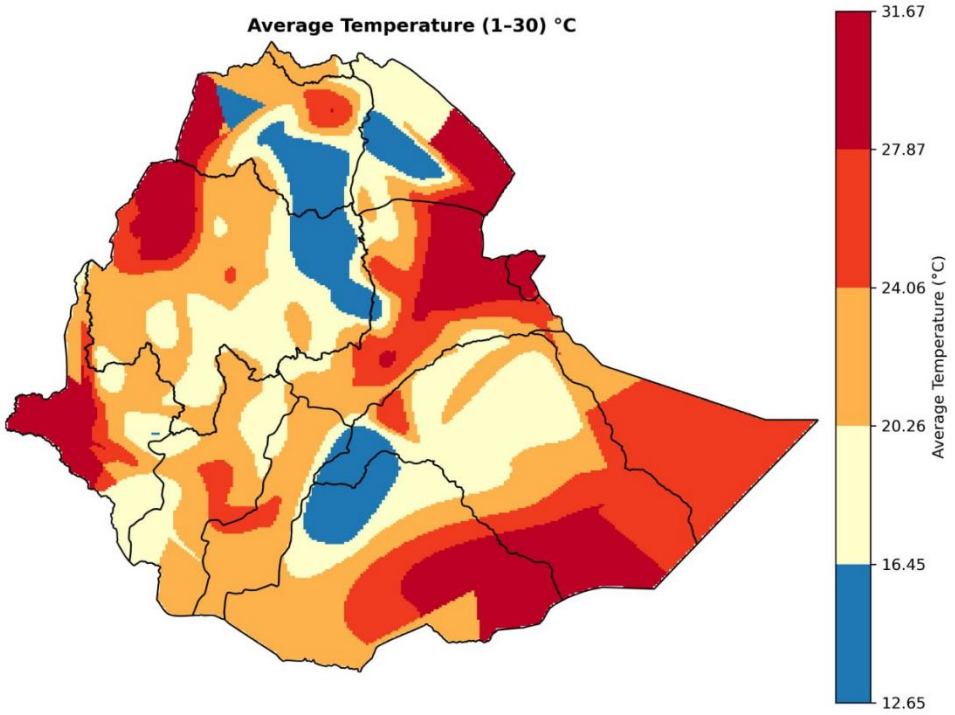


Figure 3 April monthly mean temperature over Ethiopian River Basin

1.1.4 Assessments of Aridity Index during the month of April

During April, most parts of Abay, Baro Akobo, Omo Gibe, Rift Valley, Genale Dawa, wet to very wet surface water status and Wabisheble, upper Awash, Afar Denakil, Ogaden, Tekeze have experienced sub humid to wet moisture condition Likewise, Since the received moisture over most parts of Belg rain benefiting catchment are well exceeded from the potential evapotranspiration of the month, it favours the available of ample moisture on the surface and ground water.

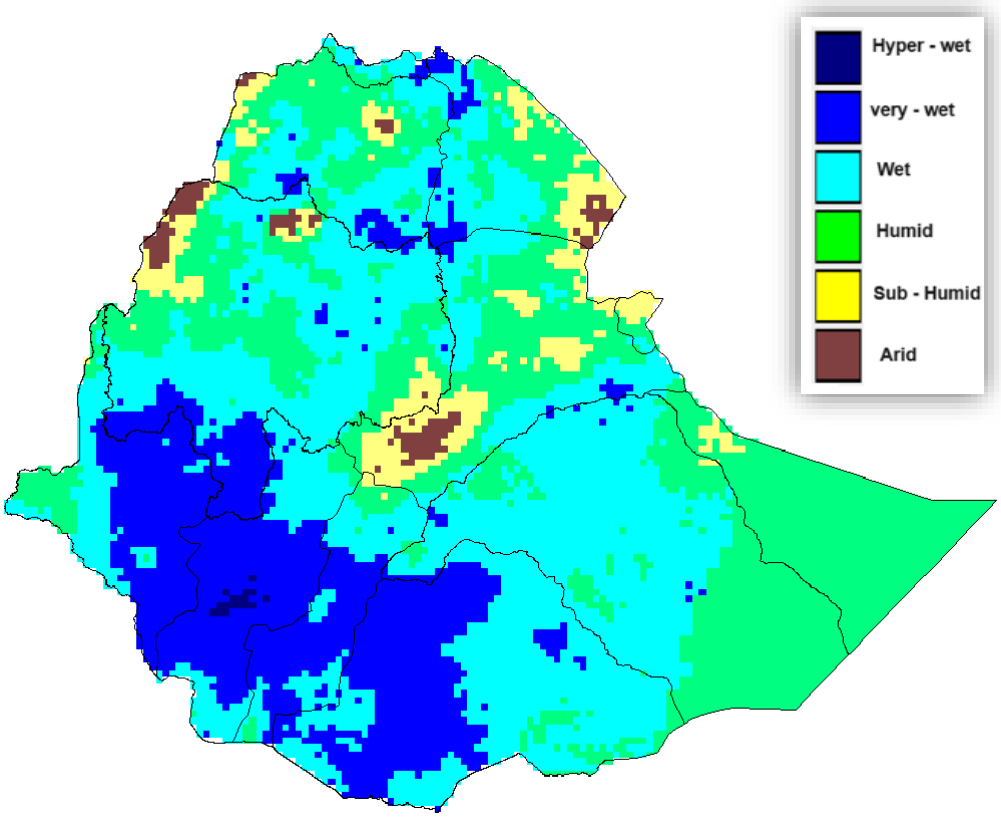


Figure 4. March monthly Aridity Index condition over the river basins

1.1.5 Distribution of Heavy fall (>30mm a day)

The map shows the monthly distribution of heavy rainfall frequency (≥ 30 mm/day**)** across Ethiopia, highlighting a strong spatial contrast between the western–southwestern high rainfall zones and the eastern lowlands. The highest frequency (5-6 heavy rain days per month) is concentrated in the southwestern part of the country, particularly around the humid lowlands and highlands associated with the Omo-Gibe and adjacent western basins. These areas appear as the most intense red zones, indicating repeated heavy rainfall events and very wet conditions during the period.

Surrounding this core hotspot, the western and southwestern highlands show moderate to high frequencies (3-4 days**)**, forming a transitional belt where heavy rainfall is still common but less persistent than the core southwest zone. In contrast, the central highlands mostly experience low to moderate frequencies (1–2 days)**,** indicating occasional heavy rainfall events rather than sustained extremes. Moving further eastward and toward the northeastern and eastern lowlands (including arid and semi-arid regions)**,** the frequency drops to 1 day or near-minimum values, showing that heavy rainfall events are rare and spatially scattered. Overall, the pattern reveals a clear west-to-east decreasing gradient in heavy rainfall occurrence, strongly controlled by topography and moisture influx from the western and southwestern parts of Ethiopia.

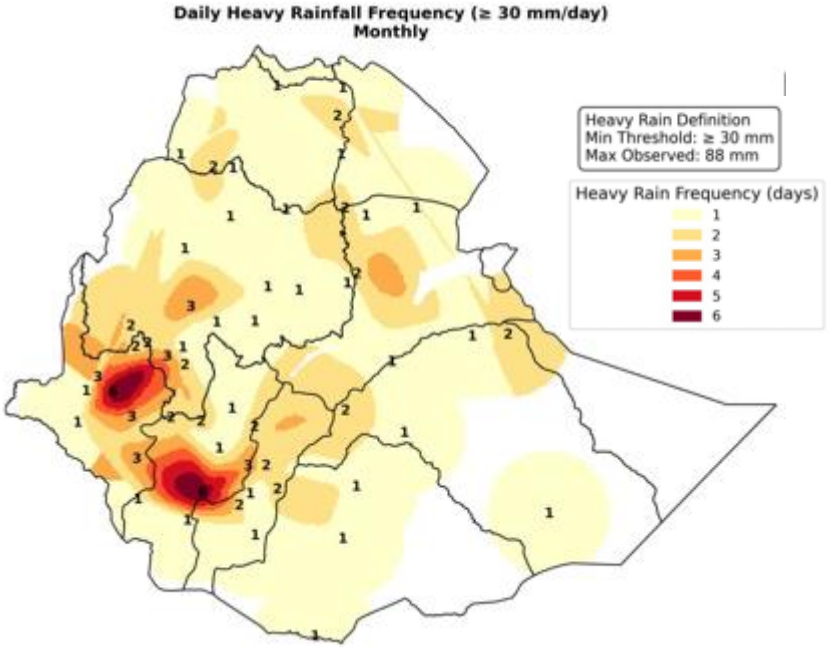
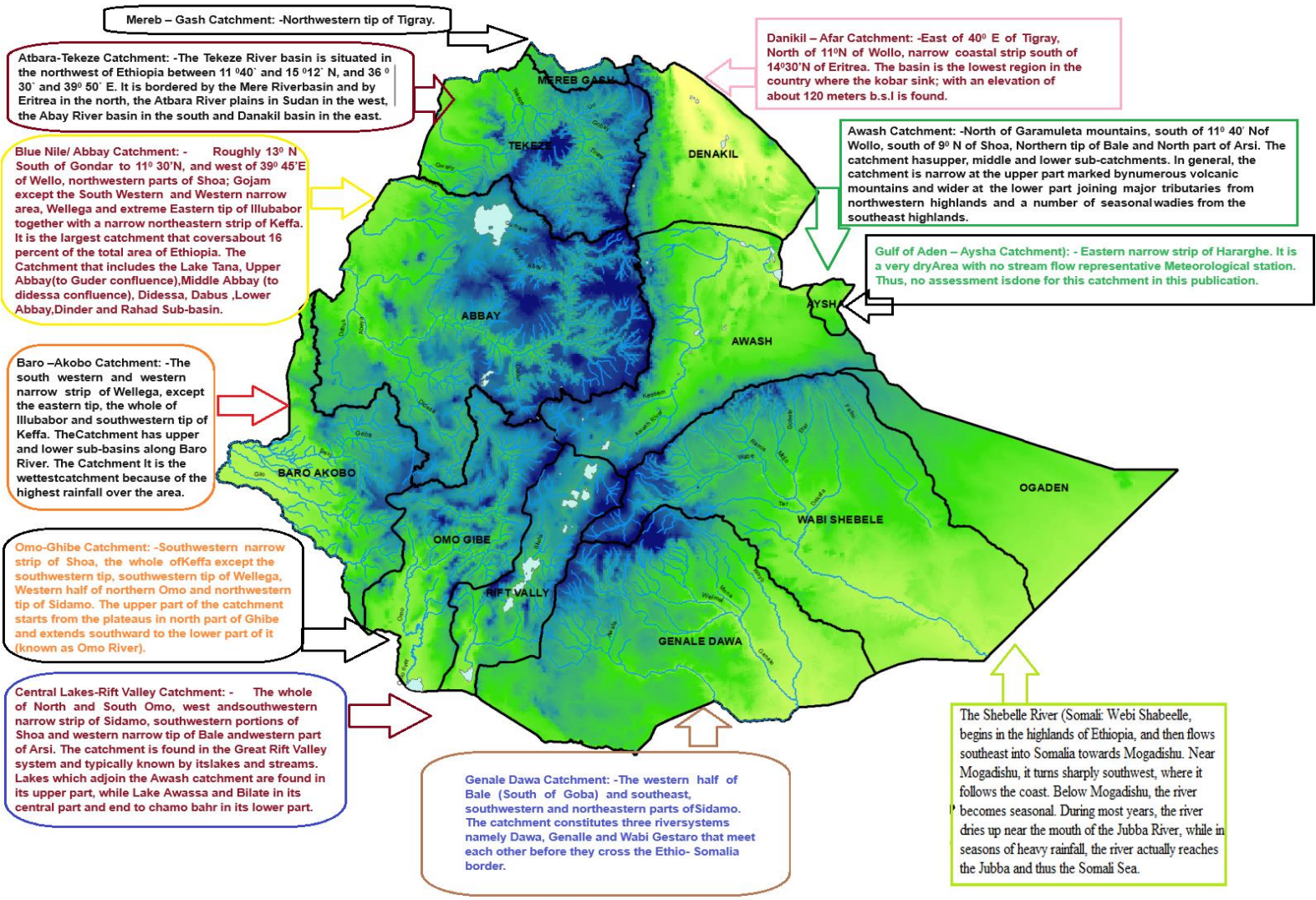


Figure 5 Heavy fall Frequency during the April month over Ethiopian River Basin

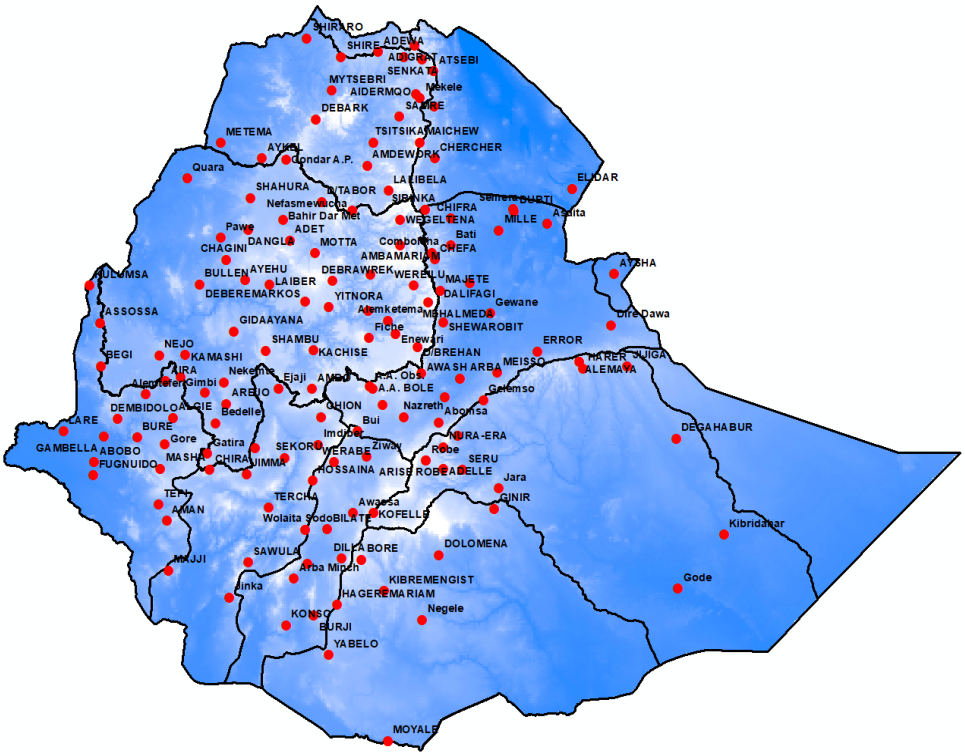
2.1. Expected weather impact on water resource the coming May, 2025

The expected weather conditions for the coming month of May indicate a predominantly humid to wet scenario across most of Ethiopia's major river basins, with important implications for water resources, agriculture, and energy production. In particular, the Baro Akobo, Omo Gibe, Genale Dawa, Central Rift Valley, Wabi Shebele, and Abay basins are projected to experience above-normal moisture conditions. This widespread availability of rainfall will likely enhance surface runoff, soil moisture recharge, and river discharge, thereby creating favorable conditions for irrigation agriculture, ecosystem restoration, and hydropower generation. Reservoir inflows are expected to improve, supporting dam operations and increasing the potential for reliable electricity production during and following the season. Given these favorable Hydrometeorological conditions, it is highly recommended to strengthen water harvesting, storage, and management practices, particularly in areas where rainfall is seasonal and highly variable. Special attention should be given to maximizing the capture of excess runoff during the kiremt season in non-beneficiary or moisture-deficit zones, to ensure water availability during subsequent dry periods. Effective planning at both local and basin levels will be essential to reduce water loss and improve resilience against intra-seasonal variability. In contrast, the Aysha, Mereb–Gash, and Ogaden basins are expected to remain under partial dry weather conditions. These areas will likely continue to experience limited rainfall, higher evaporation demand, and persistent water stress. As a result, water resources in these regions may remain constrained, requiring adaptive measures such as efficient groundwater use, water conservation practices, and drought preparedness strategies. Overall, while the majority of the country is expected to benefit from improved hydrological conditions, spatial disparities in rainfall distribution highlight the need for integrated water resource management that balances surplus and deficit regions effectively.

APPENDIX **Major Ethiopian River Basin**



Number of weather stations used for Hydro Meteorological Analysis


SHIRARO
SHIRE
ADEWA
ADIGRAT
ATSEBI
SENKATA
MYTSEBRI
AIDERMQO
Mekele
DEBARK
SAMRE
METEMA
TSITSIKAMAICHEW
AYKEL
CHERCHER
Gondar A.P.
AMDEWORK
Quara
LALIBELA
ELIDAR
SHAHURA
DITABOR
SIRINKA
Semera
DURTI
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ADET
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CHAGINI
DANGLA
MOTTA
Combolcha
CREFA
AMBAMARIAM
AYSHA
BULLEN
AYEHU
DEBRAWREK
WERELU
MAJETE
LAIBER
DEBEREMARKOS
DALIFAGI
YITNORA
Gewane
Atemketema
MISHALMEDA
Dire Dawa
GIDAAYANA
SHEWAROBIT
Fiche
SHAMBU
Enewari
ERROR
NEJO
KACHISE
D/BREHAN
KAMASHI
AWASH ARBA
MEISSO
HARER JUGA
Nekemte
Ejaji
A.A. Obs
ALEMAYA
Gimbi
A.A. BOLE
Geremso
ARBIO
Bedelle
GHION
Nazreth
Abomsa
DEMBIDOLO
Bui
Imdober
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BURE
Gore
NURA-ERA
Gatira
SEKORU
YERABE
Ziway
Robe
SERU
MASHA
CHIRA
JIMMA
ROBEADELLE
Jara
TEPI
TERCHA
GINIR
Awaesa
AMAN
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Gode
KIBREMENGIST
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Negele
KONSO
BURJI
YABELO
MOYALE